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MEMORANDUM

TO: Mayor Michael J. McGlynn
City of Medford

FROM: Ed Hollingshead, AICP

DATE: December 11, 2009

SUBJECT: Peer Review Green Line Extension Project
EA/DEIR and 4 (f) Statement EEA # 13886

This memorandum was prepared to summarize the findings of our peer review of the Medford section of the referenced EA/DEIR (Document). Attached to this memorandum are individual memoranda containing our completed reviews for the air quality, noise/vibration, visual, traffic, stormwater, and constructability sections of the Document. Outlined below is an overview of the project and our main comments.

Overview

The project's Preferred Alternative involves the extension of the Green Line from Lechmere Square in Cambridge to Route 16 in Somerville. Three stations are proposed in or immediately adjacent to Medford: Ball Square, College Avenue Station, and Route 16.

Due to funding constraints discussed in the Document, the Preferred Alternative is divided into two parts. The first part termed the Proposed Project (Alternative 1) proposes to extend the Green Line from Lechmere to the proposed College Avenue Station at College Avenue in Medford by 2014. The project's second part termed the "Future Full-Build Alternative or the Preferred Project" (Alternative 2), which completes the extension beyond College Station to Route 16 at Medford Hillside, is anticipated to receive funding between 2016 and 2020. Consequently, while the intent is to follow the Proposed Project with the final extension to Route 16 with a minimum of lag time the Future Full-Build Alternative, which can be thought of as beyond College Station, is a later and, realistically, less-certain phase.

In general, the Document is well done and complies to an acceptable degree with the December 1, 2006 Certificate of the Secretary of Environmental Affairs on the October 10, 2006 Expanded Environmental Notification Form.

Having said that, while the directions in the Certificate are followed and required topics are covered, our review as identified issues that need to be responded to in the Final Environmental Impact Report (FEIR).

Our review focuses on the following main topic areas:

- Transportation
- Stormwater
- Wastewater
- Bridges
- Constructability
- Air Quality
- Noise and Vibration
- Visual Impacts

Issues related to our overall findings follow.

General Comments

1. The language used in the Project Description on Pages ES-11 and ES-12 of the Executive Summary is misleading for the Medford segment of the project. This portion of the project is rarely in a full cut section. Therefore, impacts to adjacent properties along the existing Lowell Commuter Rail corridor need to be mitigated in a different manner other than using "green" retaining walls. The only portion in a full cut section is located in the vicinity of the Winthrop Street Bridge. This is the only bridge in Medford where the rail profile is lowered to achieve the necessary vertical clearance. All other segments of the Green Line Extension through the City of Medford are located in a partial cut, at grade, or on retained fill. Widening the rail footprint in these areas will have greater impact to adjacent properties and require other means of mitigation besides the use of "green" retaining walls. What other types of mitigation are being proposed in the City of Medford?

2. In regard to construction staging, the Construction section on Page ES-14 states "Most of the right-of-way is located below the surrounding land surface, reducing potential land acquisitions as well as environmental impacts such as noise and visual changes." This statement is not entirely correct for the Green Line Extension through the City of Medford. Only a limited segment of the project in the vicinity of the Winthrop Street Bridge exhibits an existing cross section as shown in Figure ES-3 (i.e., cut slopes on both sides of the rail corridor). In fact, no portion of the Proposed Project has an existing cross section similar to Figure ES-3. This cross section only applies to the "Future Full Build" Alternative that extends to the Mystic Valley Parkway (Route 16) Station. The Proponent should, in sketch form, similar to Figure ES-3, provide the range of existing cross sections throughout the various segments of the Proposed Project within the City of Medford and include the mitigation treatments for each section.

Based on the construction staging discussion on Page ES-14, it is unclear how only two bridges will require traffic detours during construction. In the preceding sections it states that all four bridges in the City of Medford (Harvard Street, College Avenue, Winthrop Street, and North Street) need to be reconstructed. The Proponent should provide additional details to support the statement that most bridges will not require detours. For all bridges that do require traffic detours, these routes within the City of Medford and detour routes into Medford from replacement of the Broadway Street Bridge in Somerville should be shown.

3. Proponent should provide an emergency response plan showing access and egress locations to the railroad right-of-way to assist emergency personnel when responding to an incident/emergency on a Green Line or Commuter Rail vehicle. This is of particular concern in sections bordered by noise barriers. Who will be the primary respondent to such an incident--City of Medford responders or others?

4. Table 6-2 on page 6-3 states that the project will avoid nighttime construction in residential neighborhoods. As much of the Commuter Rail alignment abuts residential neighborhoods, the proponent

should specify how and where specifically construction activity could occur during revenue hours. All locations of nighttime or weekend construction should be identified and hours of construction identified. Page ES-14 in the document states, "The preliminary analysis of construction staging and sequencing shows that it is feasible to construct the Project while maintaining railroad operations, access to abutters, and traffic and pedestrian paths." Based on the conceptual level of analysis that has been performed up to this point, we believe this statement is misleading. It seems to imply that the current "quality of life" within the City of Medford will go on unaffected by the construction of this project. We do not understand how Commuter Rail operations will be maintained at current levels of service throughout construction. The preliminary staging plans in the EA/DEIR show only one phase of construction occurring during non-revenue hours of operation. Given the proximity of the construction to the existing Commuter Rail tracks, we find it impractical to maintain Commuter Rail service without employing the use of full time flag persons, nighttime construction, or weekend construction activities to minimize disruption to Commuter Rail schedules. All of these methods will affect daily schedules, commuter routes, and pedestrian travel. The Proponent should identify, in more detail, what methods will be used to maintain current service levels.

5. On page ES-38 considerable discussion is devoted to the anticipated noise impacts of the project and the range of potential mitigation measures such as noise walls, noise treatments, and rail lubrication. Please identify specific locations in the City of Medford that qualify for noise treatments and noise walls. The FEIR should indicate areas where mitigation for noise and vibration is needed based on the impact assessment and identify the specific mitigation that will be proposed (e.g., use of ballast along the tracks, sound insulation, sound barriers, maintenance plans).

The EA/DEIR provides the first step in detailing impacts and mitigation. The FEIR should identify specific locations within the City of Medford that require noise or vibration mitigation and provide the specific mitigation being proposed for each location. As feasible, mitigation for noise impacts (particularly window replacements which are unrelated to physical construction in the corridor that might influence construction of some barriers) should be provided prior to the start of construction rather than at the completion of construction as stated in Table 6-1 on page 6-2.

6. On Page 5-116 regarding specific noise mitigation treatment it states, "For many locations along the MBTA Fitchburg and Lowell lines, noise barriers are a feasible and effective means of noise mitigation because the existing right-of-way is lower than sensitive receptors for substantial portions of the Project." While this may be true for segments of the project outside the City of Medford, this is certainly not the case for the Green Line Extension project within the city limits. As identified and stated earlier, much of the corridor within the City of Medford is either in partial cut (i.e., west side in cut/east side at grade), entirely at grade, or entirely on retained fill sections. As a result, the use of sound/noise walls as an effective mitigation measure becomes questionable and, in some cases, impractical. Second-story bedroom windows of residential receptors, for instance, would seem to be extremely difficult to mitigate. Table 5.7-4 on Page 5-117 and Figure 5.7-5 indicate the maximum height noise barrier being proposed in the vicinity of Piggott Road, Lyman Avenue/Charnwood Street is 10 feet. Adjacent to Burget Avenue the proposed noise wall height is only 6 feet. Sensitive receptors in this vicinity are at approximately the same elevation as the rail corridor. Thus, the second stories of these receptors are higher than the noise walls being proposed. Please provide your proposed noise mitigation treatments for this type of situation as it relates to the sensitive receptors along Boston Avenue, Winchester Street, Colby Street, Burget Avenue, Charnwood Road, Orchard Street, Lyman Street, Walkling Court, and Piggott Road.

7. On Page 5-127, Table 5.8-4 Potential Vibration Impacts at Sensitive Receptors Without Mitigation appears not to include many sensitive receptors in its vibration analysis. In the EA/DEIR there is no mention of vibration studies being conducted or vibration monitoring sites being established north of College Avenue Station. In fact, based on Figure 4.8-3 Noise and Vibration Measurement Sites, only two

vibration monitoring sites were established at sensitive receptors along Boston Avenue between College Avenue and Harvard Street near Tufts University buildings. To accommodate the new Green Line tracks, the existing Commuter Rail tracks are being moved as much as 18 feet further east within the existing right-of-way. Consequently, there is the potential for increased vibration to sensitive receptors located along that side of the right-of-way. While Table 5.8-4 does identify potential vibration impacts at sensitive receptors along Winchester Street, Colby Street, Brookings Street, and Piggott Road, it fails to mention any potential vibration impacts to residential sensitive receptors along Burget Avenue, Charnwood Road, Orchard Street/Lyman Avenue, or Walkling Court. Please confirm that these sensitive receptors were included in your vibration analysis, identify the existing vibration levels at these above locations, and, as required by the Secretary's Certificate, please identify specific mitigation measures for each sensitive receptor that requires mitigation.

8. A total of 19 bridges exist along the entire Green Line Extension Corridor. However, only four bridges in the City of Medford are affected by the project - Harvard Street, College Avenue, Winthrop Street, and North Street in Medford.

The Winthrop Street Bridge has inadequate horizontal clearance to accommodate a 4-track (2 Commuter Rail and 2 light rail) system and, thus, would need full replacement to lengthen the main span. The College Avenue Bridge has adequate clearance to accommodate a 4-track system but may need replacement due to its proximity to the proposed College Avenue Station and the subsequent need for a wider cross section to accommodate a new Green Line center platform. The North Street Bridge has adequate horizontal clearance but should be evaluated to confirm its structural integrity. Although the abutments are sufficiently spaced apart, the rail bridge superstructure over Harvard Street needs to be widened to accommodate two additional Green Line tracks. It appears that this widening will impact the vertical clearance beneath the rail bridge, as Harvard Street is concave beneath the bridge. Consequently, it may be that the profile of Harvard Street would need to be lowered to maintain an acceptable clearance. Currently, the section of Harvard Street under the bridge floods in high rain events. Should the profile of Harvard Street need to be altered to maintain vertical clearance due to widening of the bridge the MBTA should address this flooding issue as part of that roadway project.

The FEIR should provide detailed construction staging plans for the reconstruction of each of these bridges and explain how both vehicular and pedestrian traffic is to be maintained throughout the reconstruction activities. These staging plans are essential to determine the impact to emergency response personnel, abutters, and the traveling public. If needed, identify specific detour routes for vehicles as well as pedestrians.

Issue Specific Comments

Air Quality

The document appears to be reasonably thorough and, for the most part, uses methodologies that are consistent with current EPA/DEP guidance. However, as discussed below, a number of issues with the analysis limit the verification of the accuracy of the results. Missing data and methodology details would need to be provided by the author to check the accuracy. However, the errors and inaccuracies described are not likely significant enough to change the overall conclusions presented in the Report, which states that the build alternatives would provide air quality benefits when compared to the No-Build Alternative.

<u>Compliance With the Secretary's Certificate on the Expanded Environmental Notification Form</u>

- The Certificate requires reporting of emission inventory results for CO and PM2.5, these results are not presented in the Report; and

- Quantitative PM10 and PM2.5 hotspot assessments that were not required in the Certificate were included in the analysis using methodology that is not currently endorsed by EPA or FHWA, and therefore the reported results may be misleading to the public.

Affected Environment – Section 4.7

- Report does not provide description of modeling methodology for the Microscale Commuter Rail Evaluation; and

Environmental Consequences – Section 5.6

- The 1-hour CO background concentration is suspect and the 8-hour CO background concentration is not presented;
- No description of the development of PM10/PM2.5 background concentrations is provided;
- The project-opening year, or construction completion year, is not included in the analysis; and
- As required in the Certificate, an attempt to provide a greenhouse gas emission inventory comparison between the alternatives is provided. However, it is incomplete. Although greenhouse gas emissions are calculated for on-road motor vehicles, there is no accounting of greenhouse gas emissions for electricity generation to power the extended Green Line.

Noise and Vibration

The Noise and Vibration Sections of the subject document contain a complete noise and vibration assessment report and methodology, similar to that which would be developed for an Environmental Impact Statement (EIS). The document appears to be reasonably thorough and utilizes methodologies that are consistent with current general practice, as defined in the Federal Transit Administration (FTA) guidance manual *Transit Noise and Vibration Impact Assessment* (Report FTA-VA-90-1003-06, May 2006). The document also complies with the Secretary's Certificate for Noise and Vibration.

However, we would like to point out several portions of the assessment which may be lacking in detail, or which may provide a less than adequate and balanced perspective to the possible noise and vibration exposure to residents that live close to the proposed project. The following presents a summary of our concerns.

