

# Exit 75 Transportation Study Phase II Report Long Term Transportation Needs

**Maine Turnpike Authority**



Prepared by:

**HNTB**

March 2010

## Table of Contents

Executive Summary .....	ii
Introduction.....	1
Study Area .....	2
Geometric and Safety Analysis for Exit 75 .....	3
Northbound Off Ramp .....	4
Northbound On Ramp.....	5
Southbound Off Ramp .....	6
Southbound On Ramp.....	7
Weave Section (All Ramps).....	7
Summary .....	8
Safety Analysis for Study Area Intersections .....	9
Intersection of Route 202/4/100 and Exit 75 Ramps .....	9
Intersection of Route 202/4/100 and Kittyhawk Avenue .....	9
Intersection of Kittyhawk Avenue and Hotel Road.....	11
Intersection of Route 202/4/100 and Route 122 .....	11
Intersection of Route 122 and Eastman Lane .....	11
Intersection of Route 122 and Hotel Road.....	11
Intersection of Route 202/4/100 and Allied Road .....	11
Intersection of Route 202/4/100 and East Hardscrabble Road .....	11
Intersection of Route 202/4/100 and Park and Ride Lot Access .....	11
Summary .....	11
Traffic Data Collection .....	12
Intersection Turning Movement Counts .....	12
Daily Traffic Counts .....	12
Other Traffic Data Sources .....	14
Exit 75 Traffic Weaving Survey .....	19
Traffic Analysis Methodology.....	21
2009 Traffic Analysis .....	23
Baseline Traffic Volumes .....	23
Level-of-Service Analysis .....	26
2025 No-Build Traffic Analysis .....	28
2025 No-Build Traffic Volumes.....	28
Level-of-Service Analysis .....	35
2025 Build Alternatives .....	37
Alt 1 – Local Intersection Improvements Only .....	37
Alt 2 – Relocating the Northbound Ramps to Kittyhawk Ave. ....	41
Alt 3 – Relocating the Southbound Ramps to Kittyhawk Ave. ....	45
Alt 4 – Relocating all of the Exit 75 Ramps to Kittyhawk Ave. ....	49
Alt 5 – Adding a Southbound On-Ramp to Kittyhawk Ave. ....	56
Alt 6 – Adding a Southbound On-Ramp and Northbound Off-Ramp to Kittyhawk Ave. ....	60
Findings.....	64

## **Executive Summary**

The Maine Turnpike Authority (MTA), in cooperation with the City of Auburn, the Androscoggin Transportation Resource Center (ATRC), and the Maine Department of Transportation (MaineDOT), has conducted a transportation study at and around Exit 75 on the Maine Turnpike.

The study evaluated the immediate and future transportation needs of the Exit 75 study area as well as the needs of Greater Auburn. This study recognizes that an efficient transportation system is crucial for the economic development of a region. As such, transportation alternatives were evaluated based on ability to accommodate traffic demand, cost, ability to be permitted, and impacts to right-of-way – particularly developable parcels.

The study looked at safety and traffic operations for the Exit 75 ramps and adjacent local intersections. Traffic operations were assessed not only for existing conditions, but for future year (2025) conditions as well. In addition, the study also analyzed the geometric alignment of the Exit 75 ramps.

### ***Study Area***

In addition to the interchange, Exit 75, off of the Maine Turnpike, the study area contains nine intersections two of which are signalized. The signalized intersections are:

- Route 202/4/100 & Kittyhawk Avenue
- Route 202/4/100 & the Exit 75 ramps.

The remaining seven intersections analyzed are unsignalized. The unsignalized intersections are:

- Route 202/4/100 (free flow) & Route 122/Poland Spring Road (stop controlled),
- Route 122/Poland Spring Road (free flow) & Eastman Lane (stop controlled),
- Hotel Road (free flow) & Route 122/Poland Spring Road (stop controlled),
- Hotel Road (stop controlled) & Kittyhawk Avenue (stop controlled),
- Route 202/4/100 (free flow) & the Park and Ride lot access (stop controlled),
- Route 202/4/100 (free flow) & Allied Road (stop controlled), and;
- Route 202/4/100 (free flow) & East Hardscrabble Road (stop controlled).

### ***Geometric Analysis***

The deceleration lengths, acceleration lengths, and the radius of curvature of the four Exit 75 ramps were compared to the recommendations of the current design guidelines for ramp alignments. The results of the analysis are summarized in the following table.

### Geometry and Safety Summary

Ramp	Deceleration/ Acceleration Length	Length of Curve Adjacent to Accel/Decel Lane	Minimum Radius of Curve
<b>Northbound off</b>	Meets Standards	Meets Standards	Meets Standards
<b>Northbound on</b>	Does Not Meet Standards	Meets Standards	Does Not Meet Standards
<b>Southbound off</b>	Meets Standards	Meets Standards	Does Not Meet Standards
<b>Southbound on</b>	Does Not Meet Standards	Meets Standards	Does Not Meet Standards

### ***Safety Analysis***

All of the ramps at Exit 75, except the northbound off-ramp, do not meet the current recommendations for geometry at freeway ramps. However, an analysis was made of reported crashes at Exit 75. The analysis indicated that there does not seem to be any safety issues associated with the ramps at the present time. While these results do not indicate an immediate need for geometric improvements, the geometric issues of the ramps can present challenges with future traffic.

Only the intersection of Route 202/4/100 and Kittyhawk Avenue is considered a high crash location. A possible improvement for this intersection would be to implement split traffic signal phasing for the Kittyhawk Avenue and the Station Road approaches. Two other intersections in the study area are close to meeting the conditions of a HCL – the intersection of Route 202/4/100 and the Exit 75 Ramps, and the intersection of Kittyhawk Avenue and Hotel Road. These intersections are recommended to be monitored in the future.

### ***2009 Traffic Analysis***

The baseline traffic volumes were input into the traffic capacity model and analyzed. The delay and LOS ratings for each of the nine study area intersections are illustrated in the following table.

### 2009 Delay & LOS Summary

<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	9.7	A
Route 122/Poland Spring Rd & Eastman Lane	Stop	4.8	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	6.7	A
Hotel Rd & Kittyhawk Ave	4-way Stop	10.7	B
Route 202/4/100 & Kittyhawk Ave	Signal	21.7	C
Route 202/4/100 & Exit 75 ramps	Signal	23.2	C
Route 202/4/100 & P&R Access	Stop	13.1	B
Route 202/4/100 & Allied Rd	Stop	19.6	C
Route 202/4/100 & E Hardscrabble Rd	Stop	9.9	A

All intersections in the study area currently operate at acceptable levels of service.

### **2025 No Build Traffic Analysis**

Future traffic levels for Exit 75 were estimated based on growth trends, land use and zoning plans for the study area. Estimating the future traffic was done in four steps:

1. Estimate traffic associated with recent development growth adjacent to the study area.
2. Apply the traffic growth rate to parcels in an area of influence targeted for development.
3. Determine a reasonable background growth rate to capture growth from outside the area of influence.
4. Grow every traffic movement at all study area intersections by at least the background growth rate.

The calculated traffic volumes for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections are illustrated in the following table.

**Table 6 – 2025 No-Build Delay & LOS Summary**

<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	52.4	F
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.8	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	9.1	A
Hotel Rd & Kittyhawk Ave	4-way Stop	197.7	F
Route 202/4/100 & Kittyhawk Ave	Signal	329.6	F
Route 202/4/100 & Exit 75 Ramps	Signal	88.5	F
Route 202/4/100 & P&R Access	Stop	26.8	D
Route 202/4/100 & Allied Rd	Stop	25.7	D
Route 202/4/100 & E Hardscrabble Rd	Stop	19.5	C

The following intersections can be expected to operate at or above capacity by 2025.

- Route 202/4/100 & Route 122/Poland Spring Rd
- Hotel Rd & Kittyhawk Ave
- Route 202/4/100 & Kittyhawk Ave
- Route 202/4/100 & Exit 75 Ramps

The amount of traffic that is expected by 2025 will exceed the available capacity of several of the current intersections in the Exit 75 study area. Long delays and queues can be expected if no improvements are made to the study area roadways and intersections.

### ***Build Alternatives***

Using the results of the 2025 No-Build analysis, HNTB developed six build alternatives specifically designed to address the long range transportation deficiencies. Six different build alternatives were evaluated based on their ability to reduce the expected traffic congestion, estimated cost to implement, and potential right-of-way impacts. The six build alternatives are as follows:

- Alt. 1) Local intersection improvements only**
- Alt. 2) Relocating the northbound ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 3) Relocating the southbound ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 4) Relocating all of the Exit 75 ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 5) Adding a southbound on-ramp at Kittyhawk Ave. plus local intersection improvements**
- Alt. 6) Adding a northbound off-ramp plus southbound on-ramp at Kittyhawk Ave. plus local intersection improvements**

It should be noted that in addition to improvements to MTA roadways and intersections, roads and intersections under the jurisdiction of the MaineDOT and the City of Auburn were also included and analyzed. Even though recommendations are made for several of the study area roadways and intersections, only those recommendations for roadways and intersections within the Maine Turnpike right-of-way are assumed to be within the control of the MTA. The other recommendations are provided for planning purposes of MaineDOT and the City of Auburn.

All of the alternatives require improvements to at least some of the local roadway intersections. Two of the improvements that would be required to handle the estimated future traffic, that are constant through all of the alternatives are the following:

- A traffic signal at the intersection of Kittyhawk Avenue and Hotel Road
- A double left turn lane for traffic heading from Kittyhawk Ave. to northbound Route 202/4/100.

All of the alternatives would bring the study area roadway network to acceptable levels-of-service. However, most of the alternatives do not alleviate the traffic conditions to a point where the local intersection improvements, included in Alternative 1, would not be needed by 2025.

Alternatives 2 and 3 would alleviate the need for a double left turn from Route 202/4/100 unto the Exit 75 ramps. Alternative 4 would move all of the Exit 75 ramps thereby eliminating the current intersection, but would require widening Kittyhawk Ave. to four lanes from Route 202/4/100 to Hotel.

Alt. 1) Local Intersection Improvements Only would provide the most benefit for the cost, would have the least impact, and is permissible. Some of the other alternatives could then be built at a later time, if the transportation needs of the area outgrew the capacity for the intersection improvements.

In addition, the acceleration length of the southbound ramp does not currently meet design guidelines. Even though there was no safety issue identified at that location, the Maine Turnpike Authority proposes to also lengthen the acceleration lane for the southbound on-ramp. The acceleration length for the northbound on-ramp will be lengthened as part of the ongoing construction at the mainline bridge over Route 202/4/100.

## Introduction

The Maine Turnpike Authority (MTA), in cooperation with the City of Auburn, the Androscoggin Transportation Resource Center (ATRC), and the Maine Department of Transportation (Maine DOT), has conducted a transportation study at and around Exit 75 on the Maine Turnpike.

The study evaluated the immediate and future transportation needs of the Exit 75 study area as well as the needs of Greater Auburn. This study recognizes that an efficient transportation system is crucial for the economic development of a region. As such, transportation alternatives were evaluated based on ability to accommodate traffic demand, cost, ability to be permitted, and impacts to right-of-way – particularly developable parcels.

The Exit 75 Transportation Study consisted of two phases. Phase I identified short term transportation needs, such as pavement condition and signing, and recommended short term improvements<sup>1</sup> for a focused study area immediately adjacent to Exit 75. Phase II identified future or long term transportation needs by estimating and analyzing future traffic demand for the interchange and the adjacent study area roadway network. It should be noted that in addition to MTA roadways and intersections, roads and intersections under the jurisdiction of the MaineDOT and the City of Auburn were included as part of the study area.

In addition to analyzing future traffic demands, Phase II also examines the geometry and configuration of the interchange. A safety analysis was performed not only for the interchange, but also for the broader study area.

---

<sup>1</sup> HNTB Corporation, *Exit 75 Transportation Study Phase I Report, Short Term Transportation Needs*. Portland, ME: Maine Turnpike Authority, 2009



## Study Area

The study area, as shown in Figure 1 encompasses freeway access (Exit 75), an urban arterial (Route 202/4/100), and collector roads that provide access to primarily industrial land uses. As such, there are varying traffic and travel conditions in all of the study area roadways. Route 202/4/100 has higher travel speeds, no sidewalks and wide shoulders. The collector roadways have lower travel speeds, lower traffic volumes, no sidewalks and narrow shoulders.

The study area contains nine intersections two of which are signalized. The signalized intersections are:

- Route 202/4/100 & Kittyhawk Avenue
- Route 202/4/100 & the Exit 75 ramps.

The remaining seven intersections analyzed are unsignalized. The unsignalized intersections are:

- Route 202/4/100 (free flow) & Route 122/Poland Spring Road (stop controlled),
- Route 122/Poland Spring Road (free flow) & Eastman Lane (stop controlled),
- Hotel Road (free flow) & Route 122/Poland Spring Road (stop controlled),
- Hotel Road (stop controlled) & Kittyhawk Avenue (stop controlled),
- Route 202/4/100 (free flow) & the Park and Ride lot access (stop controlled),
- Route 202/4/100 (free flow) & Allied Road (stop controlled), and;
- Route 202/4/100 (free flow) & East Hardscrabble Road (stop controlled).

**Figure 1 - Exit 75 Transportation Study Area**



## Geometric and Safety Analysis for Exit 75

The geometry and alignment of Exit 75 including the ramps, weaving sections, and merge and diverge areas met the standards and guidelines at the time when it was constructed. This is typical of most Turnpike interchanges, which were constructed during the same time period. However, the standards and guidelines have changed. According to the American Association of State Highway and Transportation Officials (AASHTO), the fact that design guidelines have changed does not indicate that a roadway is unsafe, nor does it mandate the initiation of an improvement project<sup>2</sup>. This geometric and safety analysis, examines whether the alignment and geometry of Exit 75 meets current standards and guidelines. It also examines the crash data at the individual ramps to see if there are safety issues or concerns that could be attributed to any geometric deficiencies.

The geometric elements of the Exit 75 ramps were compared against the recommendations set forth in The Maine Department of Transportation’s Highway Design Guide<sup>3</sup> (*Highway Design Guide*). The *Highway Design Guide* sets forth uniform design practices for highway projects which includes the guidelines published by AASHTO. The deceleration lengths, acceleration lengths, and the radius of curvature of the four Exit 75 ramps were compared to the recommendations of the current design guidelines for ramp alignments. The results of the analysis are summarized in Table 1 and are described in detail in the following sections.

**Table 1 - Geometry and Safety Summary**

Ramp	Deceleration/ Acceleration Length	Length of Curve Adjacent to Accel/Decel Lane	Minimum Radius of Curve
<b>Northbound off</b>	Meets Standards	Meets Standards	Meets Standards
<b>Northbound on</b>	Does Not Meet Standards	Meets Standards	Does Not Meet Standards
<b>Southbound off</b>	Meets Standards	Meets Standards	Does Not Meet Standards
<b>Southbound on</b>	Does Not Meet Standards	Meets Standards	Does Not Meet Standards

For this analysis all necessary information, with the exception of speed, was obtained from construction plans. Due to the ongoing improvements being made on the north end of the Turnpike to bring the roadway up to current design guidelines the following were assumed:

- All guardrail on the mainline has been updated and meets guidelines
- Clear zones and side slopes have been or will be updated or have been updated to meet standards and are not analyzed in this report.

Crash data for this analysis was obtained from the MaineDOT for the most recent time period for which data is available (2005-2008). MaineDOT’s Crash Records Section summarizes all

<sup>2</sup> American Association of State Highway and Transportation Officials. *A Policy on Geometric Design of Highways and Streets*. Washington, D.C, 2004

<sup>3</sup> Maine Department of Transportation. *Highway Design Guide*. Augusta, ME, 2004

reported crashes in which there is property damage in excess of \$1000, or in which there has been personal injury. The MaineDOT summarizes crash data by nodes and elements. Each intersection, major bridge, railroad crossing, and crossing of town, county or urban compact lines is a considered to be a node. The segments of roadways that connect the nodes are referred to as elements. As crash reports are received by MaineDOT, the crash information is assigned to a corresponding node or element at which it occurred.

MaineDOT has a system of classifying whether or not a location is considered a high-crash location (HCL). A designation of HCL warrants an analysis for patterns of crashes associated with possible geometric issues. If crash history of a particular element or node meets two criteria, then MaineDOT would classify it as a high-crash location (HCL). The criteria are:

- The element or node must have eight or more reported crashes over the past three years, and;
- The element or node must have a critical rate factor (CRF) over 1.00. (The critical rate factor relates the crash rate at a particular element or node to the statewide average crash rate for a similar type of facility).

### ***Northbound Off Ramp***

The northbound off-ramp from the Turnpike at Exit 75 is shown in Figure 2. The geometry of the northbound off-ramp from the deceleration lane to the merge with the southbound off-ramp was analyzed.

**Figure 2 – Exit 75 Ramps**



## ALIGNMENT

Based on the design speed of 30 mph for the northbound off-ramp the recommended minimum radius of a curve is 235'. The smallest or tightest radius on the current alignment of the northbound off ramp is 750'. Therefore, the recommendation for minimum radius is met.

Based on the radius of the sharper curve within the compound curves on this ramp, the recommended length of the first arc is 200'. The length of the first curve in the compound curve on this ramp is 320'. Recommendations for compound curves are met for this ramp.

## DECELERATION LENGTH

The recommended deceleration length is based on the highway speed, ramp speed, and grade of the ramp. Based on the current geometry at the site, the recommended deceleration length is 470'. The actual deceleration length is 920' which is more than the recommended. Therefore the deceleration length of the northbound off ramp meets current standards.

## SAFETY ANALYSIS

Two crashes occurred at the northbound off ramp diverge location from I-95 during the three year study period. No additional crashes were reported on I-95 northbound near the ramp diverge point. The CRF for the ramp diverge area was reported as 1.56. Because there were less than eight crashes that happened in the vicinity of the ramp diverge, the northbound off ramp diverge area is not considered a HCL.

Two crashes also occurred on the ramp (element). Those two crashes happened in the middle of the ramp. Those crashes are therefore considered separately because they are at a different location on the ramp. The CRF for the ramp element was reported as 1.34. Because less than eight crashes happened on the ramp element; it is not considered a HCL.

## ***Northbound On Ramp***

The northbound on-ramp from the Turnpike at Exit 75 is shown in Figure 2. The geometry of the northbound on-ramp from the ramp diverge with the southbound on-ramp to the acceleration lane was analyzed.

## ALIGNMENT

Based on the design speed of 30 mph for the northbound on-ramp the recommended minimum radius of a curve is 235'. The smallest or tightest radius on the current alignment of the northbound on ramp is 230'. The recommendation for minimum radius is not met.

Based on the radius of the sharper curve within the compound curves on this ramp, the recommended length of the first arc is 108'. The length of the first curve in the compound curve on this ramp is 290'. The minimum compound curve recommendation is met.

## ACCELERATION LENGTH

The recommended acceleration length is based on the highway speed, ramp speed, and grade of the ramp. Based on the current geometry at the site, the recommended acceleration length is 1,200'. Currently an acceleration length of 618' exists. Construction on the mainline bridges over Route 202/4/100 will involve widening the bridge. The widening will accommodate the

recommended acceleration length for the northbound on-ramp. Therefore the acceleration length of the northbound on ramp does not currently meet design guidelines but will meet the guidelines after reconstruction of the mainline bridge.

#### SAFETY ANALYSIS

Six crashes occurred at the northbound on ramp merge point during the three year study period. An additional crash was reported on I-95 northbound between the ramp merge point and the bridge over Route 202/4/100. The CRF for the merge area was reported as 4.95. Because there were less than eight crashes that happened in the vicinity of the ramp merge, the northbound on ramp merge area is not considered a HCL.

Two crashes also occurred on the ramp (element). Those two crashes happened near the diverge point of the weaving area, or beginning of the ramp. Those crashes are therefore considered separately because they are at a different location on the ramp. The CRF for the ramp element was reported as 1.37. Because there were less than eight crashes that happened in the diverge area of the ramp, that area is not considered a HCL.

#### ***Southbound Off Ramp***

The southbound off-ramp from the Turnpike at Exit 75 is shown in Figure 2. The geometry of the southbound off-ramp from the deceleration lane to the merge with the northbound off-ramp was analyzed.

#### ALIGNMENT

Based on the design speed of 30 mph for the southbound off-ramp the recommended minimum radius of a curve is 235'. The smallest or tightest radius on the current alignment of the southbound off ramp is 200'. The recommendation for minimum radius is not met.

Based on the radius of the sharper curve within the compound curves on this ramp, the recommended length of the first arc is 90'. The length of the first curve in the compound curve on this ramp is 195'. The minimum compound curve recommendation is met.

#### DECELERATION LENGTH

The recommended deceleration length is based on the highway speed, ramp speed, and grade of the ramp. Based on the current geometry at the site, the recommended deceleration length is 470'. The actual deceleration length is 867' which is more than the recommendation. Therefore the deceleration length of the southbound off ramp meets current guidelines.

#### SAFETY ANALYSIS

No crashes occurred at the southbound off ramp diverge location from I-95 during the three year study period. Two crashes were reported on I-95 southbound near the ramp diverge point. The CRF for the ramp diverge area was reported as 0.82. The southbound off ramp diverge area is not considered a HCL.

Six crashes occurred on the ramp (element) from the ramp diverge point off the Turnpike to the point where the southbound ramps merge with the northbound at the weaving section. Four of those crashes happened near the point where the two-way southbound ramp section begins. The

two crashes happened in the middle of the two-way ramp segment. None of these crashes were rollovers. The CRF for this ramp element was reported as 1.91. Because less than eight crashes happened on this ramp element; it is not considered a HCL.

### ***Southbound On Ramp***

The southbound on-ramp from the Turnpike at Exit 75 is shown in Figure 2. The geometry of the southbound on-ramp from the ramp diverge with the northbound on-ramp to the acceleration lane was analyzed.

#### **ALIGNMENT**

Based on the design speed of the northbound on-ramp the recommended minimum radius of a curve is 235'. The curve of the southbound on ramp has a radius of 215'. The allowable minimum radius recommendation is not met.

There is no compound curve on this ramp, so the compound curve recommendation does not apply to this ramp.

#### **ACCELERATION LENGTH**

The recommended acceleration length is based on the highway speed, ramp speed, and grade of the ramp. Based on the current geometry at the site, the recommended acceleration length is 1,120'. Currently an acceleration length of 717' exists. Therefore, the acceleration length of the southbound on ramp does not meet current design recommendations.

#### **SAFETY ANALYSIS**

No crashes were reported at the southbound on ramp merge point during the three year study period. No crashes were reported on I-95 southbound near the ramp merge point. No crashes were reported on the ramp (element). The safety analysis, for the southbound on-ramp element that is part of the two-way ramp segment, is located in the above section titled Southbound Off Ramp.

### ***Weave Section (All Ramps)***

The geometry of the weave section was analyzed. The section includes the merge area of the southbound and northbound off-ramps to the intersection with Route 202/4/100 including the weaving area for the on-ramps.

#### **GEOMETRY**

The *Highway Design Guide* provides no minimum requirements for a weave section. The minimum recommended length of a weave section is based only on a roadway capacity analysis. The roadway capacity analysis for the weave section is located in a subsequent section of this report – 2009 Traffic Analysis (and also in the No-Build 2025 Analysis).

