RESOURCE ENGINEERING ASSOCIATES, INC.

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August 16, 2010

Karl Manthe, Street Superintendent
Stoughton Street Department
535 South 4th Street
Stoughton, WI 53589

RE: 4th Street Dam & Powerhouse
Stream Bank Restoration
Preliminary Site Investigation

Karl,

Resource Engineering Associates, Inc. (REA) would like to thank you for the opportunity to provide our professional opinions and services for a project of this scope. We believe strongly in developing sound and cost effect ways to meet our clients' needs. Our objective is to provide exceptional agricultural, civil and environmental engineering consulting services focusing on client satisfaction.

Our staff has completed a preliminary site investigation focusing on the river bank erosion problem present at the tail race outlet area of the 4th Street Dam & Powerhouse facility. We have formulated a brief discussion of the scope of restoration of this area based on sound economical engineering practices. An opinion of the development costs has been included for the proposed structural erosion control best management practice.

REA is very excited about playing a part in the solution to this issue. We are prepared to meet with you or your staff to detail our proposal/report for clarity and understanding.

Thank you again for this opportunity and we look forward to working with you in the near future.

Sincerely,
RESOURCE ENGINEERING ASSOCIATES, INC.

Carl T. Chenoweth, P.E.
Senior Civil Engineer

Cc: file

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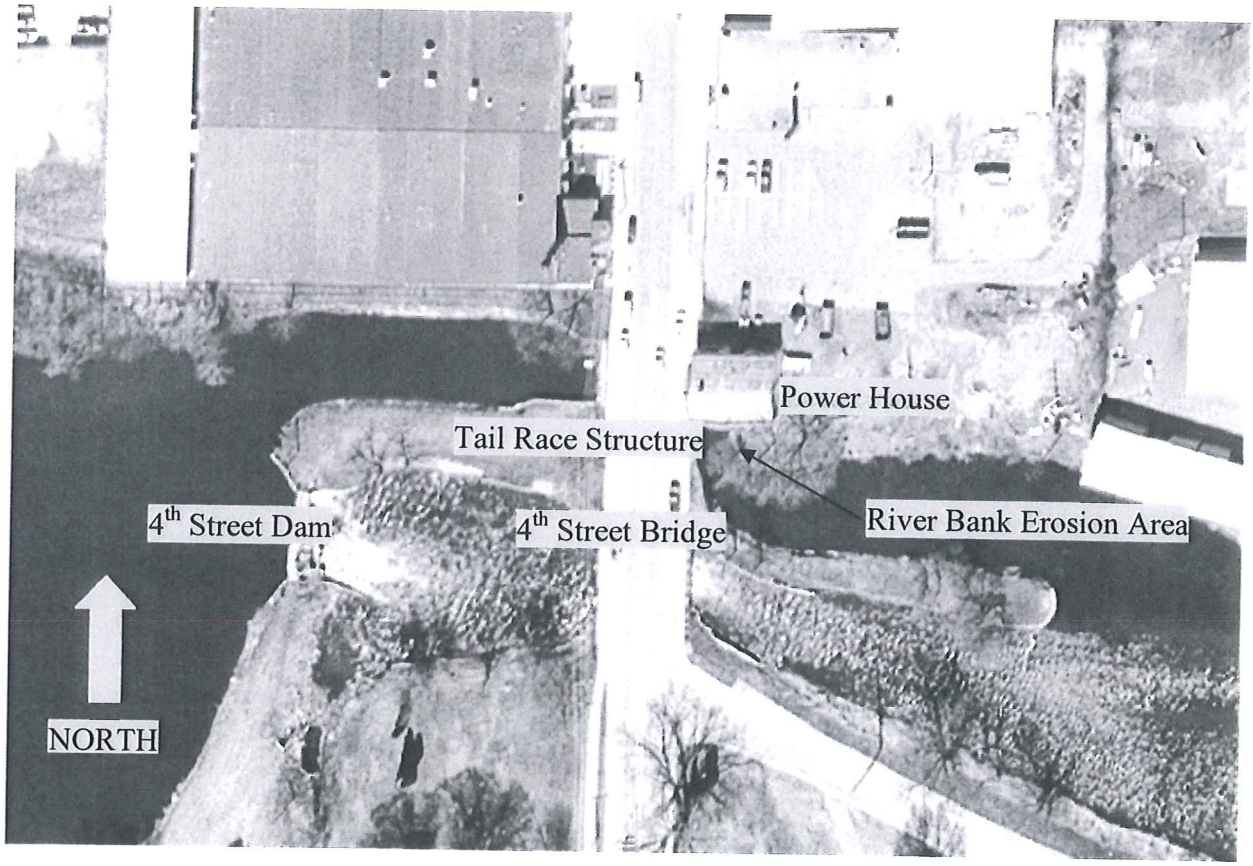
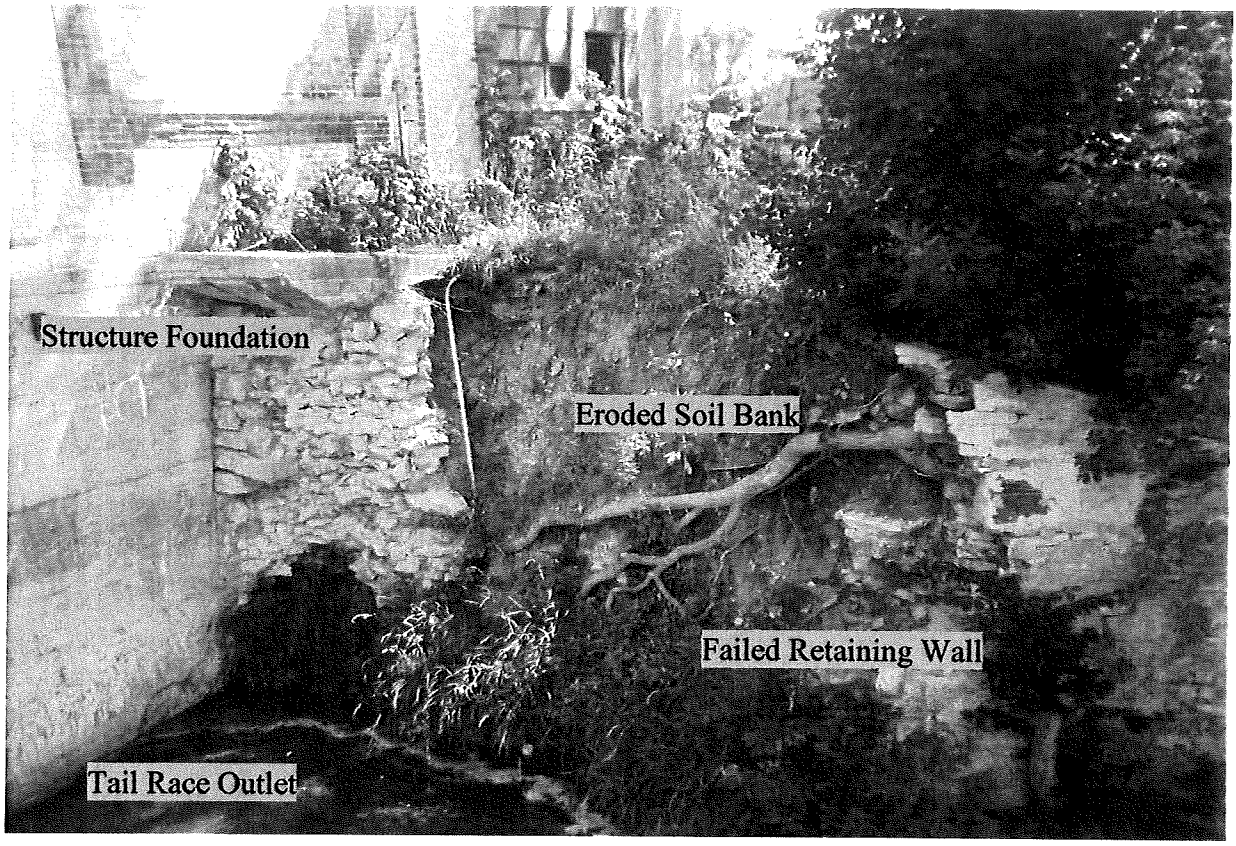
**4th Street Dam & Powerhouse**
**Stream Bank Restoration**
**Preliminary Site Investigation**