Existing Environment – Noise (4.8)

- The background discussion for noise may under emphasize the meaning of the measurement scale (dB) as it relates to human annoyance. For the reader who is not familiar with noise measurements, the quantitative results of the assessment may render the predicted noise level increases as less of an annoyance than will actually be experienced.
- The assessment relies on estimations of 24-hour Ldn from a one-hour noise measurement. This technique could lead to inaccurate characterization of the existing noise level that, in turn, can lead to inaccurate predictions. The report should have included more 24-hour measurements at more locations, especially in parts of Medford other than where Tufts University is located.

Environmental Consequences – Noise (Section 5.7)

- The summary statements imply that there will be no noise impacts with mitigation; however, several mitigation options may not work for practical reasons resulting in higher levels of impact than the report indicates. The FEIR should address these conditions and the consequential reduction in impact mitigation.

- Construction noise impacts are not adequately analyzed, such as effects from required nighttime construction and other operations that are likely to be very disruptive. The FEIR should analyze in detail the types of equipment to be used and the time and frequency of operation and the likely impact from construction operations.
- The report lacks detail to determine impact levels and likely forms of mitigation at individual buildings, and how well the mitigation is expected to perform. The report should include a list of all impacted buildings, the type of mitigation, and whether the mitigation in practice is capable of reducing noise levels sufficiently.
- Noise source reference details for MBTA trains, equipment, and maintenance yard activities are not complete and therefore it is not clear if the assessment is adequate. The report should include an appendix that lists all noise sources including the expected variation in the assumed noise levels.
- The methodology used to determine receptor locations and allocation of measurement data to establish impact criteria is not provided. It is possible that more measurements should have been conducted in areas of Medford other than near Tufts University buildings.

Existing Environment - Vibration (4.9)

- Train vibration measurements were only performed at one location near the Tufts University sports fields and appear to have neglected the residential portions of Medford to the north and south of this area. Additionally, the vibration data shown in the report does not indicate the variation between different MBTA trains, which can be 15 VdB or more. This could lead to inaccurate predictions, or predicted levels that are less than the levels that may actually occur. This issue should be explained in the FEIR.
- The assessment does not include any mention of vibration sensitive businesses in Medford, such as a possible research and development facility that may be sensitive to vibration. As such operations do exist in Medford in and around the Tufts campus, the FEIR should document these uses and either document that increased vibrations will not impact operations or propose sufficient mitigation to manage documented impacts.
- The EA/DEIR does not and the FEIR should include a technical appendix listing equipment used, certifications, etc.
- The discussion and assessment only pertains to effects felt by people. The background discussion should have included some discussion for assessment of possible house damage caused by large displacement oscillations of the rail track.

Environmental Consequences – Vibration (5.8)

- The performance of the proposed vibration mitigation options (ballast mats and resilient fasteners) is not sufficiently referenced and the stated performance levels (10 to 15 VdB for ballast mats) may be greater than what can be practically achieved. This may result in higher vibration levels to nearby residents than proposed. The report should either be more realistic about mitigation, or provide references of actual post installation tests, not conducted by manufacturers, to substantiate claims.
- The number of vibration impacts and vibration levels in the section between Medford Hillside and Mystic Valley Parkway seems proportionally less than other sections of the project. Also, no ground propagation tests were performed in areas to the north and south of the Tufts University ground propagation measurement site. Either more tests and analysis should be performed, or at least an explanation for the inconsistent data should be provided.

- The listing of vibration impacts does not include detailed information for each receptor making it difficult to determine the level of vibration to be expected at each building location. The document should include a list of all affected buildings, including predicted levels and mitigation details.

Constructability

Typical MBTA requirements for Maintenance and Protection of Railroad Traffic state "***under no circumstances shall any equipment or materials be placed or stored within fifteen (15) feet from the centerline of the outside track***." Although in the EA/DEIR it was noted to maintain minimum horizontal and vertical offsets from live track centerlines to work zones and structures, how prevalent is the condition where the referenced 15-foot offset cannot be achieved? In such circumstances it is understood this restriction may require additional off-peak hour work construction. The FEIR should identify all areas requiring that construction occur at night and/or weekends and for any such locations the duration/type of construction activities together with proposed mitigation should be described.

While land acquisitions were discussed for the project, temporary and permanent easements are not addressed in the EA/DEIR. The Certificate required that temporary and permanent construction easements be identified. Consequently, the FEIR should provide a detailed study and investigation of the existing topographic conditions, construction staging, contractor work zone and laydown requirements, contractor construction equipment anticipated to be utilized, potential contractor access/egress locations and major construction tasks to be performed. The information obtained will enable the preliminary temporary and permanent easements to be determined.

The EA/DEIR notes the railroad bridge that carries the MBTA Lowell Line over Harvard Street will have to be reconstructed to add two spans to accommodate four tracks. The bridge inspection report indicated the existing substructure and superstructure require rehabilitation for reuse to satisfy the proposed Green Line projects design life. We recommend documentation regarding these required improvements be provided by the project proponent. As mentioned previously, FST questions if the Harvard Street bridge has adequate vertical clearance based on existing conditions and the need for potential improvements to the Harvard Street alignment under future build conditions. These roadway improvements may also impact the existing utilities such as drainage, wastewater, and water located within the roadway. We recommend the vertical clearance under existing and future build condition be documented as per MassHighway Bridge Manual and that the need for roadway improvements, if applicable, including impacts to the existing utilities, be addressed by the project proponent.

Wastewater and Water

The EA/DEIR does not address or comment upon potential impacts to specific existing wastewater facilities at any of the proposed three station locations, at any of the five bridges, or along the existing train corridor in the City of Medford. The online existing conditions drawings show some manholes, but do not show the pipelines associated with these manholes. The drawings do not indicate whether there are any utilities on the five bridges. Concerning the generation of wastewater at the proposed stations, the EA/DEIR makes one general comment regarding the use of low-flow and waterless fixtures to minimize water consumption and wastewater generation. There are no quantities given for the generation of wastewater at the stations or any discussion on how the stations will be sewered. The FEIR should indicate projected wastewater volumes and confirm with the City of Medford that capacity exists to accommodate the projected volumes. The presence/absence of utilities on bridges impacted by the

project should be noted and, as appropriate, their accommodation during construction staging of the appropriate bridges noted.

Regarding water service, there is no discussion on this topic in the EA/DEIR. While water usage is anticipated to be low, the FEIR should document coordination with the City of Medford regarding capacity available to service Station demands.

Transportation

In general, based on EA/DEIR assumptions related to how far new riders will travel to each station and the low percentage of those riders arriving in cars, the traffic analysis is (with limited comments) adequate and does not depict meaningful impacts to the City of Medford.

However, the EA/DEIR's projections of station-by-station ridership demands are based in part on an assumption that the catchment area for each station is one mile. Based on this assumption, ridership is divided between walking, bicycle, buses, and drop-off/pick-up. Regarding drop-off/pick-up, the EA/DEIR assumes that only five percent of riders will arrive in this manner uniformly for each station. Because the proposed design for the Ball Square Station proposes no area for drop-off/pick-up while College Avenue Station only provides 7 spaces and the Route 16 station only provides 14 spaces, it is critical to traffic operations that both the size of each station's catchment area and the percentage of drop-off/pick-up arrivals be correct. These assumptions are also critical for both traffic operations and parking demand. The EA/DEIR states these values but does not provide documentation to support these assumptions. The FEIR should document that the assumed five percent rate is reasonable based on recorded activity at other urban end-of-the-line stations. For instance, Oak Grove and Forest Hills are end-of-the-line stations on the Orange Line. What is the experience at these locations with the adequacy of short-term parking and what happens when Orange line service is delayed and drivers start to stack up waiting for delayed riders? Where will an ever-increasing number of vehicles wait at Ball Square without impacting traffic flow on busy streets adjacent to this station?

Additionally, the FEIR should document why a one-mile catchment area is reasonable. Particularly for potential riders north of Route 16 with little alternatives to, say, College Avenue Station in less then two miles, it seems unlikely that drop-off will not be an attractive option. If the catchment area was extended such that due to distance, say two miles, very few new riders would access the station on foot, then what happens with the demand for drop-off and long term parking near these end-of-the-line stations? Without a detailed explanation supporting the catchment area and related pick-up/drop-off and even parking demand at these end-of-the-line stations, a final conclusion on traffic impacts is not possible.

The FEIR should also discuss how the MBTA will monitor both drop-off/pick-up activity along with commuter parking on residential streets for the demand cases ultimately documented in the FEIR.

Stormwater

While not expressly subject to the state's Stormwater Standards, the Proponent has committed to comply with these requirements. This is a major environmentally positive commitment on the part of the project. We suggest, however, that while much has been done, the FEIR needs to enhance this effort to document full compliance with these standards. The attached memorandum on stormwater discusses additional steps that should be documented in the FEIR.

Visual

The most significant change would be the loss of forested areas along the right-of-way, reducing the green space visible from local residential areas. In a city like Medford, the tree-lined buffer

between the existing rail lines and the houses and businesses means a lot to the community character of the neighborhoods and to Tufts University.

The wide stand of trees along Boston Avenue across from the Tufts campus buffers the rail corridor. The University's Tisch Library, at the top of the hill, overlooks this stand of trees. The partial loss of this buffer will greatly impact the ambiance of the College.

We recommend that the entire Medford stretch of the Green Line Extension be reviewed again for the FEIR, from a visual point of view, with an eye to the elevation of the abutters in relation to the elevation of the rail corridor.

We recommend also that the existing tree buffer be inventoried before it is removed. The City of Medford has a policy that if trees are removed, the same number of caliper inches need to replaced with new trees in the project. If the trees needed to replace the tree buffer do not fit in the project area, new trees could be planted on the streets of the City of Medford in the neighborhoods adjacent to the project area.

Transportation

Fay, Spofford & Thorndike

Memorandum

To: Ed Hollingshead, AICP

From: Gary Hebert, PE, PTOE

Date: December 11, 2009

Re: Peer review Transportation– Green Line Extension Project Draft Environmental Impact Report, Environmental Assessment, and Section 4(f) Statement (referred to as 'the EA/DEIR') - EOEA # 13886

Traffic Impacts Overview

This peer review focuses on the probable traffic impacts of the Green Line Extension Project in Medford as they pertain to vehicular, pedestrian, and bicycle traffic for the Proposed Project (short term) with a College Avenue Station terminus and the Preferred Alternative (long term) with a Mystic Avenue/Route 16 terminus. The referenced EA/DEIR concludes that the traffic impacts of the Green Line Extension Project are expected to be minimal following construction.

A review of the EA/DEIR indicates that City of Medford traffic-related issues are addressed in several parts of that document including:

- Chapter 4 – Affected Environment, Sub-section 4.6
- Chapter 5 – Environmental Consequences, Sub-section 5.5
- Chapter 6 – Draft Section 61 Findings and Mitigation Commitments
- Appendix A: Responses to Comments on the EENF
- Appendix F: Traffic Analysis

The Green Line Extension Project includes three potential stations within or adjacent to the City of Medford. The Proposed Project includes Ball Square and College Avenue Stations located entirely within the City of Medford. In the long term, the Preferred Alternative extends Green Line service northwestward to a proposed Mystic Avenue/Route 16 Station located in the City of Somerville just northwest of the Medford line. Implementation of the Route 16 Station involves the purchase of two properties within the City of Medford. The Preferred Alternative assumes none of the proposed Green Line Extension stations in Medford will include park and ride facilities. A total of 7 drop-off/pick-up spaces will be provided at

the College Avenue Station, and approximately 14 drop-off/pick-up spaces will be provided at the eventual Mystic Valley Parkway/Route 16 Station. None are proposed for the Ball Square Station.

The EA/DEIR indicates that traffic impacts in Medford will be minimal or beneficial. Detailed traffic analysis sheets in the EA/DEIR traffic technical appendix (Appendix F) indicate that there will be only small differences between the Build and No-Build traffic conditions. However, AM and PM peak hour diagrams showing the projected differences in traffic volumes between alternatives were not provided in EA/DEIR or its appendices for direct comparisons.

There are two key assumptions made in the EA/DEIR that led to the presented ridership forecasts and to the resulting conclusions that traffic impacts associated with the Green Line Extension Project will be minimal.

Specifically, the ridership analysis methodology described in Appendix F of the EA/DEIR indicates that it is assumed that the "catchment area" of a transit station is defined as being within <u>one mile</u> of the station's location, regardless of access mode. This assumption, therefore, includes buses, drop-off/pick-up, bicycles, and walking.

The assumed size of the catchment area sets a limit on the population served by each station and, thus, the potential ridership levels that the service might attract. One of the key consequences of this limited-size catchment area is that future ridership estimates assume *that commuters living to the north and west of the new Medford Green Line stations at distances greater than one mile will not drive to the station areas and park their vehicles in nearby neighborhoods or nearby unrestricted parking spaces and walk to the Stations.* This key assumption will require intensive enforcement if it is to be achieved.

The second key assumption made in the EA/DEIR is that drop-off/pick-up riders will comprise only five percent of the ridership at each station.

