

Memo



To: Chet Meyers, John McAllister (Apex Companies, LLC)
From: Diane Baxter, David Carchedi (GZA GeoEnvironmental, Inc.)
File: 33734.04 Mem-05
Date: September 11, 2013
Re: Blasting Impacts on the Palmer Island Lighthouse
New Bedford Marine Commerce Terminal
New Bedford, Massachusetts

GZA GeoEnvironmental Inc. (GZA) is pleased to provide you with this memorandum on blasting impacts to the Palmer Island Lighthouse.

Blasting Limitations

Blasting limitations have been imposed on the Contractor for this project in the Blasting Specification to limit the impacts of blasting on adjacent structures. The limits are based on the Massachusetts Building Code, 527 CMR 13.00 Explosives. The code requires that vibrations, measured in Peak Particle Velocity (PPV) in units of inches per second, fall below levels recommended by the U.S. Bureau of Mines as follows:

- Historic Structures PPV<0.5 in/sec
- Residential Structures in Massachusetts PPV<0.8 in/sec
- Other Structures PPV<2.0 in/sec

Based on years of data, it has been shown that vibrations measured below the readings listed above are unlikely to result in damage to the respective structures.

GZA's Blasting Impacts Report

GZA has performed an extensive study on the impacts of blasting for this project on adjacent structures (GZA Report, Assessment of Blasting Impacts to the New Bedford-Fairhaven Hurricane Barrier, New Bedford Marine Commerce Terminal, New Bedford, Massachusetts, October 2012, revised August 2013). As a result, we are able to produce estimates of the anticipated vibrations for structures that are located various distances from the nearest blasting location. The equation utilized to determine the potential vibration impact is:

$$'PPV' = 'H' \times ['D' / (\text{SQUARE ROOT OF 'W'})]^{\wedge} 'B'$$

Where:

'PPV' = The Peak Particle Velocity in inches per second.

'H' = The Peak Particle Velocity intercept in inches per second (as formulated from historic blasting data from the United States Bureau of Mines)

'B' = The Slope Factor (as formulated from historic blasting data from the United States Bureau of Mines)

'W' = Weight of charge per delay in pounds

'D' = Distance in feet to the structure in question.

In this case, the following values were utilized:

H = 50 (the upper range of historic United States Bureau of Mines data)

B = -1.6 (the upper range of historic United States Bureau of Mines data)

W = 200 pounds, the maximum charge evaluated.

D = 1,350 feet, the distance from the nearest charge to the Palmer's Island lighthouse.

The results of this analysis indicates that the maximum anticipated vibration at the Palmer's Island lighthouse is approximately 0.034 in/sec. This value is approximately 15 times lower than the recommended level issued by U. S. Bureau of Mines and in the MA Building Code (0.5 in/sec) and included in the Contractor's requirements. As a result, we feel confident that the vibrations associated with blasting will not have an impact on the Palmer's Island lighthouse.