

## MEMORANDUM

**TO:** Joseph Cahill, TranSystems  
**FROM:** Maureen Chlebek  
**PROJECT:** Northampton I-91 Interchange 19 Project  
**SUBJECT:** Induced Traffic  
**DATE:** September 16, 2010

**PRINCIPALS**  
Joseph W. McMahon, P.E.  
Joseph J. DeSantis, P.E., PTOE  
John S. DePalma  
William T. Steffens  
Casey A. Moore, P.E.  
Gary R. McNaughton, P.E., PTOE

**ASSOCIATES**  
John J. Mitchell, P.E.  
Christopher J. Williams, P.E.  
John F. Yacapsin, P.E.

### Introduction

The purpose of the Northampton I-91 Interchange 19 project is to improve traffic operations at Interchange 19, improve I-91 access, reduce accident levels at the interchange, and adequately prepare for projected growth in the area. A series of conceptual improvement alternatives were developed for the Northampton I-91 Interchange 19 project, which included intersection improvements, interchange modifications, and flyover alternatives. Many of the alternatives have been eliminated from further study. Evaluation of the No-Build Alternative, Concepts 13, 13A, and 13B is being continued.

The Build options consist of improvements at the intersections of Route 9/Damon Road/I-91 NB off-ramp and Route 9/I-91 SB on-ramp and are described below:

- Concept 13: Intersection and Ramp Improvements – Improves existing on and off ramps, adds lanes to intersections for improved traffic flow.
- Concept 13A: Intersection and Ramp Improvements with Roundabout – Converts intersection of Route 9/Damon Road/I-91 NB off-ramp to a roundabout, adds capacity to the signalized intersection of Route 9/I-91 SB on-ramp, and improves existing on and off ramps.
- Concept 13B: Intersection and Ramp Improvements with Double Roundabout – Converts both intersections into roundabouts, improves on and off ramps.

These alternatives do not provide access between Route 9 and I-91 to and from the north. The highway access remains the same, and no alternative traffic routes are provided.

### Induced Traffic

Induced traffic can be defined as new trips attracted to a new or improved transportation facility. McMahon has evaluated the potential for “induced traffic” as a result of the concepts being considered for the Northampton I-91 Interchange 19 project. This memorandum summarizes our findings. “Induced traffic” can result from the behavioral changes of the transport system users in response to improved roadway conditions. In the short term, there are several ways in which users may alter their behavior:

- Change travel route

- Change mode of transportation
- Change destination
- Change trip frequency
- Change time of travel

In the long term, transportation improvements may result in changes in the location of homes and businesses and altered land use growth patterns. For example, a new road and river crossing may facilitate economic development that would not have otherwise occurred or change the location of that development. Regional travel patterns over time may adjust to those changes in land use.

Induced traffic becomes a larger factor when there are significant savings in travel time or cost due to a proposed project. For instance, a large time savings may occur for a particular origin to destination movement when a new river crossing is provided. Induced traffic is likely to occur for projects in areas with a high *elasticity of demand*, such as congested urban environments with competing travel routes. Induced traffic may also occur when there is little or no existing base traffic and the proposed transportation project offers a ground breaking connection.

The specific elements of induced traffic are discussed below in relation to the Northampton I-91 Interchange 19 project.

### **Travel Route Changes**

The alternatives under consideration for the Northampton I-91 Interchange 19 project do not offer new access or connections. Interchange 19 will remain a partial interchange providing access to and from I-91 to the south. This interchange works in pair with Interchange 20, which provides access to and from I-91 to the north. Travellers in the study area seeking to use I-91 are thus unlikely to change travel routes following the construction of the proposed concepts.

The proposed concepts will improve travel times along Route 9. If there were a nearby parallel congested roadway, it is likely that some trips would shift to an improved Route 9. However, Route 9 provides one of the few river crossings in the area; the adjacent river crossings to the north and south are each more than twelve miles away. The magnitude of the expected time savings due to the proposed Route 9 improvements is not great enough to attract a meaningful number of trips from alternate routes. Trips that originate near the midway point between two river crossings are low in volume and the slight variations in travel paths that may occur near the midway point would not result in significant volume changes. In summary, the effect of motorists shifting routes due to the proposed improvements is not expected to be significant.

### **Mode of Transportation Change**

Transit ridership in the study area is dominated by students and others affiliated with one of the Five Colleges. Based upon an on-board customer survey conducted by PVPC in 2009, 83% of the riders on the three routes using Route 9 in the study area (B43, M40, and 39) were

university-affiliated (and thus permitted to ride for free by showing their college identification card).<sup>1</sup> The survey also revealed that 71% of the riders on buses using Route 9 in the study area had “no other mode available to make their trip.” In addition, 54% lived in households that owned no motor vehicles and another 25% in households that had just one motor vehicle. Nearly 90% of the transit riders in the Northampton district of PVRTA, according to the same study, had household income of less than \$20,000. Thus it is likely that most transit users in this corridor are motivated by the desire to reduce motor vehicle ownership expenses, particularly in light of the availability of free public transit (for most) and parking charges and restrictions at UMass, the single largest trip generator. For these reasons, improvements in the roadway network such as those proposed in the current project are unlikely to cause many bus riders to switch to driving, given that the value of the time savings is much less than the cost of car ownership. Furthermore, the time savings would also benefit bus passengers, who would see further travel time improvements if TDM measures such as expanded transit signal priority were adopted.