**Background:**

Last year, the City of Stoughton went forward with the repair and reconstruction of the 4th Street Dam just west of the 4th Street bridge across the Yahara River. During the construction process, the river flow was to be diverted through the tail race structure of the abandon power house on the NE corner of the 4th Street bridge. With the river flow completely diverted along this path, the river bank just downstream of the power house outlet had eroded to an unstable condition. Concerns have been raised to the structural integrity of the river bank retaining wall and the power house south foundation. A preliminary site investigation was performed by REA and the following report outlines technical opinions formulated based on this investigation.




**Existing Site Conditions:**

This stone/masonry retaining wall has been eroded by a strong direct current onto this area. The stone masonry retaining wall has deteriorated and is currently beyond repair. With the wall failure at this location, the diverted river current seemed to provide enough energy to erode a least 3ft deeper into the bank. Vegetation and tree roots have been exposed in this area. The tail race outlet shown is currently a calm pool of water north of the main river current.

From a surface inspection, the power house foundation wall appears to be sound and stable. Minor cracking in the concrete surface is apparent but there are not any signs of foundation movement or settlement at the surface. The surface of erosion includes a 15ft X 15ft area which includes approx. 50 cy of soil and stone masonry retaining wall erosion.

There are no indications that surface storm water has been directed or surface flow concentrated from the parking/equipment storage area to the North and East. Thus it is concluded that the principal cause of this failure is supported by the effect of the larger river current energy; placed at this point, during the dam repair river channel diversion in 2009.