#### **SAFETY ANALYSIS**

Four crashes occurred within the four lanes of the weave section between the merge of the northbound and southbound off ramps to the intersection with Route 202/4/100. The Critical Rate Factor (CRF) for the weave section was reported as 1.45. Because less than eight crashes happened on this weave segment; it is not considered a HCL.

## ***Summary***

All of the ramps at Exit 75, except the northbound off-ramp, do not meet the current recommendations for geometry at freeway ramps. However, an analysis of reported crashes at Exit 75 indicates that there does not seem to be any safety issues associated with the ramps at the present time. While these results do not indicate an immediate need for geometric improvements, the geometric issues of the ramps can present challenges with future traffic.

## **Safety Analysis for Study Area Intersections**

Crash data was also obtained from MaineDOT for the nine study area intersections for the most recent time period (2005-2008). This data at the nine study area intersections was reviewed to determine if there are any existing safety issues.

### ***Intersection of Route 202/4/100 and Exit 75 Ramps***

Twenty-seven crashes were reported at this signal controlled intersection during the three year study period. The CRF for this intersection was reported as 0.87. This intersection is not considered an HCL because the reported CRF for the intersection of Route 202/4/100 and the Exit 75 ramps was reported as less than 1.0.

### ***Intersection of Route 202/4/100 and Kittyhawk Avenue***

Eleven crashes were reported at this signal controlled intersection during the three year study period. The CRF for this intersection was reported as 2.00. This intersection meets the requirements to be considered a high crash location.

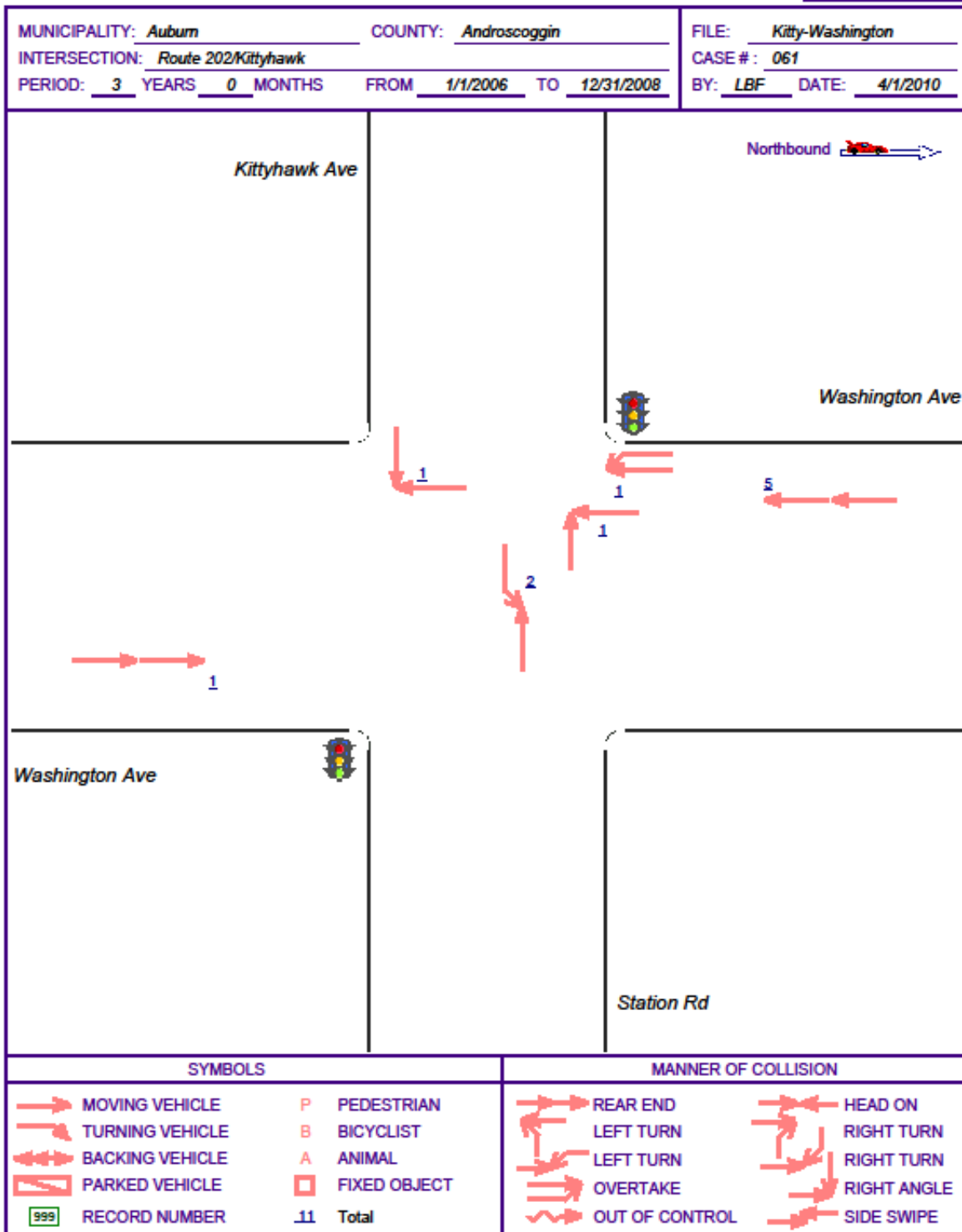
Police reports were examined for this intersection to see if any patterns emerge that could indicate a safety issue. Figure 3 shows a diagram of the crashes that happened at this intersection during the three year study period. The following details were derived from the police reports.

- 4 of the crashes were rear-ends on the southbound direction for Route 202/4/100
- 1 of the crashes was a side-swipe on the southbound direction for Route 202/4/100
- 2 of the crashes were rear-ends on the northbound direction for Route 202/4/100
- 2 of the crashes involved a left-turning vehicle from Kittyhawk colliding with a westbound vehicle from Station Road
- 2 of the crashes involved a vehicle from the southbound direction for Route 202/4/100 colliding with a westbound or eastbound vehicle in the intersection

As can be seen, six of the crashes that happened at this intersection were rear-end crashes. Rear-end crashes are a common type of crash at signalized intersections. Four of the crashes involved an intersection movement and one of the crashes was a side-swipe. After further examination of the intersection movement crashes – a pattern emerged. Even though traffic from Station Road is light, there have been three intersection movement crashes that involve a westbound vehicle from Station Road. Because of the alignment of Station Road at the approach to the intersection, it may be overlooked. One option, for consideration by the MaineDOT and the City of Auburn, would be to implement split phasing for Station Road, so that Kittyhawk Avenue and Station Road have separate green times.



Figure 3 – Collision Diagram



H&A Software 3.0

### ***Intersection of Kittyhawk Avenue and Hotel Road***

Seven crashes were reported at this stop controlled intersection during the three year study period. The CRF for this intersection was reported as 1.40. Because there were less than eight crashes reported for this intersection, it is not considered an HCL. This intersection is close to meeting the conditions for a HCL.

### ***Intersection of Route 202/4/100 and Route 122***

Three crashes were reported at this stop controlled intersection during the three year study period. The CRF for this intersection was reported as 0.70. Because there were less than eight crashes reported for this intersection and the CRF is less than 1.0, it is not considered a HCL.

### ***Intersection of Route 122 and Eastman Lane***

Two crashes were reported at this stop controlled intersection during the three year study period. The CRF for this intersection was reported as 1.06. Because there were less than eight crashes reported for this intersection, it is not considered a HCL.

### ***Intersection of Route 122 and Hotel Road***

One crash was reported at this stop controlled intersection during the three year study period. The CRF for this intersection was reported as 0.38. Because there were less than eight crashes reported for this intersection and the CRF is less than 1.0, it is not considered a HCL.

### ***Intersection of Route 202/4/100 and Allied Road***

Three crashes were reported at this stop controlled intersection during the three year study period. The CRF for this intersection was reported as 0.28. Because there were less than eight crashes reported for this intersection and the CRF is less than 1.0, it is not considered a HCL.

### ***Intersection of Route 202/4/100 and East Hardscrabble Road***

Five crashes were reported at this stop controlled intersection during the three year study period. The CRF for this intersection was reported as 1.32. Because there were less than eight crashes reported for this intersection, it is not considered a HCL.

### ***Intersection of Route 202/4/100 and Park and Ride Lot Access***

One crash was reported at this stop controlled intersection during the three year study period. The CRF for this intersection was reported as 0.21. Because there were less than eight crashes reported for this intersection and the CRF is less than 1.0, it is not considered a HCL.

### ***Summary***

Only the intersection of Route 202/4/100 and Kittyhawk Avenue is considered a high crash location. However, two intersections in the study area are close to meeting the conditions of a HCL – the intersection of Route 202/4/100 and the Exit 75 Ramps, and the intersection of Kittyhawk Avenue and Hotel Road. These intersections are recommended to be monitored in the future.

## **Traffic Data Collection**

In order to gain a better understanding of the traffic conditions in the Exit 75 study area, an extensive data collection effort was undertaken. The data collected was used in the traffic capacity analysis, which estimates traffic congestion and delay (further discussed in later sections). The traffic data that was gathered included the following:

- Peak period intersection turning movement counts
- Daily Automatic Traffic Recorder Counts
- Peak period traffic weaving survey at Exit 75
- Previous traffic data

Gathering traffic data for this project was a challenge. A construction project on Route 202/4/100 was ongoing at the time of the data collection. The construction involved a closure of Route 202/4/100, in the northbound direction only, for the replacement of the Route 202/4/100 bridge over the Saint Lawrence and Atlantic Railroad, which was in place until mid-November 2009. In order to keep with the study schedule, finding a way to adjust for the detouring traffic became necessary. Therefore, in addition to taking traffic counts, previously collected traffic count data was also gathered. Traffic data from MaineDOT and ATRC was collected and evaluated. Our baseline traffic model was adjusted and calibrated with this historic traffic data.

### ***Intersection Turning Movement Counts***

All traffic counts were taken at times of the day and days of the week that are representative of a typical peak condition. Traffic volumes tend to fluctuate more on Fridays and Mondays than during Tuesdays, Wednesdays, and Thursdays. Traffic at the Exit 75 ramps, particularly, tends to run lower on Fridays and Mondays as opposed to Tuesdays, Wednesdays, and Thursdays (as is evidenced from count data at the MTA permanent count stations). Traffic counts for this analysis were collected on Tuesday, October 20<sup>th</sup>, 2009 through Thursday, October 22<sup>nd</sup>, 2009. Turning movement counts were taken at the following intersections within the study area from 6 AM to 8 AM and again from 4 PM to 6 PM:

- Route 122/Poland Spring Road & Eastman Lane
- Route 122/Poland Spring Road & Hotel Road
- Route 202/4/100 & Route 122/Poland Spring Road
- Route 202/4/100 & Exit 75 Ramps
- Route 202/4/100 & the Park & Ride lot access
- Route 202/4/100 & East Hardscrabble Road

The AM peak hour for the study area roadways, as a system, was found to occur between 7:00 and 8:00 AM. The PM peak hour for the study area roadways, as a system, was found to occur between 4:30 and 5:30 PM.

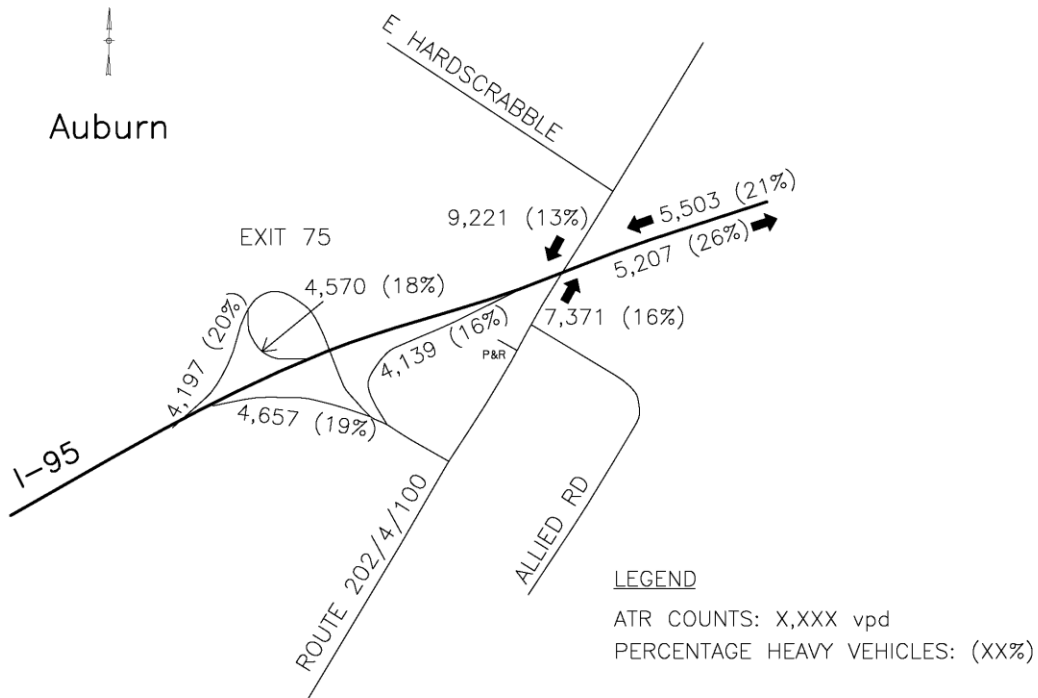
### ***Daily Traffic Counts***

The MTA has permanent count stations on all ramps and several mainline locations. However, the count stations do not classify the type of vehicle. In order to capture the number of heavy vehicles in the study area, Automatic Traffic Recorder (ATR) counts were taken for 48 hours. The ATR counts counted all vehicles but also classified the amount of trucks and heavy vehicles, at the following locations in the study area:

- Exit 75 northbound off ramp
- Exit 75 northbound on ramp
- Exit 75 southbound off ramp
- Exit 75 southbound on ramp
- Route 202/4/100 north of Allied Road – northbound and southbound traffic
- Route 202/4/100 north of East Hardscrabble Road – northbound and southbound traffic
- East Hardscrabble west of Route 202/4/100

In addition, a portable traffic counter was placed on the Turnpike mainline to count daily northbound and southbound traffic and classify the amount of trucks and heavy vehicles on the mainline. Daily traffic volumes and heavy vehicle percentages are shown in Figure 4.

**Figure 4 – 24 Hour ATR Data**

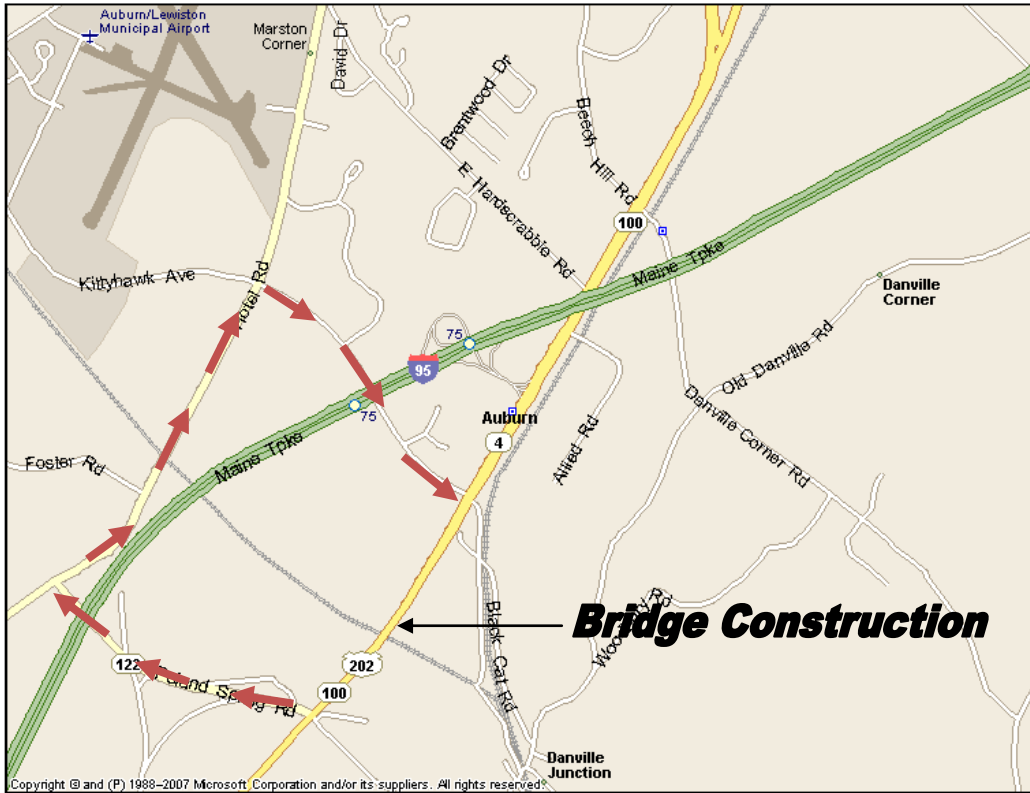


NOTE: NORTHBOUND TRAFFIC ON ROUTE 202/4/100 LOW DUE TO CONSTRUCTION

***Other Traffic Data Sources***

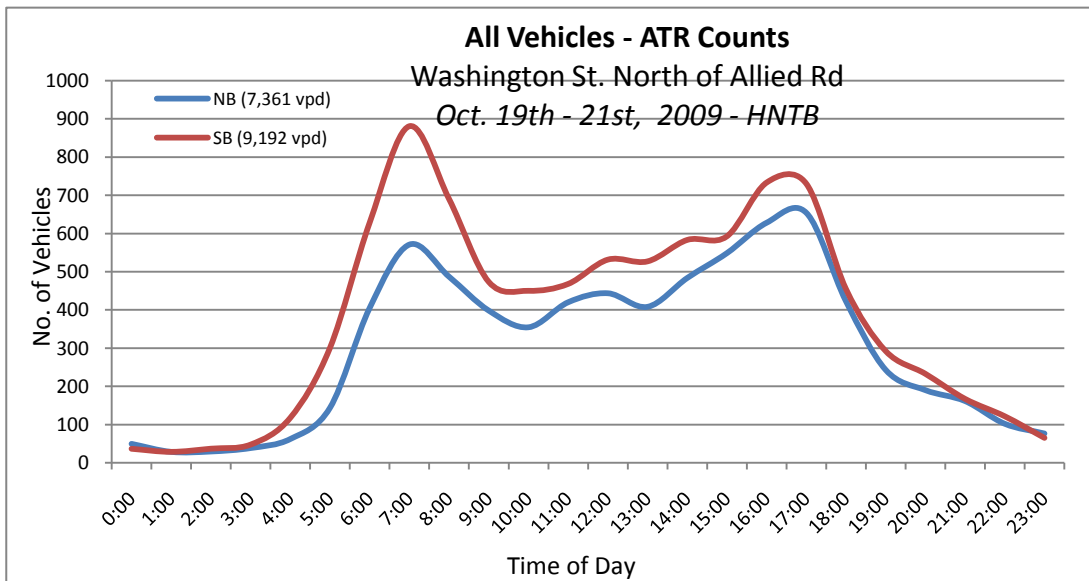
During the time of data collection in October of 2009 a lane closure and detour were in progress on Route 202/4/100 in the study area. The northbound side of the railroad bridge illustrated in Figure 5 was closed and northbound traffic was being routed along the arrows in the figure. Southbound traffic was not detoured.

**Figure 5 – Bridge Detour**



Due to the northbound detour, traffic counts in the northbound direction were found to be lower than what could otherwise be expected on Route 202/4/100. The difference in the northbound and southbound volumes, counted in October of 2009, is illustrated by the chart in Figure 6.

**Figure 6 – Directional Hourly Volumes During Detour**



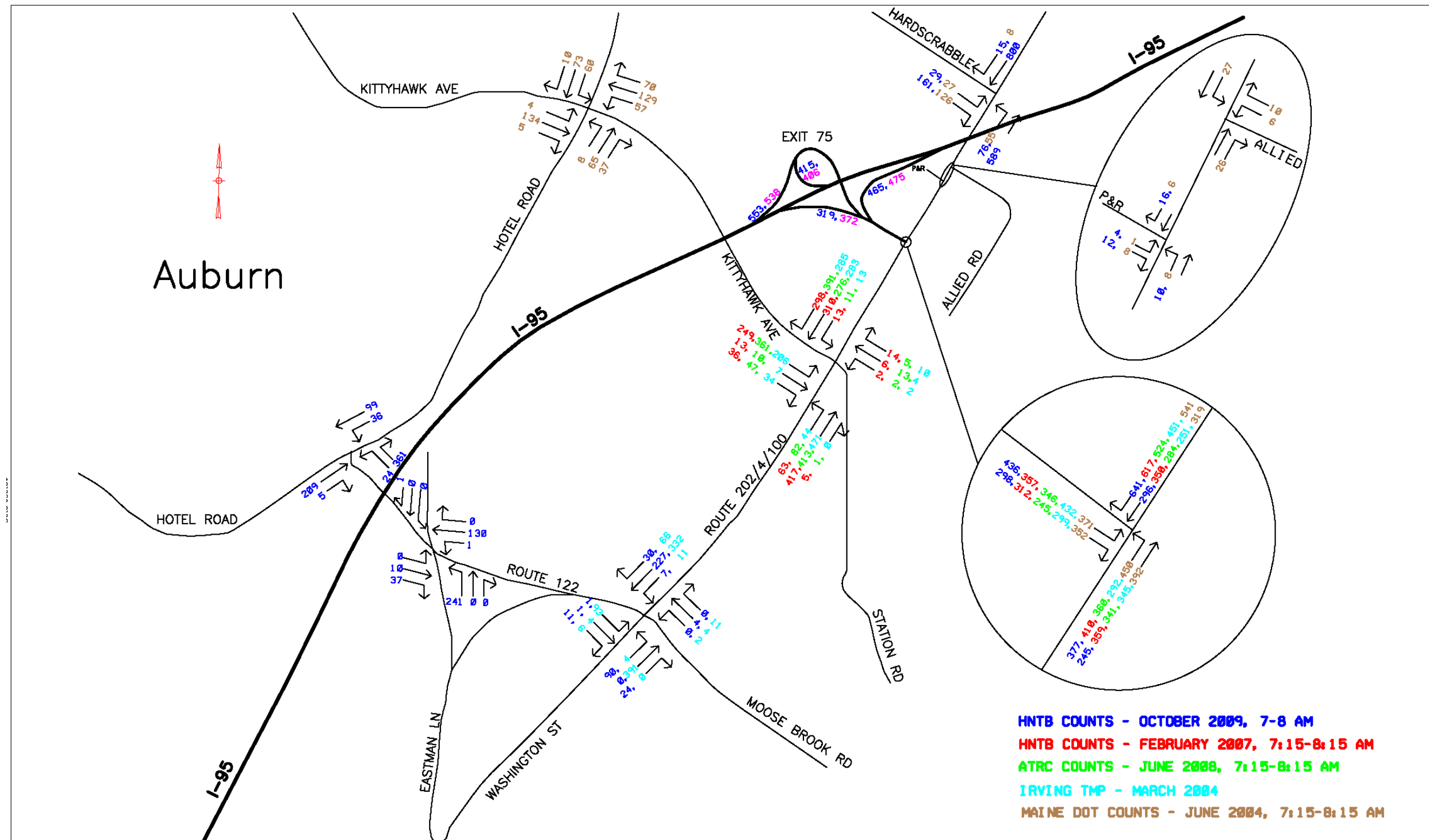
Historically, the daily northbound traffic is generally about 3% higher than the southbound traffic along Route 202/4/100. However on the days in 2009 that traffic was counted on Route 202/4/100, the northbound daily traffic is 20% lower than the southbound traffic. On average 1,800 vehicles avoided Route 202/4/100 in the northbound direction when compared to the southbound direction. It is reasonable to believe that these vehicles may have continued into Auburn via Hotel Road rather than returning to Route 202/4/100.