Due to the critical importance of these two assumptions, it is highly recommended that the FEIR focus on documenting the validity of them with supporting data, based if possible on actual experiences at other MBTA stations already operational. Of particular interest would be their validity at end-of-the line stations such as what the College Avenue Station in Medford will be with the Proposed Project and what the Mystic Avenue/Route 16 Station will be with the Preferred Alternative. If the actual station catchment areas should prove to be larger than the assumed one mile, resulting in higher-than-anticipated station use and accordingly an increase in the number of people using each of the various access modes, traffic impacts in Medford would be expected to be different, in a negative way, from what has been anticipated in the EA/DEIR. Also, either by itself or in conjunction with a larger catchment area, an actual rate of drop-off/pick-up mode greater than the assumed five percent would potentially result in greater traffic impacts to the street system and neighborhoods surrounding the stations than was estimated in the EA/DEIR.

Detailed Comments

Chapter 4 – Affected Environment Sub-section 4.6

The existing 2008 traffic analyses were generally conducted in accordance with accepted industry procedures and included intersections cited in the December 1,2006 Certificate on the EENF and in accordance with MEPA Traffic Analysis Guidelines. Chapter 4 identifies the following signalized study area intersections within the City of Medford (from Mystic Valley Parkway southerly):

- Mystic Valley Parkway at Auburn Street east and west
- Mystic Valley Parkway at Winthrop Street
- North Street at Boston Avenue
- Winthrop Street at Boston Avenue
- Boston Avenue at College Avenue
- Boston Avenue at Harvard and Warner Streets
- Broadway at Boston Avenue (Ball Square)
- Main Street at Harvard Avenue
- Medford Square – Main Street at High, Salem, and Forest Streets, and Riverside Avenue

Additionally, the following unsignalized study area intersections located within the City of Medford were evaluated in Chapter 4 of the EA/DEIR:

- Boston Avenue at High Street/Sagamore Avenue
- College Avenue at George Street
- Main Street at George Street
- Main Street at Mystic Avenue
- Main Street at South Street/Mystic Valley Parkway EB Ramps (potential future signal location)
- Main Street at Mystic Valley Parkway WB Ramps (potential future signal location)

The EA/DEIR provided information requested in the MEPA Certificate on pedestrian activity and pedestrian mitigation measures in the vicinity of Medford stations. Figures providing AM and PM peak hour pedestrian flow volumes at Medford intersections illustrating existing and projected pedestrian crossing movements at intersections analyzed are included in the EA/DEIR. Figures presenting No-Build and Build traffic volumes are not included in the EA/DEIR.

The list of intersections selected and evaluated within the City of Medford is generally adequate, though Boston Avenue at North Street should be analyzed in the FEIR as an intersection likely to be affected during construction when the North Street Bridge is reconstructed.

An analysis for recent crash data in Medford is also included in the EA/DEIR.

Chapter 5 –Environmental Consequences Sub-section 5.5 – Traffic

The future Build and No-Build traffic analyses were generally conducted in accordance with accepted industry procedures and included intersections cited in the December 1, 2006 Certificate on the EENF. The Build year is 2030, a twenty-two-year horizon from the year 2008 existing conditions for the study. Our review of the intersections indicates that the analyses were performed in accordance with accepted procedures identified in the current Highway Capacity Manual, the industry standard. Also, the traffic impact analyses specifically were prepared to respond to the City of Medford's comment letter dated October 17, 2006.

From a 'big picture' perspective, the two following conditions have the potential to significantly affect traffic conditions in Medford.

1. Traffic conditions during construction of Proposed and Preferred Project

    - During construction of the proposed project to College Avenue Station, reconstruction of three bridges will result in traffic impacts in the City of Medford. College Avenue and Harvard Street bridges in Medford are required to be reconstructed, along with retaining walls adjacent to neighborhoods and commercial abutters. The EA/DEIR indicates that reconstruction of these Medford bridges will not require traffic diversions, while the reconstruction of the Broadway Bridge in Somerville is expected to produce traffic diversions, conceivably both in nearby Medford neighborhoods and in Somerville. We recommend that specific construction phasing plans be developed for all bridges proposed for reconstruction. This will confirm the notion that only the Broadway bridge in Somerville (next to Medford) requires traffic, pedestrian, and/or bike circulation detour plans. For all bridges for which detour plans are

necessary, these plans should be included in the FEIR. The EA/DEIR does not provide a detour plan for the Broadway bridge the one bridge that is slated for closure during reconstruction.

Reconstruction of the Winthrop and North Streets bridges and the retaining walls adjacent to residential and commercial abutters will also produce traffic impacts on the City of Medford during construction of Green Line service to Route 16. Again, detour plans, as appropriate, should be included in the FEIR for each of these bridge locations.

2. Traffic conditions with the proposed Green Line service in operation to both College Avenue Station and Route 16.

    - The potential for traffic operational issues coincident with the opening of Green Line stations primarily relates to the appropriateness of the ridership catchment areas and rate of drop-off assumed in the EA/DEIR. If the EA/DEIR's assumptions on these two issues are correct, then with the comments discussed below, traffic, pedestrian, bicycle and parking issues associated with the project are limited. However, until these assumptions are fully supported in the FEIR, transportation impacts associated with the proposed action remain unclear. These two key assumptions are discussed below.

Assumed Catchment Area and Rate of Drop-off/Pick-up

The EA/DEIR projections of traffic in 2030 are based on the premise that all drop-off/pick-up activity will originate ***within one mile of the new Green Line stations***. The validity of this assumption is particularly questionable for end-of-the-line stations. When the College Avenue and finally the Route 16 Stations represent the end of the line it seems unlikely that drop-off/pick-up activities will not be generated from distances in excess of one mile.

In fact, we note that the FTA on November 13, 2009 published a new policy request in the Federal Register Volume 74, No. 218 that states:

> "All pedestrian improvements located within one-half mile and all bicycle improvements within three miles of a public transportation stop have a *de facto* physical and functional relationship to public transportation. According to a test of activity and use, *pedestrian and bicycle improvements beyond these threshold distances may be eligible for FTA funding if the improvement is within the distance most people can be expected to safely and*

> *conveniently walk or bicycle to use that particular transit service*."

If FTA anticipates riders bicycling up to three miles, it seems reasonable to anticipate drop-off/pick -up activities occurring within this same distance. Certainly, it seems reasonable that these activities will involve populations located beyond one mile from stations.

Even based on the catchment area and arrival modes assumed in the EA/DEIR, questions exist related to the impact of drop-off/pick-up activities on area traffic operations. The following table based on EA/DEIR data presents ridership and drop-off/pick-up at the relevant stations

As indicated in the following table, 30 drop-off/pick-up actions are projected during peak hours at the Ball Square Station **although no location for these actions to occur is proposed**. Consequently, even assuming that the projected number of actions is correct, this represents, on average, a vehicle stopping every two minutes. In the busy afternoon peak hour with on-street parking limited and vehicles arriving as other vehicles continue to await the arrival of passengers, it is reasonable to anticipate a number of vehicles parked or double parked. The FEIR should acknowledge that the EA/DEIR has not addressed this issue and identify locations where drop-off/pick-up activity can safely occur at Ball Square. Without this identification, traffic operations in Ball Square are likely to be impacted by double-parked vehicles.

Future Station	**Peak Hour Drop-off/Pick-up demands***	**Total Daily Drop-off/Pick-up demands***	**Total Daily Riders at Station***
Ball Square Station	30/30	90/90	1,800/1,800
College Avenue	40/35	115/100	2,300/2,000
Mystic Valley Parkway/Route 16	NA/42	NA/120	NA/2,400

Data Source: EA/DEIR Chapter 5 and Appendix F
*Proposed to College Station/Preferred to Route 16
NA – Not Applicable

The preceding table also suggests that the EA/DEIR projects a uniform five percent of the total riders for the Medford Green Line Extension stations is expected to come from drop-off/pick-up activity; the rest will either be arriving by walking, biking, or bus. The EA/DEIR indicates this is typical for such stations. Given the dense urban locations these stations are proposed for, the surrounding high traffic volumes, and the total lack of Station parking at Ball Square and the very limited parking at the College Avenue and Route 16 stations, this assumption of five percent is an important assumption. Again, the FEIR should document that this is a reasonable assumption based on actual behavior at other MBTA end-of-the-line

stations. Simply doubling the drop-off/pick-up rate to 10 percent could have meaningful peak hour implications for each of the proposed stations.

Additionally, it is recommended that the potential drop-off/pick-up 'catchment' area be extended to locations within a 5- to 10-minute *drive* of the College Avenue and Ball Square Stations; e.g., up to two plus miles upstream from each station. Because the MBTA does not propose park and ride facilities at either of the two Medford Stations, we would anticipate higher-than-projected demands for drop-off/pick-up activity from locations more than one mile distant. For instance, the EA/DEIR indicates that an evaluation of demand for parking at the Route 16 Station supported a demand for 300 parking spaces. Although not proposed, this suggests that there is a demand to reach the extended Green Line that exceeds the EA/DEIR's assumed one-mile catchment area. This in turn suggests that drop-off/pick-up activity may be higher than assumed.

Parking

Observations and parking inventory findings presented in the EA/DEIR confirm there are opportunities for parking within 500 feet of the new Medford Stations.

Any available spaces may be subject to use, particularly by motorists picking up passengers in the afternoon and evening or for longer-term parking. Because some Medford neighborhoods have neighborhood parking permit programs, it may be less likely that motorists will attempt to park and ride in neighborhoods. However, with an increased likelihood of more riders driving to stations, the potential for more vehicles on Medford streets exists pending resolution on the catchment and drop-off/pick up assumptions in the FEIR.

Chapter 6 –Section 61 Findings and Mitigation Commitments

Review of Traffic Mitigation measures in the EA/DEIR indicates traffic impact mitigation is proposed at only two intersections in the City of Medford—Boston Avenue at College Avenue (with the Proposed Project) and Boston Avenue at Winthrop Street (with the Preferred Alternative).

The latter intersection requires removal of 12 on-street parking spaces on Boston Avenue for an intersection upgrade that involves re-striping and signal modifications only. According to the data contained in the EA/DEIR, the Project increases intersection traffic by approximately 3 percent during the PM peak hour or approximately 60 trips per hour out of nearly 2,000 trips per hour projected to enter the intersection. The projected level of service with the change modifies the operation from LOS F in both the No-Build and the unmitigated Build to LOS D. AM analysis for this intersection with the Proposed Project was not available for review. While removing on-street parking does improve PM peak hour operations from LOS F to LOS D, it could adversely affect local businesses on Boston Avenue that may rely on an available supply of on-street parking. The FEIR should address this potential impact.

Similarly, the addition of an exclusive-right-turn lane on Boston Avenue at College Avenue, according to the EA/DEIR analysis sheets, improves the overall LOS from an LOS F with both the No-Build and unmitigated Build to LOS D with the mitigated Build. There are drawbacks with the exclusive-right-turn lane. It is located at a busy pedestrian crossing and will conceivably make the crossing more difficult. Provision of an exclusive right-turn lane next to the station within a few feet of the station's proposed drop-off/pick-up location could be problematic from a safety perspective if drop-off/pick-up vehicles queue back into the travel lane on Boston Avenue. Since a portion of the drop-off demands may come from the north, U-turning on Boston Avenue may also become a safety issue, as the proposed alignment for the drop-off/pick-up area is for vehicles to enter facing northbound.

As noted above, the addition of an exclusive-right-turn lane at this location is not pedestrian-friendly, as it creates a longer crossing of College Avenue at the station and encourages higher-speed right turns from College Avenue to Boston Avenue near the proposed drop-off/pick-up lane at the future station. Analysis of the projected volumes indicates that accommodation of the slight increase in traffic at the College Avenue intersection should be balanced by the need to enhance pedestrian flow to and from the station and to monitor (enforce) potential overflow of drop-off/pick-up activity at the seven spaces that may be well used throughout the day. If, as expected, drop-off/pick-up demands are higher than projected, motorists may be double-parked or encroach on parking areas in nearby neighborhoods. We suggest that FEIR revisit this issue.

As listed below, a total of 12 intersections is proposed for pedestrian enhancements in Medford. Of these, four involve pedestrian signal enhancements, two involve wheel chair ramp enhancements, and six involve signs or crosswalk markings only. One of the two wheelchair ramp enhancement locations has already been implemented by the City of Medford. Because the City routinely maintains crosswalk markings, it is assumed that the new markings would need to be reviewed with the City for applicability.

