

# WELCOME TO BLUE HILL AVE STATION



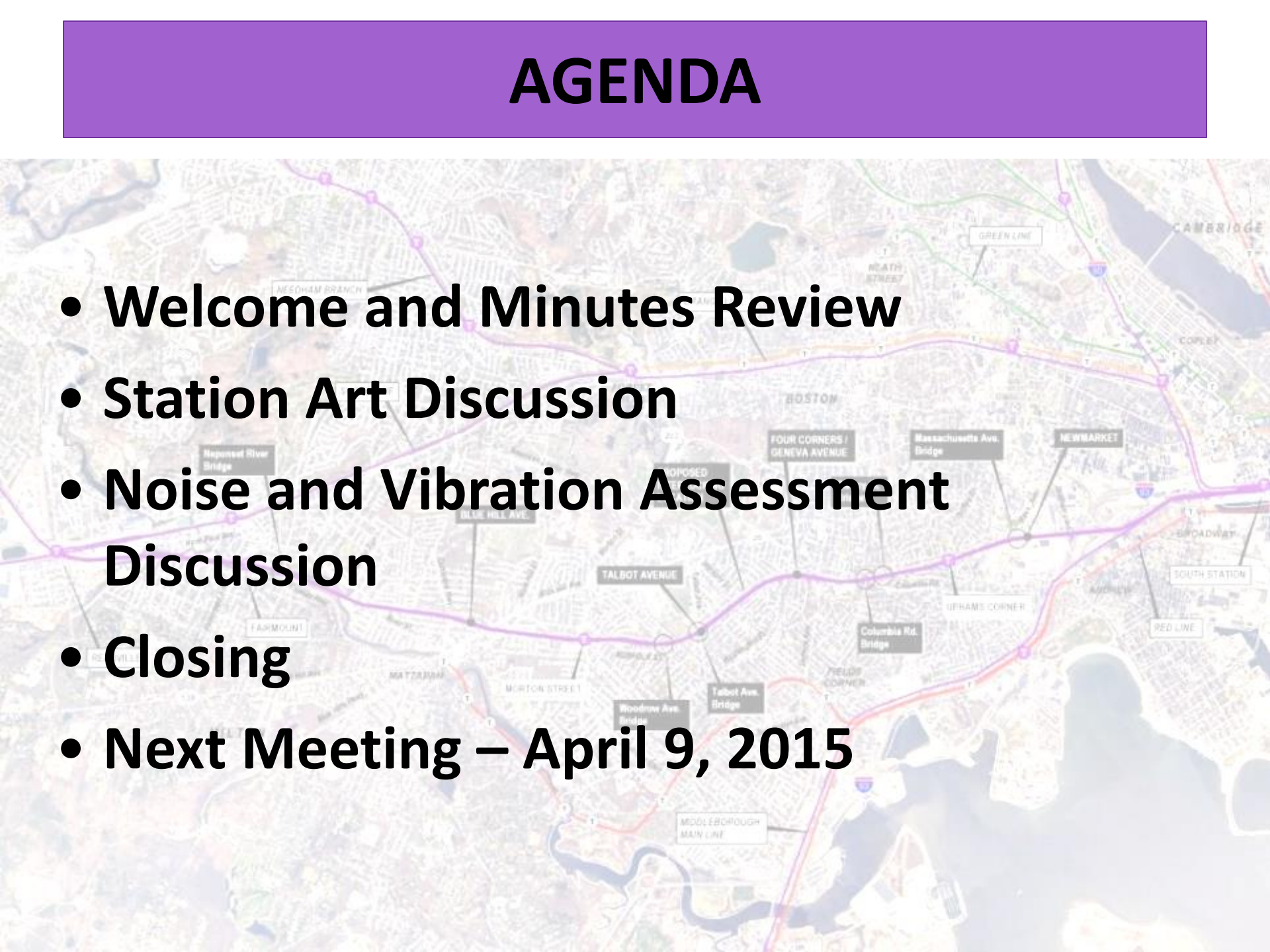
**Work in Progress**

**BLUE HILL AVE STATION**

## DESIGN WORKING GROUP

**Meeting Number 3 – March 12, 2015**

# AGENDA

- **Welcome and Minutes Review**
  - **Station Art Discussion**
  - **Noise and Vibration Assessment Discussion**
  - **Closing**
  - **Next Meeting – April 9, 2015**
- 
- A map of the Boston area, including parts of Cambridge and Middleborough, showing various transit lines and stations. The map is overlaid with a purple line representing a proposed transit route. Key locations labeled include Needham Branch, North Street, Green Line, Cambridge, Copley, Boston, Four Corners / Geneva Avenue, Massachusetts Ave. Bridge, Newmarket, South Station, Red Line, Broadway, Uplands Corner, Columbia Rd. Bridge, Talbot Avenue, Talbot Ave. Bridge, Woodrow Ave. Bridge, Middleborough Main Line, Morton Street, Farm Mount, Mattapan, and Revere. The map also shows the Revere River Bridge and the proposed route passing through the city center.

An aerial map of Boston and surrounding areas, including Needham Heights, Milton, and Cambridge. The map shows various transit lines: the Orange Line (orange), Green Line (green), Shore Line (purple), and Middleborough Main Line (red). Key locations and landmarks are labeled, such as Needham Branch, Orange Line, Green Line, Shore Line, Revere River Bridge, Blue Hill Ave., Talbot Avenue, Four Corners / Geneva Avenue, Massachusetts Ave. Bridge, Newmarket, South Station, and Red Line. A central text overlay reads "WELCOME and Minutes Review".