To compensate for the disruption in northbound traffic due to the bridge closure and detour, many historical traffic counts were consulted. The following lists those traffic counts along with the date they were taken, as well as the organization or agency that collected the data:

- Route 202/4/100 & Kittyhawk Road, 6/18/2008, Courtesy of ATRC
- Route 202/4/100 & Exit 75 Ramps, 7/30/2008, Courtesy of ATRC
- Route 202/4/100 & Exit 75 Ramps, 3/15/2004, Courtesy of Irving TMP
- Route 202/4/100 & Kittyhawk Avenue, 3/1/2004, Courtesy of Irving TMP
- Route 202/4/100 & Route 122, 3/9/2004, Courtesy of Irving TMP
- Hotel Road & Kittyhawk Avenue, 10/2/2008, Courtesy of Bill Eaton, P.E.
- Route 202/4/100 & Kittyhawk Avenue, 8/18/2008, Courtesy of Bill Eaton, P.E.
- Route 202/4/100 & Exit 75, 9/10/2008, Courtesy of Bill Eaton, P.E.
- Route 202/4/100 & Park and Ride Lot, 6/11/2004, Courtesy of MaineDOT
- Route 202/4/100 & East Hardscrabble Road, 6/11/2004, Courtesy of MaineDOT
- Route 202/4/100 & Exit 75, 6/11/2004, Courtesy of MaineDOT
- Hotel Road & Kittyhawk Avenue, 10/22/2002, Courtesy of MaineDOT
- Route 202/4/100 & Allied Road, 6/11/2004, Courtesy of MaineDOT
- ATR Count on Eastman Lane, 6/12/2008, Courtesy of MaineDOT
- ATR Count on Route 122, 6/12/2008, Courtesy of MaineDOT

Figures 7 and 8 summarize the traffic data that was counted and collected for the study area for the AM and PM peak periods, respectively.

Figure 7 – AM Peak Hour Traffic Data



Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

	By	Date		By	Date
Designed			Checked	EAR	3/10
Drawn	CDH	3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
 Westbrook, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909



TURNING MOVEMENT COUNTS  
 AM PEAK HOUR

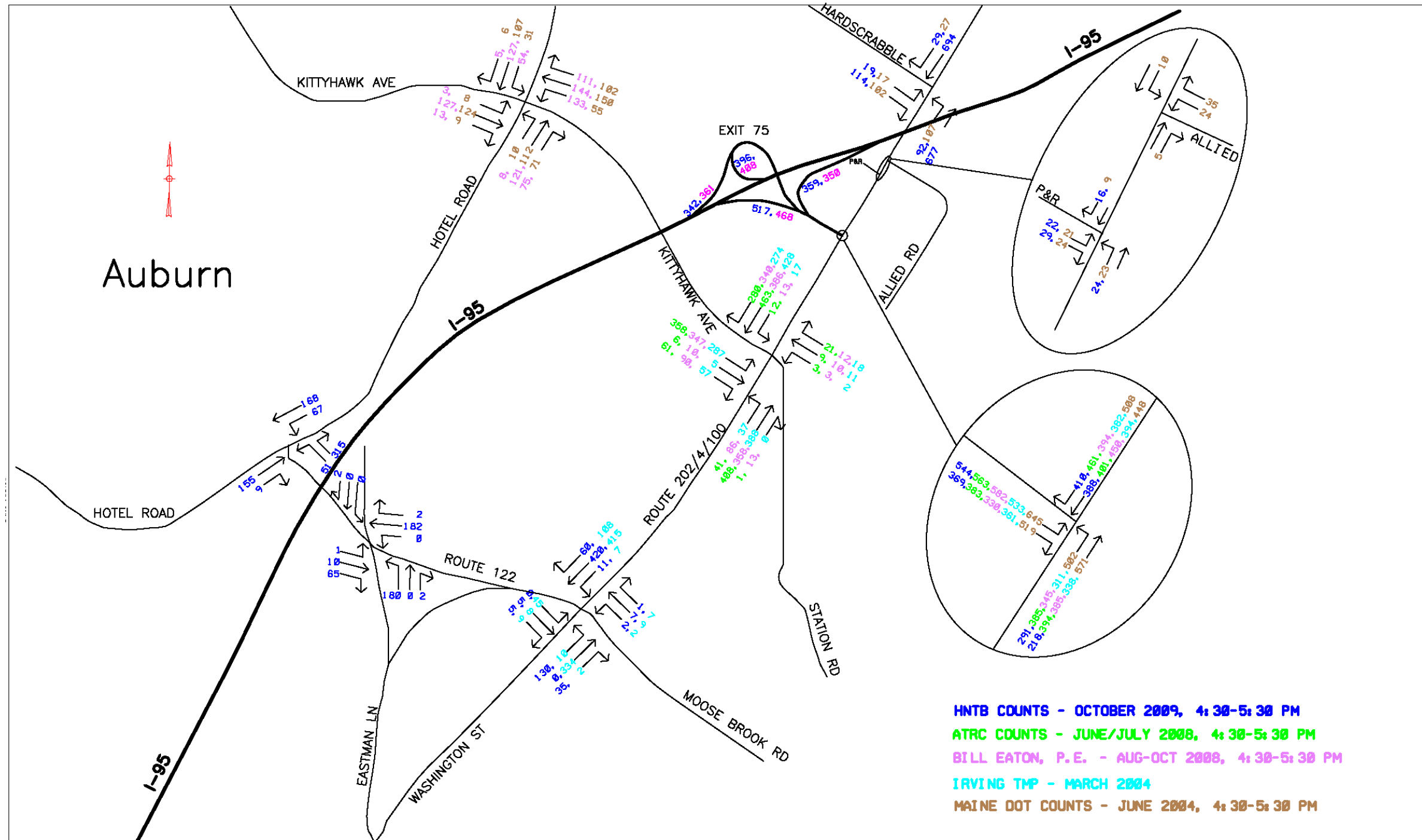
RAW DATA


SHEET NUMBER: 1 OF 1

CONTRACT: 09009-XW-975-061



Figure 8 – PM Peak Hour Traffic Data



Scale: N.T.S.		Designed by: <b>HNTB</b>		340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909		 <b>THE GOLD STAR MEMORIAL HIGHWAY</b>		TURNING MOVEMENT COUNTS PM PEAK HOUR RAW DATA	
SHEET NUMBER: 1 OF 1		CONTRACT: 09009-XW-975-061		SHEET NUMBER: 1 OF 1		CONTRACT: 09009-XW-975-061		SHEET NUMBER: 1 OF 1	

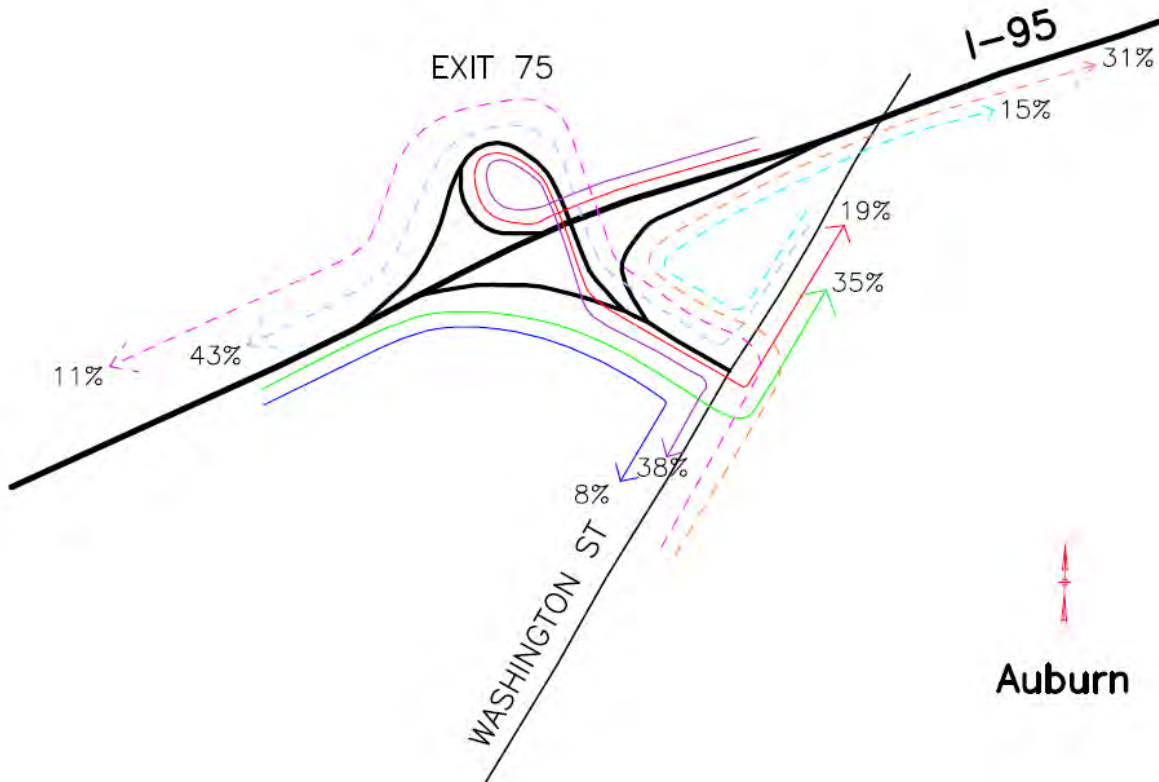
### Exit 75 Traffic Weaving Survey

The traffic coming off of the Turnpike from the northbound and southbound directions meets on a segment of roadway, referred to as the weaving section, where vehicles have to maneuver into a lane to get to the direction that they wish to head, oftentimes, competing with traffic that headed into their lane. This creates traffic weaving. Similarly traffic has to weave from Route 202/4/100 to get into the desired destination lane for the Turnpike northbound or southbound ramps.

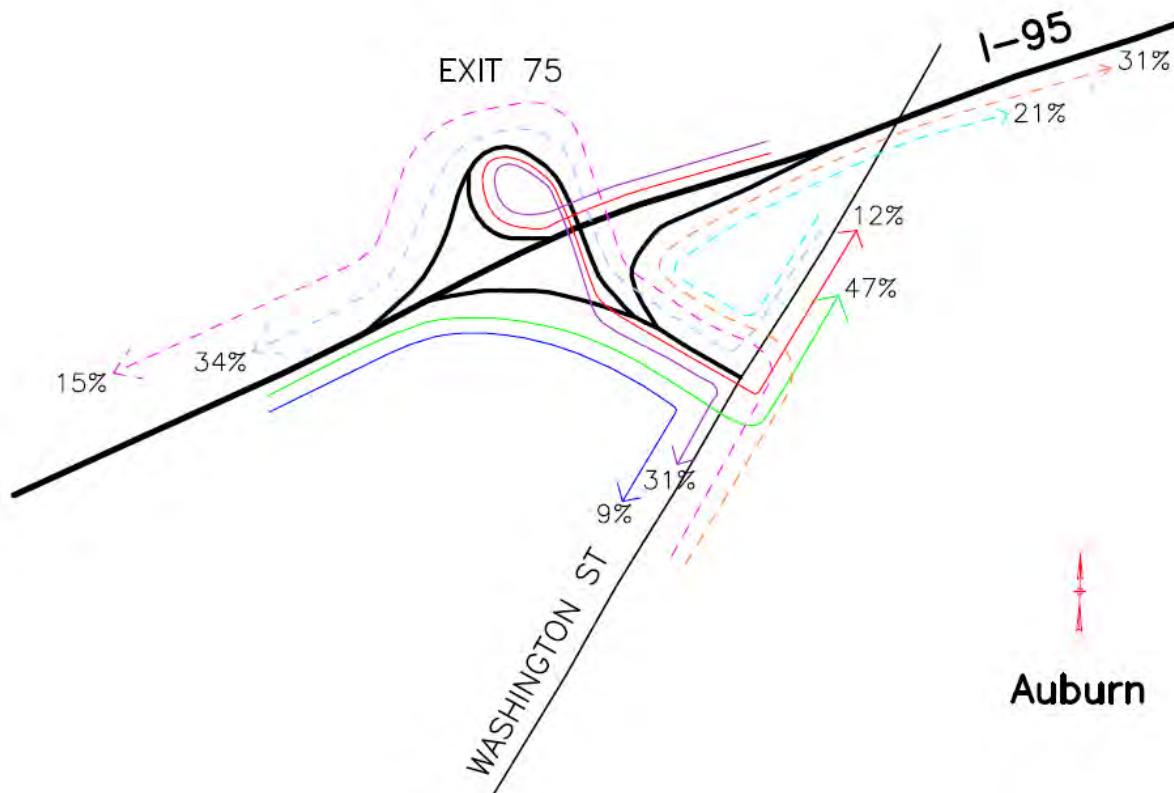
A traffic weaving survey was performed on Thursday, October 22<sup>nd</sup> from 6-8 AM and again from 4-6 PM to gain a better understanding of the amount and complexity of the weaving maneuvers on the Exit 75 Ramps. Two people watched and tracked vehicles. One person tracked vehicles from Route 202/4/100 destined toward the Turnpike. The other person tracked vehicles from the Turnpike destined toward Route 202/4/100.

Figures 9 and 10 present a summary of the weaving traffic patterns as collected during the AM and PM peak periods. The dotted lines trace all traffic entering the Turnpike. The associated percentages represent the portion of total traffic for each movement from Route 202/4/100 destined to the Turnpike mainline. The solid lines trace all traffic exiting the Turnpike and the associated percentages represent the portion of traffic moving from each off ramp to Route 202/4/100 northbound or southbound.

Figure 9 - AM Weaving Analysis Results



**Figure 10 - PM Weaving Analysis Results**



The heaviest movement in the AM peak period is the movement from Route 202/4/100 southbound headed to the Turnpike southbound (43%). The heaviest movement in the PM peak period is the movement from the Turnpike northbound headed to Route 202/4/100 northbound (the reverse trip). During the AM and PM peak periods, the majority of traffic continues in the same direction that it travels on the Turnpike when exiting at Exit 75 onto Route 202/4/100 and vice versa. For example, traffic headed south on Route 202/4/100 will continue to head south on the Turnpike. Likewise, traffic headed north on the Turnpike will continue to head north on Route 202/4/100. As a result, 73% of traffic at the interchange needs to cross or weave, and likely change lanes, to get to their destination. This high amount of weaving maneuvers reduces the capacity of the weaving section.

## Traffic Analysis Methodology

The signalized and unsignalized intersections in the study were analyzed based on methods from the Highway Capacity Manual (HCM)<sup>4</sup>. The HCM sets forth a methodology to determine the level of service at which a traffic facility operates. Level of Service (LOS) is a qualitative measure describing operational conditions within a traffic stream. LOS is based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. Letters designate each level ranging from A to F, where a LOS of A represents free flow operating conditions and LOS F represents a stop-and-go congested condition. Descriptions of each LOS designation are as follows:

- *LOS A* represents free flow. The general level of comfort and convenience to the motorist is excellent.
- *LOS B* is in the range of stable flow but the level of comfort and convenience is somewhat less than at LOS A.
- *LOS C* is in the range of stable flow, but marks the beginning of the range of flow in which the operation of the individual users becomes significantly affected by the presence of other motorists. The general level of comfort and convenience declines is noticeable at this level.
- *LOS D* represents high density but stable flow. The motorists experience a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operations problems at this level.
- *LOS E* represents operating conditions at or near the capacity level. Comfort and convenience levels are extremely poor. Operations at this level are usually unstable because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.
- *LOS F* represents a stop-and-go condition. More vehicles are on the roadway than can be accommodated.

Generally, most agencies consider a LOS D or better to be an acceptable design standard. Tables 2 and 3 summarize the relationship between delay and LOS for unsignalized intersections and signalized intersections, respectively.

**Table 2- LOS Criteria for Unsignalized Intersections**

Level of Service	Delay per Vehicle (sec)
A	0.0 to 10.0
B	10.1 to 15.0
C	15.0 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

<sup>4</sup>Transportation Research Board. *Highway Capacity Manual*, Washington, D.C.: 2000.

**Table 3 - LOS Criteria for Signalized Intersections**

Level of Service	Delay per Vehicle (sec)
A	0.0 to 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	Greater than 80.0

The traffic analysis model Synchro with SimTraffic was used to analyze traffic conditions in the study area for baseline conditions and future year 2025 conditions. Synchro is an analysis model that is based on the methodology set forth in the HCM. SimTraffic is the accompanying micro-simulation model. Because SimTraffic can model individual vehicles in the traffic network, the model can incorporate traffic issues from other intersections within the network, such as delays caused by adjacent intersections. The results from each SimTraffic model run vary. Therefore, results shown in subsequent sections are an average of 5 SimTraffic runs.

## 2009 Traffic Analysis

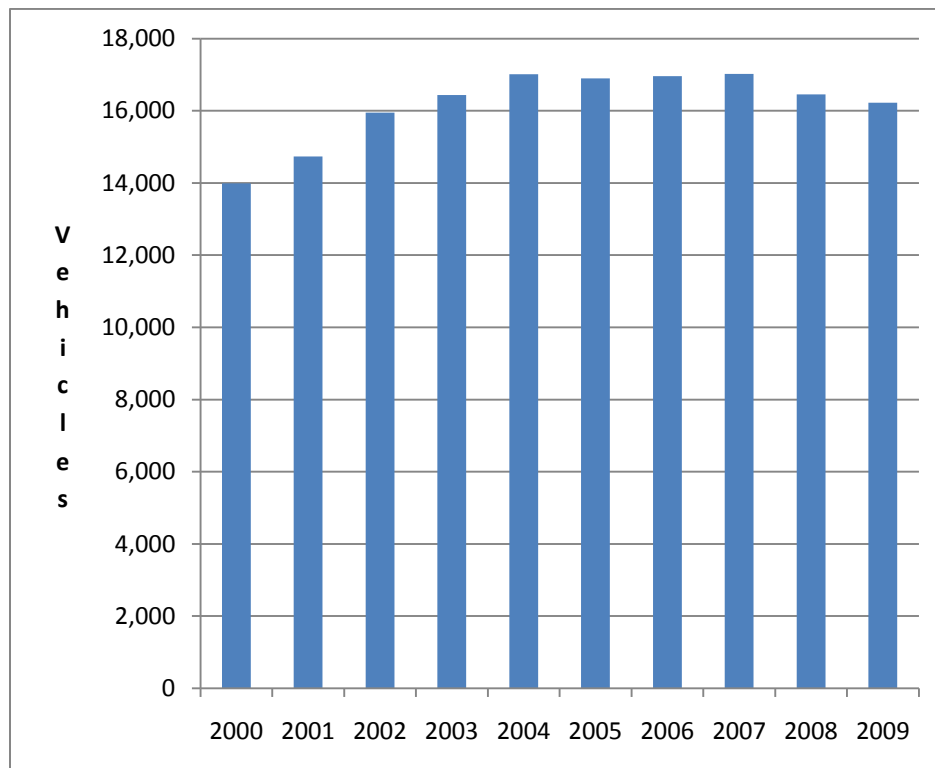
Baseline traffic congestion and delays were analyzed using the methods described in the previous section. The baseline traffic analysis for the Exit 75 study area provides insight into current traffic conditions and can be used to compare with future traffic conditions in the study area.

### ***Baseline Traffic Volumes***

The process of analyzing traffic within the study area involved starting with a baseline peak hour of traffic that represents a 30<sup>th</sup> highest hour for traffic in 2009. The PM peak hour 4:30-5:30 was found to be the highest hour of a typical day for the intersections within the study area. The AM and the PM peak hour traffic levels were very similar, but the traffic during the PM peak hour is higher overall for the entire study area. Therefore, the PM peak hour traffic was used for the traffic analysis, not only for the baseline conditions, but also for the future year conditions.

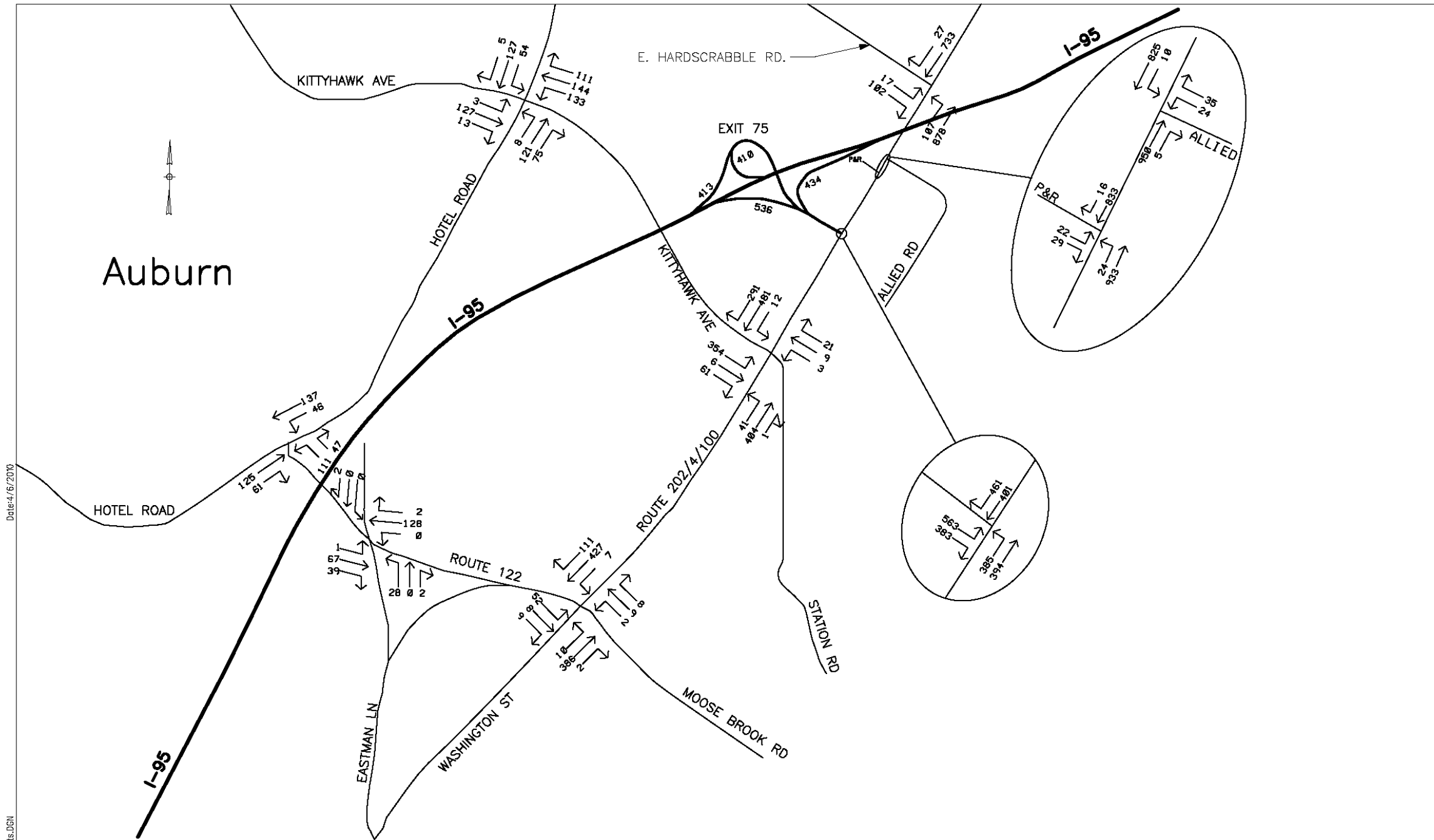
A baseline traffic network was set up from the traffic data that was gathered and counted, which is described in the section entitled *Traffic Data Collection*. Traffic counts that were gathered from various sources showed little variation, with one exception. The traffic counts taken by MaineDOT in 2004 were found to be significantly higher than other counts. However, as can be seen from Figure 11, traffic on Exit 75 was higher in 2004 than in other years, particularly 2008 and 2009.