- Mystic Valley Parkway at Auburn Street: - Signalize side street crossings and increase pedestrian walk/flashing don't walk time

- Mystic Valley Parkway at Winthrop Street - Increase pedestrian walk/flashing don't walk time

- Boston Avenue at North Street - Upgrade pedestrian signal heads and increase pedestrian walk/flashing don't walk time

- Boston Avenue at Winthrop Street - Re-stripe crosswalk markings

- Boston Avenue between Winthrop Street and College Avenue - Install warning signage for mid-block crossing
- Boston Avenue at Harvard Street - Re-stripe crosswalk markings
- College Avenue between Boston Avenue and Frederick Street - Signal warrant analysis for possible mid-block pedestrian signal; install if warrants are met
- College Avenue at George Street - Install wheelchair ramps and re-stripe crosswalk markings
- Main Street at George Street - Install wheelchair ramps and add crosswalk markings
- Main Street at Mystic Valley Parkway ramps - Re-stripe crosswalk markings
- Main Street at Harvard Street – Re-stripe crosswalk markings
- Main Street at Mystic Avenue – Re-stripe crosswalk markings

Of the above mitigation measures, the intersection of Boston Avenue with North Street requires additional wheel chair ramps to become ADA compliant and the intersection of Main Street at George Street has recently been upgraded to include new wheel chair ramps and a crosswalk.

As mentioned previously, the FTA on November 13, 2009 published a new policy request in the Federal Register Volume 74, No. 218 that states impacts that could be eligible for FTA funding. We recommend that the Green Line Extension project conform to these distances, should the FTA policy be adopted.

The EA/DEIR indicates that during the peak hours 700-800 pedestrians an hour will access the Ball Square and College Avenue Stations in Medford. At a minimum, if these demands are to occur, sidewalks within ½ mile of the Medford Stations should be addressed from an ADA enhancements perspective. Sidewalks with narrow passageways or rare missing sidewalks, or accessible pedestrian routes that are not compliant with current ADA requirements, should be improved under this Project.

Additional Mitigation Measures

The EA/DEIR in Tables 6-1 and 6-2 commits to working with the Cities (including the City of Medford) to develop station-area parking enforcement plans. It would be appropriate to cite specific examples of what types of actions the Proponent would commit to in working with the City in the FEIR. For instance, monitoring of pick-up/drop-off activity at both stations and before/after surveys of parking demands in residential neighborhoods generated by Green Line riders would be useful. Should these prove to be issues, the Proponent should suggest what next steps would be committed to.

Additionally, should projected drop-off/pick-up estimates be meaningfully understated based on future monitoring, and nearby intersections become an issue with unforeseen double parking and/or congestion, we would recommend the Proponent establish a contingency fund to assist the City in dealing with potential traffic and parking problems.

Substantial bicycle activity was observed on streets in the vicinity of the proposed two Medford Green Line Extension stations at Ball Square and College Avenue during early December. It is recommended that the City also request the Proponent for funds, potentially eligible under the proposed FTA regulation cited above, to address enhancement of bicycle circulation facilities in the vicinity of the stations to improve bicycle access to the Stations. We note that bike lanes were recently added on Broadway in Somerville in the vicinity of the proposed station at Ball Square, but there are none on streets in the vicinity of the proposed Ball Square or College Avenue stations in Medford. We suggest that the MBTA commit to a comprehensive study to identify a system of bike routes in Medford between abutting residential neighborhoods and the proposed stations.

Stormwater

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MEMORANDUM

TO: Ed Hollingshead, AICP

FROM: David Glenn, P.E.

DATE: December 4, 2009

PROJECT: DEIR/EA EEA Number 13886
Green Line Extension
Medford, MA.

SUBJECT: Stormwater Review

As requested, Fay, Spofford & Thorndike, LLC. (FST) has performed a review of the Stormwater Management Plan associated with the above referenced Environmental Assessment/Draft Environmental Impact Report (EA/DEIR) for the Green Line Extension Project. Materials received to date include DEIR/EA Volume 1, dated October 15, 2009 as prepared by Vanasse Hangen Brustlin, Inc (VHB).

In regards to stormwater, the Secretary's Certificate on the Expanded Environmental Notification Form (EENF) required the DEIR to include an overall drainage plan and demonstrate the stormwater management system will comply with the DEP Stormwater Management Standards, including water quality and quantity during construction and post development. The DEIR should include an operations and management plan of the stormwater management system and identify stormwater discharge points and describe any drainage impacts associated with required off-site improvements.

The EA/DEIR, Chapter 5.9 Stormwater provides a general discussion on the above referenced items. FST offers the following comments on the proposed stormwater management system, specifically for compliance with the DEP Stormwater Management Standards.

A) Standard No.1 requires no untreated stormwater discharges or erosion to wetland resource areas.

The DEIR/EA notes a new underdrain system will be constructed along the MBTA commuter rail corridor that will connect to the existing drainage trunk lines beyond the railroad corridor that discharge to the Mystic River. Stormwater runoff from the Ball Square Station will discharge into the existing Harvard Street Drainage. Runoff from the College Avenue Station and Mystic Valley Parkway/Route 16 Station will be directed to the Mystic Valley Parkway/Route 16 Station drainage system, which

discharges to the Mystic River. **FST recommends additional documentation be provided to demonstrate discharge velocities from the existing and proposed outfalls will not cause erosion or scouring at the point of discharge or downstream.**

B) *Standard No.2 requires peak flow attenuation (i.e. no increase in peak stormwater discharge rates).*

A summary table of the net impervious surface changes by station identifies an increase in impervious area for each of the three stations located in Medford. The increase in impervious area consisting of new pavement and rooftops varies from 0.4 to 0.6 acres. Stormwater runoff from each station will discharge into an existing municipal drainage system. **FST recommends a hydraulic analysis for the 2-, 10- and 100-year storms be provided that assesses the potential impacts of the increase of peak flow and volumes to the existing municipal drainage systems.**

C) *Standard No. 3 requires the loss of annual recharge to groundwater be minimized through the use of infiltration measures and annual recharge from post-development shall approximate the annual recharge from pre-development conditions.*

The EA/DEIR provided a general discussion on infiltration systems to be utilized as a component of the stormwater management system based on existing soil conditions. As previously noted, the proposed three stations in Medford will result in the increase in impervious, thereby resulting in a loss of annual recharge to groundwater. **We recommend additional documentation be provided to demonstrate the annual recharge from post-development shall approximate the annual recharge from pre-development conditions and the use of Low Impact Development (LID) measures to be considered.**

D) *Standard No. 4 requires the stormwater management system include a series of Best Managements Practices (BMPs) to demonstrate a total suspended solids (TSS) removal rate of at least 80 percent. Where there is more than one outfall, each outfall shall achieve 80% TSS removal prior to discharge.*

The DEIR/EA states where need, TSS removal would be accomplished by way of a proprietary water quality device. **FST recommends the proposed Stormwater BMP's and TSS Removal Calculation Worksheet be provided for each station to demonstrate compliance.**

E) *Standard No. 5 requires the use of specific stormwater management BMP's from Land Uses With Higher Potential Pollutant Loads (LUHPPLs).* **Does not apply.**

F) *Standard No. 6 Critical Areas.* **Does not apply**.

G) *Standard No. 7 Redevelopment Project.* **Does not apply**.

H) *Standard No. 8 requires an erosion and sedimentation control plan be implemented to prevent impacts during construction and land disturbance activities.*

The erosion and sedimentation control narrative provides a general discussion on controls to be utilized during construction phases of the project. We recommend a more detailed discussion be provided identifying items such as sequence of construction, limits of phasing and placement/type of erosion control measures

I) *Standard No. 9 requires all stormwater management systems have an operation and maintenance plan to ensure the systems function as designed.*

The stormwater operations and maintenance program needs to address the frequency of inspection/cleaning of the proposed Stormwater BMP's. The program should also identify the stormwater management system owner and parties responsible for operation and maintenance of the stormwater facilities.

J) *Standard No. 10 Prohibition of Illicit Discharges.*

The standard has not been addressed in the EA/DEIR.

Wastewater

Fay, Spofford & Thorndike

Memo

To: Richard A. Azzalina

From: Robert H. Letourneau, P.E.

Date: November 20, 2009

Re: Peer Review of Greenline Extension DEIR/EA
Regarding Wastewater Facilities in Medford

Draft Environmental Impact Report/Environmental Assessment and Draft Section 4(f) Evaluation for Greenline Extension Project into the City of Medford

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I have reviewed on-line the above mentioned document as it pertains to the proposed Greenline Extension project into the City of Medford. The subject report does not address or comment upon potential impacts to specific existing wastewater facilities at any of the proposed three station locations, at any of the five bridges, or along the existing train corridor in the City of Medford. The online existing conditions drawings show some manholes, but do not show the pipelines associated with these manholes. The drawings do not indicate whether there are any utilities on the five bridges. Concerning the generation of wastewater at the proposed stations, the report makes one general comment regarding the use of low-flow and waterless fixtures to minimize water consumption and wastewater generation. There are no quantities given for the generation of wastewater at the stations or any discussion on how the stations will be sewered.

Bridges

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ENGINEERS ● PLANNERS ● SCIENTISTS
5 Burlington Woods, Burlington, Massachusetts

MEMORANDUM

TO: Ed Hollingshead, AICP

FROM: John Haladay, PE

DATE: December 11, 2009

SUBJECT: Bridge Review Peer Review Green Line Extension Project
EA/DEIR and 4 (f) Statement EEA # 13886

College Avenue Over MBTA Commuter Rail, Medford (M-12-012)

The bridge is a single-span, prestressed concrete slab bridge supported by wall abutments. The bridge was constructed in 1997.

The bridge was last inspected on July 17, 2009. The Routine Inspection Report indicates that:
Item 58, Deck, is rated 8 – Very Good.
Item 59, Superstructure, is rated 8 – Very Good.
Item 60, Substructure, is rated 8 – Very Good.

Immediately to the north of the existing bridge is a separate utility bridge that supports two large pipes.

The Green Line project DEIR documentation suggests that this bridge requires replacement, due to horizontal constraints for fitting two new tracks below the structure.

Discussion:

- There may be lateral clearance for two additional tracks. Because the existing structure is in very good condition, and because of the difficulties of construction at this site (discussed below), the Green Line Project should carefully review options to fit new tracks in the existing right-of-way without replacing the bridge. The DEIR suggests that the existing commuter rail tracks should be moved 13 feet in the alignment to the east. New Green Line tracks would be placed to the west.

- A new Green Line College Avenue Station is proposed on the alignment north of the College Avenue Bridge. Placement of a new station requires additional track right-of-way width, from 61 feet without the station to a maximum of 81 feet at the station. Ideally, the new proposed College Avenue Station location should be coordinated to minimize track width requirements so that the existing bridge could be reused. To do so requires a study of station siting and track widths as the station location is placed at some distance to the north of the bridge crossing.

If it is determined that the bridge requires replacement due to track width requirements, the following is a discussion of impacts and issues:

- Construction at this site for a new bridge is very constrained. The existing intersection of College Avenue and Boston Avenue is immediately to the west of the west abutment of the bridge. The intersection appears to be congested for many parts of the day. In addition to vehicular traffic, the intersection has very heavy pedestrian traffic from Tufts University.

- Construction of a temporary bridge at this site will be difficult. Immediately to the south is the existing post office/Tufts lounge building. To the north is an existing utility bridge, with further site constraints posed by Boston Avenue and a Tufts administrative building and parking lot.

- For a new, longer span, it may be possible to construct the replacement bridge one half at a time:
  - Build a section of the new bridge wide enough for one lane of traffic to the north of existing with new connections for utilities. To minimize right-of-way and alignment impacts, demolish part of northern face of existing bridge (as much as possible while still providing service for two lanes of traffic).
  - Relocate College Avenue WB onto new section. Demolish additional section of new bridge, providing service still for one lane.
  - Construct more of new bridge, providing service for College Avenue EB.
  - Demolish remaining existing bridge, complete new bridge. The new bridge would be wider than existing, thus providing a right-turn-only lane from College Avenue WB to Boston Avenue NB.

- The existing bridge is the only connection between the main part of the Tufts University campus and athletic facilities and support buildings on the east side of the tracks. Furthermore, the bridge provides access to one of the main Tufts University parking lots on the east side of campus adjacent to Cousins Field. As a result, the bridge supports a very heavy demand for pedestrian traffic. Any construction scheme will need to maintain unfettered pedestrian access at all times during the academic year. This requirement potentially may be lessened during the summer months when school is not in session.

- College Avenue rises in a steep grade from the east approach to cross the tracks. Should the span be lengthened, the vertical control point for this crossing will likely need to be moved further to the east down College Avenue. A careful study will be needed to confirm roadway grade elevations for access along the right-of-way, in particular for Tufts University Halligan Hall to the north, and the Cousins Parking Lot to the south.

- The Green Line Project Full Build will require replacement of Winthrop Street over MBTA Commuter Rail (see also separate discussion). Winthrop Street, along with Harvard Avenue, provides the potential for detours around College Avenue. Should the work proceed with the Full Build option, it will probably be necessary to avoid limiting service to both the College Avenue and Winthrop Street crossings at the same time.

