

ENTRY FORM



DVASE 2017 Excellence in Structural Engineering Awards Program

PROJECT CATEGORY (check one):

Buildings under \$2M		Buildings Over \$100M	
Buildings \$2M-\$10M		Other Structures Under \$5M	
Buildings \$10M - \$30M		Other Structures Over \$5M	X
Buildings \$30M - \$100M		Single Family Home	

Approximate construction cost of facility submitted:	\$6.8 million	\$2.3 m – Phase I \$4.5 m – Phase II
Name of Project:	Carnegie Lake Dam Structural Repairs and Maintenance	
Location of Project:	Princeton, Mercer County, New Jersey	
Date construction was completed (M/Y):	November 2016	
Structural Design Firm:	Joseph B. Callaghan, Inc.	
Affiliation:	All entries must be submitted by DVASE member firms or members.	
Architect:	NA	
General Contractor:	Kyle Conti Construction, LLC	

Company Logo (insert .jpg in box below)



Important Notes:

- Please .pdf your completed entry form and email to bsagusti@barrhorstman.com.
- Please also email separately 2-3 of the best .jpg images of your project, for the slide presentation at the May dinner and for the DVASE website. Include a brief (approx. 4 sentences) summary of the project for the DVASE Awards Presentation with this separate email.

- Provide a concise project description in the following box (one page maximum). Include the significant aspects of the project and their relationship to the judging criteria.

Project Summary

Princeton University's Carnegie Lake is iconic. Not only does it give home to competitive rowing at Princeton, it provides a haven for wildlife to flourish and serves as a retreat for the University's community - Albert Einstein was frequently seen boating and fishing on the lake. It is without a doubt one of Princeton's most treasured natural spaces.

And none of it would be possible without an incredible feat of concrete – the Carnegie Lake Dam.

Since its completion 110 years ago, repairs have varied in frequency and quality and in 2014 it was clear that a comprehensive structural rehabilitation was required. Due to Joseph B. Callaghan's (JBCI) trusting relationship with Princeton University, JBCI was engaged to perform an overall structural assessment and to act on the University's behalf for construction administration of the restoration project.

JBCI recognized the historical significance as well as the magnitude of completing a full assessment and restoration of the active dam. Extensive research of historical records at the University's library helped the firm fully understand the engineering past of this behemoth structure.

Completed in 1907, the Dam is a steel reinforced concrete structure spanning 724 feet long. Documented repairs to the dam date back to 1918 and surface spalling documentation as far back as 1922 and deemed in poor shape by the Division of Waters. In 1966, the Dam was covered in a layer of gunite. Unfortunately, the Dam continued to deteriorate over decades. This research was key in preparing the team and subcontractors for unforeseen challenges during the project.

After research, JBCI created a plan of execution based on visual surveys and extensive core tests of the concrete while the Dam was still active. The major factor to ensure success was determining the original concrete mix used in the early 1900s. Over the years, incompatible concrete used to repair the structure was contributing to the deterioration. 100 years of past repairs had to be undone to even begin the restoration process.

JBCI designed a cofferdam to dewater and expose the concrete for deeper assessment, repair and restoration. Once the concrete was exposed and gunite layer removed, additional more significant damage was discovered; adding to the scale and scope of the project. Phase I and II of the project totaled \$6.8 million in construction costs and was completed in November 2016.

The repair of the Lake Carnegie Dam is significant due to the historical importance of the structure, obstacles in gaining access to the concrete structure, the removal of a century of incompatible repairs, hidden faults under the gunite layer and the testing required to match the original concrete mix. JBCI was proud to be a part of the design/construction team; helping to preserve Princeton University's landmark playground for its crew team and community alike.

- The following 5 pages (maximum) can be used to portray your project to the awards committee through photos, renderings, sketches, plans, etc...

Additional Details of Carnegie Lake Dam Restoration Project

Project Team

Joseph B. Callaghan, Inc.