**Figure 11 – Historic Average Annual Daily Traffic at Exit 75**



The baseline traffic network needs to represent what 2009 traffic could have been expected to be, if there was no construction or detour on Route 202/4/100. It was decided that the best method to develop a 2009 baseline traffic condition was to begin with the most recent counts taken by ATRC (in 2008). Other traffic counts were balanced to match the 2008 ATRC volumes. Traffic volumes along Route 122/Poland Spring Road were estimated based on previous turning movement counts that were taken at the intersection of Route 202/4/100 and Route 122/Poland Spring Road as well as average daily traffic counts provided by MaineDOT on Hotel Road, south of Route 122/Poland Spring Road, and Eastman Lane. The baseline PM peak hour traffic network is shown in Figure 12

Figure 12 – Baseline PM Peak Hour Traffic Network



Date: 4/6/2010

Filename: PM\_Balanced Counts.DGN

Scale: N.T.S.		Designed by: <b>HNTB</b>		<b>THE GOLD STAR MEMORIAL HIGHWAY</b>		EXIT 75 INTERCHANGE STUDY TURNING MOVEMENT COUNTS YEAR 2009 – PM PEAK HOUR BALANCED VOLUMES	
340 County Road Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909							
No.	Revision	By	Date	By	Date	SHEET NUMBER: CONTRACT: 09009-XW-975-061 1 OF 1	
		Designed	By	Checked	By		
		Drawn	CDH	In Charge of	RAL		



The traffic volumes at the interchange ramps were compared to the MTA’s permanent count stations. It was found that the 30<sup>th</sup> highest traffic hour for Exit 75, from the counts stations, was a ramp total of 1,771 vehicles per hour. The baseline network reflects a ramp total of 1,793 vehicles per hour. Therefore, the baseline traffic network is a slightly conservative estimate of peak hour conditions.

***Level-of-Service Analysis***

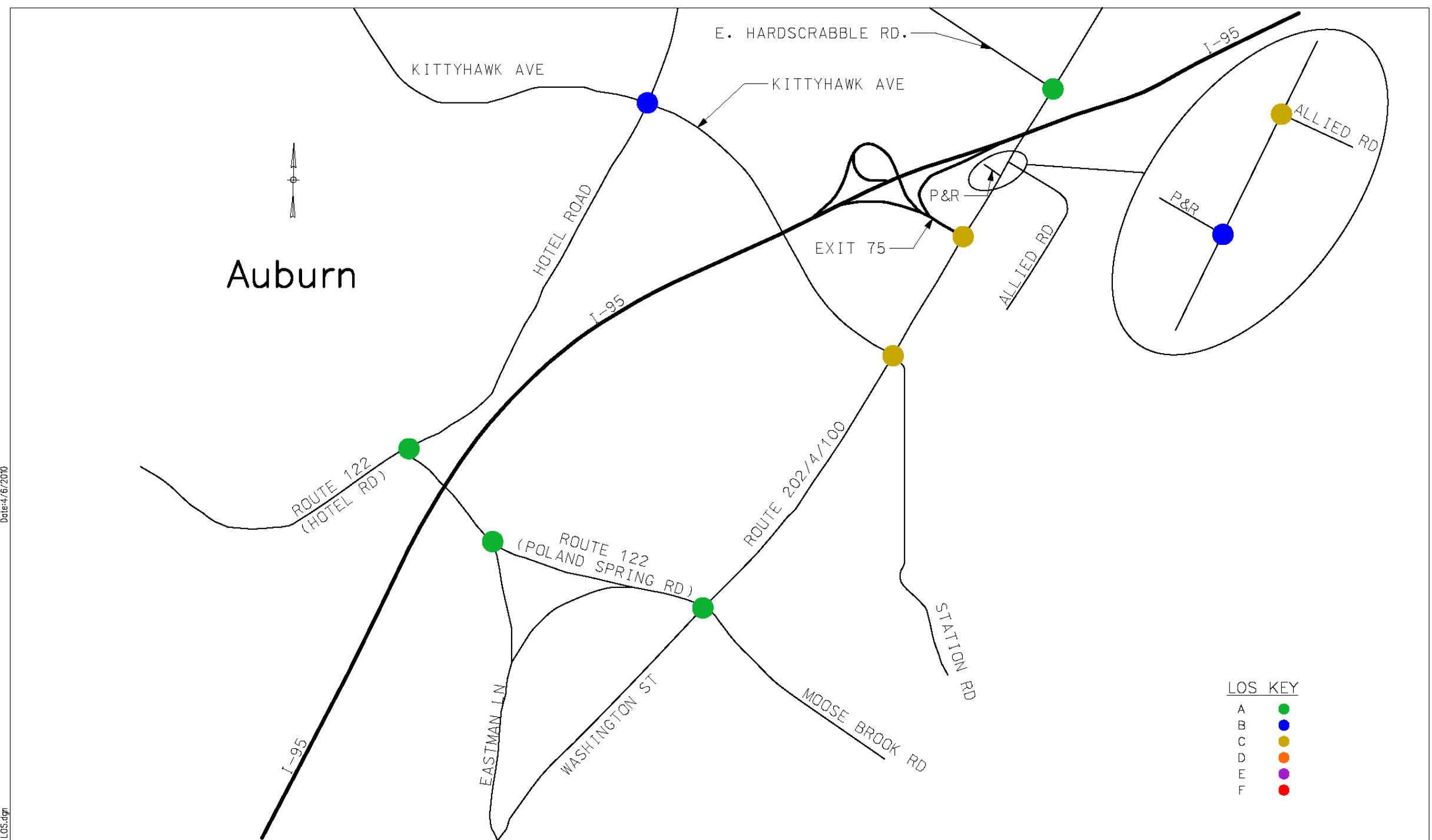
The baseline traffic volumes were input into the traffic capacity model and analyzed. The delay and LOS ratings for each of the nine study area intersections are illustrated in Table 4 and Figure 13.

**Table 4 – 2009 Delay & LOS Summary**

<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	9.7	A
Route 122/Poland Spring Rd & Eastman Lane	Stop	4.8	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	6.7	A
Hotel Rd & Kittyhawk Ave	4-way Stop	10.7	B
Route 202/4/100 & Kittyhawk Ave	Signal	21.7	C
Route 202/4/100 & Exit 75 ramps	Signal	23.2	C
Route 202/4/100 & P&R Access	Stop	13.1	B
Route 202/4/100 & Allied Rd	Stop	19.6	C
Route 202/4/100 & E Hardscrabble Rd	Stop	9.9	A

The level of service results for unsignalized intersections reflects the average delay on the stop controlled approaches to the intersection. The level of service results for signalized intersections reflects the overall delay for the entire intersection. As shown, all intersections in the study area currently operate at acceptable levels of service.

Figure 13 – Baseline PM LOS Map



Date: 4/6/2010  
Filename: 2009 PM No Build LOS.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

	By	Date	Checked	By	Date
Designed				EAR	3/10
Drawn	CDH	3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



EXIT 75 INTERCHANGE STUDY  
INTERSECTION LEVELS OF SERVICE  
YEAR 2009 – PM PEAK HOUR  
NO BUILD

SHEET NUMBER: 1 OF 1

CONTRACT: 09009-XW-975-061

## 2025 No-Build Traffic Analysis

This transportation study was undertaken not only to understand current traffic conditions around Exit 75, but also to understand traffic conditions that could be expected fifteen years into the future. Traffic congestion and delays for expected traffic conditions for 2025 were analyzed using methods described in the section entitled *Traffic Analysis Methodology*. The 2025 No-Build traffic analysis for the Exit 75 study area provides insight into traffic conditions that can be expected if development growth continues at its current rate and no improvements are made to the current study area roadways and intersections.

### 2025 No-Build Traffic Volumes

Estimating the future traffic for the study area was done in four steps:

5. Estimate traffic associated with recent development growth adjacent to the study area.
6. Apply the traffic growth rate to parcels in an area of influence targeted for development.
7. Determine a reasonable background growth rate to capture growth from outside the area of influence.
8. Grow every traffic movement at all study area intersections by at least the background growth rate.

#### ESTIMATING RECENT DEVELOPMENT GROWTH

In order to estimate Study Area development growth, all of the commercial building permits for 2002-2009 were obtained from the City of Auburn. Of the construction permits, only the permits with an estimated cost of more than \$100,000 for new construction or additions were examined further.

Three basic types of information were gathered from the construction permit data: (1) the size of the new building or size of additional building space; (2) the type of development (e.g. retail, warehousing); and (3) the location of the development. The expected trip generation associated with each development site was estimated from this information, as well as from information gathered from the Trip Generation Manual.<sup>5</sup>

All permits within Auburn, that met the guidelines described, were used in the analysis. However, only those permits within an area of influence were further examined. The area of influence was defined as areas that the City of Auburn has identified for development, that are also in close proximity of Exit 75. Close proximity means that a majority of the trips generated from the development would be expected to distribute among the study area roadways and intersections. The area of influence is shown within the thick black line in Figure 14.

---

<sup>5</sup> Institute of Transportation Engineers, *Trip Generation, 7<sup>th</sup> Edition*. Washington, D.C., 2003

Figure 14 – Growth Area of Influence

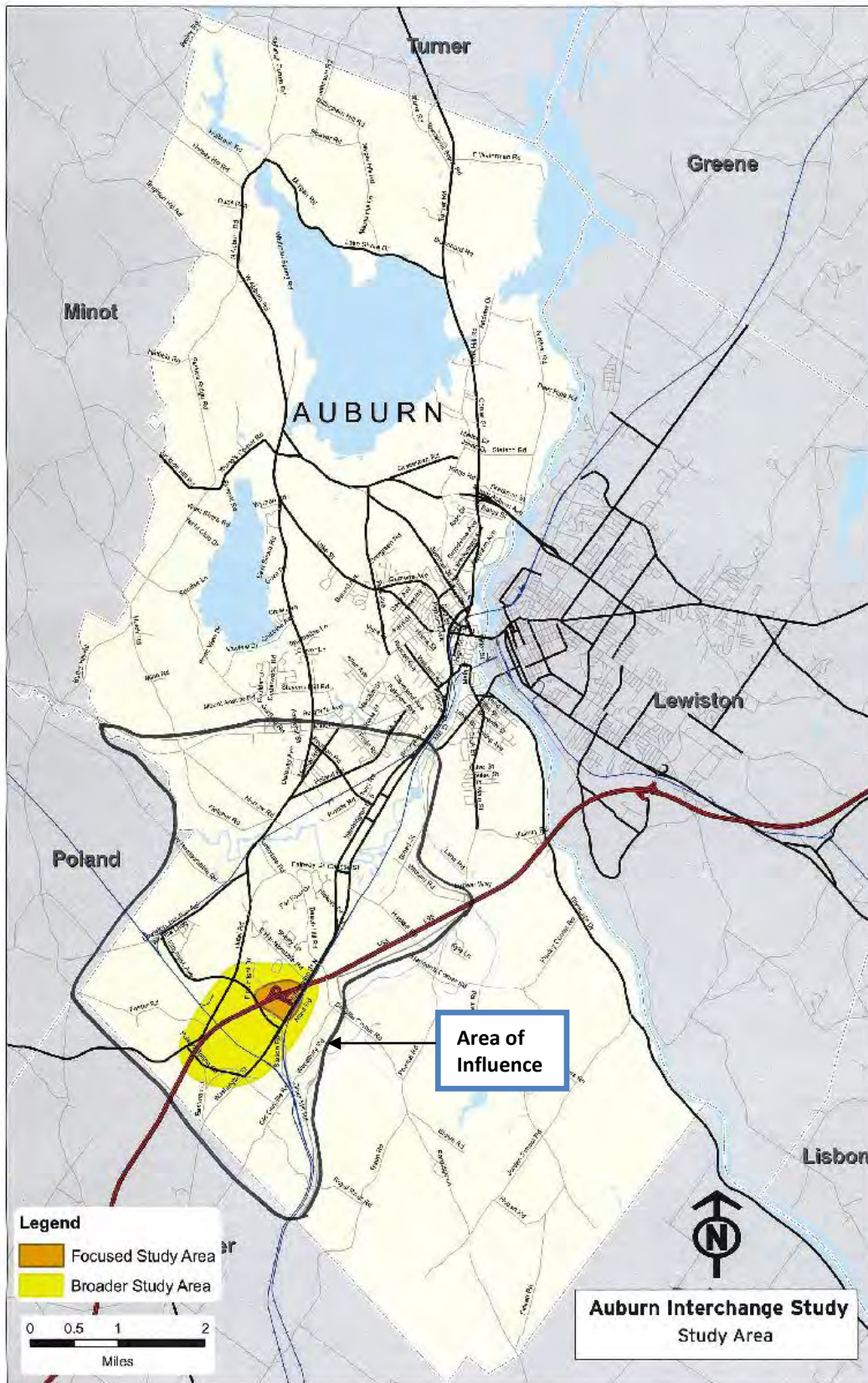


Table 5 shows the average development within the area of influence from 2002-2009. As can be seen from Table 5 it is estimated an average of approximately 105 new trips could have been generated per year by the amount of development that was permitted from 2002 through 2009.

**Table 5 – Commercial Development Permitted within Area of Influence**

<b>Land Use Type</b>	<b>Total Units</b>	<b>Unit/Year</b>	<b>Additional Peak Hour Trips/Year</b>
Residential Condominium/Townhouse	-	-	-
New Car Sales	23,400	3,343	9
General Office Building	8,785	1,255	3
Warehousing	461,455	65,922	27
Restaurant	-	-	-
Retail	14,425	2,061	24
Nursing Home	-	-	-
Manufacturing	212,840	30,406	23
Hotel	-	-	-
Day Care Center	10,325	1,475	19
<b>Total</b>	<b>731,230</b>		<b>105</b>

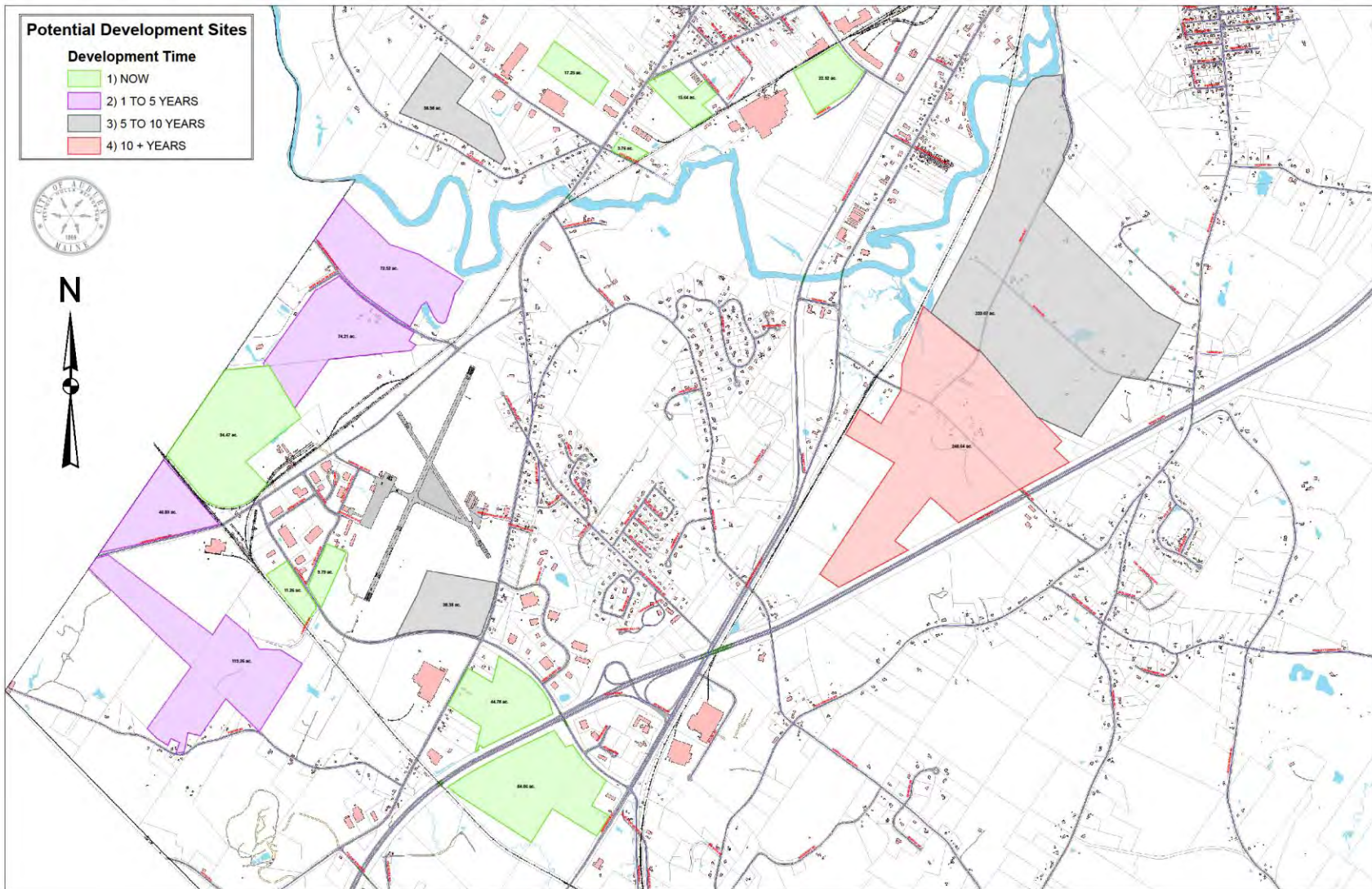
**TRAFFIC GROWTH FROM DEVELOPMENT**

It was assumed that development would continue to grow over the next fifteen years at the same rate that is has been growing for the last seven years. Since growth from development is constrained by available developable land, the amount of new traffic from development, within the area of influence, will not necessarily grow by a percentage of overall traffic but rather as a portion of the land is available to be developed. It should be noted that new traffic generated by potential development not only includes trucks, but also employees, as well as vendors, and other local trips.

Therefore, 105 new trips per year were assigned to the development parcels identified by the City of Auburn as shown in Figure 15. Parcels were assigned development based on zoning, types of development that was permitted within 2002-2009, and the building-to-lot size ratio, which was calculated from the building permits information, for the different types of development in Auburn.



Figure 15 – Identified Potential Development Parcels



Source: City of Auburn

## DETERMINING BACKGROUND GROWTH RATE

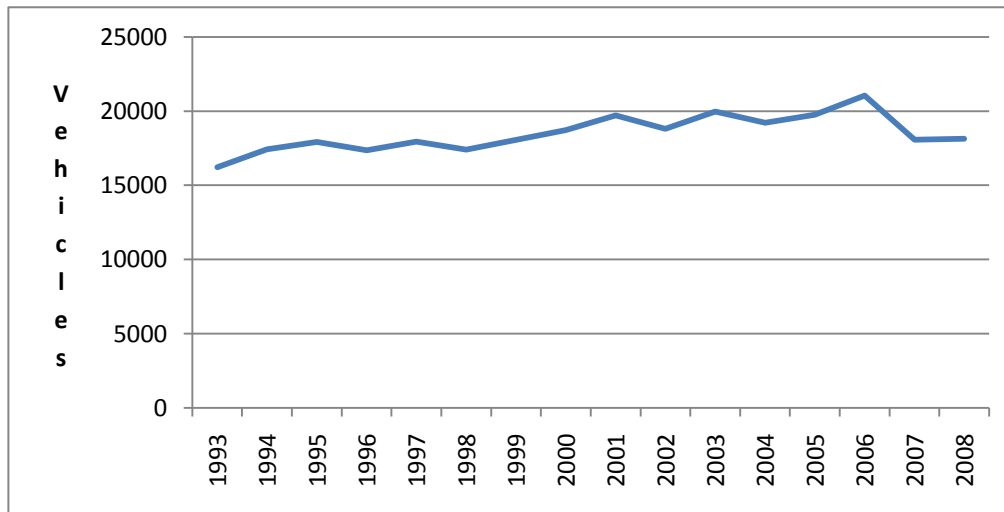
As mentioned in the previous section entitled *Traffic Data Collection*, historic traffic counts were gathered for this study:

- Peak hour counts in order to calibrate the baseline peak hour traffic network
- Daily counts to determine background traffic growth.

One of the traffic count data locations, provided by MaineDOT, was along Route 202/4/100 north of Exit 75 (northeast of Miami Avenue). This count location's data set yielded traffic data for most of the last 30 years. Due to the count location and the completeness of the dataset, an analysis of this traffic data can be expected to give a fairly good representation of local traffic growth within the study area.

Figure 16 shows the average rate of growth for the fifteen year time period for the Route 202/4/100 location. The average annual rate of traffic growth at this count location was 0.77%. This rate of growth was higher than the average rate of growth found from the travel demand model provided by Androscoggin Transportation Resource Center (ATRC), which has an overall average annual growth of 0.36% in the 2035 model. So, a conservative background growth rate of 0.77% per year was used to determine the amount of traffic growth generated from outside the study area that travels into or through the study area.