<u>MBTA Commuter Rail over Harvard Street – (M-12-011)</u>

The bridge is a single-span, steel girder floor beam bridge supported by wall abutments. The bridge consists of two separately framed spans supported by the continuous wall abutments

The Green Line project DEIR documentation suggests that this bridge can be widened to support two new tracks crossing Harvard Street.

Discussion:

- The existing crossing of Harvard Street originally had four tracks. Two of the tracks and the superstructure were removed. The wall abutments remain. Assuming the abutments are sound, it should be possible to build new spans in the available slots.

- The Commuter Rail tracks crossing the existing spans are placed at the center of the crossing. Two new spans would be constructed to the east and west of the existing spans. The Commuter Rail tracks would be shifted to the east, using part of the existing

span and one new span. Likewise, the Green Line tracks would be placed on the existing span and one new span to the east.

- The inspection report suggests that the existing substructure and superstructure require some rehabilitation for reuse to satisfy the proposed Green Line project's design life.

- The schedule for new construction and rehabilitation work at Harvard Street should be carefully coordinated with other needed bridge construction/reconstruction for the Green Line project, in particular work at College Avenue.

Broadway Over MBTA Commuter Rail - (S-17-013)

The bridge is a single-span, steel stringer bridge supported by wall abutments. The bridge was constructed in 1973.

The bridge was last inspected on October 24, 2008. The Routine Inspection Report indicates that:
Item 58, Deck, is rated 7 –Good.
Item 59, Superstructure, is rated 6 – Satisfactory.
Item 60, Substructure, is rated 6 – Satisfactory.

The Green Line project DEIR documentation suggests that this bridge requires replacement, due to horizontal constraints for fitting two new tracks below the structure.

Discussion:

- The existing span appears to be not long enough to provide space for two new tracks below in the right-of-way.

- The crossing site at Ball Square is heavily congested. Construction staging for a new crossing will require careful coordination with abutters and traffic on Broadway.

- Due to right-of-way limitations, it appears that construction of a temporary bridge may be difficult. It may be possible to reconstruct the bridge half at a time, providing a minimum of two lanes of service on Broadway.

- Broadway rises in a sharp grade to cross the tracks. For a new, longer span, the vertical control points for this crossing will likely need to be shifted to the east and west. A careful study will be needed to confirm roadway grade elevations for access along the right-of-way for abutters.

Bridges potentially impacted by the Green Line Full Build Option to Mystic Valley Parkway:

North Street Over MBTA Commuter Rail (M-12-014)

The bridge is a three-span, prestressed concrete slab bridge supported by wall abutments and piers. The bridge was constructed in 1997.

The bridge was last inspected on July 17, 2009. The Routine Inspection Report indicates that:
Item 58, Deck, is rated 8 – Very Good.
Item 59, Superstructure, is rated 8 – Very Good.
Item 60, Substructure, is rated 8 – Very Good.

The Green Line project DEIR documentation suggests that this bridge may be reused as part of the Full Build option. Sufficient room is present to fit two new tracks below the structure.

Discussion:

- The inspection report and field visit suggest that the bridge is in good condition and suitable for reuse as part of the Green Line Full Build option. Minor rehabilitation of pavement, joints, and concrete walls may be needed.

- The span layout of the existing bridge is such that new tracks would be placed under each of the approach spans. The Commuter Rail NB track would be shifted to beneath the east approach span, and the SB track would remain under the main span but shifted to the east. New Green Line tracks would be placed under the main span and west approach span. The tracks for both facilities would need to take into account the existing wall piers separating the main span from approach spans.

- Existing traffic patterns in the residential areas to the east of the bridge limit access for through traffic to the south. Unless the pattern of one-way streets is temporarily changed during construction of the other bridges (at Winthrop Street and College Avenue), the North Street crossing would not be useful as a detour route.

- The current approach of North Street to the east of the bridge rises in a very sharp grade that appears to be substandard.

Winthrop Street Over MBTA Commuter Rail (M-12-013)

The bridge is a single-span, steel stringer bridge supported by wall abutments. The bridge was constructed in 1984.

The bridge was last inspected on January 16, 2008. The Routine Inspection Report indicates that:
Item 58, Deck, is rated 7 –Good.
Item 59, Superstructure, is rated 7 –Good.
Item 60, Substructure, is rated 7 –Good.

The Green Line project DEIR documentation suggests that this bridge requires replacement, due to horizontal constraints for fitting two new tracks below the structure. Discussion:

- The existing span appears to be not long enough to provide space for two new tracks below in the right-of-way.

- The crossing site is adjacent to the intersection of Winthrop Street and Boston Avenue. It is in a heavily congested commercial area. Construction staging for a new crossing will require careful coordination with abutters and residential owners on Winthrop Street and Boston Avenue. In particular, one abutter has a driveway access to Winthrop Street immediately to the northeast of the existing bridge.

- Due to right-of-way limitations, it appears that construction of a temporary bridge may be difficult. It may be possible to reconstruct the bridge half at a time, providing a minimum of two lanes of service on Winthrop Street.

Constructability

ENGINEERS FST Since 1914 ***FAY, SPOFFORD & THORNDIKE, LLC***

To: Richard A. Azzalina, P.E.

From: John Haladay, P.E.

Date: December 3, 2009
Regarding Constructability Issues in Medford

Subject Draft Environmental Impact Report/Environmental Assessment and Draft Section 4(f) Evaluation for Green Line Extension Project into the City of Medford

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Comments contained herein are with regard to the **"Draft Environmental Impact Report/Environmental Assessment and Section 4(f) Statement Volume 1**" dated October 2009.

The Certificate of the Secretary of Environmental Affairs on the Expanded Environmental Notification Form for the Green Line Extension, dated December 1, 2006, states the following on pages 13 and 14:

"***Construction Period Impacts***
The EIR should include a discussion of construction phasing, evaluate potential impacts associated with construction activities and propose feasible measures to avoid or eliminate these impacts. It should note whether any blasting will be required. The EIR should identify temporary and permanent construction easements. The proponent must comply with DEP's Solid Waste and Air Quality Control Regulations during construction. The proponent should implement measures to alleviate dust, noise, and odor nuisance conditions (including rodent control), which may occur during construction."

With reference to Chapter 3 Section 3.7.6 **Construction Sequencing and Staging**, FST has reviewed the Report and has the following review comments:

1) Construction Zones and Lay Down Areas

A statement is made that there is limited space for construction zones and lay down areas within or near the rail corridor. There is no general discussion of the various contractor work zone size and lay down area requirements that would be anticipated to complete the tasks associated with the work. Typical Construction Staging Figures 3.7-37 and 3.7-38 are not representative of the various site conditions that will be encountered within the railroad corridor. Further studies need to be completed to develop additional Typical Construction Staging sketches that will enable a further detailed discussion of the \

potential constraints and conditions to be encountered. The discussion should also address contractor work zone requirements for the equipment and work to be performed. Also addressed should be whether or not there are any potential contractor lay down areas available off-site. If it is determined that potential sites do exist, their locations should be identified.

2) MBTA Lowell Line Commuter Rail

The existing MBTA commuter rail service must be maintained throughout construction. With train service on the Lowell Line being provided on weekdays and weekends, work directly impacting the train service will be limited to off-peak daytime and nighttime work. This issue should be discussed for the major construction work tasks that will be performed to properly evaluate and address when the daytime and nighttime impacts will be occurring.

3) MBTA Lowell Line Commuter Rail

As noted in Section 4.5.2.1 **MBTA Lowell Line**, there are 21 inbound and 21 outbound weekday commuter train runs. Weekend and holiday service consists of eight inbound and eight outbound train runs. The times of these train runs should be documented for the current schedule, particularly noting the times of the first trains in the morning and the last trains at night. For work activities occurring adjacent to and in close proximity to the easterly side of the commuter rail tracks, the MBTA will place restrictions on how close to the tracks and what type of work can be performed with regard to Green Line construction. It is anticipated that for much of the work in this area that is directly adjacent to the railroad tracks there will be a requirement for off-peak-hour nighttime work. This requirement should be addressed and discussed for the major construction work tasks that will be performed to properly evaluate and address the potential nighttime impacts to the residential neighborhoods.

4) Maintenance and Protection of Railroad Traffic

Typical MBTA requirements state "***under no circumstances shall any equipment or materials be placed or stored within fifteen (15) feet from the centerline of the outside track***". Although in the report it was noted the necessity to maintain minimum horizontal and vertical offsets from live track centerlines to work zones and structures, it must be determined how prevalent is this condition. It is understood this restriction may require additional off-peak-hour work construction. Whether most of the work will be done in the day or night should be documented.

5) Existing Freight Rail Service

Freight rail service must also be maintained throughout construction, and maintaining this service has implications for construction staging. There is no mention of hours of freight rail operation on weekdays and weekends. As with the commuter rail line, work directly impacting the freight service will be limited to off-peak-hour work. The noise, vibrations, dust, and air quality will negatively affect the residential and commercial neighborhoods as well. This situation should be addressed and discussed for the major construction work tasks that will be performed to properly evaluate and address the daytime and nighttime impacts to the neighborhoods.

6) Land Acquisition

While land acquisitions were discussed in the EA/DEIR for the project, temporary and permanent easements were not addressed. The Certificate required that temporary and permanent construction easements be identified. As noted above, a more-detailed study and investigation of the existing topographic conditions, construction staging, contractor work zone and lay down requirements, contractor construction equipment anticipated to be utilized, potential contractor access/egress locations, and major construction tasks to be performed are needed. The information obtained will enable the preliminary temporary and permanent easements to be determined.

7) Construction Staging and Sequencing

Activity for the new Green Line extension will be dictated by the number and type of bridges to be reconstructed, traffic detours, alternate construction by-pass routes, pedestrian access, commuter rail service, freight rail service, access to commercial and residential areas, contractor work zone requirements, contractor lay down requirements, contractor access/egress requirements, temporary easement requirements, and Life Safety vehicular access. These are items, issues, and concerns that need to be properly addressed during the initial planning and permitting stages. A more detailed study and investigation is warranted to further evaluate, understand, potentially address, and make additional recommendations at this stage to fulfill the EIR requirements.

8) Reconstruction of Harvard Street bridge

Harvard Street's profile as it passes under the rail bridge is concave. In heavy rain events, water ponds in this depression directly under the rail bridge. Given its concave shape, as the rail bridge is widened its eastern and western edges will extend toward the sections of Harvard Street that are at an angle. At these points it is possible that the clearance between Harvard Street and the expanded edges of the rail bridge will be reduced such that they could impact trucks. The Build case clearance at this location should be established in the FEIR. If the existing clearance is reduced such that an impact to vehicular traffic occurs, the proponent may need to adjust the grade of Harvard Street. In such an event, the proponent should address the flooding issue at this location as part of a redesign of Harvard Street.

Air Quality

KM Chng Environmental Inc.

MEMORANDUM

To: Ed Hollingshead (FST)

From: Tim Lavelle (KM Chng)

Subject: EOT Green Line Extension – EIR/EA
- Air Quality Review

Date: 4 December 2009

As requested, we have reviewed the document *Draft Environmental Impact Report/ Environmental Assessment and Section 4(f) Statement* for the Green Line Extension Project (EEA #13886). Our objective was to review the completeness, methodology, and data assumptions for the air quality analysis conducted for the Project.

SUMMARY

The document appears to be reasonably thorough and, for the most part, uses methodologies that are consistent with current EPA/DEP guidance. However, as discussed below, a number of issues with the analysis limit the verification of the accuracy of the results. Missing data and methodology details would need to be provided by the author to check the accuracy. However, the errors and inaccuracies described are not likely significant enough to change the overall conclusions presented in the Report, which states that the build alternatives would provide air quality benefits when compared to the No-Build Alternative.

The following brief summary points identify issues with the document's compliance with the Secretary's Certificate and also problems with missing or incomplete methodology details and data within the air quality sections of the Report. For more explanation of the summary points, this Summary section is followed by a section of Detailed Comments addressing each of the bulleted summary points.

Compliance With the Secretary's Certificate on the Expanded Environmental Notification Form

- The Certificate requires reporting of emission inventory results for CO and PM2.5, these results are not presented in the Report; and
- Quantitative PM10 and PM2.5 hotspot assessments that were not required in the Certificate were included in the analysis using methodology that is not currently endorsed by EPA or FHWA, and therefore the reported results may be misleading to the public.

Affected Environment – Section 4.7

- No description of PM10/PM2.5 persistence factors used to estimate 24-hour and annual results from the 1-hour modeled results is provided;
- Report does not provide description of modeling methodology for the Microscale Commuter Rail Evaluation; and
- The emissions inventory does not present results for CO or PM2.5.

Environmental Consequences – Section 5.6

- The 1-hour CO background concentration is suspect and the 8-hour CO background concentration is not presented;
- No description of the development of PM10/PM2.5 background concentrations is provided;
- The project-opening year, or construction completion year, is not included in the analysis; and
- As required in the Certificate, an attempt to provide a greenhouse gas emission inventory comparison between the alternatives is provided, however it is incomplete. Although greenhouse gas emissions are calculated for on-road motor vehicles, there is no accounting of greenhouse gas emissions for electricity generation to power the extended Green Line.