# WELCOME and Minutes Review

# NOISE AND VIBRATION ASSESSMENT



## TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT

FTA-VA-90-1003-06

May 2006



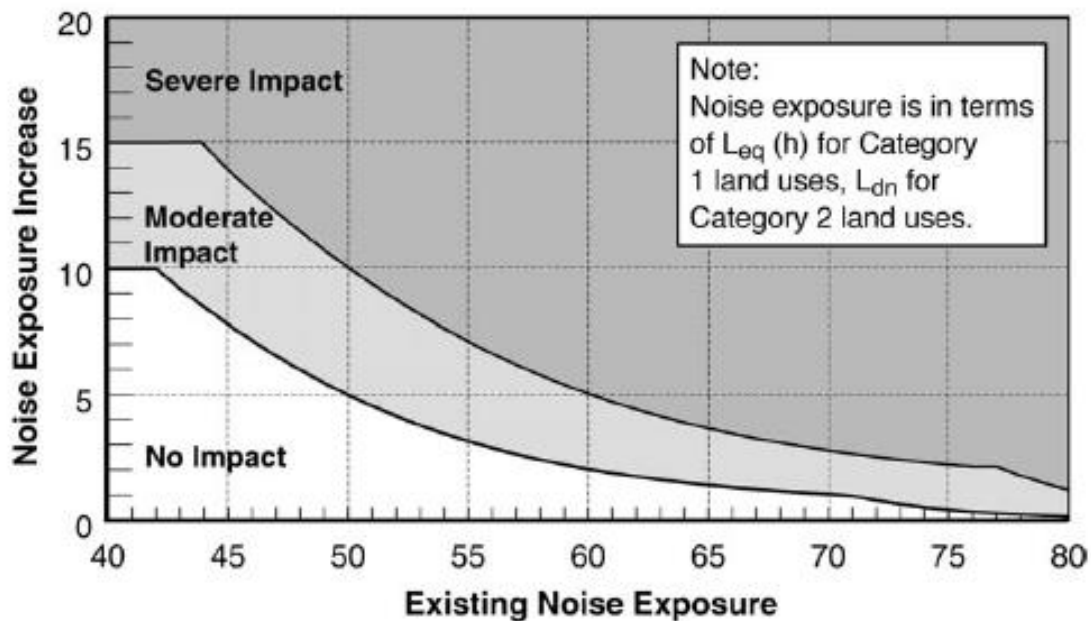


Figure 3-2. Increase in Cumulative Noise Levels Allowed by Criteria (Land Use Cat. 1 &2)

## NOISE EXPOSURE GRAPH



# NOISE METRICS

- **Lmax** - represents the maximum noise level that occurs during an event or train passby and is the noise level actually heard during the event or passby.
- **Leq**, or equivalent noise level - represents a level of constant noise with the same acoustical energy as the fluctuating noise levels observed during a given interval such as one hour. For transit projects the Leq noise level is commonly used to describe levels at non-residential receptors (such as offices, schools, and churches) with primarily daytime uses. Leq(h) is a noise level averaged over one hour.
- **Ldn**, or the day-night noise level - represents the average noise level evaluated over a 24-hour period. A 10-decibel penalty is added to events that occur during the nighttime hours (10:00 PM to 7:00 AM) to account for people's increased sensitivity to noise while they are sleeping. For transit projects the Ldn is commonly used to describe noise at residences

Table 8-1. Ground-Borne Vibration (GBV) and Ground-Borne Noise (GBN) Impact Criteria for General Assessment						
Land Use Category	GBV Impact Levels (VdB re 1 micro-inch /sec)			GBN Impact Levels (dB re 20 micro Pascals)		
	Frequent Events <sup>1</sup>	Occasional Events <sup>2</sup>	Infrequent Events <sup>3</sup>	Frequent Events <sup>1</sup>	Occasional Events <sup>2</sup>	Infrequent Events <sup>3</sup>
<b>Category 1:</b> Buildings where vibration would interfere with interior operations.	65 VdB <sup>4</sup>	65 VdB <sup>4</sup>	65 VdB <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>
<b>Category 2:</b> Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
<b>Category 3:</b> Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

**Notes:**

- "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
- "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
- "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
- This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
- Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