**Figure 16 – Daily Traffic on Route 202/4/100 from 1994-2009**



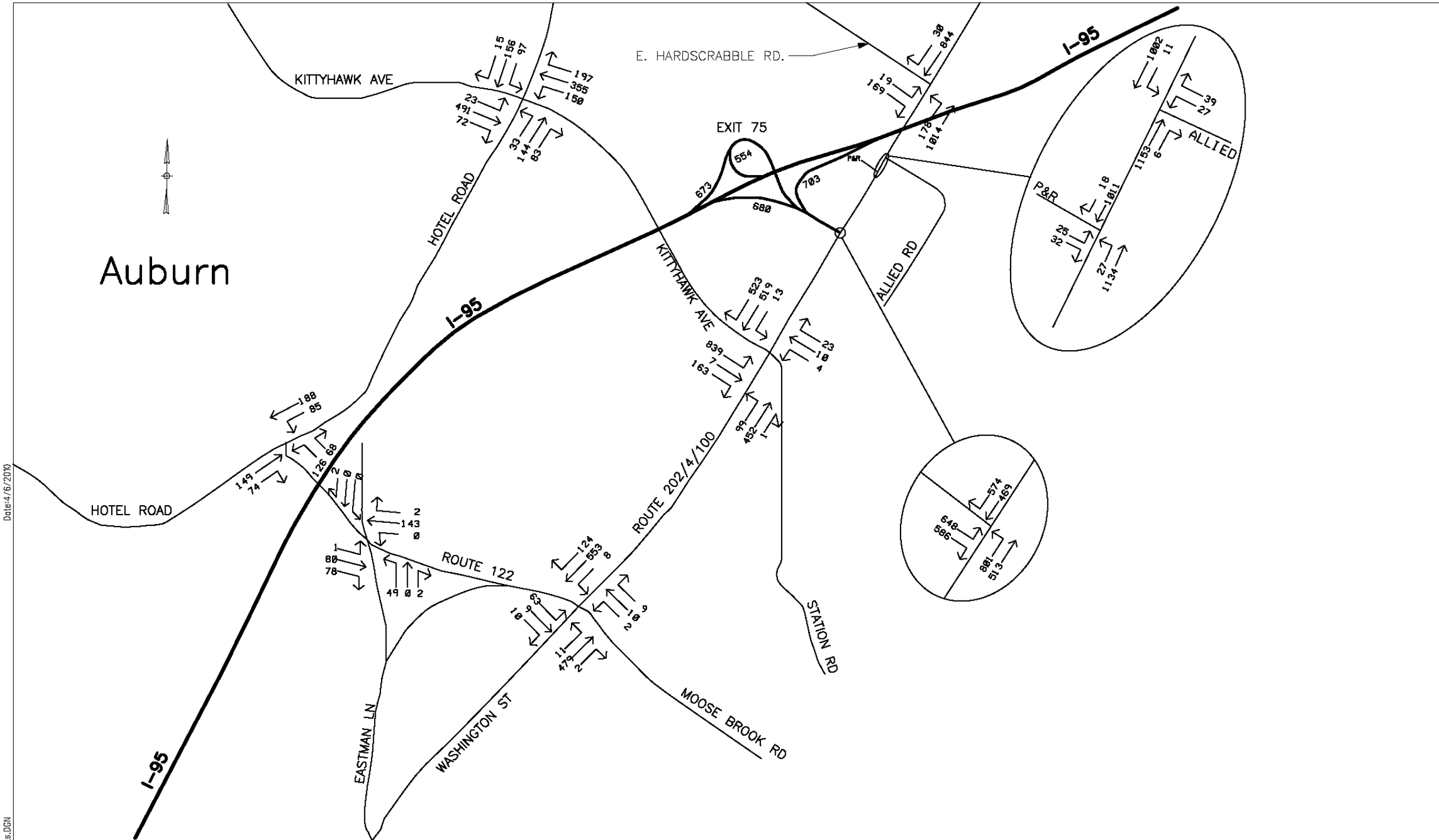
## ESTIMATING TRAFFIC AT STUDY AREA INTERSECTIONS

To estimate the traffic movements at the study area intersections, a conservative approach was undertaken. The new development trips were added to the network at a rate of 105 trips per year. The trips were generated at the identified parcels (described previously and shown in Figure 15) and distributed onto the roadway network following similar distribution patterns as the ATRC travel demand model. 39% of the new trips were assumed to be destined to or from the Turnpike with the remainder of the new trips destined for the various local roadways such as Route 202/4/100 and Lewiston Junction Road.

After the new development growth was added onto the roadway network, all other traffic movements, which were not affected by the development growth, were grown at a conservative rate of 0.77% per year. As a result, every traffic movement at each intersection was grown at an annual rate of 0.77% or more. The 2025 No-Build traffic network is shown in Figure 17.



Figure 17 – 2025 No-Build Traffic Network



Date: 4/6/2010  
Filename: PM\_Balanced\_Counts.DGN

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**  
 340 County Road  
 Westbrook, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909

By	Date	Checked	By	Date

By	Date
CDH	2/10
In Charge of	RAL
	2/10



**THE GOLD STAR  
MEMORIAL HIGHWAY**

EXIT 75 INTERCHANGE STUDY  
 TURNING MOVEMENT COUNTS  
 YEAR 2025 – PM PEAK HOUR  
 BALANCED VOLUMES

SHEET NUMBER: 1 OF 1

CONTRACT: 09009-XW-975-061

### ***Level-of-Service Analysis***

The calculated traffic volumes for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections are illustrated in Table 6 and Figure 18.

**Table 6 – 2025 No-Build Delay & LOS Summary**

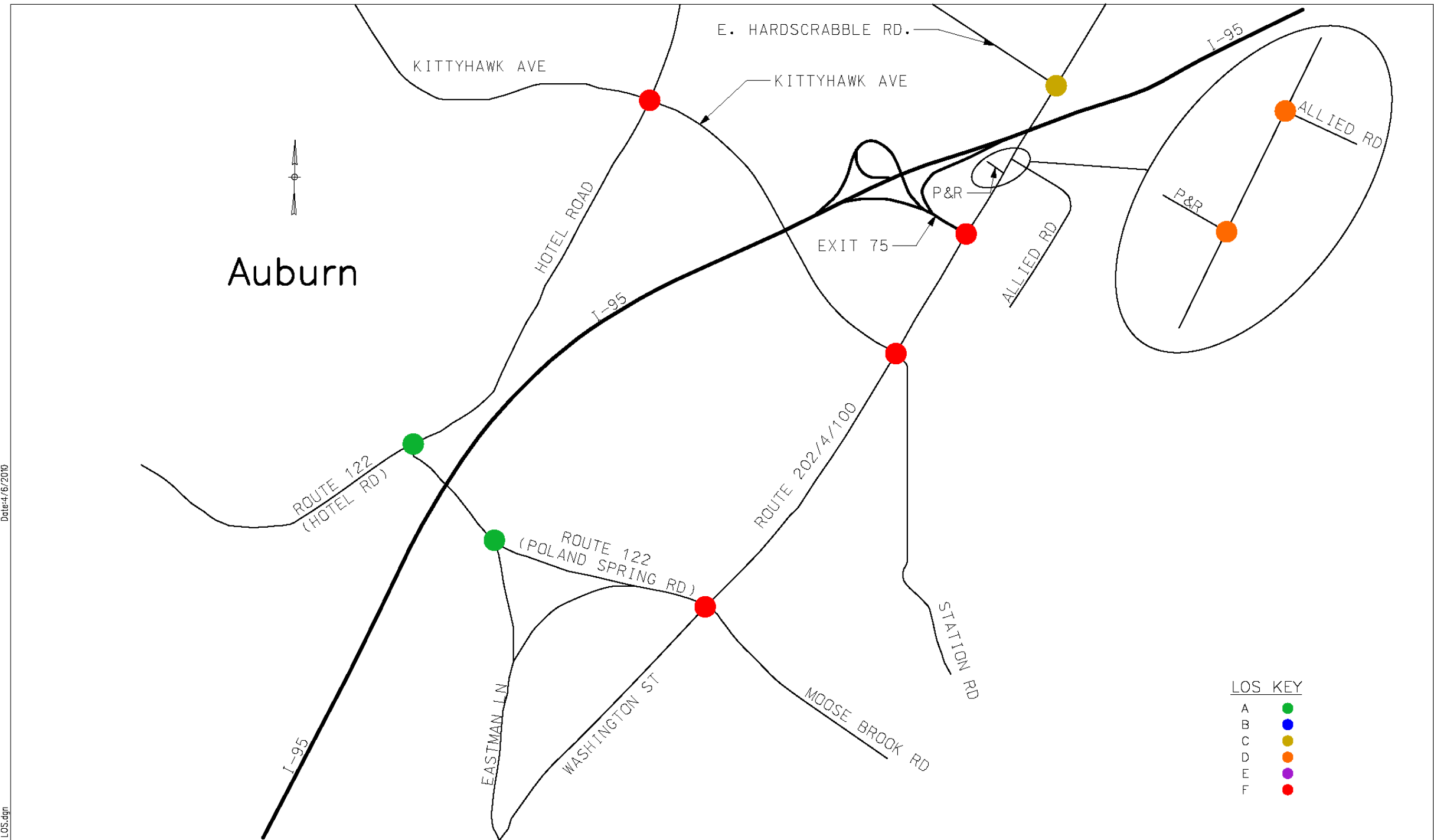
<b><i>Intersection Description</i></b>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	52.4	F
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.8	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	9.1	A
Hotel Rd & Kittyhawk Ave	4-way Stop	197.7	F
Route 202/4/100 & Kittyhawk Ave	Signal	329.6	F
Route 202/4/100 & Exit 75 Ramps	Signal	88.5	F
Route 202/4/100 & P&R Access	Stop	26.8	D
Route 202/4/100 & Allied Rd	Stop	25.7	D
Route 202/4/100 & E Hardscrabble Rd	Stop	19.5	C

The level of service results for unsignalized intersections reflects the average delay on the stop controlled approaches to the intersection. The level of service results for signalized intersections reflects the overall delay for the entire intersection. The following intersections can be expected to operate at or above capacity by 2025.

- Route 202/4/100 & Route 122/Poland Spring Rd
- Hotel Rd & Kittyhawk Ave
- Route 202/4/100 & Kittyhawk Ave
- Route 202/4/100 & Exit 75 Ramps

The amount of traffic that is expected by 2025 will exceed the available capacity of several of the current intersections in the Exit 75 study area. It should be noted that the LOS of the intersection of Route 202/4/100 & Route 122/Poland Spring Road is degraded due to traffic delays and queues from adjacent intersections to the north on Route 202/4/100, and not necessarily the levels of traffic at that intersection.

Figure 18 – 2025 No-Build LOS Map



Date: 4/16/2010

Filename: 2025 PM No Build LOS.dgn

Scale: N.T.S

No.	Revision	By	Date

Designed by:

**HNTB**

By	Date	Checked	By	Date
Designed			EAR	3/10
Drawn	CDH 3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



**THE GOLD STAR  
MEMORIAL HIGHWAY**

EXIT 75 INTERCHANGE STUDY  
INTERSECTION LEVELS OF SERVICE  
2025 NO BUILD

SHEET NUMBER: 1 OF 1

CONTRACT: 09009-XW-975-061

## 2025 Build Alternatives

As can be seen from the previous section, if development growth continues at its current rate, four of the nine study area intersections will be at or over capacity by 2025. Long delays and queues can be expected if no improvements are made to the study area roadways and intersections.

Using the results of the 2025 No-build analysis, HNTB developed six build alternatives specifically designed to address the long range transportation deficiencies. This section will analyze these six different build alternatives, their ability to reduce the expected traffic congestion, and provide an estimated cost to implement. The six build alternatives are as follows:

- Alt. 1) Local intersection improvements only**
- Alt. 2) Relocating the northbound ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 3) Relocating the southbound ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 4) Relocating all of the Exit 75 ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 5) Adding a southbound on-ramp at Kittyhawk Ave. plus local intersection improvements**
- Alt. 6) Adding a northbound off-ramp plus southbound on-ramp at Kittyhawk Ave. plus local intersection improvements**

It should be noted that in addition to improvements to MTA roadways and intersections, roads and intersections under the jurisdiction of the MaineDOT and the City of Auburn were also included and analyzed. Even though recommendations are made for several of the study area roadways and intersections, only those recommendations for roadways and intersections within the Maine Turnpike right-of-way are assumed to be within the control of the MTA. The other recommendations are provided for planning purposes of MaineDOT and the City of Auburn.

### ***Alt 1 – Local Intersection Improvements Only***

This improvement alternative focuses on improvements that can be made to the local intersections to reduce the traffic congestion. Under this alternative, the Exit 75 ramps would remain at their current location. Capacity improvements would be made that bring the study area intersections up to acceptable levels-of-service. Those capacity improvements are described as follows.

#### **IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND EXIT 75 RAMPS**

- Widen the Route 202/4/100 northbound approach to accommodate two left turn lanes for traffic heading toward the Turnpike.

**IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND KITTYHAWK AVE.**

- Widen the Route 202/4/100 northbound approach to accommodate a left turn lane of 150’ length for traffic heading onto Kittyhawk Ave. and an additional shared through/right lane of 200’.
- Widen the Route 202/4/100 southbound approach to accommodate a 150’ channelized right turn lane for traffic heading onto Kittyhawk Ave.
- Widen the eastbound Kittyhawk Ave. approach to accommodate two left turn lanes of 550’ length for traffic heading north on Route 202/4/100.

**IMPROVEMENTS TO THE INTERSECTION OF KITTYHAWK AVE. AND HOTEL RD.**

- Add a traffic signal
- Widen the westbound Kittyhawk Ave. approach to accommodate a 200’ left turn lane for traffic heading south on Hotel Road.

**COST**

The estimated cost of constructing the Local Intersection Improvements is approximately **\$1 million**.

**LEVEL-OF-SERVICE ANALYSIS**

The calculated traffic volumes for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections with the improvements described are illustrated in Table 7 and Figure 19.

**Table 7 – 2025 Delay & LOS Summary for Local Intersection Improvements**

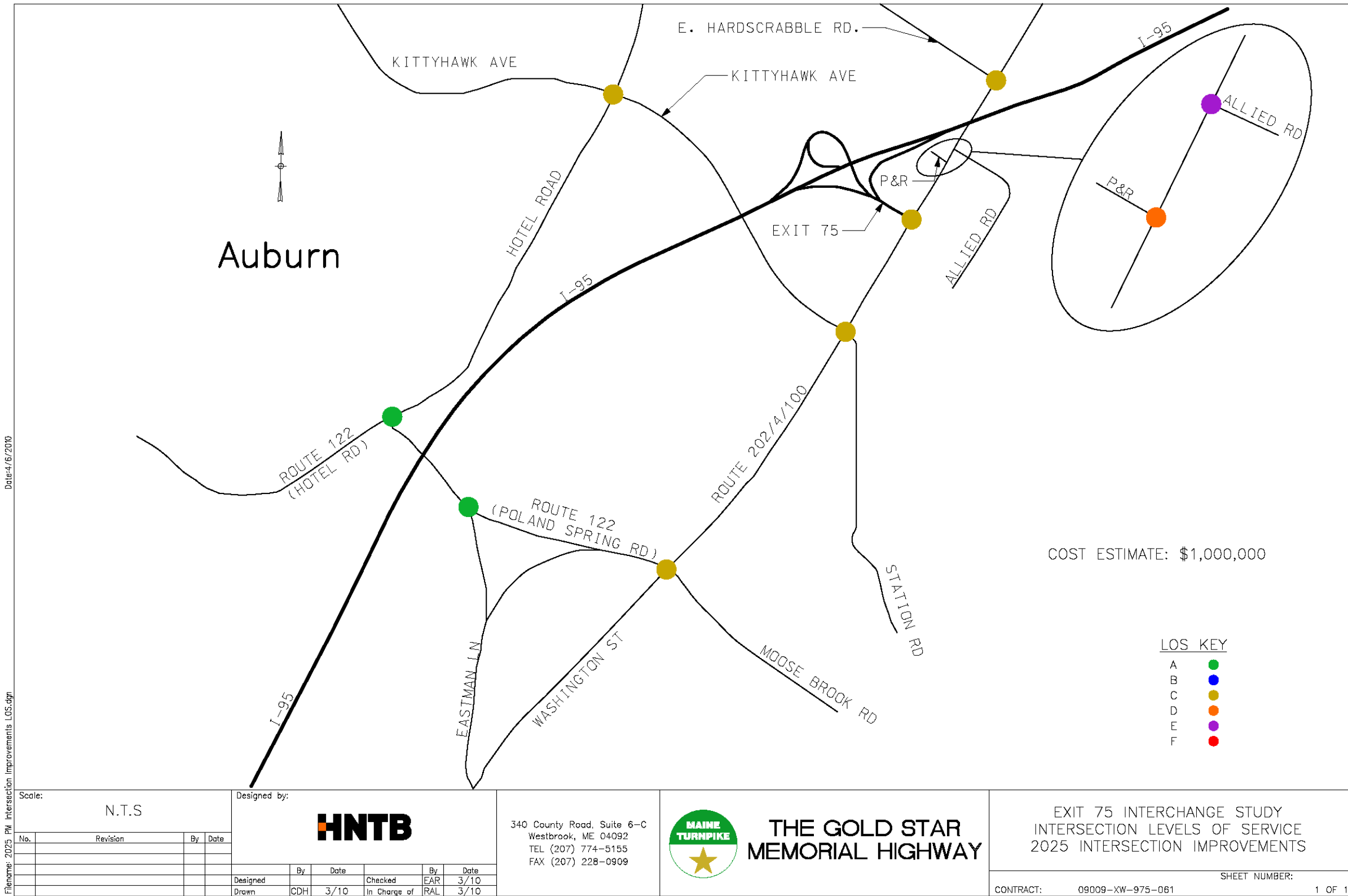
<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	16.5	C
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.5	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	7.7	A
Hotel Rd & Kittyhawk Ave	Signal	27.0	C
Route 202/4/100 & Kittyhawk Ave	Signal	29.3	C
Route 202/4/100 & Exit 75 Ramps	Signal	32.3	C
Route 202/4/100 & P&R Access	Stop	29.0	D
Route 202/4/100 & Allied Rd	Stop	38.6	E
Route 202/4/100 & E Hardscrabble Rd	Stop	19.5	C

**PROS AND CONS**

As can be seen with this alternative, nearly all intersections would be expected to operate at acceptable levels of service. The intersection of Route 202/4/100 and Allied Road is expected to operate at capacity with this alternative. However, Allied Road only serves a small amount of traffic. Operations in and out of Allied Road are not expected to be greatly impacted under this alternative.

This alternative would have a minimal impact on right-of-way. Obtaining construction permits for this alternative should not be an issue.

Figure 19 – 2025 LOS Map with Intersection Improvements



File name: 2025 PM Intersection Improvements LOS.dgn Date: 4/6/2010

## ***Alt 2 – Relocating the Northbound Ramps to Kittyhawk Ave.***

This improvement alternative focuses on relocating the northbound on-ramp and the northbound off-ramp from their current location onto Kittyhawk Ave. In addition, other improvements to local intersections are included that are needed to reduce traffic congestion and bring the intersections up to acceptable levels-of-service. Under this alternative, the Exit 75 southbound ramps would remain at their current location. The intersection capacity improvements are described as follows.

### IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND EXIT 75 RAMPS

- No improvements needed.

### IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND KITTYHAWK AVE.

- Widen the Route 202//4/100 northbound approach to accommodate a left turn lane of 350' length for traffic heading onto Kittyhawk Ave. and an additional shared through/right lane of 250'.
- Widen the Route 202/4/100 southbound approach to accommodate a 150' channelized right turn lane for traffic heading onto Kittyhawk Ave.
- Widen the eastbound Kittyhawk Ave. approach to accommodate two left turn lanes of 300' length for traffic heading north on Route 202/4/100.

### IMPROVEMENTS TO THE INTERSECTION OF KITTYHAWK AVE. AND HOTEL RD.

- Add a traffic signal.
- Widen the westbound Kittyhawk Ave. approach to accommodate a 150' left turn lane for traffic heading south on Hotel Road.
- Widen the southbound Hotel Road approach to accommodate a 200' left turn lane for traffic heading east on Kittyhawk Ave.
- Widen the northbound Hotel Road approach to accommodate a 150' right turn lane for traffic heading east on Kittyhawk Ave.

### IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW NORTHBOUND RAMPS

- Add a traffic signal
- Widen the Kittyhawk Ave. eastbound approach to accommodate a 350' right turn lane for traffic heading onto the northbound on ramps
- Widen the Kittyhawk Ave. westbound approach to accommodate an additional lane from Route 202/4/100 that becomes a left turn lane at the intersection with the northbound on ramps.

### COST

The estimated cost of constructing these improvements and relocating the ramps is approximately **\$5 million**.



## REDISTRIBUTED TRAFFIC

Changing the location of the northbound ramps will result in changed traffic patterns. The resulting change in traffic patterns was estimated based on trip distribution patterns from the ATRC travel demand model and the traffic weaving survey that was taken at Exit 75. The calculated traffic volumes for 2025 for this alternative are shown in Figure 20.

## LEVEL-OF-SERVICE ANALYSIS

The calculated traffic volumes for this alternative for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections plus the additional intersection created with this alternative, with the improvements described are illustrated in Table 8 and Figure 21.

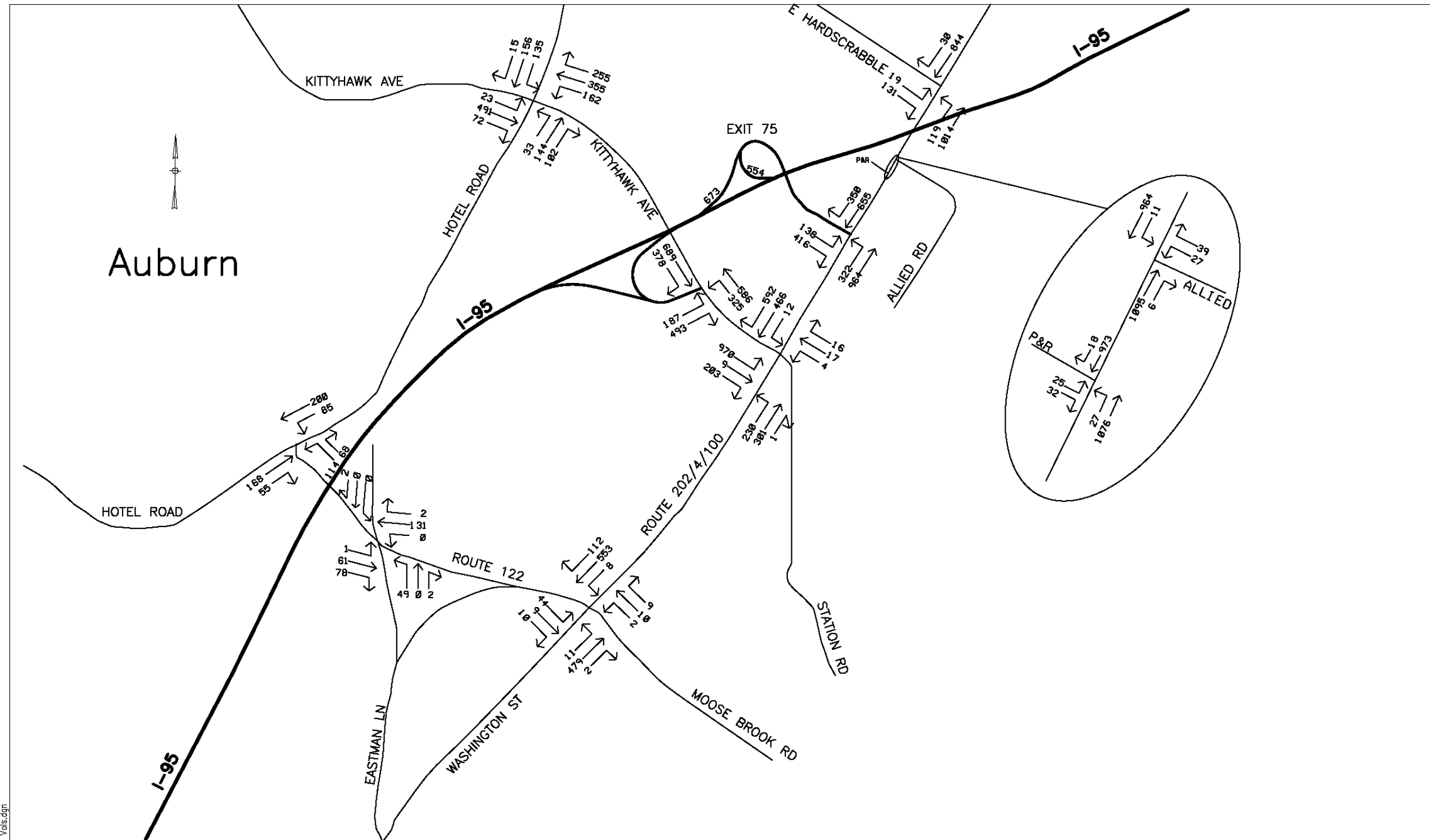
**Table 8 – 2025 Delay & LOS Summary for Relocating NB Ramps**

<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	11.6	B
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.8	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	8.8	A
Hotel Rd & Kittyhawk Ave	Signal	21.1	C
Route 202/4/100 & Kittyhawk Ave	Signal	32.1	C
Route 202/4/100 & Exit 75 Ramps	Signal	18.1	B
Route 202/4/100 & P&R Access	Stop	23.6	C
Route 202/4/100 & Allied Rd	Stop	25.0	C
Route 202/4/100 & E Hardscrabble Rd	Stop	15.9	C
Kittyhawk Ave. & Northbound Ramps	Signal	24.5	C

## PROS AND CONS

As can be seen with this alternative, which includes local roadway improvements, all intersections would be expected to operate at acceptable levels of service. This alternative would alleviate the need for a double left turn lane from Route 202/4/100 onto the Turnpike ramps at Exit 75. Most of the other local roadway improvements would still be needed. This alternative would have significant right-of-way impacts. Most of the right-of-way impacted for this alternative is within a parcel slated for development. The amount of wetlands is unknown on this site. However, it is expected that there are significant wetlands on the site. It would be very difficult to obtain the permits to build this alternative.