**Project Recommendations:**

Stream bank stabilization can take be implemented in two forms. The passive form includes grading the bank to a shallow slope with vegetative plantings along the disturbed slope to stabilize and prevent soil erosion. This method is best suited for a slow to moderate river channel current.

Although the tail race pool is currently stagnant, it is anticipated that there may be a need to use the power house tail race at some future date. This could be either as an outlet for hydro-power generation or as a river channel by-pass for some future dam repairs. With this type of use of the power house tail race, the channel current through the tail race pool would be greatly increased and turbulent.

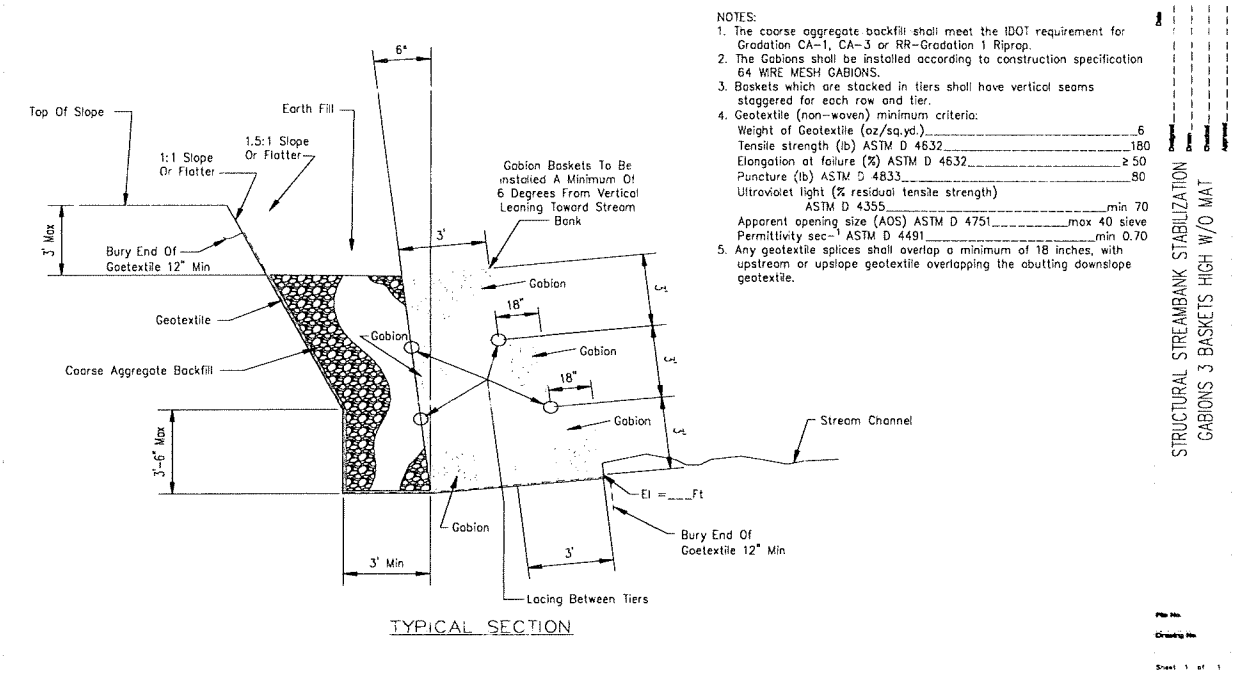



Figure (1)

It is recommended that a structural form of stream bank stabilization be considered for this erosion control best management practice. Figure (1) provides a detail of the use of 3X3 Rip-Rap Gabions stacked alternatively along the damaged area to provide structural protection against the erosion of the soil embankment adjacent to the power house. The gabions would be stacked as detailed and extend approx. 25ft south of the power house foundation wall. All backfill material and sloping embankment would be constructed as shown; which would provide for a stable embankment supporting the power house foundation.

**Opinion of Construction Cost:**

Construction approx. 25ft of (3X3) stacked gabion stream bank stabilization structure [Figure (1)] at the power house tail race outlet pool.

| Item | Units | Unit Cost | Total |
|---|---|---|---|
| Clearing & Grubbing | 1 LS | $ 2,500.00 | $ 2,500.00 |
| Structural Excavation | 250 CY | $ 15.00 | $ 3,750.00 |
| Cofferdam/Dewatering | 1 LS | $ 5,000.00 | $ 5,000.00 |
| (3X3) Rip-Rap Gabions | 60 CY | $ 200.00 | $ 12,000.00 |
| Granular Backfill | 100 CY | $ 30.00 | $ 3,000.00 |
| Geo-Textile Fabric | 50 SY | $ 18.00 | $ 900.00 |
| | | Construction Subtotal: | $ 27,150.00 |
| | | +30% Contingency: | $ 8,145.00 |
| | | Construction Total: | $ 35,295.00 |
| | | +13% Engineering/Permits: | $ 4,705.00 |
| | | Project Total: | $ 40,000.00 |