### **Destination**

The proposed improvement concepts will improve travel time along the Route 9 corridor. However, the magnitude of the overall travel time savings coupled with the proximity of area attractions is not enough to influence trip destinations. For example, consider home-based other trips such as shopping and dining trips. Currently motorists on the Route 9 corridor generally select between downtown Northampton and Hadley. Given that the major mall in Hadley is about 5 miles from Interchange 19 and downtown Northampton is about 1.5 miles, the magnitude of the time savings associated with the intersection improvements along Route 9 are not likely to alter the destinations between Northampton and Hadley. The Route 9 improvements may improve travel time by two to three minutes. The 1.5 mile drive to Northampton is likely to take 3-6 minutes while the drive to Hadley takes 9-12 minutes. Even with a two to three minute time savings, the ride to Hadley is still twice as long as the ride to Northampton.

### **Trip Frequency**

Travel time affects trip frequency. Motorists may reduce the frequency of a trip or consolidate trips if they anticipate travel delays. Given the magnitude of the travel time savings for the improvements being considered, it is not likely that a significant volume of motorists will alter trip frequency as a result of this project. The proposed improvements reduce the overall intersection delay by approximately one minute at each of the two intersections at Interchange 19 based upon 2034 peak hour traffic volumes. Based upon the density and proximity of area trip attractions and productions, a majority of the trips along Route 9 are of a trip length greater

---

<sup>1</sup> *PVRTA Onboard Customer Survey, Northern Service Region*. Prepared under the direction of the Pioneer Valley Metropolitan Planning Organization for the Pioneer Valley Transit Authority by the Pioneer Valley Planning Commission. December 15, 2009.

than five minutes. The time savings realized under the proposed improvements are not significant enough in the overall travel time to alter trip frequency.

### **Time of Travel**

In congested areas, motorists may alter the time of their travel to avoid peak periods. For example, staggered work hours may reduce the peak hour demand on a transportation facility and allow the same volume of traffic to be serviced over a longer period of time. The proposed intersection improvements will improve travel time along the Route 9 corridor. As a result, the added capacity at these intersections may attract peak hour trips that are currently occurring during the non-peak hours. The hourly distribution of Route 9 traffic over the course of a day indicates that there is not a large variation in the traffic volumes that occur between 8 AM and 6 PM. For example, a traffic recorder on Route 9 counted 876 vehicles per hour (vph) during the afternoon peak hour. At noon, 764 vph were recorded, which is only 13% less than the afternoon peak hour. Typically, a principal arterial such as Route 9 will experience a significant rise in traffic during the morning and afternoon peak hour commuter periods. While traffic does increase in the morning and afternoon peak periods, traffic in the midday off peak hours is not much less than peak hour conditions. This applies to directional flow as well as two-way traffic volumes on Route 9. Because traffic volumes near the peak hours are almost as much as in the peak, there is a smaller likelihood that motorists will shift travel to the peak periods, and therefore the proposed intersection improvements are not likely to influence the time of day for travel along Route 9.

### **Regional Travel and Land Use Patterns**

The proposed improvements will not change or provide new access to an area or transportation system. The improvements are not expected to alter regional travel patterns or induce land use changes, since the travel time savings are fairly isolated and of small magnitude. Furthermore, the study area is not situated in an area with high elasticity of demand, such as a highly congested urban environment where traffic relief on one facility is often overtaken by traffic shifts from nearby routes with congested conditions. Route 9 provides the primary east-west travel in Northampton and there is not a similar competing east-west route from which traffic could be attracted.

### **Summary**

The Build options under consideration for the Northampton I-91 Interchange 19 project are not expected to draw a significant volume of induced traffic for the following reasons:

- The Build alternatives do not offer new access or connections. The proposed improvements are relatively modest and do not alter access to the interstate highway system.
- While travel time savings of one to three minutes are anticipated along the Route 9 corridor during peak periods, these savings are not of the magnitude to alter travel routes, destinations, or trip frequency.

- Most bus riders on Route 9 do not have an automobile available as an alternative to taking transit and have low household income. They are unlikely to purchase a motor vehicle because of a modest reduction in travel time. Because they would in any case benefit from the time savings as bus riders, there would be no change in the relative attraction of driving compared to riding the bus.
- Based upon the existing distribution of Route 9 traffic over the course of the day, time of travel modifications are not anticipated due to the proposed improvements.
- Because they represent a marginal improvement rather than a dramatic time savings, the proposed transportation improvements are not likely to alter land use patterns in the surrounding area.