## IMPACT CRITERIA for GENERAL ASSESSMENT



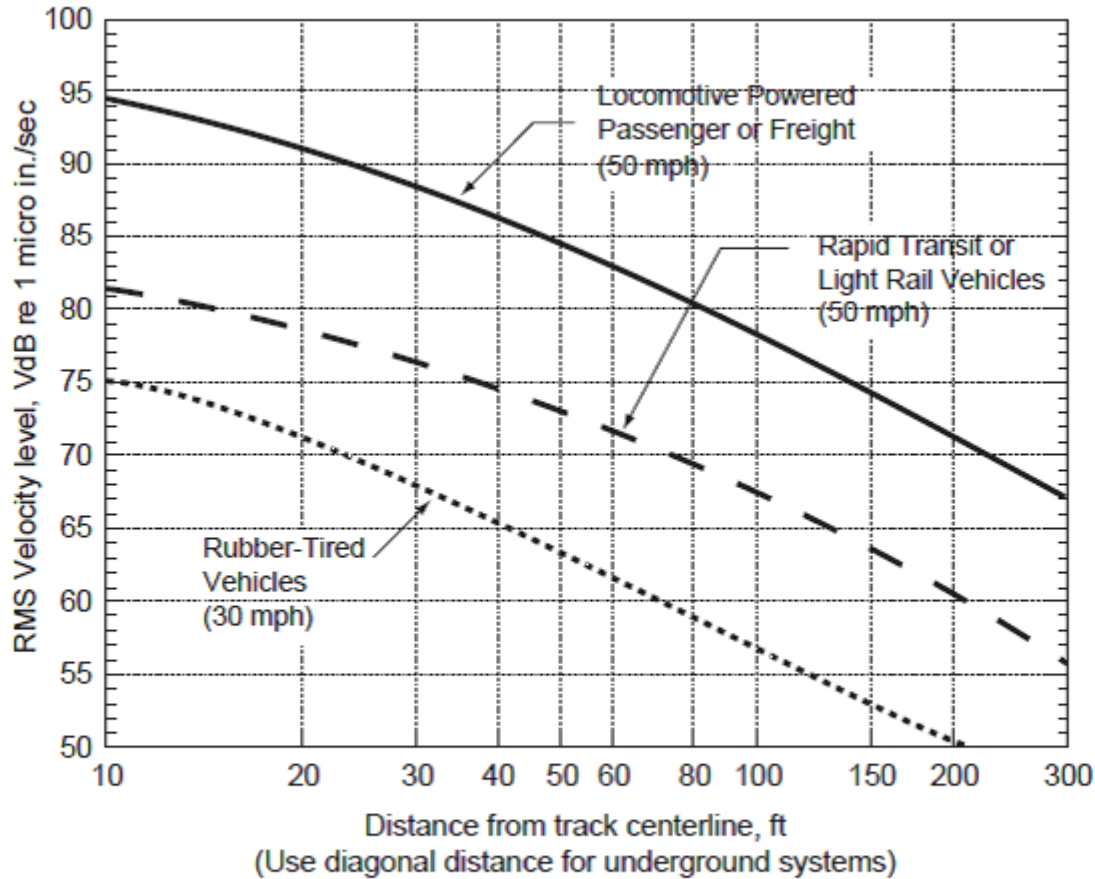
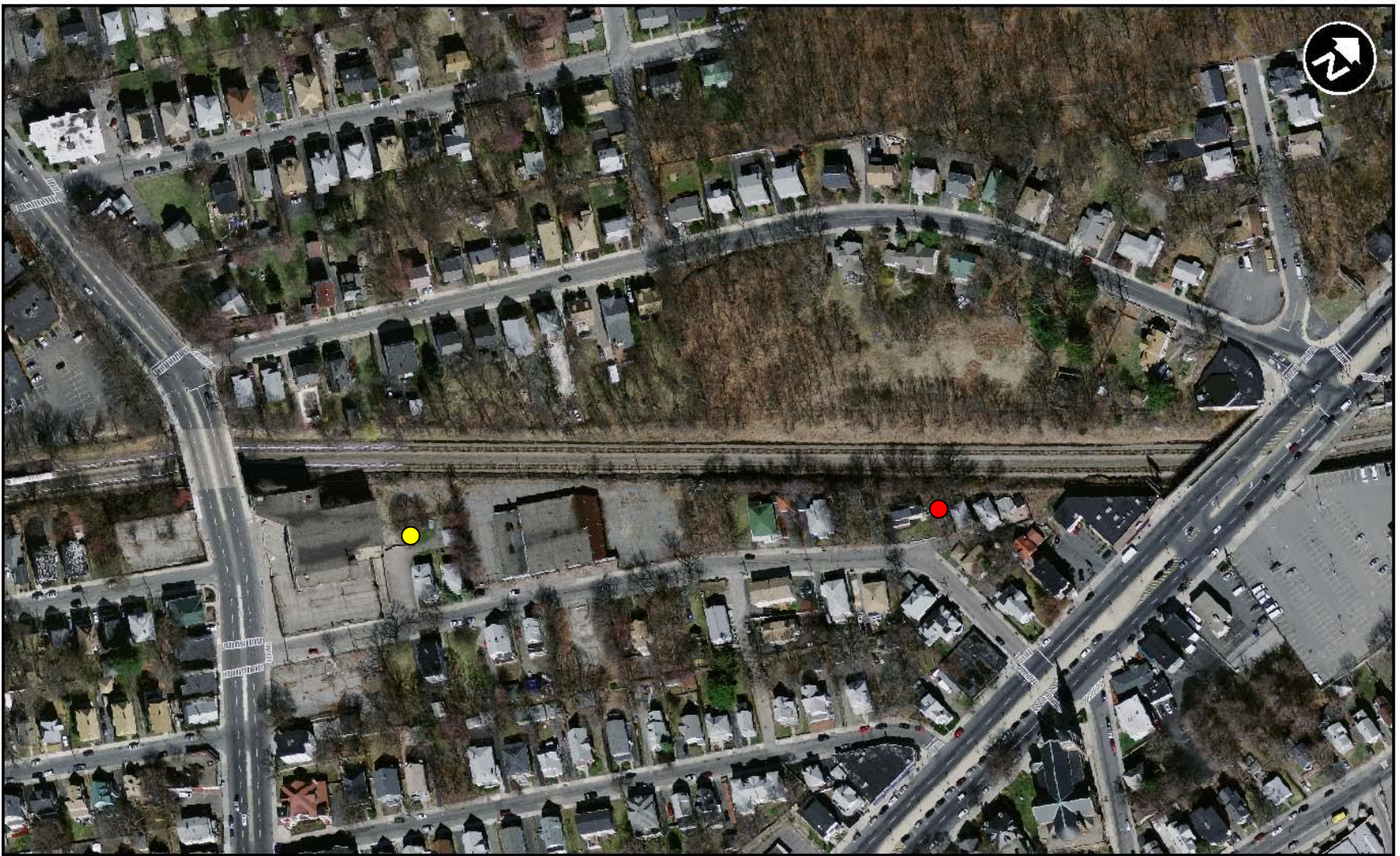


Figure 10-1. Generalized Ground Surface Vibration Curves

## GROUND SURFACE VIBRATION CURVES





Legend:

● Noise and Vibration Train Passy Measurements

● 24-hour Noise Measurements

## NOISE AND VIBRATION MEASUREMENT LOCATIONS



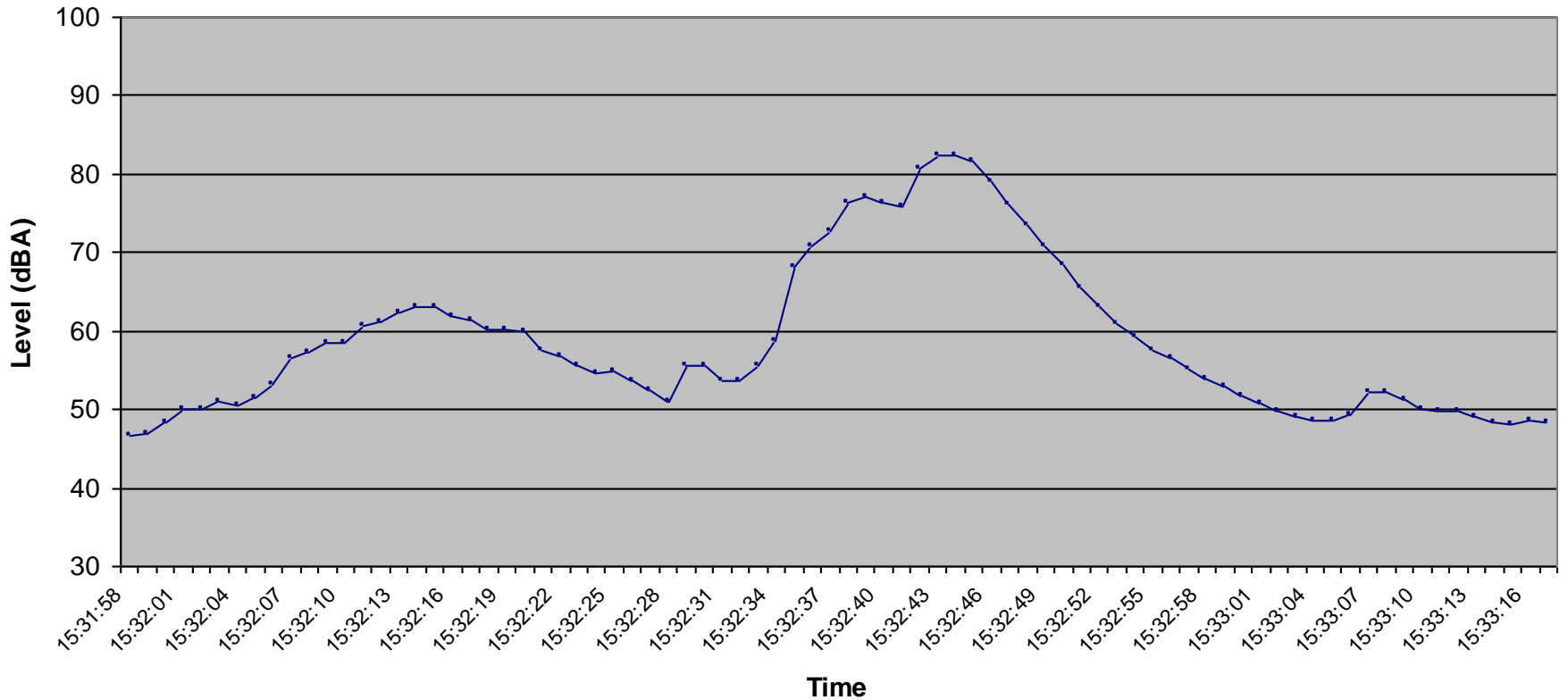
MASSACHUSETTS BAY  
TRANSPORTATION AUTHORITY