Air Quality Appendix

- The air quality study protocol is not provided in the Report Appendix for public review;
- It appears that the 8-hour CO concentration results were calculated incorrectly;
- It appears that there are multiple issues with the MOBILE motor vehicle emission factor modeling;
- There are issues with the background concentrations used in the CAL3QHC hotspot modeling for CO, PM10, and PM2.5; and
- There are data input issues with the emission factors used in the CAL3QHC hotspot modeling.

DETAILED COMMENTS

Compliance With the Secretary's Certificate on the Expanded Environmental Notification Form

- The air quality scope in the Secretary's Certificate requires that "the analyses should analyze the following emissions: VOC, NOx, greenhouse gases, carbon

monoxide, particulate matter (PM) and air toxics." Although it appears that CO and PM2.5 emissions were estimated for each alternative as data files in the Air Quality Appendix indicate, the results for these two pollutants are not presented in the EIR.

- The scope requires that the microscale analysis examine localized hotspots for CO concentrations only. Because the study area is located in an attainment area for PM10 and PM2.5 (meaning that EPA recognizes this area as meeting the regulated ambient air quality standards for these pollutants), there are no requirements for including PM10/PM2.5 hotspots in the analysis, and even more so for not including a *quantitative* analysis. Even if PM10/PM2.5 hotspots were required, current Transportation Conformity guidance endorsed by FHWA and EPA calls for *qualitative* assessments only. The agencies are currently in the process of finalizing *quantitative* methodology for PM10 and PM2.5 hotspots in conjunction with the completion and distribution of the MOVES emission factor model, which is scheduled to be released by the end of 2009. Therefore, PM10/PM2.5 modeled concentrations may not be accurate. The results presented are potentially misleading, and should not be included in this Report. This comment also applies to the PM2.5 hotspot analysis conducted for the Microscale Commuter Rail Evaluation, which has further questionable issues described under the Affected Environment section below.

Affected Environment – Section 4.7

- The section describes persistence factors used and how they were developed for modeling 8-hour CO concentrations, however no explanation of persistence factors is provided for the 24-hour PM10 and PM2.5 concentrations or annual PM2.5 concentrations. The persistence factor is used to estimate pollutant concentrations for longer averaging time periods than the 1-hour concentrations predicted by the modeling.
- The Report provides no description of the modeling methodology or the model used in the analysis for the Microscale Commuter Rail Evaluation.
- As discussed previously, meeting compliance with the Secretary's Certificate requires that the existing conditions mesoscale analysis include estimates of PM2.5 and CO emissions, which are not presented in the Report.

Environmental Consequences – Section 5.6

- As in the Affected Environment section, no persistence factors are provided for the PM10/PM2.5 hotspot modeling, no description of methodology for the Commuter Rail Evaluation is provided, and the mesoscale analysis does not present CO or PM2.5 emission results.
- The NAAQS for lead was revised to 0.15 ug/m^3 in October 2008. Table 5.6-1, *National Ambient Air Quality Standards*, should be updated to reflect this revision. This edit has no effect on the analysis or results.
- EPA recommends using the maximum applicable concentration from the last 3 years of monitoring data as the background concentration for microscale modeling. It appears that background concentrations used in the analysis were

extracted from a report published in 2006. No 8-hour CO background concentration is presented in the Report.

- Although PM10 and PM2.5 background concentrations used in the hotspot analyses are presented, no description of how the concentrations were developed is provided. Also, it is unusual to see a 24-hour PM10 background concentration (23 ug/m^3) that is less than the 24-hour PM2.5 background concentration (29.7 ug/m^3), which, again, leaves the PM10/PM2.5 modeling suspect.
- Because of Federal and State-mandated emission controls, which reduce motor vehicle emission rates in future years, the project-opening year (or construction completion year) can often show higher emissions and concentrations than the project-design year. Therefore, the project-opening year is usually included in the air quality analysis for transit projects. The project-opening year for the Green Line Extension was not included in the analysis.
- Greenhouse gases are not a local or regional issue, but a global issue. Although greenhouse gas emissions were estimated for study-area on-road motor vehicle traffic, there is no accounting of emissions from power plants providing the electricity to power the Green Line Extension.

Air Quality Appendix

- The Certificate requires that a study protocol be developed for the Project. Although the Report text alludes to DEP consultation regarding development of the study protocol, the accepted protocol should be included in the Air Quality Appendix for public review.
- It appears that the 8-hour CO concentrations were calculated incorrectly. The analysis uses the 1-hour modeled concentration plus the background concentration multiplied by the persistence factor to calculate the 8-hour values, instead of applying the persistence factor to the 1-hour modeled concentrations and then adding in the 8-hour background concentration. Since no 8-hour CO background concentration is presented in the Report, the 8-hour CO concentration results could not be verified. Since PM10 and PM2.5 persistence factors are also not presented, the modeled microscale results for PM10 and PM2.5 could not be verified.
- Based on the review of the MOBILE emission factor model inputs, there appear to be multiple issues with the emission factor modeling for the 2007 and 2030 calendar years including: vehicle registration data, I/M program data, anti-tampering program data, diesel rebuild effects, diesel sales fractions, ambient temperatures, RVP values and diesel sulfur content. This means that emission factors developed for the project are not completely accurate according to the latest guidance from DEP.
- CAL3QHC CO files show a background ambient concentration of 5 ppm, not 3 ppm as presented in the Report.
- CAL3QHC PM10/PM2.5 files show all free flow links having 0.0 g/mi emission factors. This under-estimates the concentrations estimated for the PM10/PM2.5 microscale analyses. However, as noted previously, quantification of

PM10/PM2.5 hotspot concentrations is not endorsed by FHWA/EPA and this error just leads to further misinterpretation of the results presented in the Report.

- CAL3QHC PM10/PM2.5 files show a background ambient concentration of 5 ug/m^3, which does not match any of the background concentrations presented in the Report. Therefore, based on issues already discussed, and errors of this magnitude, all air quality modeling for this project is considered suspect.

Although there are obvious errors in parts of the analysis, the overall conclusions presented in the Report would not likely change if the errors were corrected.

Noise and Vibration

KM Chng Environmental Inc.

MEMORANDUM

To: Ed Hollingshead (FST)

From: Martin Brien (KM Chng)

Subject: EOT Green Line Extension - EA
- Noise and Vibration Preliminary Review

Date: 25 November 2009

As requested, we have reviewed the document *Draft Environmental Impact Report/ Environmental Assessment and Section 4(f) Statement* for the Green Line Extension Project (EEA #13886). Our objective was to review the completeness and methodology of those documents with regard to possible noise and vibration exposure to neighbors of the project, with particular concern for the portions of the project within Medford city limits.

SUMMARY

The Noise and Vibration Sections of the subject Environmental Assessment (EA) document contain a complete noise and vibration assessment report and methodology, similar to that which would be developed for an Environmental Impact Statement (EIS). The document appears to be reasonably thorough and utilizes methodologies that are consistent with current general practice, as defined in the Federal Transit Administration (FTA) guidance manual *Transit Noise and Vibration Impact Assessment* (Report FTA-VA-90-1003-06, May 2006). The document also complies with the Secretary's Certificate for Noise and Vibration, as stated in the EA.

However, we would like to point out several portions of the assessment which may be lacking in detail, or which may provide a less than adequate and balanced perspective to the possible noise and vibration exposure to residents that live close to the proposed project. The following presents a summary of our concerns. The summary is followed by a detailed account with references to the EA document providing specific reasons for the concerns.

Environmental Consequences – Noise (Section 5.7)

- The summary statements imply that there will be no noise impacts with mitigation; however, several mitigation options may not work for practical reasons resulting in higher levels of impact than the report indicates. The report should address these conditions and the consequential reduction in impact mitigation.
- Construction noise impacts are not adequately analyzed such as effects from required nighttime construction and other operations that are likely to be very disruptive. The report should analyze in detail the types of equipment to be used and the time and frequency of operation and the likely impact from construction operations.
- The report lacks detail to determine impact levels and likely forms of mitigation at individual buildings, and how well the mitigation is expected to perform. The report should include a list of all impacted buildings, the type of mitigation, and whether the mitigation in practice is capable of reducing noise levels sufficiently.
- Noise source reference details for MBTA trains, equipment and maintenance yard activities is not complete and therefore it is not clear if the assessment is adequate. The report should include an appendix that lists all noise sources including the expected variation in the assumed noise levels.
- The methodology used to determine receptor locations and allocation of measurement data to establish impact criteria is not provided. It is possible that more measurements should have been conducted in areas of Medford other than near Tufts University buildings.

Environmental Consequences – Vibration (5.8)

- The performance of the proposed vibration mitigation options (ballast mats and resilient fasteners) is not sufficiently referenced and the stated performance levels (10 to 15 VdB for ballast mats) may be greater than what can be practically achieved. This may result in higher vibration levels to nearby residents than proposed. The report should either be more realistic about mitigation, or provide references of actual post installation tests, not conducted by manufacturers, to substantiate claims.
- The number of vibration impacts and vibration levels in the section between Medford Hillside and Mystic Valley Parkway seems proportionally less than other sections of the project. Also, no ground propagation tests were performed in areas to the north and south of the Tufts University ground propagation measurement site. Either more tests and analysis should be performed, or at least an explanation for the inconsistent data should be provided.
- The listing of vibration impacts does not include detailed information for each receptor making it difficult to determine the level of vibration to be expected at each building location. The document should include a list of all affected buildings, including predicted levels and mitigation details

Existing Environment – Noise (4.8)

- The background discussion for noise may under emphasize the meaning of the measurement scale (dB) as it relates to human annoyance. For the reader who is not familiar with noise measurements, the quantitative results of the assessment may render the predicted noise level increases as less of an annoyance than will actually be experienced.
- The assessment relies on estimations of 24-hour Ldn from a one-hour noise measurement. This technique could lead to inaccurate characterization of the existing noise level that, in turn, can lead to inaccurate predictions. The report should have included more 24-hour measurements at more location, especially in parts of Medford other than where Tufts University is located.

Existing Environment - Vibration (4.9)

- Train vibration measurements were only performed at one location near the Tufts University sports fields and appear to have neglected the residential portions of Medford to the north and south of this area. Additionally, the vibration data shown in the report does not indicate the variation between different MBTA trains, which can be 15 VdB or more. This could lead to inaccurate predictions, or predicted levels that are less than the levels that may actually occur.
- The assessment does not include any mention of vibration sensitive businesses in Medford, such as a possible research and development facility which may be sensitive to vibration.
- The assessment should have included a technical appendix listing equipment used, certifications, etc.
- The discussion and assessment only pertains to effects felt by people. The background discussion should have included some discussion for assessment of possible house damage caused by large displacement oscillations of the rail track.

KM Chng Environmental - DETAILED COMMENTS

Affected Environment – Noise (4.8)

1. 4.8.1 Introduction, page 4-63, the first paragraph may under emphasize the meaning of a sound pressure decibel by stating that a 3 dB change is a "barely noticeable change outside the laboratory", whereas a "10 dB change would typically be perceived as a doubling (or halving) in loudness". The reference for this statement is not given. Earlier research (e.g. Stevens, 1956), suggests this phenomenon; however, other research indicates that there is a range of 1-3 dB that is noticeable to many people and that a 6-10 dB difference is generally perceived as a doubling in loudness (e.g. Warren 1970). This is particularly true of louder sounds (above approximately 70 dBA). It should be noted that all physics reference texts define a doubling of sound pressure level as 6 dB. The term "loudness" is a psycho-acoustic term which can be confusing to the general public. Also, the discussion does not mention possible practical effects of project noise increases, such as levels which would limit normal speech, require extreme level adjustments in telephones and television sets, levels which might cause elevated stress, or learning disabilities, etc.
2. Table 4.8-1 Exiting Noise Measurement Results, page 4-67, the use of long term and short term measurements in the same column is confusing. For the short-term measurements, apparently Ldn was estimated, and shows a significantly larger variability (58-80 dBA) compared to the long-term measurements. This result casts some doubt on the use of these types of data and their consequent veracity in describing the existing environment. The data indicate that it would be perhaps less speculative to omit the short term Ldn "measurements" from the assessment, or else measurements should have been obtained using a measurement system that had been recording data for a complete 24 hours period.
3. 4.8.3.2 Noise-Sensitive Land Use, page 4-68 to 4-70, the discussions for each section of the project corridor do not explain the specific reasons for the variations in measured sound level. The short-term levels vary from 59 to 80 dBA, which is a large range for a generally homogeneous urban area. Although the introduction states that, in general, the measured noise levels were dominated by the heavy rail activity (commuter and Amtrak trains), the assessment does not describe adequately the noise contributions from other sources. Since the Ldn near train corridors will mostly reflect the level and duration for train events, the reader would not know whether the area is otherwise relatively quiet or noisy. For example, why is the Ldn at LT-1 64 dBA at 60 feet from the nearest track, whereas the Ldn at LT-9 is 71 dBA, which is also 60 feet from the track? Also, if there is significant variation in noise levels between different MBTA trains, the assessment does not account for this.

