April 15, 2021

Dan Morgan
Behal Sampson Dietz
990 West Third Avenue
Columbus, OH 43212

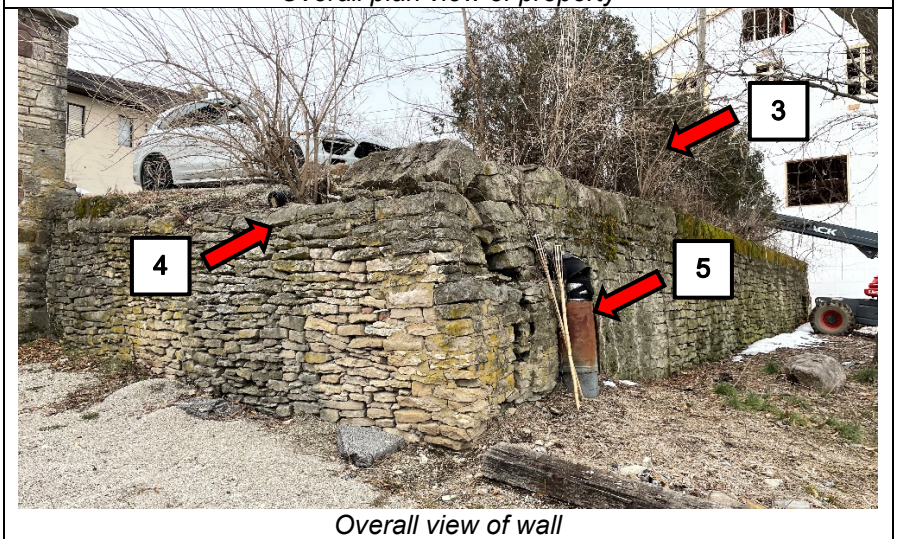
RE: 40 North High Street
Korda File: 2021-1006.15

Dear Dan:

At your request, I performed a structural assessment of the existing retaining wall behind the structure at the above stated location on Friday, February 26, 2021. The structural assessment was requested to evaluate the structural integrity of the existing field stone retaining wall located along the Eastern side of the property with the main retaining wall built towards the North and a return wall towards the West.

The wall is approximately 69.5' long x 22.5' deep x 6.25' tall and is constructed of fieldstone. The upper portion of the retaining wall is used as a gravel parking lot (**#1**) while the lower portion is unoccupied and does not have any construction (**#2**). There are several coniferous trees and other vegetation that line the top of the retaining wall (**#3**). There are several visible roots and vines that are coming through the cracks at the top several layers of the wall (**#4**). There is a sewer line that penetrates the retaining wall at the North side of the corner and turns down below grade (**#5**).

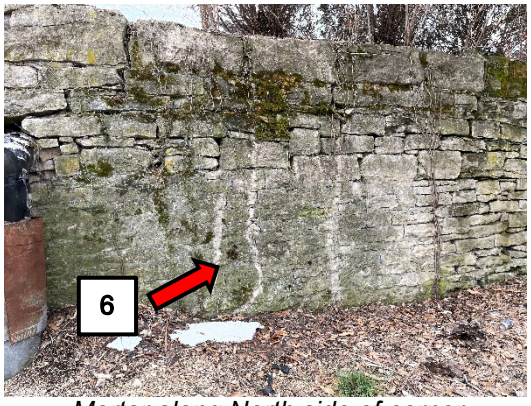
Overall plan view of property



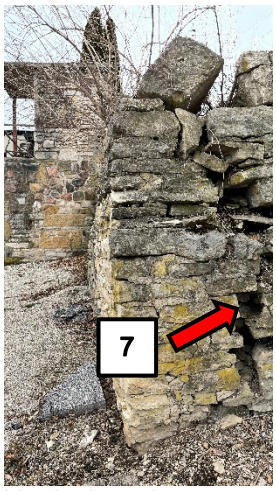
Overall view of wall

In general, the stone wall is held together by interlocking stones that resist the lateral pressure behind the wall. This type of wall is called a dry stone wall and was a viable option for building a wall in the 1800's and early 1900's. The intent for the wall is to retain the soil while letting water circulate through and beside the wall. This was generally achieved by providing free draining material behind the wall to allow for this to happen. Mortar was not typically used to interlock these stones as it prohibits water from passing through. If water is present behind the retaining wall, it increases the lateral pressure exerted onto the wall, and compromise the walls structural stability.

There are several locations where it appears that mortar has been placed between the stones on the outside face of the wall along the North side of the corner by the sewer line (**#6**). This was likely done to allow for the sewer line to pass through without undermining the integrity of the wall at the time of installation, however this has also prevented water from getting through. There are several significant areas of concern, a vertical crack located on the North side of the corner that shows several inches of separation (**#7**), a horizontal shift at half height of the wall at the corner location (**#8**) and further, the top portion of the wall at this corner has broken off. This indicates that there is swelling of the soil at the bottom of the wall and that the pressure has exceeded the shear capacity of the wall.