Civil & Geotechnical Engineers
Princeton Hydro, LLC

General Contractor
Kyle Conti Construction, LLC

Owner, Princeton University
Manager Robert Ortego, PE
Environmental Compliance Manager



Photo courtesy of Princeton University Archives

Specifications

Carnegie Lake Dam is a 724 foot long, concrete buttress dam structure consisting of three major structural components; 1) Buttress supported concrete wall spillway, 2) Low level outlet structure and 3) Abutment walls (See Photos No. 1 & 2).

WEST END

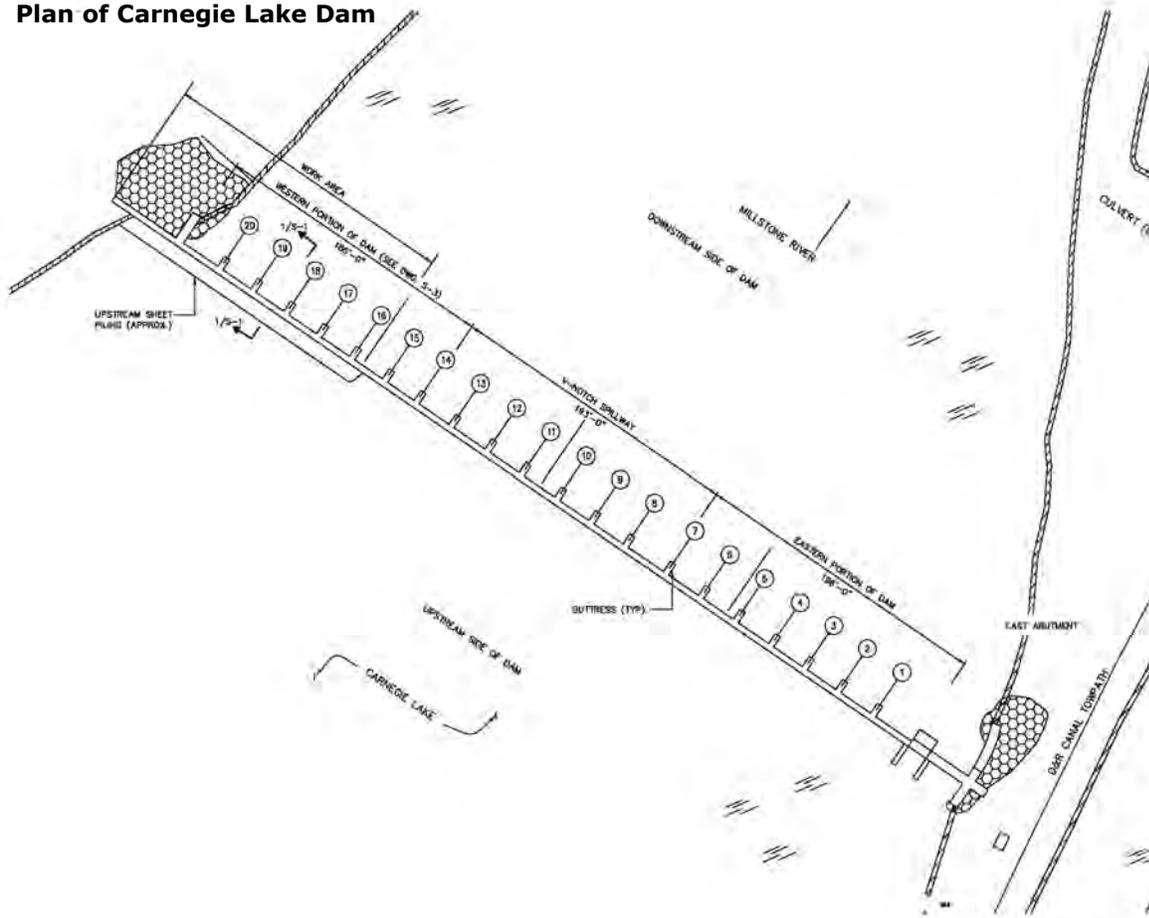
The west end of the dam consists of a 54 foot by 4 or 6 foot wide 'L' shaped concrete abutment extending out from the shoreline bank. The main dam spillway is a 575 foot long buttress supported concrete wall bounded by the east outlet structure and west abutment wall. In the center of the spillway there is a 193 foot long V-notch weir section that has a center depth of approximately 0.7 feet. The upstream face of the concrete wall consists of an interlocking steel sheet piling wall.