4. For the record, it would have been useful to have a technical appendix that lists the type and model of microphone, sound level meters, and other equipment or software used to measure the existing environment. The text mentions that audio recordings were made; however, there is no mention of anything learned from the audio recordings, assuming that observation personnel were not deployed for the full 24-hour measurement periods.

Affected Environment – Vibration (4.9)

1. 4.9.1 Introduction, page 4-71, the discussion briefly explains the common use of velocity amplitude to measure vibration levels for transportation projects. However, the text does not mention the relationship of ground displacement to certain types of structural damage. In some cases, a relatively large displacement of the rail, which can be caused by poorly maintained wheels and wheel truck suspensions, can cause cracks in surface building materials such as wallboard joints, and occasionally hairline cracks in concrete blocks and other similar rigid building materials.
2. 4.9.2 Methodology, page 4-72, the assessment only utilized one location to measure commuter train levels at Tufts University Alumni Field, and two other locations in Somerville to measure vibration propagation characteristics of the soil. In the interest of Medford residents living in dwellings north of the Tufts University athletic fields, the assessment should have included both existing train vibration measurements and soil/ground propagation measurements in this area between the proposed College Avenue station and the Mystic Valley station.
3. 4.9.4 Existing Vibration Conditions, page 4-73, the discussion and Figure 4.9-2 do not indicate how many trains were measured or what variation in levels were recorded. The range of levels can be significant since MBTA equipment on other lines has shown large variations, and receptors can be exposed to levels 10 dB or more greater than the average (KM Chng Greenbush Study).
4. 4.9.5 Vibration-Sensitive Land Use, pages 4-74 to 4-76, although the general discussion states that vibration is “generally dominated by trains” on the MBTA commuter rail lines, the individual discussion for each section do not identify any other source of vibration. It seems unlikely that there would not be any other vibration sources, such as heavy trucks on uneven pavement. If other sources exist, it might be helpful to know what and where they are, and what the typical levels are, to compare them to commuter rail levels.
5. 4.9.5 Vibration-Sensitive Land Use, page 4-76, the assessment only mentions Tufts University buildings as sensitive land use. According to Medford city officials, there may be corporate R&D facilities in this section, which employ hundreds of Medford residents that may also be sensitive to project induced vibration effects.

6. As stated for the noise section, it is useful to include a technical appendix, which would at least contain a list of the measurement equipment, software, and any techniques that would be required to obtain results similar to those shown in the assessment.

Environmental Consequences – Noise (5.7)

1. 5.7.1.3 Noise Reference Levels, page 5-107, the data presented for noise reference levels does not contain details to explain the appropriateness of using the Green Line D Branch data. There is no technical appendix to show this data so that others can assess it. For example, can it be assumed that the rail and track system that will be used for the Green Line Extension will be the same as the D Branch? What is the variance for the measured D Branch data? Is the Lmax of 81 dBA an average of all the data that was used, or a worst-case sample? The value used for wheel squeal for the green line vehicles (Lmax = 86 dBA) may be reasonable; however, the FTA manual indicates that the level could be as high as 100 dBA (SEL = 136 dBA
2. 5.7.1.3 Noise Reference Levels, page 5-107, the data presented does not include any information relating to noise sources associated with the maintenance facility. Without this information, it is difficult to determine whether the noise generated from this facility is reasonably accounted for.
3. 5.7.1.3 Noise Predication Model, page 5-107, the description does not provide details explaining how the receptor locations were determined. It would be helpful to know if the positions were determined from current aerial photography, or perhaps older mapping data. If so, were receptors and buildings checked by on site inspection? How was it determined whether to use indoor or outdoor locations, and where can one find the exact point where the calculation was made? Assuming this type of information is available, it might be helpful to residents who would like to check whether the point used for the calculation is appropriate to them.
4. 5.7.1.3 Noise Predication Model, page 5-107, the description does not give details as to where and how noise levels from measurement locations were mapped to receptor locations to determine impact criteria. It is possible that some locations may have a higher or lower impact criteria because a noise level was used from a measurement location several hundred feet away, which a resident of the area may dispute as being typical for their residence. This is a technical problem which could lead to inaccurate results
5. 5.7.2 Noise Impacts, Table 5.7-1 and 5.7.-2, these tables aggregate the data for several individual locations into clusters of 1 to 19 buildings. We understand that this is necessary to avoid long tables with as many as 188 individual buildings. However, without a technical appendix providing data for each building, it is difficult for reviewers, residents or concerned citizens to determine what level of noise individual locations would be subjected to. It seems unlikely that clusters of as many as 19 buildings would be the same distance from the near track and would be subject to the same impact criteria. We would suggest that the assessment report should at least include readings for every building in the appendix.

6. 5.7.2 Noise Impacts, Table 5.7-1, there is an error in the totals for Potential Noise Impacts where the totals for the segment between Fitchburg Mainline and Medford Hillside Alternatives 1, 2, 3, and 4 should be 120 moderate impacts and 46 severe impacts. In addition, there are errors in the number of impacts for each of the alternatives in Tables 5.7-1 and 5.7-2 and the totals in the Impact Summary Table 5.7-3. Note that impacts refer to individual buildings and not units within buildings.

7. 5.7.2 Noise Impacts, page 5-113, in the first paragraph the text states, "typically, this increase [1-2 dB due to the green line trains] is not perceptible to humans". This statement appears to be based on cumulative calculated numeric Ldn values. However, in reality, because the frequency of green line trains is higher than commuter trains, it is likely that the noise from the green line trains will be perceptible when events occur. It should be noted that in many cases the noise from the green line trains, although not as noisy as the commuter trains, will easily be heard above background noise, and the cumulative effect of the two trains passing by at different intervals might be more annoying to residents than this statement suggests.

8. 5.7.2.1 Temporary Construction Noise Impacts, this paragraph only contains a cursory review of generic construction activity and suggests that "temporary noise impacts could result from construction activities...". In all likelihood construction activity will result in considerable noise impact to the various neighborhoods for perhaps a prolonged period of time. In addition, it may be necessary to conduct operations during nighttime when the impact is more severe. A more detailed accounting of likely construction activities, and a quantitative analysis relating noise levels to the predicted project noise levels would be useful to provide town officials and residents with a clearer picture of the real noise impact of the project. Such data could also be useful at a later stage of the project so that appropriate mitigation and its costs can be factored into the true cost of the project.

9. 5.7.3 Noise Mitigation, page 5-118, in the first paragraph it is noted that "at some locations projected to be exposed to noise impact, noise barriers may not be feasible or effective". There appears to be a wide range of areas for which noise barriers are prescribed earlier in the report; however, for various reasons will no be possible. The extent to which noise barriers, which are listed in Table 5.7-4 are unlikely to be a feasible alternative could have been shown in a separate table or figure. Table 5.7-4 may portray a misleading view of the level of mitigation that may be possible with this project. In some cases the height, location, or lack of egress through the barrier may pose a problem that may limit the use of barriers in other project areas than those mentioned. It should be noted that the Medford police chief and fire chief are concerned about possible safety issues associated with tall massive barriers. Although it is understood that barrier design details are not worked out until final design, Medford city officials would have preferred to see some perspective renderings of a typical barrier in one of the Medford neighborhoods. The generic barrier textures included in the assessment are not sufficient to portray the visual and safety consequences.

10. 5.7.3 Noise Mitigation, page 5-118, the last paragraph discusses wheel squeal on Somerville Avenue near Allen Street where rail lubrication is suggested as a mitigation technique. The discussion does not include a

rough cost estimate, as in the other mitigation options. It is possible that the cost of such an option would make this an unlikely mitigation option. It should be noted that, in the interest of exploring various mitigation options at this stage of the project, other techniques such as damped wheels, rubber wheels, flange modifications, improved wheel maintenance procedures, etc. could have been included. Ideally, a rough cost estimate, or explanations of practicality, might be included so that the likelihood of implementation might be assessed.

11. 5.7.3 Noise Mitigation, page 5-119, the last paragraph states that "the proposed noise barriers, potential sound insulation, and rail lubrication would be effective in mitigating all potential noise from the Project". However, to the extent that all these mitigation options are actually not feasible, this assumption is not valid. Therefore the summary statement "there would be no moderate or severe noise impacts from the Project" is likely to be inaccurate.
12. 5.7.3.1 Construction Noise Mitigation, page 5-119, the list of mitigation options is cursory and generic. It would have been useful to develop more detail for this potentially very significant noise problem for the project, including possible required nighttime activities.

Environmental Consequences – Vibration (5.8)

1. 5.8.1.2 Vibration Reference Levels, page 5-124, the section "Planned Operations" states that Green Line tracks will be on ballast and tie including a "boat section" which is a concrete slab approximately 2 to 3 feet thick. It is not clear from the discussion that follows in the section "Vibration Reference Levels" that the Green Line D Branch data, used for reference levels, is equivalent to the concrete slab mounting. The type of mounting can have an effect on vibration propagation. It would help to have a sentence stating that the concrete slab design was properly accounted for in the assessment process.
2. 5.8.1.2 Vibration Reference Levels, page 5-124, the text shows a range of 63 to 69 VdB for Green Line cars, and a range of 74 to 87 VdB for MBTA commuter trains. The discussion is not clear as to the actual value(s) used for level computations. It would be helpful to state the actual level used and the basis for using that particular value. It should be noted that the range of levels is consistent with measurements performed by KM Chng. The median of the range of levels is somewhat lower than the general ground surface vibration curves shown in the FTA manual for 50 mph speeds. The levels used for Amtrak trains were significantly less than the FTA vibration curve for locomotives. On occasion, KM Chng has recorded vibration levels for MBTA commuter trains that are greater than 87 dBA (MBTA Greenbush and South Coast measurements). When considering the implementation of the MBTA methodology, the large variance of MBTA commuter vibration levels should be considered. During recent measurements of the Greenbush line conducted by KM Chng, anecdotal remarks from residents living within

approximately 75 feet of the rail noted that some trains caused noticeable vibrations including "rattling of dishes and shaking of picture frames"; whereas, other trains were not discernible. This seemed to correlate with a measured range of approximately 75 to 95 VdB, normalized to 50 feet, for approximately 30 measurements. Finally, it should also be noted that the outcome of the KM Chng MBTA vibration measurement program showed that actual measured levels showed a range from 14 VdB above FEIR predictions to 12 VdB below predictions. When considered in total, the average was only 0.3 above the FEIR prediction, which indicates very good agreement with the methodology used, which is similar to that used for this assessment. Nonetheless, it also true that, on an individual basis, several residents experienced vibration levels much greater than predicted in the FEIR.

3. 5.8.2 Vibration Impacts, page 5-127, Table 5.8-4, the aggregation of clusters of impacts and the lack of a technical appendix showing levels at individual receptors makes it difficult for the public to determine the magnitude of vibration on an individual basis.

4. 5.8.2 Vibration Impacts, page 5-127, Table 5.8-4, when comparing the impacts in the segment between Medford Hillside and Mystic Valley Parkway, to the impacts in the segment between Lechmere Station and Medford Hillside, the total number of impacts seems proportionally low. In particular, for the cluster listed as "Brookings Street", where distances to the track are similar to "Auburn Avenue near McGrath Highway", future commuter levels are 8 VdB less, and future Green Line levels are 5 VdB less at the Medford location. It would be helpful to explain these differences, particularly since it appears that ground propagation measurements were not performed in this section of the project.

5. 5.8.2.1 Temporary Construction Vibration Impacts, page 5-128, the discussion only mentions pile driving. It would be helpful to know what other activities, if any, might produce annoyance or structural damage. It would also be helpful to have an estimate for the duration and intensity of pile driving activities, and operations that may have to occur overnight.

6. 5.8.3 Vibration Mitigation, page 5-130, Table 5.8-6, much of the mitigation relies on the use of ballast mats, which are assumed to have a 10-15 VdB reduction in levels. Although this is the range of possible reduction stated in the FTA manual, there is some evidence that real world installations of ballast mats can fall short of manufacturer claims. KM Chng performed a very limited evaluation at one of the sections of the Greenbush line after the installation of ballast mats, which failed to show any significant measurable reduction in vibration level. Although the actual value used for vibration level reduction is not stated in the assessment, it would be helpful to know what the value is, and what the justification is for using that value. A similar argument might be made for the use of resilient fasteners, which can show significant variability in effectiveness, depending on several factors. We do recognize that ballast mats and resilient fasteners can be effective in reducing vibration; however, it is important to be realistic about what they can achieve. During our Greenbush vibration measurement program, some expressed the opinion that improving MBTA wheel maintenance may be a more cost effective solution to the problem of MBTA commuter train vibration levels.

