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MEMORANDUM

To: Cambridge Planning Board

From: Monica R. Lamboy, Interim Director

Date: November 19, 2014

Re: 75 New Street Project - Questions raised about Level of Service

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In response to questions by Planning Board members and residents about the new development at 75 New Street, the Cambridge Traffic, Parking and Transportation Department would like to offer the following additional background about what "Level of Service" (LOS) means.

Vehicle Level of Service – LOS

Vehicle Level of Service (LOS) is a tool that has been used for quite a long time by traffic engineers and planners to measure delay at an intersection. The output is a letter grade A to F. The grade is created from a formula which considers how long a vehicle is expected to be delayed getting through the intersection being measured. The variables include vehicle and pedestrian counts, number of lanes, and traffic signal timing.

LOS is actually a continuum, even though the letter grades make it appear as a step function.

So what do they mean?

A – C = free flow, little delay, not much volume. When we have a location with this letter grade, it means we have low vehicle volumes. That said, even thought vehicles might experience minimal delay, pedestrians and bikes may still not be given enough time. In general, changes can be made without a noticeable adverse impact on the vehicles. Sometimes these signals are frustrating because a vehicle may have a red light with no traffic on the cross street.

D This is a normal busy urban intersection. Vehicles will always get through on the "green" part of a cycle. Balancing time among the needs of all modes is possible.

E This is a congested intersection. At a "high E," vehicles may occasionally have to wait for more than one cycle. This is not automatically a location that needs to be "fixed". This level of delay may be the result of safety improvements which add time, such as a separate phase for left turns, the need to give pedestrians their own phase, impacts at nearby locations that cause back-ups, or other site specific situations. A determination about whether a location can be improved is site specific. Consideration also has to be given to

the tradeoffs with other modes. For example, will reducing vehicle delay increase pedestrian delay? It is not unusual for an active dense urban area like Cambridge to have signals that operate quite appropriately at LOS E.

F These are the problem intersections that are heavily congested, and where vehicles may regularly miss a cycle. They experience significant queuing which often adversely impact adjacent intersections. Congested periods are longer as it takes time for the volume trying to use the intersection to dissipate. The LOS model may not accurately model queues because of the uncertainty of predicting how much queue will be left over from the previous cycle or the delay impacts of a downstream queue. However, even F is a continuum. Even though there is no next letter grade, there can be a measurable increased delay.

How is LOS used in evaluating large project Traffic Studies?

There are 5 traffic impact indicators that are reviewed in a Traffic Impact Study (TIS) per Section 19.20 of the Zoning Ordinance to determine whether a project will have a "substantial adverse impact on city traffic". The Planning Board established the specific thresholds that would "trigger" these indicators. When a TIS indicates an "exceedence," that means that the Planning Board threshold has been exceeded for that particular indicator.

The LOS indicators are triggered when a project-induced LOS reduction or roadway volume increase at any study area intersection is in excess of the amount allowed in the following table:

Existing	With Project
LOS A	LOS C
LOS B, C	LOS D
LOS D	LOS D or 7% roadway volume increase
LOS E	7% roadway volume increase
LOS F	5% roadway volume increase

When these indicators are triggered for a signalized study intersection TPT will work with the proponent's traffic consultant to determine if mitigation is possible to reduce the impacts. Strong Transportation Demand Management (TDM) programs are an effective mitigation tool because they help reduce auto trips overall, especially in the peak hours.

The LOS indicators are based on an existing traffic conditions plus Project generated trips, known as the "Build" scenario. In addition, the TIS evaluates LOS for 5-Year Future Conditions, which include other area development projects and a general background traffic growth rate.