

737 Plum Street
Saint Paul, Minnesota



Structural Observations and Report

March 25, 2016

Performed by:

LINDAU
COMPANIES, INC.

PROFESSIONAL ENGINEERS

1074 OLD HWY 35
HUDSON, WI 54016
(715) 386-4444 OFFICE

Mr. Joe Musolf
Housing and Redevelopment Authority City Hall Annex
25 West Fourth Street, Suite 1300
Saint Paul, MN 55102

Mr. Musolf,

Lindau Companies performed a visual structural assessment of existing site retaining walls around the subject property. Work was completed in accordance with the Scope of Work as defined in Exhibit A of the Vendor Agreement between the Housing and Redevelopment Authority of the City of Saint Paul and Lindau Companies. This report presents our findings and recommendations. Upon request, Lindau Companies will prepare a fee proposal for creating restoration and repair bid documents as related to this report.

Table of Contents:

- 1.0 Project Overview and Observations
- 2.0 Conclusion and Recommendations

1.0 Project Overview and Observations

Lindau companies visited the subject property on March 10, 2016 and visually assessed two distinct retaining walls and a terraced series of retaining walls. Heretofore these three retaining walls will be referred to as Lot Line Retaining Wall, Garage Retaining Wall, and Terraced Retaining Wall. The three retaining walls have been identified by markings on the certificate of survey pdf titled “737 Plum Survey Retaining Walls” and included with this report.



Lot Line Retaining Wall



Garage Retaining Wall



Terraced Retaining Wall

Lot Line Retaining Wall

This earth retaining wall is constructed with 12” concrete masonry units, likely grouted solid in many areas, and reinforced. The wall is approximately 90’ long and retains as much as 9’-8” of earth tapering down to 2’ of retained earth at the southernmost point where the wall intersects the sidewalk on Plum Street. The southernmost 35’ of wall is experiencing bulging, bowing and leaning. Lindau Companies estimates the displacement along the southernmost section of wall to be in the range of 3”-6”. Two large vertical cracks, spaced about 4’ apart, create a clear marker of where the wall transitions from a fair condition to a

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distressed condition. The northernmost 55' of wall may be supporting surcharge loading from an adjacent apartment complex. The northernmost 55' of retaining wall has some isolated deterioration and efflorescence, but is generally appears to be in fair condition.



Bulging, bowing, and leaning southern 35' portion of the wall. Two vertical cracks at 4' on center with ~2" of relative horizontal displacement.



Deteriorated mortar joints and spalled concrete block face shell of the southern 35' portion of the wall.



Efflorescence, deteriorated mortar joints, fence post embedment deterioration, leaning, bowing and bulging of the southern 35' portion of the wall.



Northernmost 55' of wall is generally in fair condition. Isolated efflorescence and localized deterioration exists.



Apartment building appears to have repaired brick veneer in the corner where the pavement is settling.

Garage Retaining Wall

The garage retaining wall is a 12" concrete masonry wall with a rounded mortar cap. The wall has four sections connected by three 90 degree angles. The wall retains between 8' and 4' of earth. Lindau Companies did not inspect the westernmost section of wall because the wall is identified on the certificate of survey as being 0.7' west of the subject property line. The wall appears to be in good condition and performing its intended function.



Garage Retaining Wall appears to be in good condition.

Terraced Retaining Walls

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The property has four tiers of terraced retaining walls on the northeast corner. The lowest tier is constructed with railroad ties. The meandering upper three tiers are mostly constructed of limestone with a small amount of concrete masonry segmental retaining wall units. The walls typically retain 3'-4' of earth. The walls are disturbed by tree growth and generally appear dilapidated. Based on visual observation and review of the Certificate of Survey, the hill slope is estimated to be about 30 degrees. There is some evidence of hillside sloughing and sliding, which would indicate that the hillside slope is near or slightly exceeding the angle of repose. If required, this can be verified by a geotechnical evaluation of the soil.



Lowest tier of terraced retaining wall consists of wood railroad ties. Upper tiers consist of dry stacked limestone and segmental concrete masonry units.



Trees are growing through the terraced walls and compromising their integrity.



Evidence of hillside sliding and construction debris disposal.

2.0 Conclusions and Recommendations

Generally, it is unlikely that any of the retaining walls observed conform to the current Minnesota State Building Code. The determination of this would require an investigation beyond the scope of this report.

Lot Line Retaining Wall

The southernmost 35' of wall is experiencing severe leaning, bowing, and bulging. This portion of wall should be removed and replaced or strengthened. We believe drainage from the apartment complex is exacerbating the retaining wall movement by creating saturated soil conditions and earth pressures that are in excess of the design pressures. The apartment complex roof downspout that is currently draining behind the earth retaining wall should be redirected to avoid saturating the retained earth. The apartment complex pavement has settled and slopes toward the retaining wall. This pavement should be curbed and sloped away from the retaining wall to prevent surface water from saturating the retained soil. The northernmost 55' of retaining wall appears to be stable and in fair condition. This wall should have isolated repair work and preventative maintenance.



The apartment complex pavement is experiencing settlement cracking and sloped toward retaining wall. The apartment complex downspout is draining behind retaining wall.



The apartment complex downspout is draining behind retaining wall. This drainage is causing localized wall deterioration and contributing to bowing, leaning, and bulging.



Localized repairs needed in northernmost 55' of wall.

Garage Retaining Wall

The garage retaining wall appears to be in good condition, performing adequately, and should not require any immediate repairs. A small amount of isolated masonry repair and some preventative maintenance work is recommended.



No structural repairs required. Protective concrete and masonry sealer and minor isolated masonry repairs are recommended to increase the durability of this wall.

Terraced Retaining Walls

Sections of the terraced limestone dry stack retaining walls are in poor condition and are being damaged by trees. The damaging trees should be removed and the failed sections of limestone walls should be restacked. Because the hillside slope approximately matches the estimated angle of repose of the soil, the terraced limestone walls should not present an eminent safety concern unless the individual stone elements become dislodged and travel downhill., Deferring maintenance in this area will increase the likelihood of this happening and likely lead to increased future repair costs.

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Trees growing through the terraced retaining walls are causing deterioration.

Our observations and opinions are based on visual observation without the aid of historical information, original construction documents, destructive or invasive, or conversations with previous owners. Additionally, we have not performed any calculations or testing of materials or soils to verify adequacy of structural elements observed.

Furthermore, our review, observations, and opinions relate solely to the retaining walls and not to non-structural items such as civil engineering, architecture, egress, mechanical and plumbing systems, or environmental considerations. In the case that we note non-structural issues within this letter it is for the sole purpose of noting the need for the review of these items by a professional trained in that discipline.

This report is for informational purposes only and cannot be used as a construction or permit document. Construction documents need to be prepared by others when submitting for a building permit.

All construction should be performed by a licensed contractor with experience in home construction and inspected by the local building official.

We would like to thank you for the opportunity to perform this investigation. If you have any questions, comments, or if you need any additional service, please do not hesitate to contact us. Upon request, Lindau Companies will prepare a fee proposal for creating restoration and repair documents for permit.

Sincerely,

Lindau Companies, Inc.
William H. Lindau MN PE #24781

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.