

January 10, 2010

Mr. David Sumwalt
Wisconsin Department of Administration
Division of State Facilities
P.O. Box 7866
Madison, WI 53707-7866

**SUBJECT: WHITNEY RETAINING WALL STUDY
 UW-LA CROSSE
 LACROSSE, WISCONSIN
 DSF PROJECT #: 10130**

Dear Mr. Sumwalt:

Per your request, Edge Consulting Engineers, Inc. (Edge) has completed our engineering study of the Whitney Retaining Wall project located on the UW-La Crosse campus in La Crosse, WI. This study includes the following topics: Condition Assessment, Prioritized Recommendations for Repair or Replacement and Cost Estimates for Recommended Repairs.

CONDITION ASSESSMENT

Edge staff was on-site on October 27, 2010 and again on November 18, 2010 to review the retaining wall condition and to gather field data and measurements via survey. Construction plans for the Whitney Center were also provided by UW-La Crosse Staff which indicate the wall and building were originally constructed in 1966. Other site improvements including the stairs at the east end of the pedestrian bridge and railings may have been added at a later date.

1. Retaining Wall:

From our observations, it appears the retaining wall, pedestrian bridge to upper level of the Whitney building and light pole bases were all constructed per the original building plans. The retaining wall consists of large dry stacked limestones with approximate base width of 1 to 2 feet. These stones were set on a 3ft. Wx1ft. Thick concrete footing. Joints between the stones and immediate backfill were noted to be packed with "loam" soils. Overall wall height ranges from 13 feet at the high point (at pedestrian bridge) to 2 feet at the exterior points. Details for the original retaining wall and pedestrian bridge construction have been included as Figures 1, 2 and 3.

Currently the retaining wall is showing signs of movement (bowing) and settlement (Photos 10, 11 & 12). These areas are mainly located near the bridge at the tallest parts of the wall. The loam packed soil material originally placed between the limestones is non-existent along most of the wall. Several locations of excessive erosion are also evident along the wall. This is mainly near the bridge where water from the bridge slab drains onto the retaining wall and is washing out fill material from behind the wall (Photos 11 & 12).

The retaining wall is failing in several locations, however, the failures noted do not appear to be cause for imminent or catastrophic collapse. It is recommended that corrective measures be completed over the 2011 construction season to prevent damage to the pedestrian bridge which, if not addressed, will considerably increase the overall project costs.

2. Walkways, Stairs and Railings:

As part of our study we also reviewed the layout and condition of the existing walkways, stairs and railings within the limits of the retaining wall project. It was determined that several deficiencies currently exist with these access points when considering current accessibility standards. However these installations were likely installed prior to the current accessibility standards and therefore grandfathered in as acceptable. The following is a list of issues noted:

1. Pedestrian Bridge Ramp Landing: This landing (also landing at top of stairs) currently has cross slopes in excess of 1:50 (2%). Existing slopes of this area were measured to be between 7.5% and 7.7% (Photo2).
2. Pedestrian Bridge Ramp Handrails: The pedestrian bridge ramp does not have ADA compliant handrails (Photos 2 & 9).
3. Stairway to Pedestrian Bridge: The stairs leading up to the pedestrian bridge are in need of replacement. The stairs are cracking at the center and also are showing signs of settlement. The current guard rails do not have handrails that are compliant with current ADA guidelines (Photo 2).
4. Upper Walkways: The north upper walkway leading up to the pedestrian bridge appears to be an accessible route to the upper building entrance. It has a landing and ramp section. The existing ramp section does not have ADA compliant handrails on both sides (Photos 1 & 5). Also the top landing slopes are non-compliant as noted above in #1. The south upper walkway has slopes just over 1:20 (5%). The existing slopes were measured at 5.3% (Photos 6 & 7).
5. Lower Walkways: The walkways leading down to the lower building entrance both have slopes in excess of 1:20 (5%). The south walkway appears to be an accessible route to the lower building entrance. It has several landings and ramp sections. Some ramp sections are in excess of the 1:12 (8.33%) maximum ramp slope requirement. Existing slopes of the ramps were measured to be between 9.5% and 8.2%. The ramp sections also do not have ADA compliant handrails on both sides (Photos 3, 7 8 & 12). The north walkway slopes were measured to be 7.65% (Photos 4, 9, 11 & 12).