**Blue Hill Avenue / Cummins Highway Station**

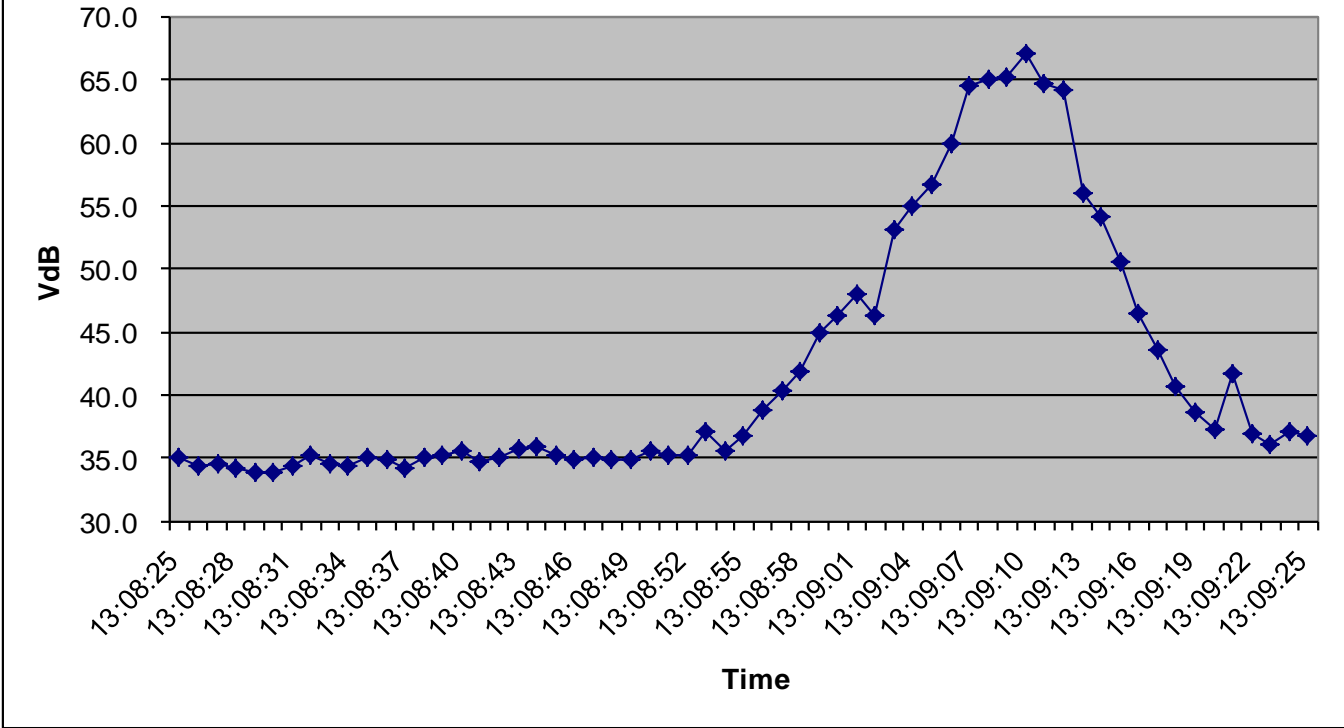
Fairmount Corridor Improvements Project

**Regis Road - Noise Measurement  
MBTA Commuter Train Passby - Inbound (near) Track**



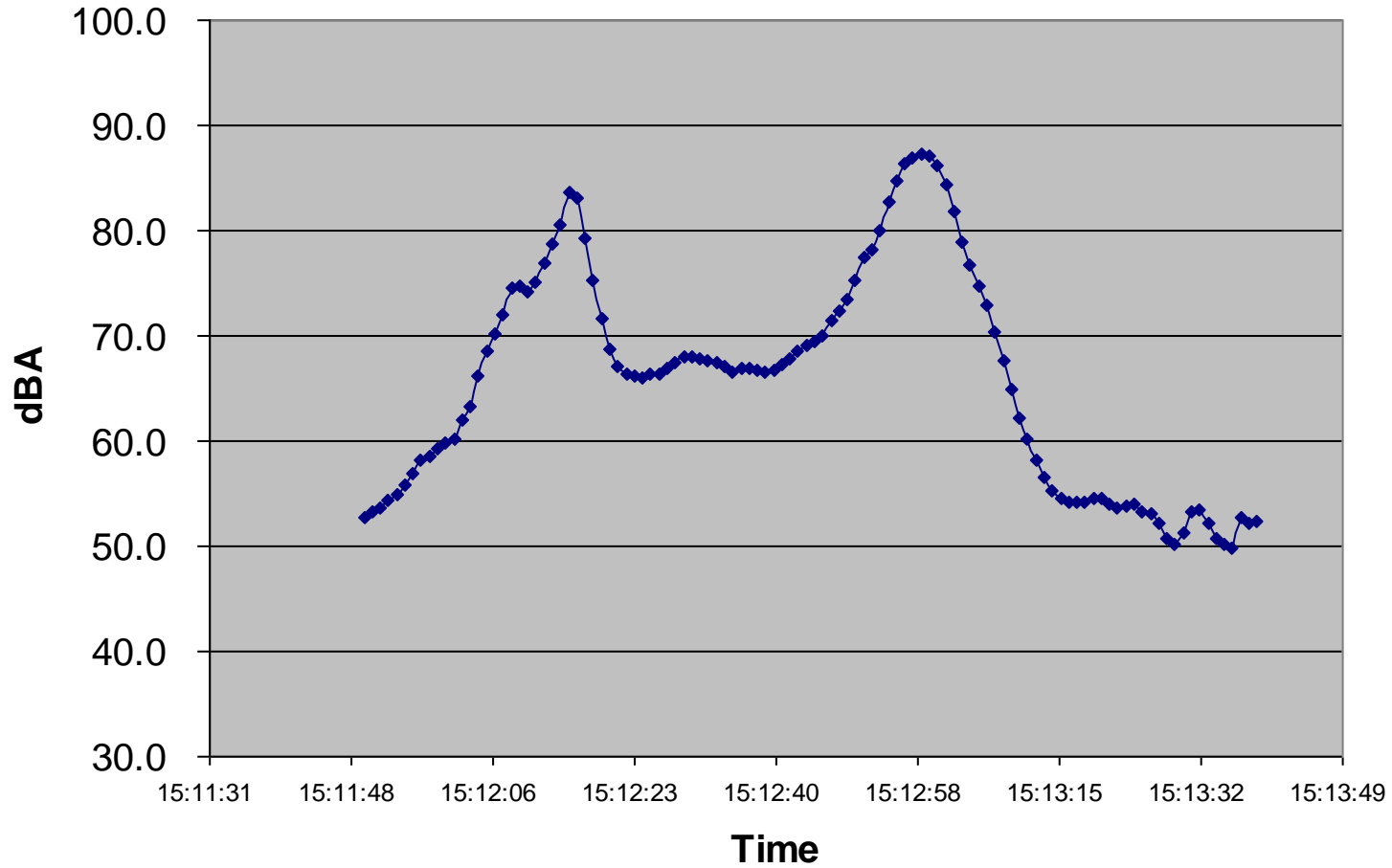
**MEASURED NOISE LEVEL TIME HISTORY  
(Lmax) during train pass by on the Inbound (near) track**

**Regis Road - Vibration Measurement  
MBTA Commuter Train Passby - Inbound (near) Track**



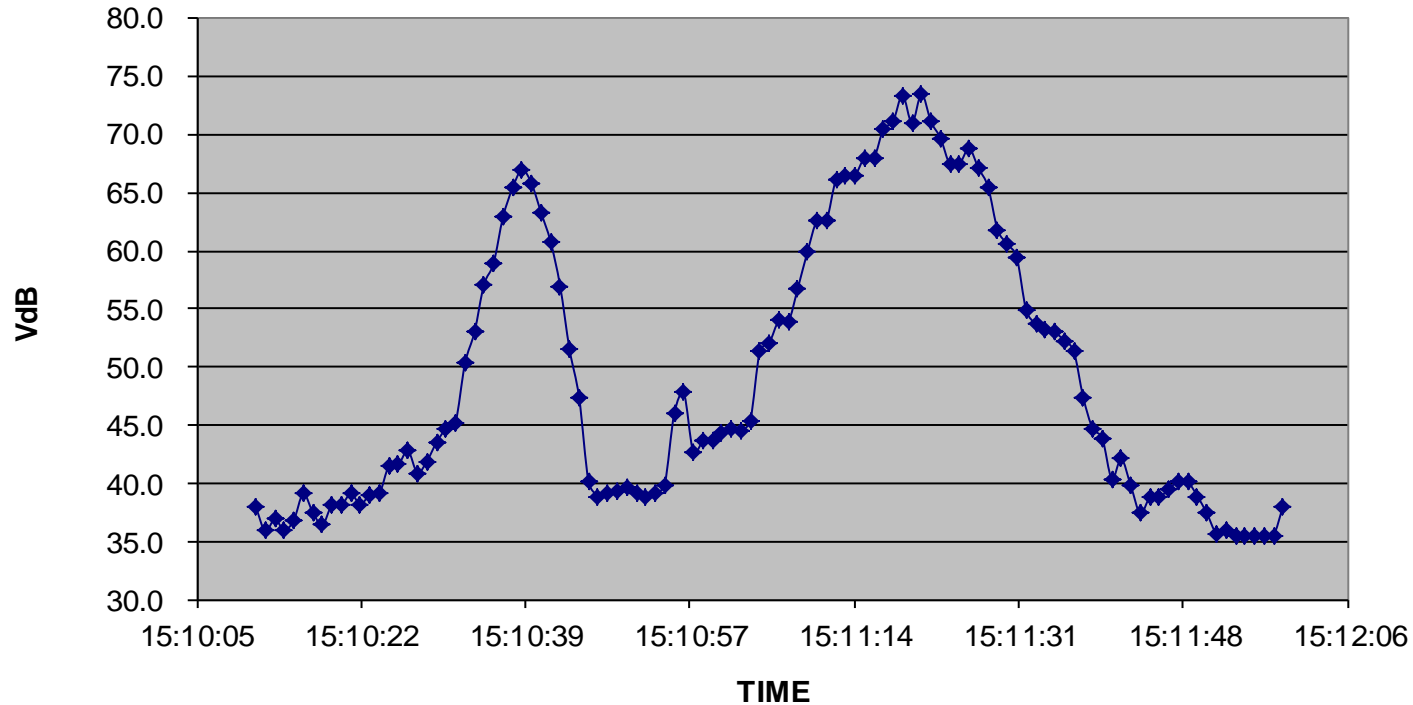
**MEASURED VIBRATION LEVEL TIME HISTORY  
(VdB) during train pass by on the Inbound (near) track**