EAST END

The east end of the dam consists of the low level outlet structure and a concrete abutment wall. The low level outlet structure is located west of the abutment wall separated by a continuation of the spillway. The outlet structure is a 12 foot long concrete structure that contains two 42"+ diameter cast iron pipes. A 20 inch thick concrete slab spans between the east end abutment wall and the outlet structure providing walkway access from the east abutment. The east end abutment wall is approximately 52 foot long by 6 foot wide concrete abutment wall curved inward on the downstream side. The east abutment wall abuts the Delaware-Raritan Canal embankment.



Plan of Carnegie Lake Dam



Detailed images of cracking and deterioration



Cracking and deterioration in gunite overlay along buttress wall.

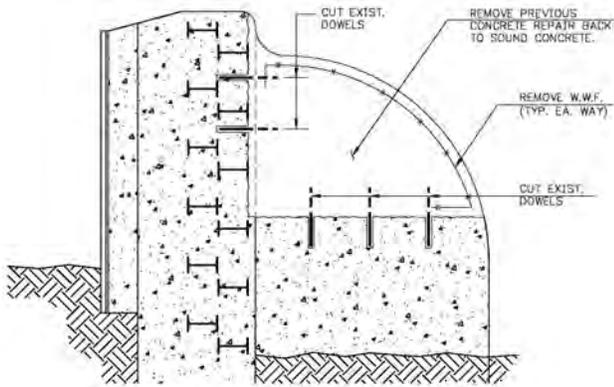


Cracking and deterioration along concrete buttress. Vegetation growth extending from buttress.

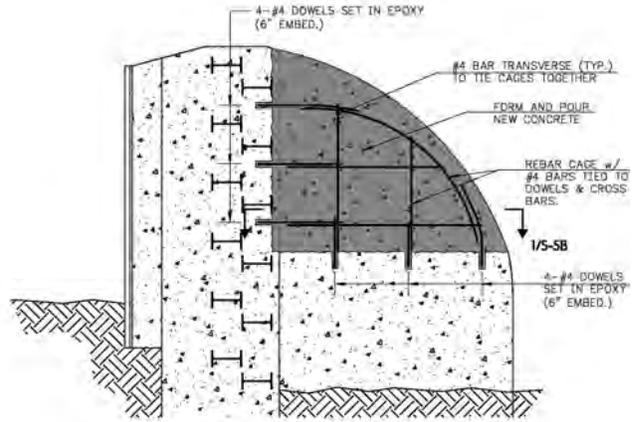


Cracking with concrete spalling at outlet control structure.

