OCHSENDORF DEJONG & BLOCK, LLC
Structural Engineering Consultants

Lili Neuhauser
80 Lorillard Road
PO Box 31
Tuxedo Park, NY 10987

November 24, 2013

RE: Tuxedo Park Retaining Wall

Dear Mayor Neuhauser,

I am writing to offer our professional opinion on the safety of the historical masonry wall near Tuxedo Park. Our firm specializes in the safety assessment of historic masonry structures and we have substantial experience in the engineering assessment of unreinforced masonry similar to this wall construction. We have particular expertise in the structural assessment of masonry that has experienced large deformations over time, which is highly relevant to the condition of the leaning masonry wall under consideration here. This letter is based on my professional opinion having reviewed the prior reports and the available photos that you sent me last month. I have not visited the wall or conducted any structural analysis in the preparation of this letter.

Per your request, I have studied the previous engineering reports on the state of the wall, namely the:

a) Weston and Sampson letter of March 11, 2013
b) O'Brien and Gere letter of March 14, 2013
c) Brooker Engineering Letter of April 22, 2013
d) Weston and Sampson letter of July 31, 2013

Having studied the documentation of the wall in detail, I have the following comments:

1) The previous reports correctly identify the wall as a gravity retaining wall, which uses its mass to resist the soil pressure acting against the wall. The wall is stabilized by its self-weight due to gravity, and it is destabilized by the horizontal pressure exerted by the soil retained behind the wall. Any outward movement (or lean) of the wall leads to reduced stability of the wall. Any added soil behind the wall also reduces its stability (such as a possible heightening of the wall which may have occurred at some point in its long history.)

2) The exact geometry of the wall is not well known at present. However the "Schematic cross section of East Lake Road Wall" provides the best understanding of the wall geometry. If the wall is consistently 24" in width throughout its height, the extent of the current leaning has dramatically reduced the stability of the wall. The width of the wall is a crucial variable and any future interventions should seek to document this dimension better.

OCHSENDORF DEJONG & BLOCK, LLC
Structural Engineering Consultants
(617) 233 3648
224 Albany Street #470
Cambridge, MA 02139
info@odb-engineering.com

3) The fact that the wall curves in plan away from the soil pressure does not help its stability. If the wall were curved in the opposite direction, or if it were straight, then it would have greater resistance to the soil pressure through arching action within the plane of the wall. Because the wall curves as it does, the wall can only rely on gravity and cannot develop arching action.

4) I agree with the initial assessment by Weston and Sampson that the wall is “severely distressed” in the bulging portion. If left as is, there is a strong likelihood that part of the wall may collapse onto the road sometime in the coming decades. The possible opening in the backside of the wall is also not an encouraging sign. Therefore, something must be done to stabilize the leaning portion of the wall.

5) The wall is historically significant and I strongly recommend that any repair should maintain both the appearance and construction method of the wall. I recommend that any proposed solution should not depend on the use of reinforcing steel, which has a short lifetime due to corrosion and will not provide a solution than can last for more than a few decades.

6) By removing at least four feet of soil depth behind the wall (immediately adjacent to the wall), it is possible to relieve the soil pressure on the back of the wall, providing time for additional action to be contemplated. Once soil is removed, the current leaning wall will be stable in the absence of horizontal pressure from soil. There are a variety of ways in which the soil could be removed without jeopardizing the wall or the construction workers.

7) In the long term, the wall should either be lowered in height or thickened in width in order to provide a safe retaining structure for the soil behind it. The wall should remain porous with regular drainage openings in order to prevent water pressure from building up behind it.

8) While repairs are being made to the wall, I strongly recommend that the roadway lane adjacent to the wall should remain closed.

Please do not hesitate to contact me with any questions or concerns.

Yours sincerely,

John Ochsendorf, PhD

OCHSENDORF DEJONG & BLOCK, LLC
Structural Engineering Consultants
(617) 233 3648

224 Albany Street #470
Cambridge, MA 02139
info@odb-engineering.com