**Noise Measurement - Morton Street Station  
Inbound Train (far track)**

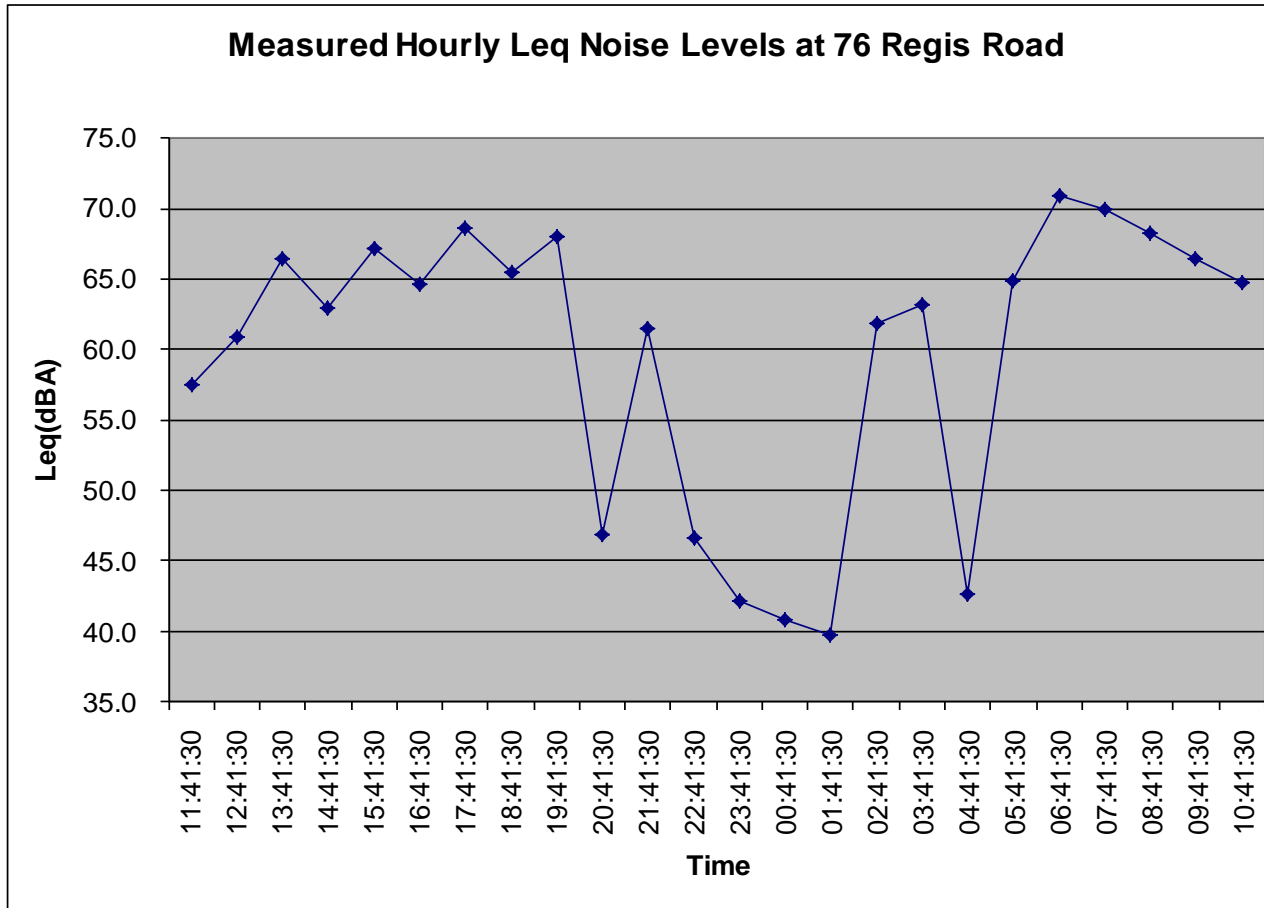


**MEASURED NOISE LEVEL TIME HISTORY  
(Lmax) during train operation at Morton Street Station**

**Vibration Measurement - Morton Street Station  
Inbound Train (far track)**



**MEASURED VIBRATION LEVEL TIME HISTORY**  
(VdB) during train operation at Morton Street Station



## MEASURED HOURLY Leq NOISE LEVELS

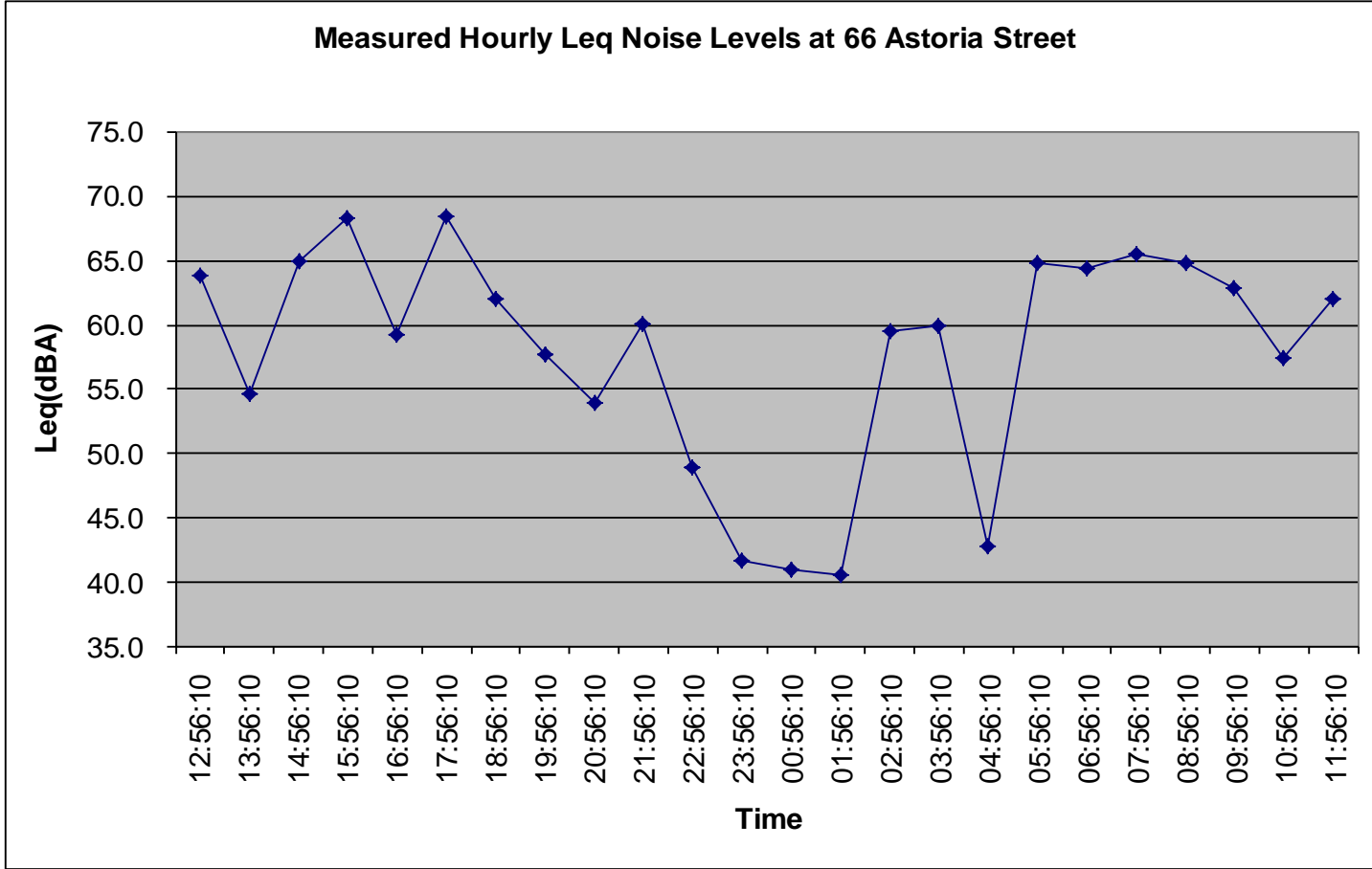


MASSACHUSETTS BAY  
TRANSPORTATION AUTHORITY