Visual Impacts

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December 8, 2009

Memo
To: Ed Hollingshead, FST

From: Clarissa Rowe, Brown, Richardson & Rowe

RE: **Visual Assessment Comments on the Draft Environmental Impact Report/Environmental Assessment and Section 4(f) Statement for the Green Line Extension Project in Cambridge, Somerville and Medford**

1. **Comments on the Visual Analysis Sections of the Executive Summary, and Section 4.14 " Visual Environment" in the Affected Environment, and Section 5.12 in Environmental Consequences**.

The DEIR finds that there is no negative affect to the visual quality of the City of Medford because the "natural visual resources...consist mostly of isolated, low-diversity habitat…" (page 5.) "Due to the urbanized character of the portions of Cambridge, Somerville, and Medford, and involved, there are no other significant visual resources associated with the Project" (page 4-83)

"The Proposed Project would not have a significant effect on the local visual environment. The changes proposed would occur in urbanized areas with and adjacent to the existing right-of-way and would have little visual impact on the public. The most significant change would the loss of forested areas along the right of way, reducing the green space visible from local residential areas. The addition of landscaping at the stations and both on and above the retaining walls will reduce the overall visual effect of vegetation losses. The proposed noise barriers would block the view of the right of way for adjacent homes and prevent any further visual impacts by obscuring the trains and rails that would otherwise be visible from residential back yards. "(Executive Summary, page ES-30)

The basic premise in these DEIR findings is that if the affected area is urban, there is little impact because there are so few trees and shrubs in this environment. Actually the reverse is true. Urban dwellers value their trees, even if they qualify as "isolated, low-diversity habitat", at least as much, and probably more than nonurban dwellers. In a city like Medford, the tree lined buffer between the existing rail lines and the houses and businesses means a lot to the community character of the neighborhoods and to Tufts University.

College Avenue at Tufts University

Boston Avenue near Tufts University

The wide stand of trees along Boston Avenue across from the Tufts campus buffers the rail corridor. The University's Tisch Library, at the top of the hill, overlooks this stand of trees. The partial loss of this buffer will greatly impact the ambiance of the College. Potential school applicants park in the garage right across Boston Avenue from the affected buffer strip.

ufts University fence and well kept lawn

Treed buffer

Also, importantly for the citizens of Medford, the DEIR does not analyze the effects of the Green Line Extension on the small residential neighborhoods that line the rail corridor. For instance, the houses on Pigott Street are far more affected by the Green Line Extension because they are at almost the same elevation as the RR tracks. On the other hand, the small businesses at Winthrop Street are substantially above the RR alignment so they are not as affected by the visual presence of the corridor.

reed buffer at Pigott Street

Treed buffer at Picott Street

- During the final design phase, it will be important to analyze each residential neighborhood and how close it is to the existing and proposed alignment and its sidewalls. Is this study part of the final design scope of work?

- We recommend that the entire Medford stretch of the Green Line Extension be reviewed again, from a visual point of view, with an eye to the elevation of the abutters in relation to the elevation of the rail corridor. Again, is this study part of the scope of work during final design?

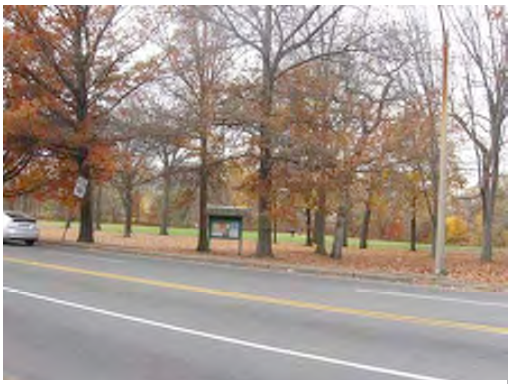
One's viewpoint will also change depending on which side of the tracks the viewer is standing. For instance again, the businesses and houses on Boston Avenue near the Winthrop Street are not as impacted as the residential houses that abut the same part of the corridor on the north side of the corridor, along Charnwood Road, Burget Avenue and along Colby and Winchester streets.

Charnwood neighborhood

iew from Winchester Road

- Cross sections of these areas should be prepared during final design to give the residents a true idea of the future work. There should be a series of cross sections, with different sound wall surfacing options, for all the residential streets within two blocks of the rail corridor. Is this coordination part of the final design scope of work?

We agree with the finding that special attention should be paid to the Mystic Valley River parklands area.



Parklands with mature trees and grass

Boston Avenue at the insection with Route 16

"Some existing vegetation would be removed, and new retaining walls and noise barriers would be built." (page ES-41). The Overhead Catenary System, 22 feet high, will also affect the quality of the visual environment. The assumption that the new retaining walls and noise barriers will have the same value in the visual environment as trees and plants is not valid. The promise of a "green" wall is a good idea, but its execution needs to be carefully detailed and viable. Two of the photographs on page5-116 show attractive noise walls, but the other two shots are not as attractive and are less unacceptable. The MBTA needs to work with each neighborhood to work out which kind of surface there should be on the noise wall. Plants will not grow in areas where they receive no sun. Therefore making the "green" walls along the "dark" side of the corridor may not work. Growing plants at the top of the walls may be the only option in these locations.

- Is it possible to do a shadow impact study during the final design to determine whether "green" walls will work along the corridor?

Each side of the corridor needs to be thought about differently. The alignment of the corridor varies from Ball Square to College Avenue to the Mystic Valley station. Station landscaping is a pleasant idea, but its exact specifications need to be worked out and its long-term maintenance needs to be factored in. At present, there is little or

no maintenance at the other MBTA stops in the region so there is little expectation that the future will bring better maintenance to the area. The planting at the three Stations cannot take the place of the planted buffer that exists today.

2. Comments on the Mitigation Commitments for the Visual Environment and Open Space

The Mitigation chart mentions the following efforts to ameliorate the visual changes: "Provide vegetation on and/or above retaining walls to minimize visual changes", and "Work with affected communities on design of noise barriers and vegetated walls prior to construction". (p. 6-2)

Also on page two of the *Chapter of Viability of Community Path Extension to Mystic Valley Parkway*, there is a quotation from the Secretary's Certificate saying that "Also, the DEIR should evaluate the viability of extending the Community Path to Route 16 to create a connection with the Mystic River parkway." (page two).The chapter goes on to say that in the Medford section of the project, it is not viable to provide a community path along or adjacent to the corridor. The recommendation made is for a shared bike path along Boston Avenue. However, Boston Avenue is too narrow a road to encourage bike traffic. The width of Boston Avenue varies from 32 feet to 44 feet curb to curb. It is probably not viable to put a bike lane on either side of the avenue. People who use bikes often ride on the narrow sidewalks.

The report goes onto say that a Community Path is not possible in Medford, so it is important to figure out what the mitigation should be for the City of Medford.

- One recommendation is for the final design team to do an inventory of the sidewalks on both side of Boston Avenue from Ball Square to the Mystic Valley Parkway. The condition of the sidewalks and their curbing should be inventoried. Is this possible?

- In the Tufts area of Boston Avenue, the sidewalks are not in good condition, are bituminous and have outdated precast curbing. This whole sidewalk area could be updated with new concrete and granite curbing as part of the College Station improvements. Is this possible?

Bikers on concrete sidewalk near Route 16

Bituminous walk & concrete curb at College Avenue

- We recommend also that the existing tree buffer be inventoried before it is removed. The City of Medford has a policy that if trees are removed, the same number of caliper inches need to replaced with new trees in the project. If the trees needed to replace the tree buffer do not fit in the project area, new trees could be planted on the streets of the City of Medford in the neighbors adjacent to the project area. Is this possible?

3. Comments on the Visual Impacts of the three MBTA Stations in the City of Medford

We have not commented on the visual quality of the two Power Stations because they are not located yet. Also, there may be screening elements that would improve the view of the Catenary system, but there is not enough detail in the DEIR to make any recommendations about its screening yet. It will be important for the City of Medford to review and comment on this missing information as it is developed. Is this possible?

Also, the DEIR talks about irrigation for the new plantings at the Station.

- We suggest that the plants be hardy natives that will not need irrigation in the long run. We also suggest that the T include a watering requirement in the planting specifications for all new station plantings for the first two summers after the plantings are installed instead of irrigation. Is this possible?

Ball Square Station

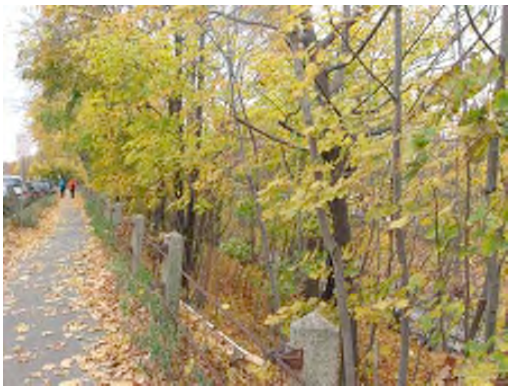
The Ball Square Station will be located in a very dense, heavily populated area, which is industrial and commercial. It would be hoped that with a well-designed T station, the Green Line Extension would actually improve the visual quality of the area. The increased foot traffic to and from the station may bring people to the small businesses in the area.

Ball Square area at present

The increased bike commuter use must be carefully planned for to make sure that the bike parking is adequate.

College Avenue Station/Tufts University

Like the Harvard T Station, the future College Avenue T Station will be the Tufts University station. The Station's architecture should blend into the surrounding University character, especially Professors Row, and the brick buildings, such as Robertson Hall, that surround that station location. The current visual character presently is pleasant because of the well kept university buildings, the historic wrought iron gates and fence, the large green lawn, and the treed buffer along College Avenue.



reed buffer that will be partially removed

Future station view

The advent of the Station will greatly enhance the area, but again the possible increase of bicycle commuters and vehicular commuters needs to be well planned for during the final design. Because the intersection of College Avenue and Boston Avenue is wide, there will be a temptation for outlying commuters to see that Station as an excellent place to drop off commuters and, again, to park in adjacent neighborhoods. Increased vehicular traffic would affect the visual quality of this area in a negative way. Because of the potential of increased vehicular traffic, it makes sense that the final designers need to rework the intersection to keep traffic moving through the intersection and to widen the pedestrian landing space at the top of the Station along Boston Avenue and in front of the Tufts Engineering Building.

From the DEIR, it is apparent that a part of the treed buffer along College Avenue may be removed. It is imperative that the T work with the City of Medford and Tufts University to make sure that the Tufts edge of the corridor as pleasant and as green an edge as possible during the final design phase of work.

Mystic Valley T Station

When the Green Line extension comes to the Mystic Valley Parkway, the Station's visual quality will need to add to, not destroy, the business renaissance in that area.

This part of Medford has turned from being a rundown industrial area to a thriving business area. It is also adjacent to a well-kept two family neighborhood.

When reviewing the plans for the Station, we see that there is a missed opportunity in the present siting of the Station. At present, the plan will eliminate some of the thriving businesses and will discharge large number of people right at the edge of the neighborhood. Why couldn't the primary access to the Station be through the other side of the tracks where the Whole Foods grocery store and the liquor store are located? There is already a large parking lot there and, more importantly a well-designed access point for vehicular traffic, which is off the Parkway, Route 16.

Possible entry to T behind white car

Entry off Route 16

Parking at Whole Foods

Again, this Station will have the same problem of a potential increase of vehicular traffic as the other two Medford Stations, but it is a far greater problem here because the station's location is also opening up ridership for people in West Medford and East Arlington. Again, increased vehicular traffic will have a negative visual affect on this area. The DCR's new Greenway in Arlington and Somerville will be

terminating only a block from the new station location, and will bring many walking and biking commuters to the Station.

The potential for vehicular drop off at this Station is the greatest of the three Medford stations. Because the T has opted not to provide parking at the Station, it is paramount that the T work to keep the commuting cars out of the residential neighborhood during the final design phase of work. Also, because there is already a large parking lot on the other side of the tracks, many commuters will think that they can park in that lot free of charge and then walk to the Station. It is good that the T has included a drop off area at this Station because there will obviously be a need for it. Unfortunately, the drop off area may require the removal of some of the largest trees in that whole project. Again, the T will need to replace them caliper inch per caliper inch with new tree plantings at this Station and elsewhere in Medford.

Increased bicycle traffic will also need to be accommodated and carefully designed. Until the two new bike cages were installed at the Alewife Station this past year, that Station had every railing festooned with bikes of all ages and conditions. This situation is bound to occur at the Mystic Valley Station as well unless there is room for two similarly scaled bike cages there too. At present, the Station schematic design has not devoted enough space for the bicycle traffic that will occur there.

The architecture of the Station will need to reflect well on the adjacent Mystic Valley parklands that are a beloved, regional, passive recreational facility. The materials of the Station Design need to be compatible with its context of a landscape of beautiful mature trees, expansive lawns and the Mystic River. The new stations at Wood Island Station and Airport Station in East Boston are good examples of stations that could be emulated.