Figure 20 – 2025 Volumes with NB Ramps Relocated to Kittyhawk



Filename: 2025 PM Move NB Vols.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

By	Date	Checked	By	Date
Designed			EAR	3/10
Drawn	CDH 3/10	In Charge of	RAL	3/10

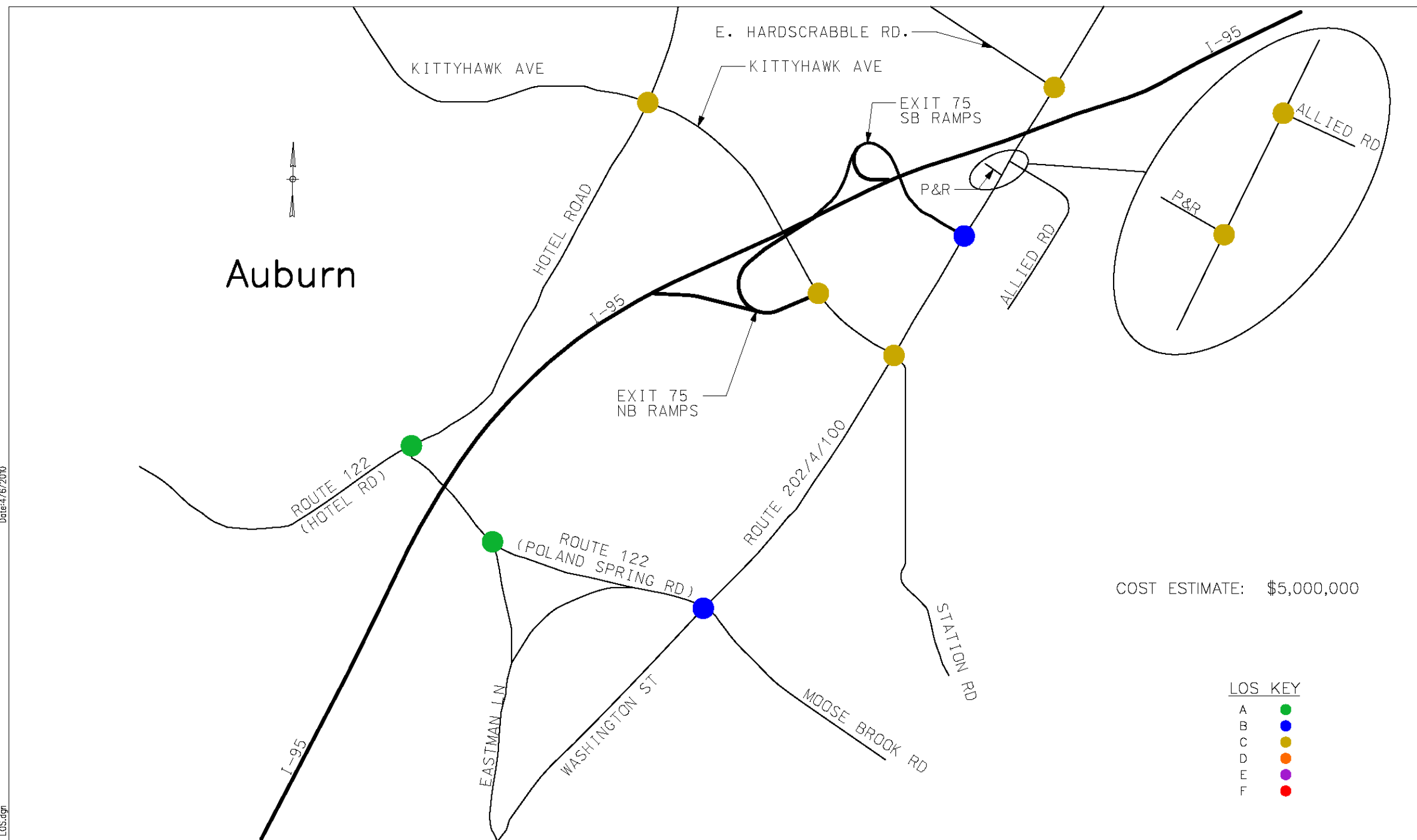
340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



**THE GOLD STAR  
MEMORIAL HIGHWAY**

2025 PM Volumes	
Relocate Northbound Ramps to Kittyhawk	
CONTRACT:	09009-XW-975-061
SHEET NUMBER:	1 OF 1

Figure 21 – 2025 LOS Map with NB Ramps moved to Kittyhawk



Date: 4/6/2010

Filename: 2025\_PM\_Move\_NB\_LOS.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

	By	Date		By	Date
Designed			Checked	EAR	3/10
Drawn	CDH	3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



EXIT 75 INTERCHANGE STUDY  
INTERSECTION LEVELS OF SERVICE  
2025 MOVE NORTHBOUND RAMPS

CONTRACT: 09009-XW-975-061

SHEET NUMBER: 1 OF 1

### ***Alt 3 – Relocating the Southbound Ramps to Kittyhawk Ave.***

This improvement alternative focuses on relocating the southbound on-ramp and the southbound off-ramp from their current location onto Kittyhawk Ave. In addition, other improvements to local intersections are included that are needed to reduce traffic congestion and bring the intersections up to acceptable levels-of-service. Under this alternative, the Exit 75 northbound ramps would remain at their current location. The intersection capacity improvements are described as follows.

#### **IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND EXIT 75 RAMPS**

- No improvements needed

#### **IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND KITTYHAWK AVE.**

- Widen the Route 202/4/100 northbound approach to accommodate a left turn lane of 200' length for traffic heading onto Kittyhawk Ave. and an additional shared through/right lane of 150'.
- Widen the Route 202/4/100 southbound approach to accommodate a 200' channelized right turn lane for traffic heading onto Kittyhawk Ave.
- Widen the eastbound Kittyhawk Ave. approach to accommodate two left turn lanes of 250' length for traffic heading north on Route 202/4/100

#### **IMPROVEMENTS TO THE INTERSECTION OF KITTYHAWK AVE. AND HOTEL RD.**

- Add a traffic signal
- Widen the westbound Kittyhawk Ave. approach to accommodate a 200' left turn lane for traffic heading south on Hotel Road.
- Widen the southbound Hotel Road approach to accommodate a 200' left turn lane for traffic heading east on Kittyhawk Ave.

#### **IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW SOUTHBOUND RAMPS**

- Add a traffic signal
- Widen the Kittyhawk Ave. eastbound approach to accommodate a 150' right turn lane for traffic heading onto the southbound ramps
- Widen the Kittyhawk Ave. eastbound approach to accommodate an additional through lane. The length of the additional through lane would need to start 350' west of the intersection and continue to 500' east of the intersection.
- Widen the Kittyhawk Ave. westbound approach to accommodate a 300' left lane for traffic heading onto the southbound on ramps.

#### **COST**

The estimated cost of constructing these improvements and relocating the ramps is approximately **\$4 million**.

## REDISTRIBUTED TRAFFIC

Changing the location of the southbound ramps will result in changed traffic patterns. The resulting change in traffic patterns was estimated based on trip distribution patterns from the ATRC travel demand model and the traffic weaving survey that was taken at Exit 75. The calculated traffic volumes for 2025 for this alternative are shown in Figure 22.

## LEVEL-OF-SERVICE ANALYSIS

The calculated traffic volumes for this alternative for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections plus the additional intersection created with this alternative, with the improvements described are illustrated in Table 9 and Figure 23.

**Table 9 – 2025 Delay & LOS Summary for Relocating SB Ramps**

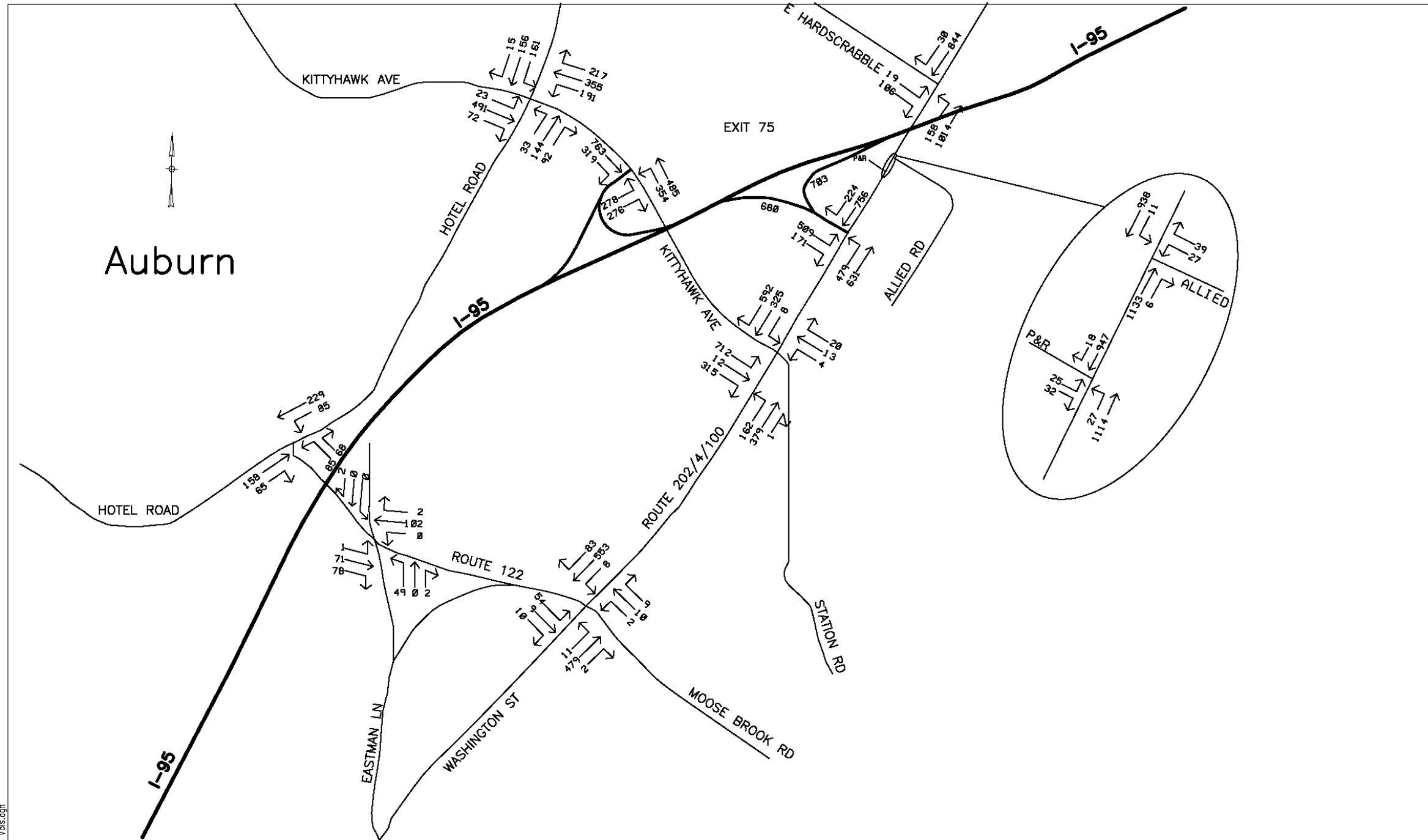
<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	12.9	B
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.1	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	7.5	A
Hotel Rd & Kittyhawk Ave	Signal	23.5	C
Route 202/4/100 & Kittyhawk Ave	Signal	21.9	C
Route 202/4/100 & Exit 75 Ramps	Signal	39.0	D
Route 202/4/100 & P&R Access	Stop	38.9	E
Route 202/4/100 & Allied Rd	Stop	26.4	D
Route 202/4/100 & E Hardscrabble Rd	Stop	16.2	C
Kittyhawk Ave. & Southbound Ramps	Signal	27.5	C

## PROS AND CONS

As can be seen with this alternative, which includes local intersection improvements, nearly all intersections would be expected to operate at acceptable levels of service. The intersection of Route 202/4/100 and the Park & Ride Lot could be expected to operate at capacity with this alternative. However, the Park & Ride Lot only serves a small amount of traffic. Operations in and out of the Park& Ride Lot are not expected to be greatly impacted under this alternative.

This alternative would alleviate the need for a double left turn lane from Route 202/4/100 onto the Turnpike ramps at Exit 75. Most of the other local roadway improvements would still be needed. This alternative would have significant right-of-way impacts. Most of the right-of-way impacted for this alternative is within a parcel slated for development. The amount of wetlands is unknown on this site. However, it is expected that there are significant wetlands on the site. It would be very difficult to obtain the permits to build this alternative.

Figure 22 – 2025 Volumes with SB Ramps moved to Kittyhawk



Filename: 2025 PM Move SB Vols.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

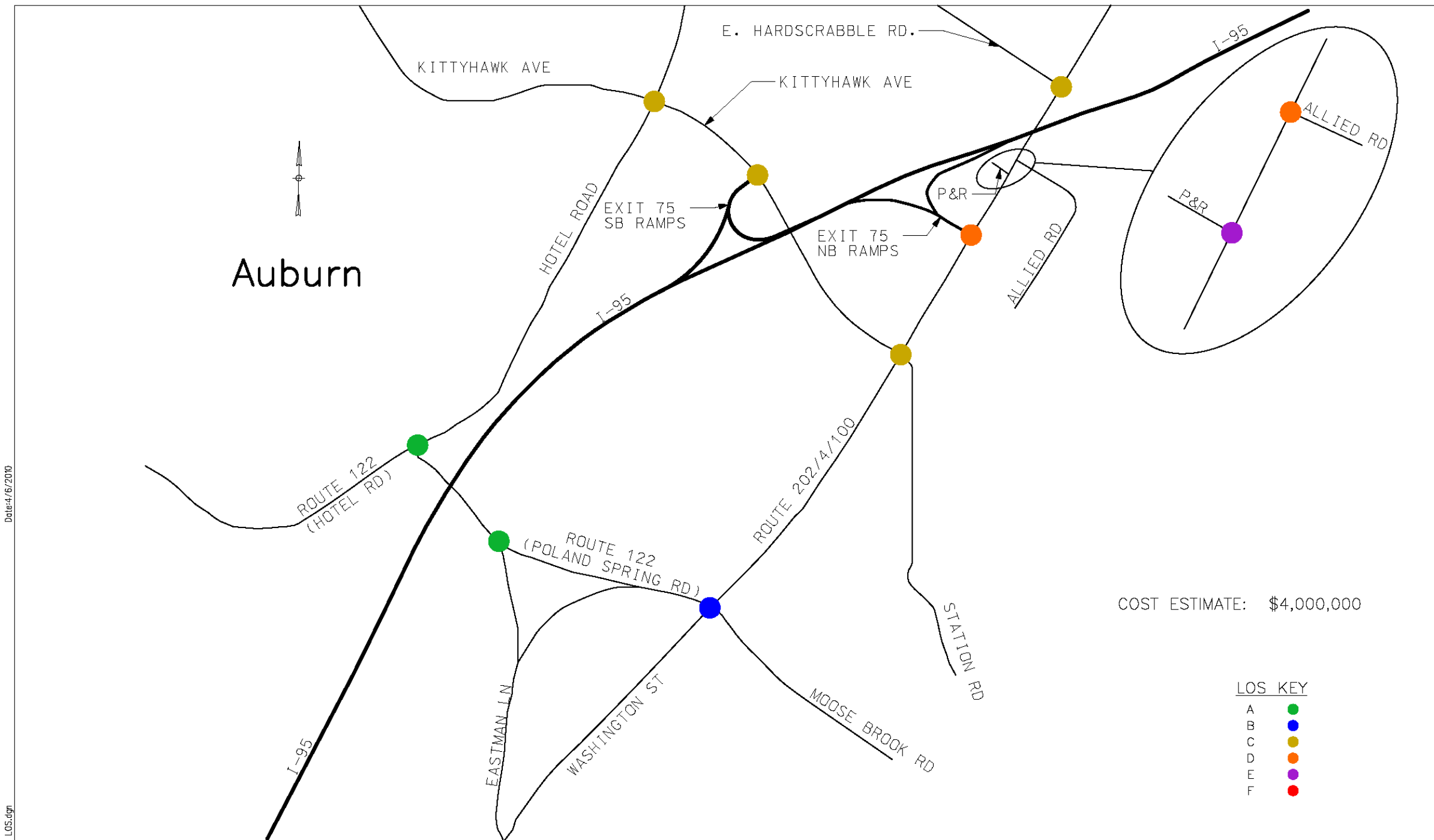
By	Date	By	Date
Designed		Checked	EAR 3/10
Drawn	CDH 3/10	In Charge of	RAL 3/10

340 County Road, Suite 6-C  
 Westbrook, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909



2025 PM Volumes	
Relocate Southbound Ramps to Kittyhawk	
CONTRACT: 09009-XW-975-061	SHEET NUMBER: 1 OF 1

Figure 23 – 2025 LOS Map with SB Ramps moved to Kittyhawk



COST ESTIMATE: \$4,000,000

LOS KEY

- A ●
- B ●
- C ●
- D ●
- E ●
- F ●

Date: 4/6/2010

Filename: 2025\_PM\_Move\_SB\_LOS.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

By	Date	Checked	By	Date
Designed			By	
Drawn	CDH 3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



**THE GOLD STAR  
MEMORIAL HIGHWAY**

EXIT 75 INTERCHANGE STUDY  
INTERSECTION LEVELS OF SERVICE  
2025 MOVE SOUTHBOUND RAMPS

CONTRACT: 09009-XW-975-061

SHEET NUMBER: 1 OF 1

#### ***Alt 4 – Relocating all of the Exit 75 Ramps to Kittyhawk Ave.***

This improvement alternative focuses on relocating all of the I-95 ramps from their current location onto Kittyhawk Ave. Two different options were examined – a folded diamond interchange and a diamond interchange. In a folded diamond interchange, one or more of the ramps are “folded” into a loop (this is shown in Figure 25). The ramps of a folded diamond have a left and a right turn movement from the local street associated with them, which is how this type of interchange is different from a partial cloverleaf interchange.

In addition, other improvements to local intersections and roadways are included that would be needed to reduce traffic congestion and bring the intersections up to acceptable levels-of-service. The intersection and roadway capacity improvements are described as follows.

#### **IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND KITTYHAWK AVE.**

- Widen the Route 202/4/100 northbound approach to accommodate a left turn lane of 400’ length for traffic heading onto Kittyhawk Ave. and an additional shared through/right lane of 150’.
- Widen the Route 202/4/100 southbound approach to accommodate a 250’ channelized right turn lane for traffic heading onto Kittyhawk Ave.
- Widen the eastbound Kittyhawk Ave. approach to accommodate two left turn lanes for traffic heading north on Route 202/4/100.

#### **IMPROVEMENTS TO THE INTERSECTION OF KITTYHAWK AVE. AND HOTEL RD.**

- Add a traffic signal.
- Widen the westbound Kittyhawk Ave. approach to accommodate a 300’ left turn lane for traffic heading south on Hotel Road.
- Widen the southbound Hotel Road approach to accommodate a 200’ left turn lane for traffic heading east on Kittyhawk Ave.
- Widen the northbound Hotel Road approach to accommodate a 150’ right turn lane for traffic heading east on Kittyhawk Ave.
- Widen the eastbound Kittyhawk Ave. approach to accommodate a 200’ shared left/through lane.

#### **IMPROVEMENTS TO KITTYHAWK AVE.**

- Kittyhawk Ave. will need to be widened to two lanes in each direction from Hotel Road to Route 202/4/100 to accommodate the expected traffic that would result from moving all of the I-95 ramps onto Kittyhawk Ave. plus the addition of turn lanes at the interchange intersections described below.

#### **IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW NORTHBOUND RAMPS – *DIAMOND OPTION***

- Add a traffic signal.
- Widen the Kittyhawk Ave. eastbound approach to accommodate a 250’ left turn lane for traffic heading onto the northbound on ramps



- Widen the Kittyhawk Ave. westbound approach to accommodate an additional 200' right turn lane for traffic heading onto the northbound on ramps.

**IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW SOUTHBOUND RAMPS –  
DIAMOND OPTION**

- Add a traffic signal.
- Widen the Kittyhawk Ave. eastbound approach to accommodate a 150' right turn lane for traffic heading onto the southbound on ramps

**Alternative – IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW NORTHBOUND  
RAMPS – FOLDED DIAMOND OPTION**

- Add a traffic signal.
- Widen the Kittyhawk Ave. eastbound approach to accommodate a 250' right turn lane for traffic heading onto the northbound on ramps

**Alternative – IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW SOUTHBOUND  
RAMPS – FOLDED DIAMOND OPTION**

- Add a traffic signal.
- Widen the Kittyhawk Ave. eastbound approach to accommodate a 250' right turn lane for traffic heading onto the southbound on ramps

**COST**

The estimated cost of constructing these improvements, plus relocating all of the Exit 75 ramps, is approximately **\$12.5-13 million**.

**REDISTRIBUTED TRAFFIC**

Changing the location of the ramps will result in changed traffic patterns. The resulting change in traffic patterns was estimated based on trip distribution patterns from the ATRC travel demand model and the traffic weaving survey that was taken at Exit 75. The calculated traffic volumes for 2025 for these improvement alternatives are shown in Figures 24 and 26.

**LEVEL-OF-SERVICE ANALYSIS**

The calculated traffic volumes for these alternatives for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections plus the additional intersections created with these alternatives, with the improvements described, are illustrated in Table 10; and Figures 25 and 27.