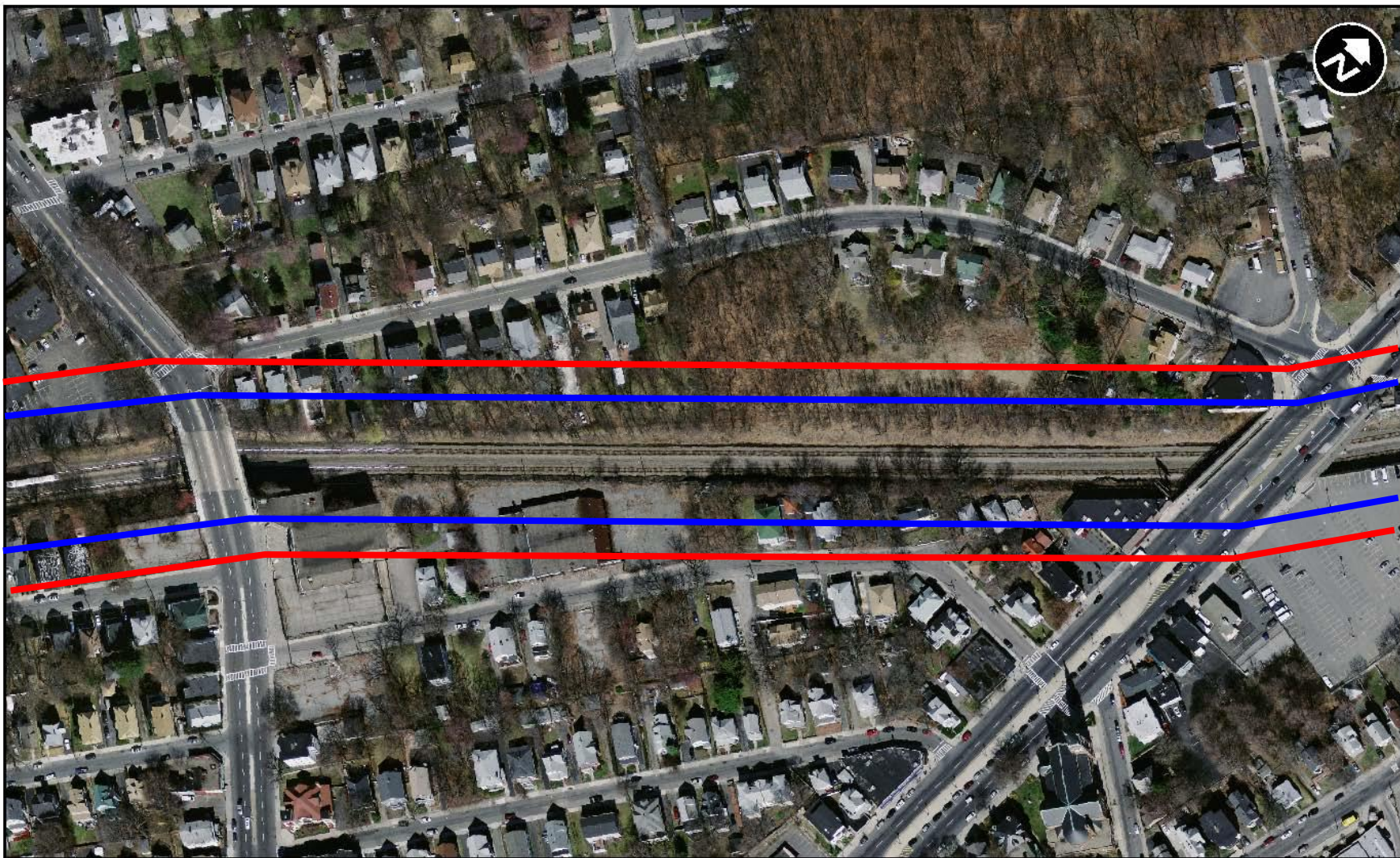


### Blue Hill Avenue / Cummins Highway Station

Fairmount Corridor Improvements Project



## MEASURED HOURLY Leq NOISE LEVELS



- Legend:**
- 75 VdB Vibration Level Contour Line During a Train Passby Event
  - 75 VdB Vibration Level Contour Line During a Train Station Event

## VIBRATION ASSESSMENT

75 VdB Vibration Level Contour Line – Train Passby vs. Station Event



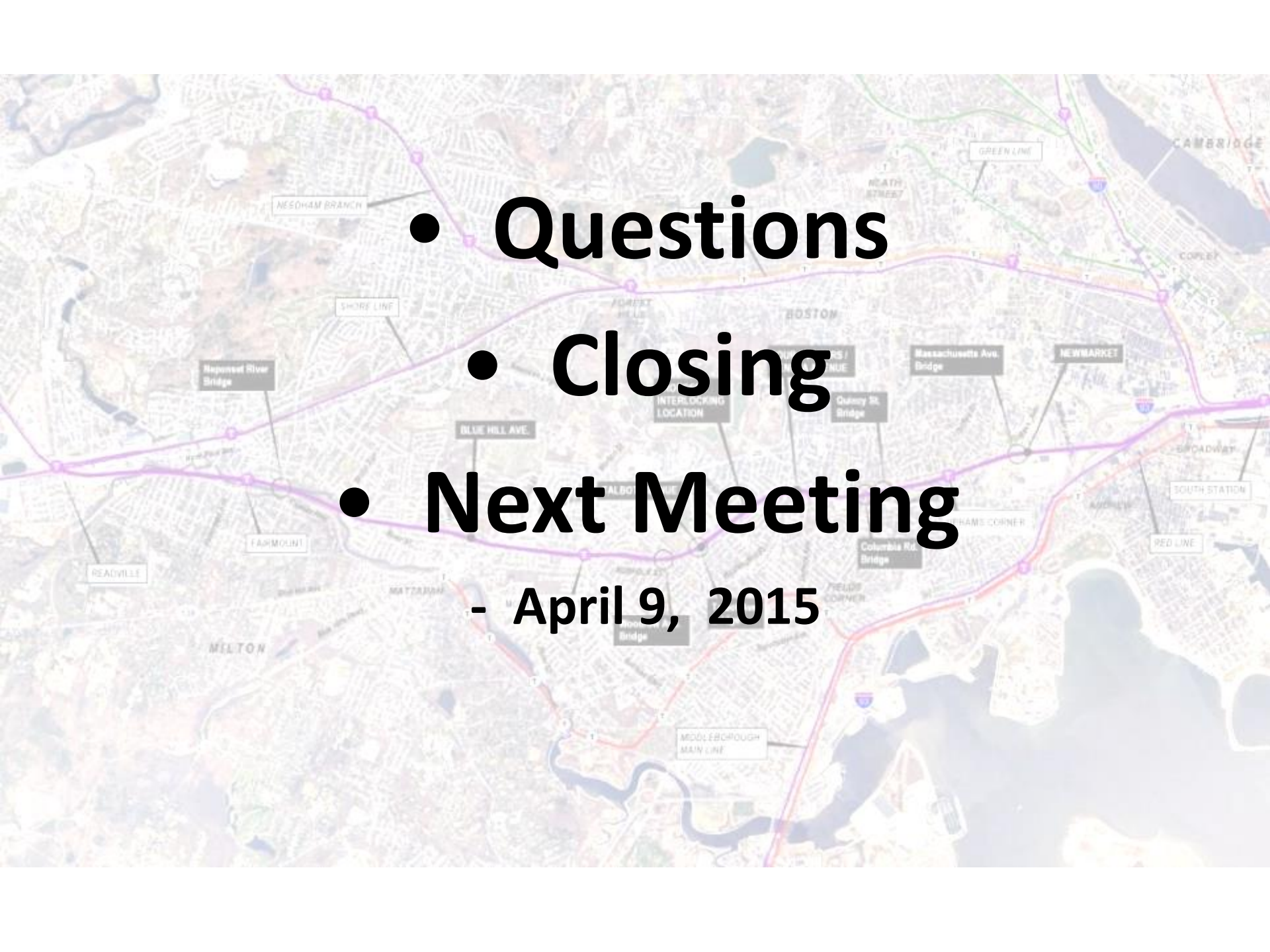
MASSACHUSETTS BAY  
TRANSPORTATION AUTHORITY



**Blue Hill Avenue / Cummins Highway Station**

Fairmount Corridor Improvements Project



- 
- An aerial map of Boston and surrounding areas, including Needham Heights, Cambridge, and Milton. The map shows various transit lines: the Green Line (purple), Shore Line (orange), and Middleborough Main Line (red). Key locations and bridges are labeled, such as Needham Branch, Revere River Bridge, Blue Hill Ave., and South Station. A central area is marked as the 'INTERSECTING LOCATION'.
- **Questions**
  - **Closing**
  - **Next Meeting**
- April 9, 2015