

# M E M O

Date: February 8, 2007  
To: Gail Rosenberg, DCAM  
From: Nick Rubino, Earth Tech  
Subject: DCAM, Proposed Trial Courts Expansion  
Salem, MA  
MBTA Garage Data – Traffic Analysis

As requested, Earth Tech has conducted an additional traffic analysis that includes the impacts of the proposed MBTA parking garage to be located across Bridge Street from the proposed Trial Court expansion in Salem, MA. According to the August, 2004 TAMS/Howard Stein-Hudson report, *15% Design Report*, the proposed garage includes the expansion of the existing surface parking facility to 1,000 spaces, 750 to be open to general public parking and 250 to be reserved for Courthouse use during business hours. The report assumed that a second driveway will be required to access the proposed garage given the increase in demand. According to the report, the additional access will be at the Bridge Street/Washington Street intersection. This will result in a fourth leg being added to this signalized intersection. This memorandum summarizes the impacts of adding the traffic generated from the proposed garage onto the previously analyzed Build Analysis Scenario (2016 volumes with Court House) network covered in Earth Tech's November 2006 Functional Design Report for MassHighway on the proposed changes to the North Street/Bridge Street interchange. The proposed garage was added to the 2016 build with Court House scenario because the schedule for the garage is after the court house project is complete. Earth Tech's analysis includes an evaluation of the origins and destinations of the new trips, as well as properly distributing these trips through the traffic study area.

## ORIGIN AND DESTINATION

According to the TAMS/Howard Stein-Hudson report, the new parking garage will generate an additional 278 vehicle trips during both the AM and PM peak hours. This is the net increase in parking spaces from the existing lot (472) to the proposed lot (750). The majority of traffic generated by the Trial Courts occurs off peak, therefore no additional peak hour trips were assumed due to the increased 250 DCAM/Courthouse spaces. Also, traffic generated by the expanded Trial Court is already included in the 2016 Build Analysis Scenario. It was assumed that 278 trips would be entering the garage during the AM peak hour and 278 trips would be exiting the garage during the PM peak hour. Each of the assumptions above came from the TAMS/Howard Stein-Hudson report. A license plate survey was conducted in September, 2003 at the existing Salem MBTA Commuter Station parking lot, to gain an understanding of the origins of the commuters. The table below summarizes the results of the survey in terms of the percent from each community to the commuter lot.



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#### Salem MBTA Station Commuter Origins

	Beverly	Danvers	Peabody	Salem	Other	Total
Percent	4	11	26	44	15	100

This information was used to distribute the new 278 trips within the roadway network for both peak hours. The additional trips were distributed as follows:

- 106 trips to/from the north traveling along North Street (Route 114).
- 45 trips to/from the west traveling along Bridge Street and Boston Street.
- 49 trips to/from the east traveling along Bridge Street (Route 1A).
- 39 trips to/from the southwest traveling along Essex Street (Route 107).
- 39 trips to/from the southeast traveling along Washington Street (Route 114).

These trips were added to the turning movements at the appropriate intersections to properly distribute them within the study area, to/from the proposed parking garage.

#### TRAFFIC CAPACITY ANALYSIS

Capacity and simulation analyses were performed with the additional 278 trips included in the 2016 Build with courthouse scenario for both the AM and PM peak hours.

Utilizing the proposed MHD Bridge Street improvement plans, the following assumptions/modifications were made to lane usage regarding both the access to the garage, and the roadway network:

- Left turns into the garage from Bridge Street would only be made at the existing Bridge Street/MBTA Drive access. The proposed lane usage at the Bridge Street/MBTA Drive intersection was revised to include an eastbound left turning lane.
- The lane configuration for the proposed second driveway exiting the garage at the Bridge Street/Washington Street intersection will consist of an exclusive left turning lane and a thru/right turning lane. Figure 1 displays the intersection layout before the garage is built and proposed layout once the garage is in place.
- No additional capacity (lanes) were added beyond what is already in place or what is being proposed (by MassHighway). We only changed lane usage and did not add any lanes.

These assumptions came from both Earth Tech, as well as the TAMS/Howard Stein-Hudson report.

As mentioned above, the traffic analysis and evaluation involved adding the new trips from the proposed MBTA parking garage into the 2016 Build with court house Scenario. The primary findings and resolutions from the analyses were as follows:

#### AM Peak Hour

- The additional 106 vehicles traveling south along North Street resulted in a somewhat longer queue approaching the West Ramps intersection. The simulation analysis revealed

that the queue will not back up to Mason Street; therefore no modifications were required.