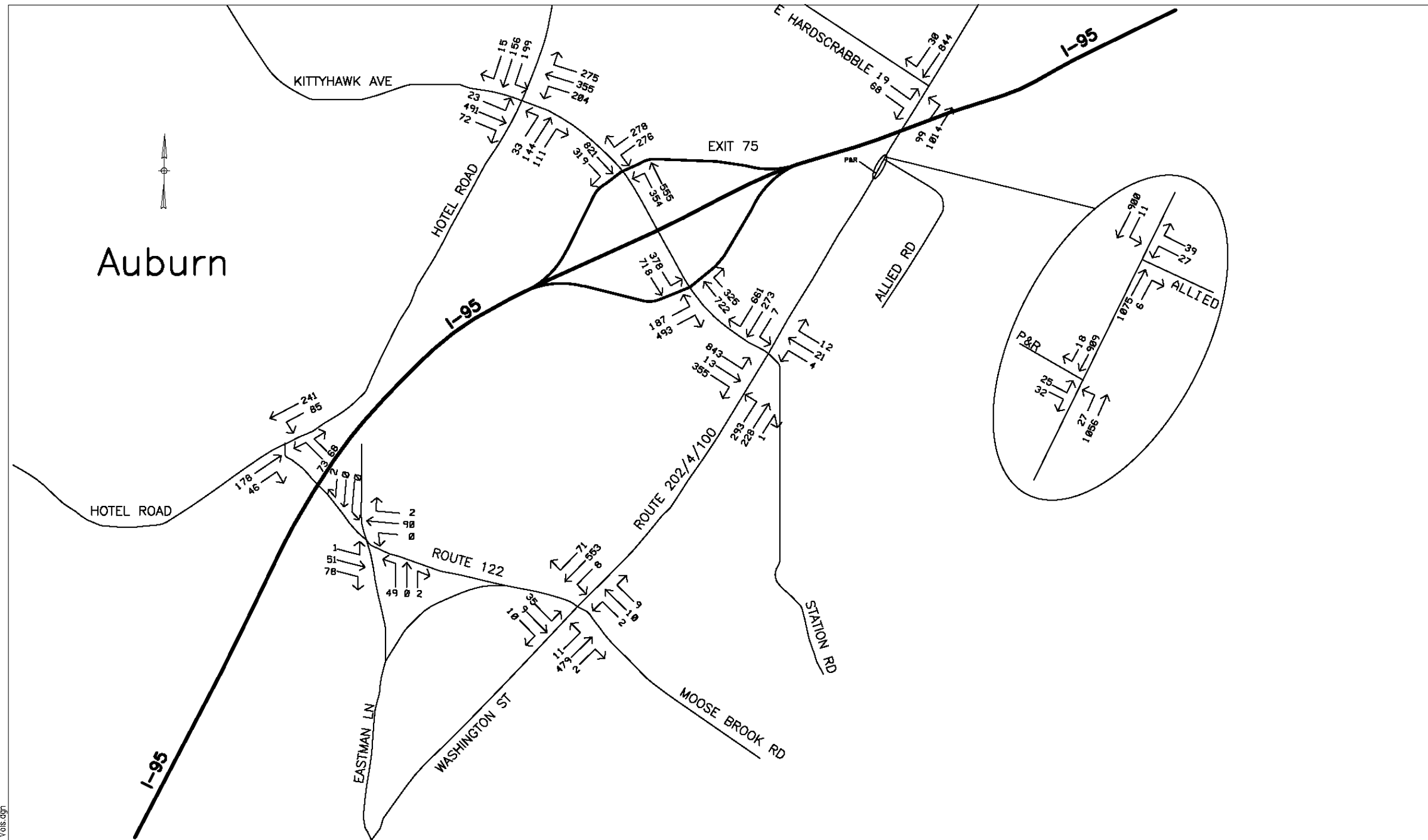
**Table 10 – 2025 Delay & LOS Summary for Relocating all Ramps**

<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	9.9	A
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.2	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	7.0	A
Hotel Rd & Kittyhawk Ave	Signal	30.2	C
Route 202/4/100 & Kittyhawk Ave	Signal	22.5	C
Route 202/4/100 & Exit 75 Ramps	--	--	--
Route 202/4/100 & P&R Access	Stop	13.9	B
Route 202/4/100 & Allied Rd	Stop	24.0	C
Route 202/4/100 & E Hardscrabble Rd	Stop	16.8	C
Diamond Interchange Option Kittyhawk Ave. & Northbound Ramps	Signal	20.0	B
Diamond Interchange Option Kittyhawk Ave. & Southbound Ramps	Signal	21.9	C
Folded Diamond Interchange Option Kittyhawk Ave. & Northbound Ramps	Signal	21.2	C
Folded Diamond Interchange Option Kittyhawk Ave. & Southbound Ramps	Signal	27.1	C

**PROS AND CONS**

As can be seen with this alternative, which includes local roadway improvements, all intersections would be expected to operate at acceptable levels of service. This alternative would have the most right-of-way impacts. In addition to impacting two parcels slated for development, right-of-way along Kittyhawk would be needed for the widening of Kittyhawk to accommodate traffic. The amount of wetlands is unknown within the project site. However, it is expected that there are significant wetlands on the project site. It would be very difficult to obtain the permits to build this alternative.

Figure 24 – 2025 Volumes with Diamond Interchange at Kittyhawk



Filename: 2025 PM Diamond Vols.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

	By	Date	Checked	By	Date
Designed				EAR	3/10
Drawn	CDH	3/10	In Charge of	RAL	3/10

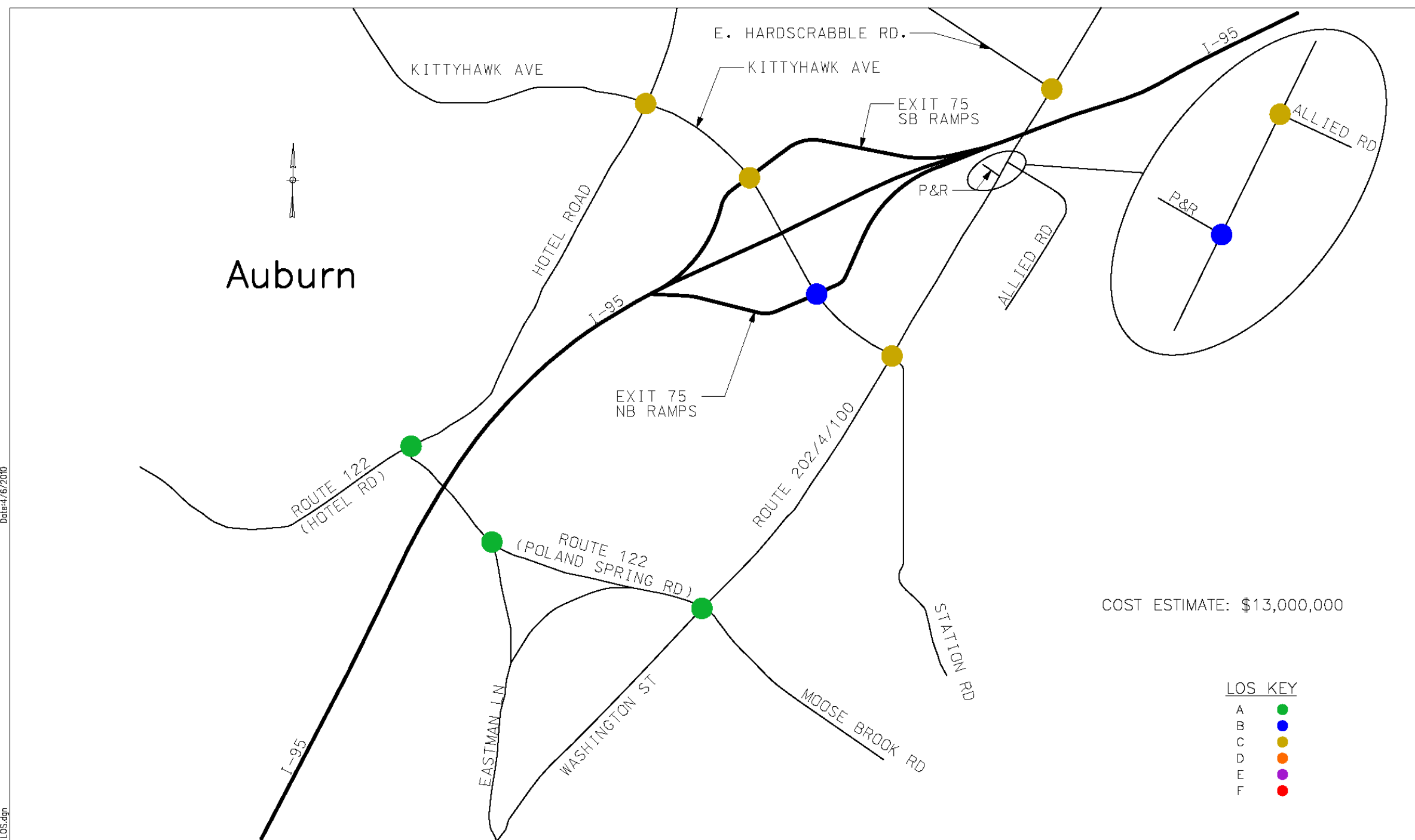
340 County Road, Suite 6-C  
 Westbrook, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909



**THE GOLD STAR  
 MEMORIAL HIGHWAY**

2025 PM Volumes	
Diamond Interchange at Kittyhawk	
CONTRACT: 09009-XW-975-061	SHEET NUMBER: 1 OF 1

Figure 25 – 2025 LOS Map with Diamond Interchange at Kittyhawk



Date: 4/16/2010

Filename: 2025\_PM\_Diamond\_LOS.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

	By	Date		By	Date
Designed			Checked	EAR	3/10
Drawn	CDH	3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909

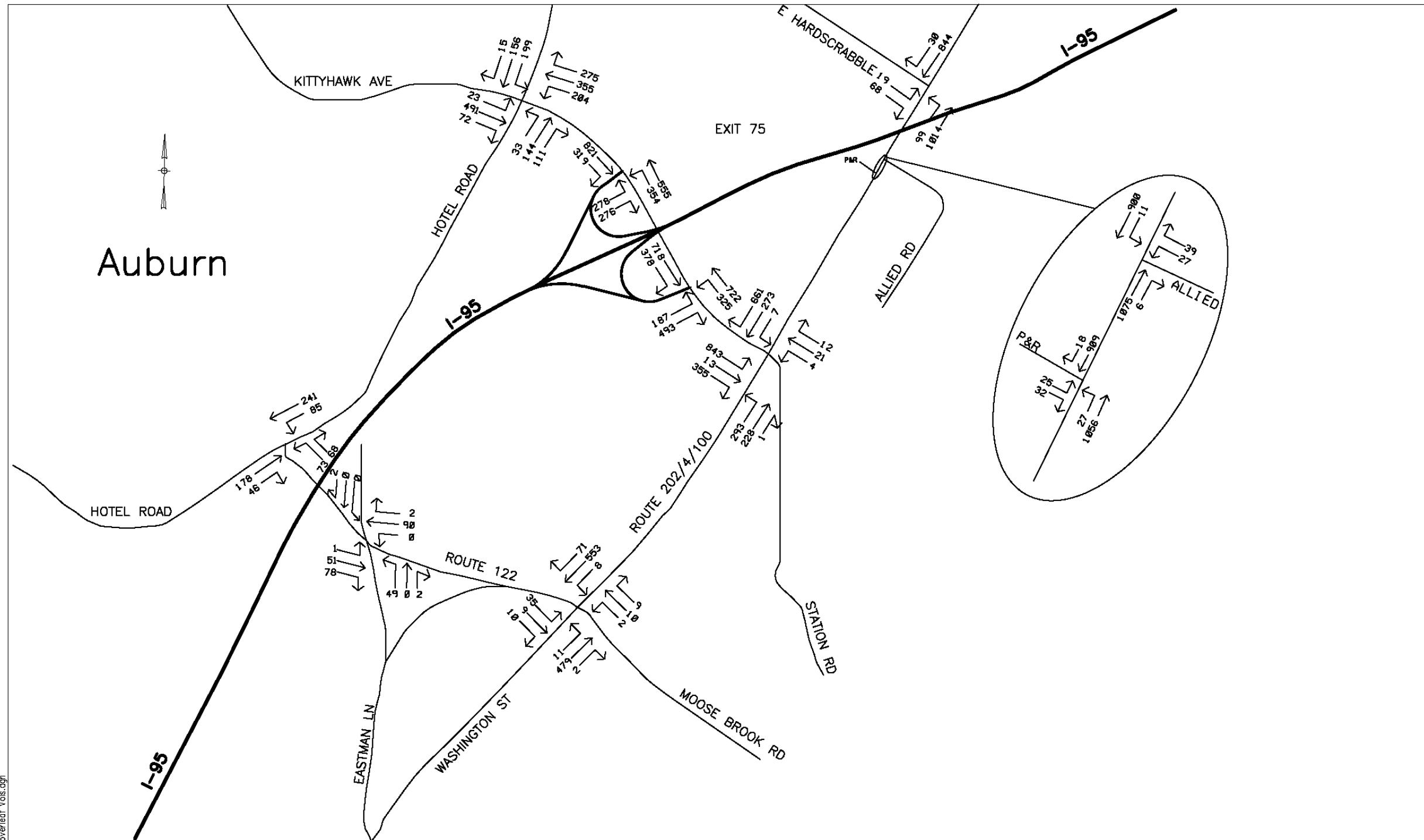


EXIT 75 INTERCHANGE STUDY  
INTERSECTION LEVELS OF SERVICE  
2025 DIAMOND INTERCHANGE

CONTRACT: 09009-XW-975-061

SHEET NUMBER: 1 OF 1

Figure 26 – 2025 Volumes with Folded Diamond at Kittyhawk



Filename: 2025 PM PartialCloverleaf Vols.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

	By	Date	Checked	By	Date
Designed					
Drawn	CDH	3/10	In Charge of	RAL	3/10

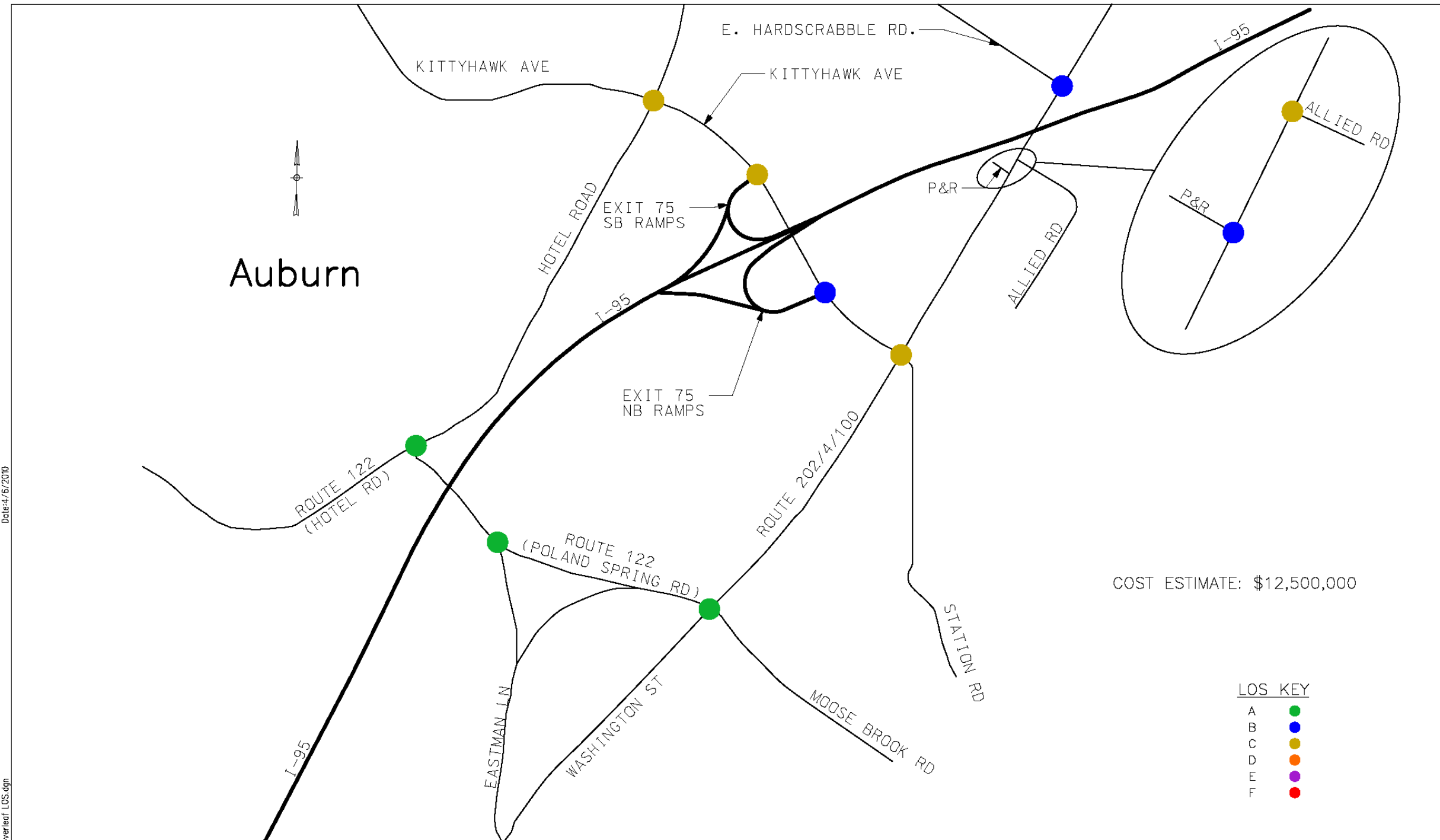
340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



**THE GOLD STAR  
MEMORIAL HIGHWAY**

2025 PM Volumes	
Folded Diamond at Kittyhawk	
SHEET NUMBER:	
CONTRACT: 09009-XW-975-061	1 OF 1

Figure 27 – 2025 LOS Map with Folded Diamond at Kittyhawk



Date: 4/6/2010  
 Filename: 2025\_PM\_PartialCrossoverLeaf\_LOS.dgn

Scale: N.T.S

No.	Revision	By	Date

Designed by:

**HNTB**

By	Date	Checked	By	Date
Designed			EAR	3/10
Drawn	CDH 3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
 Westbrook, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909



EXIT 75 INTERCHANGE STUDY  
 INTERSECTION LEVELS OF SERVICE  
 2025 FOLDED DIAMOND INTERCHANGE

CONTRACT: 09009-XW-975-061

SHEET NUMBER: 1 OF 1

### ***Alt 5 – Adding a Southbound On-Ramp to Kittyhawk Ave.***

This improvement alternative focuses on adding another southbound on-ramp from Kittyhawk Ave. In addition, other improvements to local intersections are included that are needed to reduce traffic congestion and bring the intersections up to acceptable levels-of-service. Under this alternative, the Exit 75 northbound and southbound ramps would remain at their current location. The intersection capacity improvements are described as follows.

#### IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND EXIT 75 RAMPS

- Widen the Route 202/4/100 northbound approach to accommodate two left turn lanes for traffic heading toward the Turnpike.
- Widen the receiving lanes for the Exit 75 on-ramps to accommodate the two left turn lanes from Route 202/4/100.

#### IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND KITTYHAWK AVE.

- Widen the Route 202/4/100 northbound approach to accommodate a left turn lane of 150' length for traffic heading onto Kittyhawk Ave. and an additional shared through/right lane of 200'.
- Widen the Route 202/4/100 southbound approach to accommodate a 150' channelized right turn lane for traffic heading onto Kittyhawk Ave.
- Widen the eastbound Kittyhawk Ave. approach to accommodate two left turn lanes of 300' length for traffic heading north on Route 202/4/100.

#### IMPROVEMENTS TO THE INTERSECTION OF KITTYHAWK AVE. AND HOTEL RD.

- Add a traffic signal.
- Widen the westbound Kittyhawk Ave. approach to accommodate a 200' left turn lane for traffic heading south on Hotel Road.

#### IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW SOUTHBOUND RAMPS

- No improvements needed.

#### COST

The estimated cost of constructing these improvements plus constructing the ramp is approximately **\$2.5 million**.

#### REDISTRIBUTED TRAFFIC

Adding an additional southbound ramp will result in changed traffic patterns. The resulting change in traffic patterns was estimated based on trip distribution patterns from the ATRC travel demand model and the traffic weaving survey that was taken at Exit 75. The calculated traffic volumes for 2025 for this alternative are shown in Figure 28.

#### LEVEL-OF-SERVICE ANALYSIS

The calculated traffic volumes for this alternative for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections with the improvements described are illustrated in Table 11 and Figure 29.

**Table 11 – 2025 Delay & LOS Summary for Adding SB On-ramp**

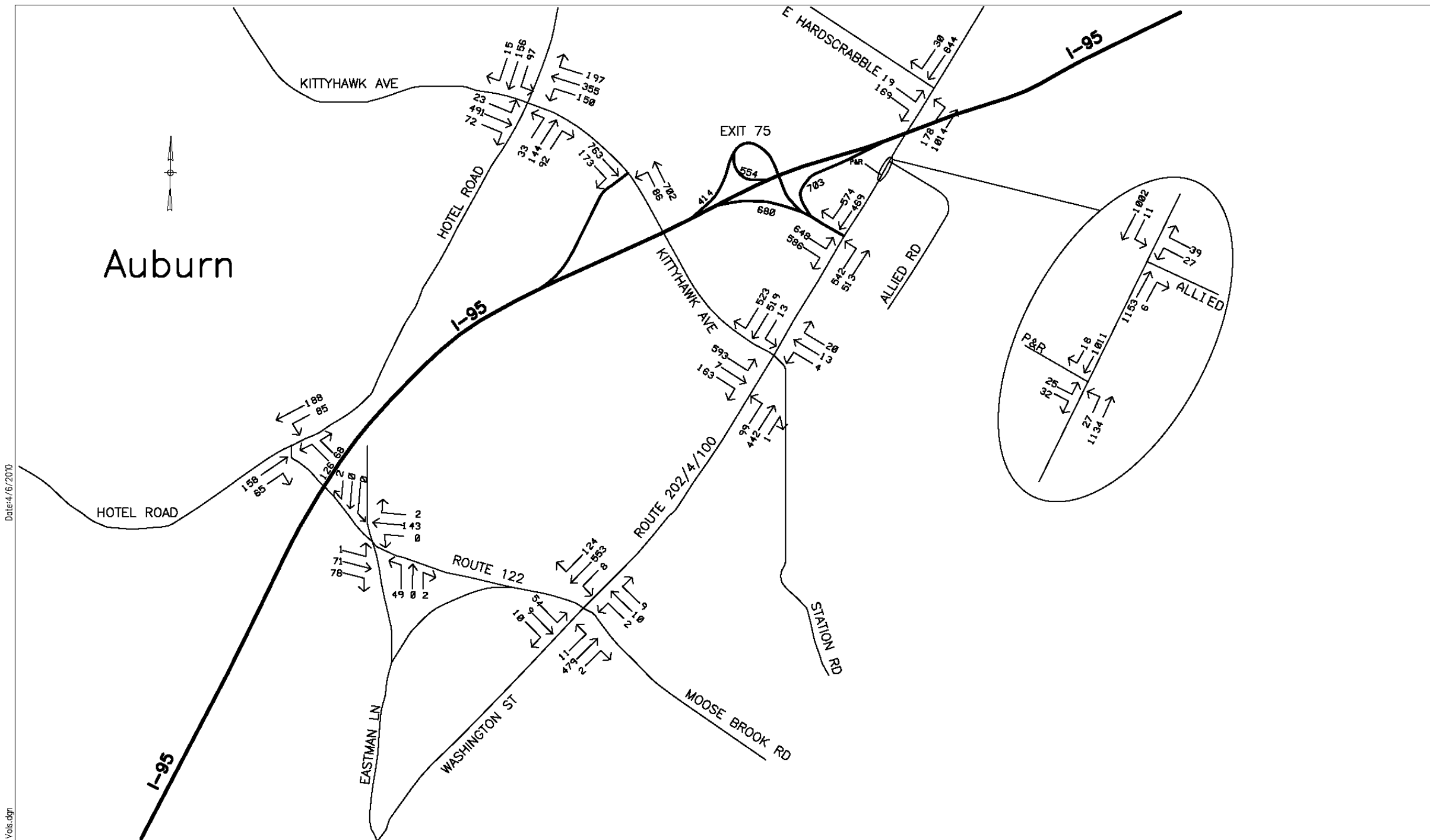
<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	14.2	B
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.6	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	8.8	A
Hotel Rd & Kittyhawk Ave	Signal	24.3	C
Route 202/4/100 & Kittyhawk Ave	Signal	26.4	C
Route 202/4/100 & Exit 75 Ramps	Signal	31.0	C
Route 202/4/100 & P&R Access	Stop	28.8	D
Route 202/4/100 & Allied Rd	Stop	26.5	D
Route 202/4/100 & E Hardscrabble Rd	Stop	16.9	C

**PROS AND CONS**

As can be seen with this alternative, which includes local roadway improvements, all intersections would be expected to operate at acceptable levels of service. This alternative would **not** alleviate the need for the other local roadway improvements. There is not much traffic that could be expected to use this ramp. This alternative would have some right-of-way impacts. Most of the right-of-way impacted for this alternative is within a parcel slated for development. The amount of wetlands is unknown on this site. However, it is expected that there are significant wetlands on the site. It would be very difficult to obtain the permits to build this alternative.