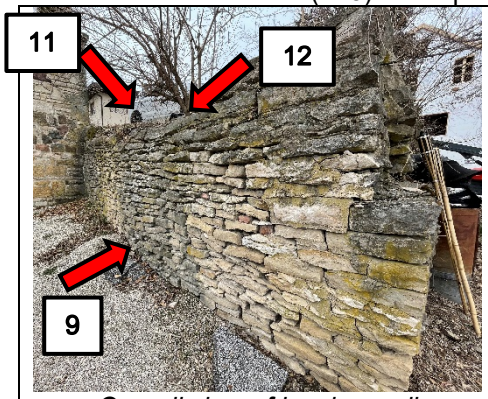
Mortar along North side of corner



Vertical crack at corner

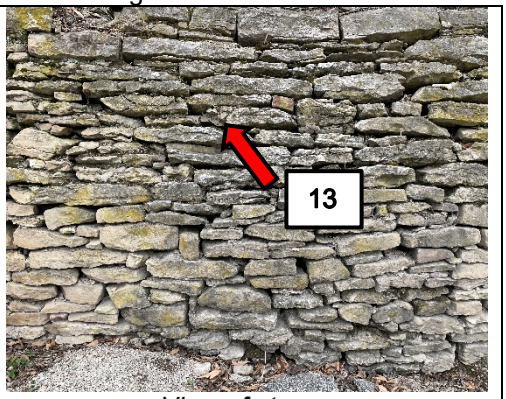
Horizontal shift at corner

The return wall West of the corner is also showing signs of bowing at the mid-length of the wall (**#9**). The bowing occurs at the bottom 1/3 height of the wall and is bowing approximately 7" from plumb (**#10**). The top of the wall has settled downward at approximately the same location of the bow (**#11**). This location aligns with a corrugated pipe that is draining the parking lot over the wall (**#12)**. It is my understanding that the corrugated pipe was placed to help remedy the water run-off from the lot to go past the retaining wall instead of letting the water saturate the soil behind the wall. The bow in the wall has caused the stone to spread outward on the outside therefore pinching the back side of the wall (**#13**). This pinching of the back side is likely contributing to more water retention.



Overall view of bowing wall

Measurement of bow



View of stones

The retaining wall's overall stability has been compromised at the Southwest corner of the wall, the South side of the wall, and approximately 20' along the Eastern length of the wall. There are many factors that likely contribute to the current wall's condition including the change in grading, rain water management, nearby construction, tuckpointing the stones in select locations, tree/shrub roots, potential thermal expansion of the wall and modifications to its structure over time. Significant corrective measures are required to bring the wall back to its proper integrity, address the compromised portions, and plumb the wall and include the following measures:

- The wall will need to be deconstructed and re-built to ensure proper stability.
- The soil behind the wall will need to be removed at a 2:1 ratio and backfilled with free draining fill to ensure that the soil's lateral pressure does not increase due to water saturation.
- An appropriate drainage system will be required to mitigate the water build up behind the wall.

Further, as there are plans for future expansion of the existing building on the West side of the wall and a new structure on the East side of the wall, it is my recommendation that the existing stone retaining wall be replaced with an engineered system capable of safely retaining the earth, parking lot and proposed building expansion rather than relying upon a patch and repair approach to the existing wall.

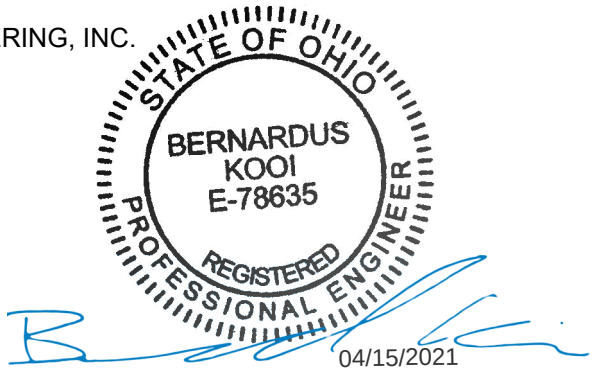
It is worth mentioning that with any development of the site, there is a high likelihood that the existing wall will see higher than designed for loads and pressures for this type of wall construction. These loads and lateral pressures can be designed for with a new retaining wall that uses modern construction techniques, systems, and methods.

In conclusion, the immediate need to address the corner of the wall is critical to the stability of the entire wall and to public safety. The corner of the wall is to be addressed by providing the above-mentioned remedial methods, however with the foresight that new construction is to occur on both sides of the wall I recommend that the wall replaced with a properly designed retaining wall.

If you have any questions or comments, please contact me.

Yours Truly,

KORDA/NEMETH ENGINEERING, INC.
Consulting Engineers



Bernie Kooi, PE, SE, LEED AP
Structural Engineer / Associate

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