- The additional 39 vehicles traveling north along North Street make a left turn at the New North Street/Federal Street/West Ramps intersection onto the West Ramps. This resulted in a somewhat longer queue that occasionally exceeded the storage length of the proposed left turning lane. Additional green time was then provided to the northbound left turn to resolve this and prevent the queue from impacting the adjacent signal at Essex Street. This additional green time was taken away from the Federal Street westbound approach. The delay for the Federal Street westbound approach will be somewhat higher, but the queue will still be a manageable length.
- There will be an additional 145 vehicles traveling down the West Ramps towards Bridge Street making a right turn onto Bridge Street. The 145 is the result of the 106 and 39 vehicles previously mentioned. In order to offset the impact of this additional traffic and to prevent a back up along the ramp to North Street, additional green time was given to the ramp approach. This required less green time to be given to the Bridge Street approach, resulting in a somewhat higher delay for the Bridge Street approaches. Given the two lane capacity for the eastbound approach, the queuing will not be problematic and most vehicles will travel through the intersection in one signal cycle.
- There will be an additional 190 vehicles making a left turn into the MBTA Drive from eastbound Bridge Street. The 190 is a result of the 145 vehicles from the West Ramps and 45 additional vehicles traveling east along Bridge Street. As mentioned above, an exclusive left turning lane was included for the eastbound approach. This was done to accommodate the increase in left turning traffic. The proposed MHD improvements for the Bridge Street project allows for the left turning lane to be installed within the proposed curb to curb width without any new physical widening of Bridge Street. This will require the westbound left turning lane at the Bridge Street/West Ramps intersection to be shortened to about half of its length. The simulation analysis reveals that there will still be sufficient storage for the westbound left turns at the Bridge Street/West Ramps intersection.
- The addition of the second MBTA garage access at the Bridge Street/Washington Street intersection will result in 15 exiting vehicles, and 88 entering vehicles. The 88 is a result of 49 right turns from Bridge Street and 39 straight through movements from Washington Street. It was assumed that almost all of the garage exiting vehicles would continue to use the existing Bridge Street/MBTA Drive. An additional phase for the Bridge Street/Washington Street signal will be required for the exiting vehicles, but given the low volume during this peak hour, the intersection will operate similar to the 2016 build with Court House condition without the access.

#### PM Peak Hour

- The main impact during the PM peak hour will be the 106 vehicles traveling north along North Street. It was assumed that 100 of these vehicles would turn right out of the second MBTA driveway at the Bridge Street/Washington Street intersection and then continue up the existing Bridge Street ramp onto North Street. This means that most of

the traffic generated from the new MBTA garage will not travel through North Street/West Ramps/Federal Street intersection during the PM peak hour. The simulation analysis reveals that traffic will occasionally back up from North Street onto Bridge Street, blocking the westbound Bridge Street traffic. This negative impact is directly related to the additional MBTA garage traffic and would have occurred without the DCAM project.

- In addition to the 100 vehicles exiting the new MBTA garage driveway to the right, it was assumed that 88 vehicles would exit straight and to the left. Of the 88 vehicles, 39 will go straight onto Washington Street and 49 will go left heading eastbound on Bridge Street. As previously mentioned, an additional phase will be required at the Bridge Street/Washington Street intersection. The higher exiting traffic during the PM peak hour results in the signal at the intersection operating less efficiently. This will result in longer queues along Bridge Street in both directions. The simulation analysis reveals that the eastbound queue occasionally backs up as far as the existing MBTA Drive access, and almost always backs up past the existing East Ramps intersection. Based on these results, it was determined that the removal of the East Ramps intersection, will provide much better operations along Bridge Street than if the intersection remained and was signalized, as proposed by the MassHighway project.

## SUMMARY

The results of Earth Tech's analysis reveals that even with the additional traffic generated from the new MBTA parking garage, the proposed mitigation improvements from the DCAM project will provide the same or improved operations in the study area.

Certain modifications (described above) will need to be made by the MBTA or MHD to both the existing and proposed intersections and roadways in order to provide the optimal traffic flow through the study area. The most notable impact (backups along Bridge Street and the northbound Bridge Street ramp onto North Street) are directly related to the proposed MBTA garage traffic and they are not a result of the proposed improvements from the DCAM project.