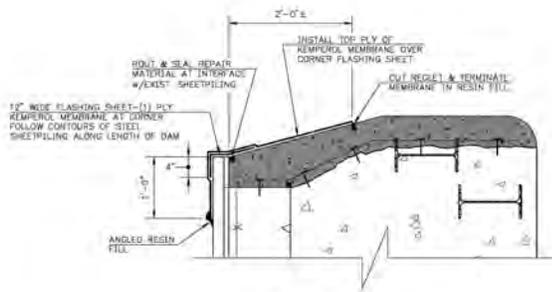




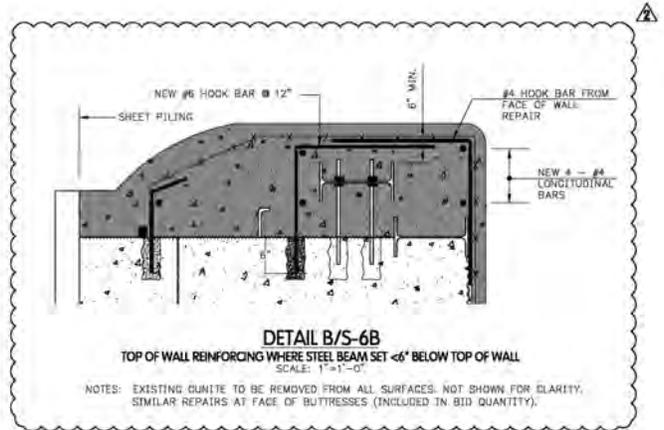
DEMOLITION



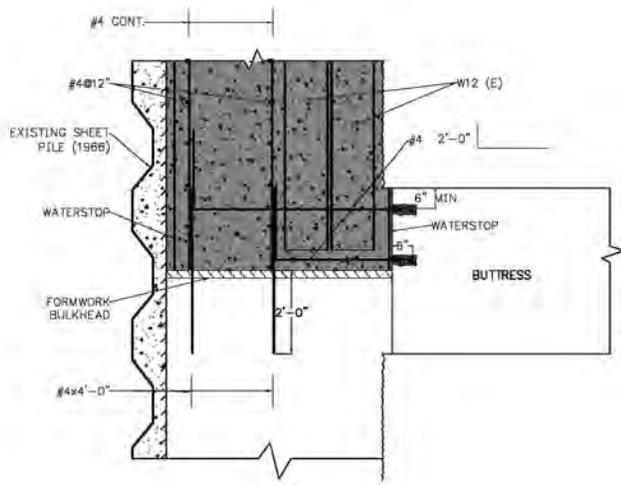
REBUILD



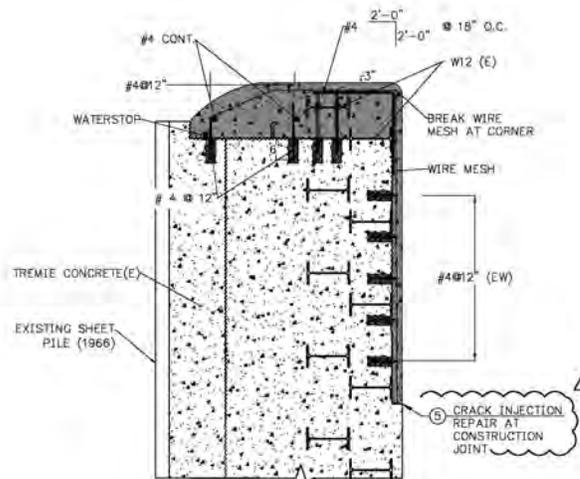
DETAIL A/S-6B
WATERPROOFING DETAIL AT TYPE 3 REPAIR
 SCALE: 1" = 1'-0"



DETAIL B/S-6B
TOP OF WALL REINFORCING WHERE STEEL BEAM SET 6" BELOW TOP OF WALL
 SCALE: 1" = 1'-0"
 NOTES: EXISTING CURB TO BE REMOVED FROM ALL SURFACES; NOT SHOWN FOR CLARITY. SIMILAR REPAIRS AT FACE OF BUTTRESSES (INCLUDED IN BID QUANTITY).



PLAN



SECTION

By signing, signatory agrees to the following and represents that he or she is authorized to sign for the structural design firm of record.

All entries become the property of DVASE and will not be returned. By entering, the entrant grants a royalty-free license to DVASE to use any copyrighted material submitted.

If selected as an award winner, you may be offered the opportunity to present your project at a DVASE breakfast seminar. Would you be willing to present to your colleagues? YES NO

Submitted by:

Print name: Allen Roth	Signature: 	Date:
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