RECOMMENDATIONS

Several options for repair or replacement of the retaining wall were considered during this study. The following is a prioritized list of recommendations for these options along with discussion of each option:

1. Replacement with Modular Block Wall:

The preferred corrective action to remedy the existing failing retaining wall is to replace the existing dry stacked limestone wall with a new modular block retaining wall with soil reinforcement. This option also includes underpinning the pedestrian bridge to provide bearing points which do not terminate in the top of the backfill area. These new bearing points would be similar to the existing light pole bases and extend down to the base of the retaining wall so the pedestrian bridge does not have to rely on the retaining wall for structural support. The underpinning measures will also provide support for the pedestrian

bridge during retaining wall reconstruction. Further details on the proposed installation are included in the attached preliminary plan set.

A. Upper Walkways:

Installation of the new wall will require removal and replacement of the upper walkways leading up to the pedestrian bridge to allow for installation of soil reinforcement behind the new wall and general project construction. This will allow the walkways to be reinstalled at ADA compliant slopes with suitable hand and guard railings. It is recommended that new guard rails and handrails be installed as part of the project.

B. Pedestrian Bridge Ramp Landing and Stairway to Pedestrian Bridge:

It is recommended that the existing pedestrian bridge ramp landing be resurfaced (leveled) and existing stairs up to the pedestrian bridge be replaced at the same time as the retaining wall project since the entire area will be disrupted as part of the project. These installations tie into the adjacent walkways and should be completed if compliance with current ADA standards are to be addressed under this project.

C. Lower Walkways:

The south walkway to the lower building entrance currently does not have handrails which comply with current accessibility standards on both sides of ramp sections. The existing installations likely predate current requirements and therefore may be currently acceptable. It is recommended that installation of ADA compliant handrails be installed as part of this project since the entire area will be disrupted as part of the project including one of the lower walkways.

D. Pedestrian Bridge Ramp Handrails:

The pedestrian bridge ramp currently does not have ADA compliant handrails on both sides of the ramp sections. The existing installations predate current requirements and are therefore acceptable. Installation of ADA compliant handrails could be installed as part of this project if compliance with current standards is desired.

2. **Replacement with Cast In Place Wall:**

The next option evaluated for corrective action was to replace the existing dry stacked limestone wall with a new cast in place concrete retaining wall. This option also includes underpinning the pedestrian bridge to facilitate construction. The concrete wall exterior could include decorative moldings in the form work and staining to produce a more aesthetically pleasing finish. Overall this option was not selected since construction costs are estimated to be in excess of 35% more than the modular block option. In addition the appearance of this type of wall was noted not to be as desirable as other options by the Agency.

3. **Dismantle and Rebuild Existing Wall:**

The final option evaluated for corrective action was to dismantle and rebuild the existing limestone wall with soil reinforcement. This option also includes underpinning the pedestrian bridge to facilitate construction. The new limestone wall would utilize mortar between the limestone joints, soil reinforcement and a drainage system behind the wall. Overall this option was not selected since function of the new wall was noted to be more important to the Agency than maintaining the existing look. In addition, construction costs

are estimated to be in excess of 50% more than the modular block option to salvage and reuse the stones.

COST ESTIMATES

Cost estimates for the recommended repairs including various options were developed as part of this study. The following is a summary of the estimated project costs:

1. **Base Bid - Replacement with Modular Block Wall:**

This base project includes full replacement of the existing retaining wall with a new modular block wall system including drainage system and soil reinforcement as shown in the attached preliminary plan set. It also includes underpinning the pedestrian bridge in two places, new upper concrete walkways with new (galvanized and painted or powder coated) steel guardrails and handrails.

Anticipated Project Cost: \$140,377.00

2. **Alternate #1 – Re surface Landing at Pedestrian Bridge and Replace Stairway:**

This potential add alternate includes resurfacing (leveling) of the existing concrete landing and replacing the existing stairway with a new reinforced concrete stairway and new (galvanized and painted or powder coated) steel hand railings.

Anticipated Project Cost: \$11,385.00

3. **Alternate #2 – South Lower Walkway:**

This potential add alternate includes replacement of the existing south concrete walkway to the lower building entrance with a new ADA compliant concrete walkway including ramp sections and new (galvanized and painted or powder coated) steel hand railings.

Anticipated Project Cost: \$31,165.00

A detailed breakdown of these cost estimates is attached.

We would like to thank you for the opportunity to be involved with this project. If you have any questions regarding this study, please feel free to contact our office at 608-644-1449.

Sincerely,

Edge Consulting Engineers, Inc.

Arlen J. Ostreng, P.E.
Project Manager

Enclosures:

Whitney Center – Retaining Wall Study Preliminary Drawings
Figures 1, 2 & 3
Photos 1 – 12
Cost Estimate