Ultimately, even with the MBTA Garage, the removal of the East Ramps intersection has a positive impact for the study area, particularly along Bridge Street.

Even though additional traffic and some delays for some of the intersection approaches in the study area result from adding the MBTA Garage to the 2016 build with Court House scenario, the overall traffic flow will be still be much better with the East Ramps removed, and the proposed mitigation improvements at the West Ramps.

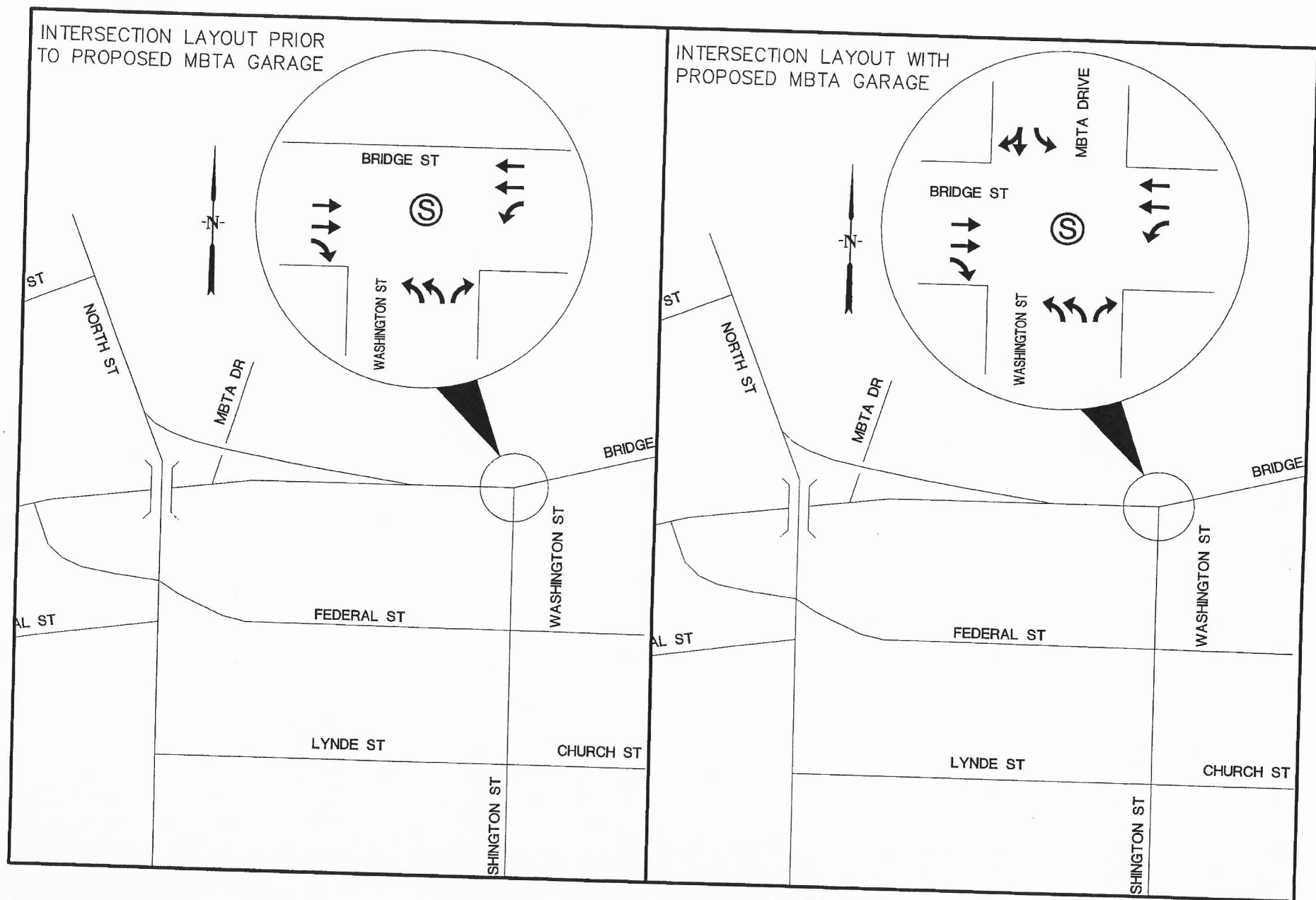


FIGURE 1  
BRIDGE STREET/WASHINGTON STREET LAYOUT  
WITH AND WITHOUT MBTA GARAGE