Figure 28 – 2025 Volumes with SB On Ramp added to Kittyhawk



Date: 4/6/2010

Filename: 2025 PM Add SB Vols.dgn

Scale: N.T.S.

No.	Revision	By	Date

Designed by:

**HNTB**

By	Date	By	Date
Designed		Checked	
Drawn	CDH 3/10	In Charge of	EAR 3/10

340 County Road, Suite 6-C  
 Westbrook, ME 04092  
 TEL (207) 774-5155  
 FAX (207) 228-0909



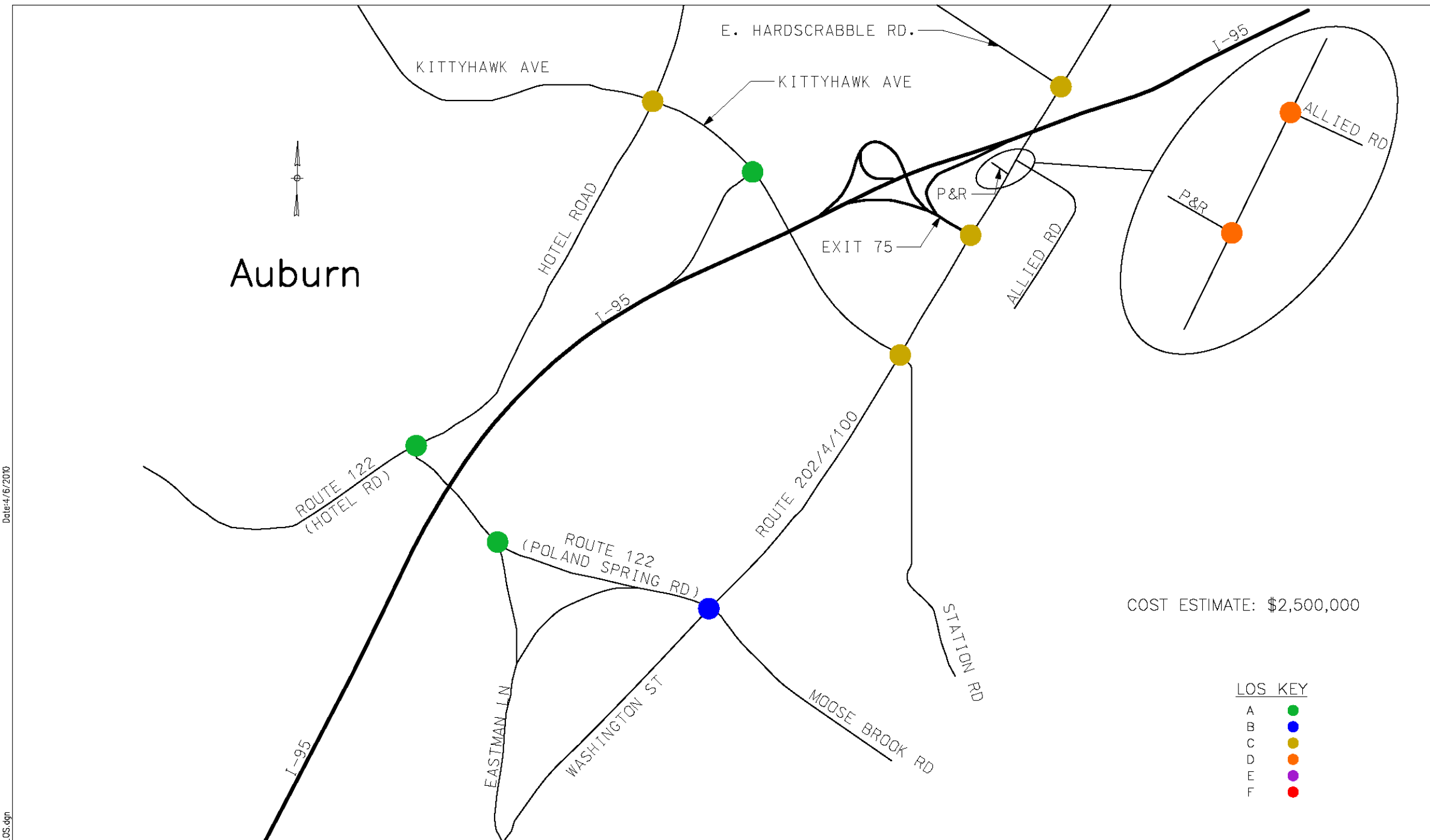
**THE GOLD STAR  
 MEMORIAL HIGHWAY**

2025 PM Volumes  
 Add SB On Ramp at Kittyhawk

SHEET NUMBER: \_\_\_\_\_

CONTRACT: 09009-XW-975-061 1 OF 1

Figure 29 – 2025 LOS Map with SB On Ramp added to Kittyhawk



Date: 4/6/2010

Filename: 2025 PM Add SB LOS.dgn

Scale: N.T.S

No.	Revision	By	Date

Designed by:

**HNTB**

	By	Date	Checked	By	Date
Designed					
Drawn	CDH	3/10	In Charge of	RAL	3/10

340 County Road, Suite 6-C  
Westbrook, ME 04092  
TEL (207) 774-5155  
FAX (207) 228-0909



EXIT 75 INTERCHANGE STUDY  
INTERSECTION LEVELS OF SERVICE  
2025 ADD SOUTHBOUND ON RAMP  
AT KITTYHAWK

CONTRACT: 09009-XW-975-061

SHEET NUMBER: 1 OF 1

### ***Alt 6 – Adding a Southbound On-Ramp and Northbound Off-Ramp to Kittyhawk Ave.***

This improvement alternative focuses on adding another southbound on-ramp and northbound off-ramp onto Kittyhawk Ave. In addition, other improvements to local intersections are included that are needed to reduce traffic congestion and bring the intersections up to acceptable levels-of-service. Under this alternative, the Exit 75 northbound and southbound ramps would remain at their current location. The intersection capacity improvements are described as follows.

#### **IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND EXIT 75 RAMPS**

- Widen the Route 202/4/100 northbound approach to accommodate two left turn lanes for traffic heading toward the Turnpike.
- Widen the receiving lanes for the Exit 75 on-ramps to accommodate the two left turn lanes from Route 202/4/100

#### **IMPROVEMENTS TO THE INTERSECTION OF ROUTE 202/4/100 AND KITTYHAWK AVE.**

- Widen the Route 202/4/100 northbound approach to accommodate a left turn lane of 150' length for traffic heading onto Kittyhawk Ave. and an additional shared through/right lane of 200'.
- Widen the Route 202/4/100 southbound approach to accommodate a 150' channelized right turn lane for traffic heading onto Kittyhawk Ave.
- Widen the eastbound Kittyhawk Ave. approach to accommodate two left turn lanes of 300' length for traffic heading north on Route 202/4/100.

#### **IMPROVEMENTS TO THE INTERSECTION OF KITTYHAWK AVE. AND HOTEL RD.**

- Add a traffic signal.
- Widen the westbound Kittyhawk Ave. approach to accommodate a 200' left turn lane for traffic heading south on Hotel Road.
- Widen the southbound Hotel Road approach to accommodate a 150' left turn lane for traffic heading east on Kittyhawk Ave.

#### **IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW SOUTHBOUND RAMP**

- No improvements needed.

#### **IMPROVEMENTS TO KITTYHAWK AVE. AT THE NEW NORTHBOUND RAMP**

- Add traffic signal.

#### **COST**

The estimated cost of constructing these improvements plus constructing the ramps is approximately **\$4.5 million**.

## REDISTRIBUTED TRAFFIC

Adding an additional southbound ramp and northbound ramp onto Kittyhawk Ave. will result in changed traffic patterns. The resulting change in traffic patterns was estimated based on trip distribution patterns from the ATRC travel demand model and the traffic weaving survey that was taken at Exit 75. The calculated traffic volumes for 2025 for this alternative are shown in Figure 30.

## LEVEL-OF-SERVICE ANALYSIS

The calculated traffic volumes for this alternative for 2025 were input into the traffic capacity model. The delay and LOS ratings for each of the nine study area intersections plus the additional intersection created with this alternative, with the improvements described are illustrated in Table 12 and Figure 31.

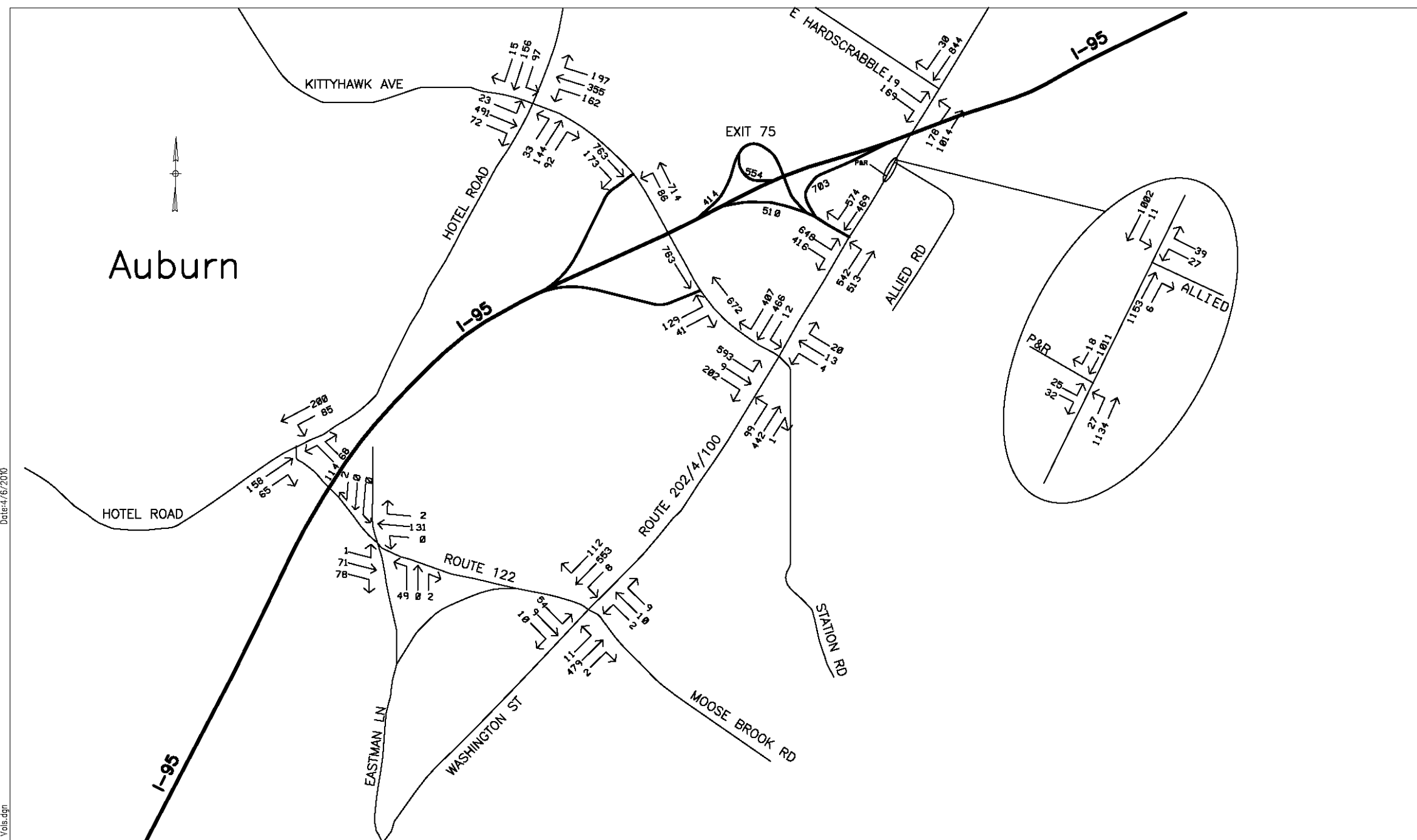
**Table 12 – 2025 Delay & LOS Summary for Adding NB and SB ramps**

<i>Intersection Description</i>	<b>Control</b>	<b>Delay (s)</b>	<b>LOS</b>
Route 202/4/100 & Route 122/Poland Spring Rd	Stop	13.7	B
Route 122/Poland Spring Rd & Eastman Lane	Stop	5.3	A
Hotel Rd & Route 122/Poland Spring Rd	Stop	8.4	A
Hotel Rd & Kittyhawk Ave	Signal	22.7	C
Route 202/4/100 & Kittyhawk Ave	Signal	24.1	C
Route 202/4/100 & Exit 75 Ramps	Signal	34.7	C
Route 202/4/100 & P&R Access	Stop	30.9	D
Route 202/4/100 & Allied Rd	Stop	33.6	D
Route 202/4/100 & E Hardscrabble Rd	Stop	22.7	C
Kittyhawk Ave. & Northbound Ramp	Signal	11.1	B

## PROS AND CONS

As can be seen with this alternative, which includes local roadway improvements, all intersections would be expected to operate at acceptable levels of service. This alternative would **not** alleviate the need for the other local roadway improvements. There is not much traffic that could be expected to use these ramps. This alternative would have significant right-of-way impacts. Most of the right-of-way impacted for this alternative is within two parcels slated for development. The amount of wetlands is unknown on this site. However, it is expected that there are significant wetlands on the site. It would be very difficult to obtain the permits to build this alternative.

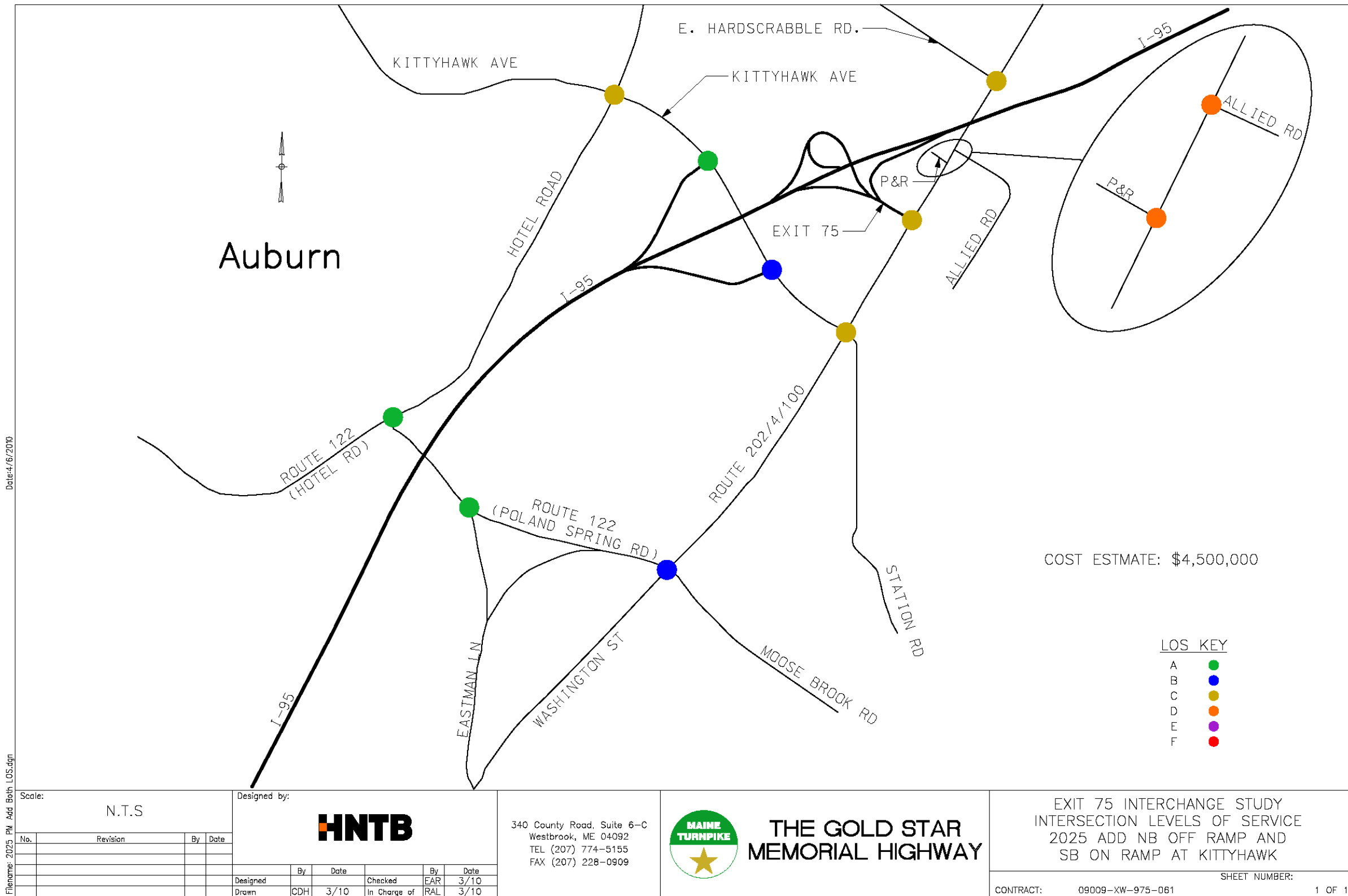
Figure 30 – 2025 Volumes with SB On-Ramp and NB Off-Ramp added to Kittyhawk



Date: 4/6/2010  
Filename: 2025 PM Add Both Vols.dgn

Scale: N.T.S.		Designed by: <b>HNTB</b>		340 County Road, Suite 6-C Westbrook, ME 04092 TEL (207) 774-5155 FAX (207) 228-0909		<b>THE GOLD STAR MEMORIAL HIGHWAY</b>		2025 PM Volumes Add NB Off Ramp and SB On Ramp to Kittyhawk																											
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No.</th> <th>Revision</th> <th>By</th> <th>Date</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		No.	Revision	By	Date													<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>By</th> <th>Date</th> <th>By</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Designed CDH</td> <td>3/10</td> <td>Checked EAR</td> <td>3/10</td> </tr> <tr> <td>Drawn</td> <td>In Charge of</td> <td>RAL</td> <td>3/10</td> </tr> </tbody> </table>		By	Date	By	Date	Designed CDH	3/10	Checked EAR	3/10	Drawn	In Charge of	RAL	3/10	SHEET NUMBER: CONTRACT: 09009-XW-975-061		1 OF 1	
No.	Revision	By	Date																																
By	Date	By	Date																																
Designed CDH	3/10	Checked EAR	3/10																																
Drawn	In Charge of	RAL	3/10																																

Figure 31 – 2025 LOS Map with SB On-Ramp and NB Off-Ramp added to Kittyhawk



## Findings

Phase II of the Exit 75 Transportation Study analyzed the long-term transportation needs of the study area surrounding Exit 75. As part of this effort, 2025 traffic was estimated and analyzed. The geometry and safety of Exit 75 was examined along with the safety of the other adjacent study area intersections.

All of the ramps at Exit 75, except the northbound off-ramp, do not meet the current design guidelines for geometry at freeway ramps. However, an analysis of reported crashes at Exit 75 for the most recent three-year period indicates no safety issues associated with the ramps at the present time. While these results do not indicate an immediate need for geometric improvements, the geometric issues of the ramps may present challenges with future traffic.

Of the study area intersections, only the intersection of Route 202/4/100 and Kittyhawk Ave. is considered a high crash location. A possible improvement for this intersection would be to implement split traffic signal phasing for the Kittyhawk Avenue and the Station Road approaches.

Currently all intersections studied are operating at an acceptable LOS during the PM peak hour. All Exit 75 ramps and weaving sections at the ramps also currently operate at acceptable levels at those locations. However, the amount of traffic that is expected by 2025 will exceed the capacity of several of the intersections in the Exit 75 study area. As a result, the following intersections can be expected to operate at or above capacity by 2025.

- Route 202/4/100 & Route 122/Poland Spring Rd
- Hotel Rd & Kittyhawk Ave
- Route 202/4/100 & Kittyhawk Ave
- Route 202/4/100 & Exit 75 Ramps

Six different build alternatives were evaluated based on their ability to accommodate traffic demand, cost, ability to be permitted, and impacts to right-of-way – particularly developable parcels. They are the following:

- Alt. 1) Local intersection improvements only**
- Alt. 2) Relocating the northbound ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 3) Relocating the southbound ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 4) Relocating all of the Exit 75 ramps to Kittyhawk Ave. plus local intersection improvements**
- Alt. 5) Adding a southbound on-ramp at Kittyhawk Ave. plus local intersection improvements**
- Alt. 6) Adding a northbound off-ramp plus southbound on-ramp at Kittyhawk Ave. plus local intersection improvements**

It should be noted that in addition to improvements to MTA roadways and intersections, roads and intersections under the jurisdiction of the MaineDOT and the City of Auburn were also included and analyzed. Even though recommendations are made for several of the study area

roadways and intersections, only those recommendations for roadways and intersections within the Maine Turnpike right-of-way are assumed to be within the control of the MTA. The other recommendations are provided for planning purposes of MaineDOT and the City of Auburn.

All of the alternatives require improvements to at least some of the local roadway intersections. Two of the improvements that would be required to handle the estimated future traffic, that are constant through all of the alternatives are the following:

- A traffic signal at the intersection of Kittyhawk Avenue and Hotel Road
- A double left turn lane for traffic heading from Kittyhawk Ave. to northbound Route 202/4/100.

All of the alternatives would bring the study area roadway network to acceptable levels-of-service. However, most of the alternatives do not alleviate the traffic conditions to a point where the local intersection improvements, included in Alternative 1, would not be needed by 2025. Alternatives 2 and 3 would alleviate the need for a double left turn from Route 202/4/100 onto the Exit 75 ramps. Alternative 4 would move all of the Exit 75 ramps thereby eliminating the current intersection, but would require widening Kittyhawk Ave. to four lanes from Route 202/4/100 to Hotel.

Alt. 1) Local Intersection Improvements Only would provide the most benefit for the cost, would have the least impacts, and is permissible. Some of the other alternatives could then be built at a later time, if the transportation needs of the area outgrew the capacity for the intersection improvements.

In addition, the acceleration length of the southbound ramp does not currently meet design guidelines. Even though there was no safety issue identified at that location, the Maine Turnpike Authority proposes to also lengthen the acceleration lane for the southbound on-ramp. The acceleration length for the northbound on-ramp will be lengthened as part of the ongoing construction at the mainline bridge over Route 202/4/100.