



EAST GOSHEN TOWNSHIP MILLTOWN DAM



PA DEP #D15-146
June 1, 2015

submitted by
SCHNABEL DAM ENGINEERING, INC.
1380 Wilmington Pike, Suite 100
West Chester, PA 19382
610-696-6066
schnabel-eng.com



June 1, 2015

Mr. Rick Smith, Township Manager
East Goshen Township
1580 Paoli Pike
West Chester, PA 19380

Subject: Proposal for Milltown Dam, East Goshen Township, Pennsylvania

Dear Mr. Smith:

SCHNABEL DAM ENGINEERING, INC. (Schnabel) appreciates the opportunity to present our proposal for this important project. Selecting Schnabel will contribute to the success of your project. Schnabel provides:

- **EXCEPTIONAL PROFESSIONAL QUALIFICATIONS.** We will serve as an extension of the Township's staff on this project and guide you through the challenges of dam ownership and regulatory compliance. We are committed to your satisfaction.
- **LOCATION.** This project will be completed from our West Chester office, located minutes from the site and your office. Our project manager and many team members live and work in Chester County and will be highly responsive to the Township's needs.
- **SPECIALIZED EXPERIENCE AND TECHNICAL EXPERTISE.** Through our work on more than 120 Pennsylvania dams, we understand the criteria for the design and permitting required for this project. Our extensive experience in spillway capacity upgrades, overtopping protection and dam removals directly apply to this project.
- **PAST PERFORMANCE.** Our references will attest to our ability to complete projects, provide high-quality services, and meet both schedule and budget expectations. We encourage you to contact them.

Our proposal and other information required by the RFP are presented in the attached submittal. We are excited about the opportunity to work with the Township. Please do not hesitate to contact me at 610-696-6066 or via email at jyoung@schnabel-eng.com should you have any questions or need additional information.

Sincerely,

SCHNABEL DAM ENGINEERING, INC.

Jeremy R. Young, PE
Associate / Project Manager



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I. LETTER OF INTRODUCTION

This letter of introduction is included per the Request for Proposal (RFP) and identifies the point person for this project, along with our understanding of the services and how Schnabel will address your needs.

Point of Contact / Project Manager

Jeremy Young, PE will be the primary point of contact and project manager for this project. Jeremy is a native of Chester County, and has worked in Schnabel's West Chester, Pennsylvania office since graduating from Penn State in 2000. He excels in project management and has experience developing designs for over 35 dam rehabilitation projects, mostly located in Pennsylvania. Additional information related to Jeremy's experience and expertise relevant to this project is described in Section II of this proposal. He can be reached at (610) 696-6066 or by email at jyoung@schnabel-eng.com.

Project Understanding

Milltown Reservoir Dam is located across the East Branch of the Chester Creek immediately north of West Chester Pike in East Goshen Township, Pennsylvania. Key site features and data are highlighted below:

Milltown Dam

- 15-ft high earthen embankment
- 70-ft long concrete gravity spillway
- Outlet Works: Concrete wet well equipped with a sluice gate and gate valve; Two 16-inch diameter CIP intake conduits; 16-inch diameter CIP outlet conduit.
- 6.6 square mile drainage area
- Originally constructed in 1924 for water supply
- Currently owned by East Goshen Township as a recreation facility



The Pennsylvania Department of Environmental Protection – Division of Dam Safety (PADEP) currently categorizes the dam as high hazard structure, and through an “in-house” hydrologic and hydraulic analysis dated July 18, 2014, indicated that the 0.5 PMF may be the appropriate spillway design flood. PADEP also estimated existing spillway capacity to be 0.14 PMF. Based on our review of available correspondence, we understand that the Township's engineer, Pennoni Associate, Inc. (Pennoni) was tasked with evaluating spillway capacity and developing alternatives to upgrade or remove the dam.

The results of the evaluation of alternatives was presented in a letter dated December 9, 2014, and considered several options to armor the dam to prevent an overtopping failure during the spillway design flood, including geocells, conventional concrete, articulated concrete blocks and roller compacted

concrete. Estimated construction costs to upgrade the dam ranged between \$350K and \$550K. Pennoni also estimated the cost to breach the dam, which ranged between \$700K and \$850K. Subsequent to this analysis, the Township met with PADEP to discuss a possible path forward to bring the dam into compliance with PADEP regulations. PADEP suggested the Township remove the dam in phases over the next few years.

We understand that prior to developing a design, the Township wishes to engage the services of a reputable dam engineering firm to further evaluate options to upgrade or remove the dam.

How Can Schnabel Address the Township's Needs

With a local office and national reputation for dam engineering, Schnabel can effectively and efficiently address your needs in establishing a concept for the rehabilitation or removal of the Milltown Dam. This first phase of work is critical in developing appropriate concepts and building a collaborative relationship between the Township, your consultant, PADEP, and other concerned stakeholders identified by the Township (e.g., local residents that will be impacted by the project).

Schnabel Provides	Benefits to the Township
A local project manager and dam engineering staff located 6.5 miles from the site and 8 miles from the Township office	A responsive, local contact and team of dam engineering experts.
Nationally recognized dam engineering qualifications	Expert guidance to the Township with regard to the challenges of dam ownership, including experience in both rehabilitation and removal.
A project team with expertise in dam rehabilitations	Sound, innovative, cost effective solutions that meet the Township's needs, including several cost-effective approaches that were not previously evaluated.
Familiarity with the regulations and staff of PADEP's dam safety program	Efficient collaboration with PADEP and acceptance of concepts and designs.
A team with a commitment to the dam safety community.	Education and training of Township staff related to dam safety, if desired.

In addition, Schnabel will work with the Township to identify potential funding opportunities for rehabilitation or removal of the dam. Funding may be available from the USDA and/or local watershed associations.

II. EXPERIENCE

Firm Overview

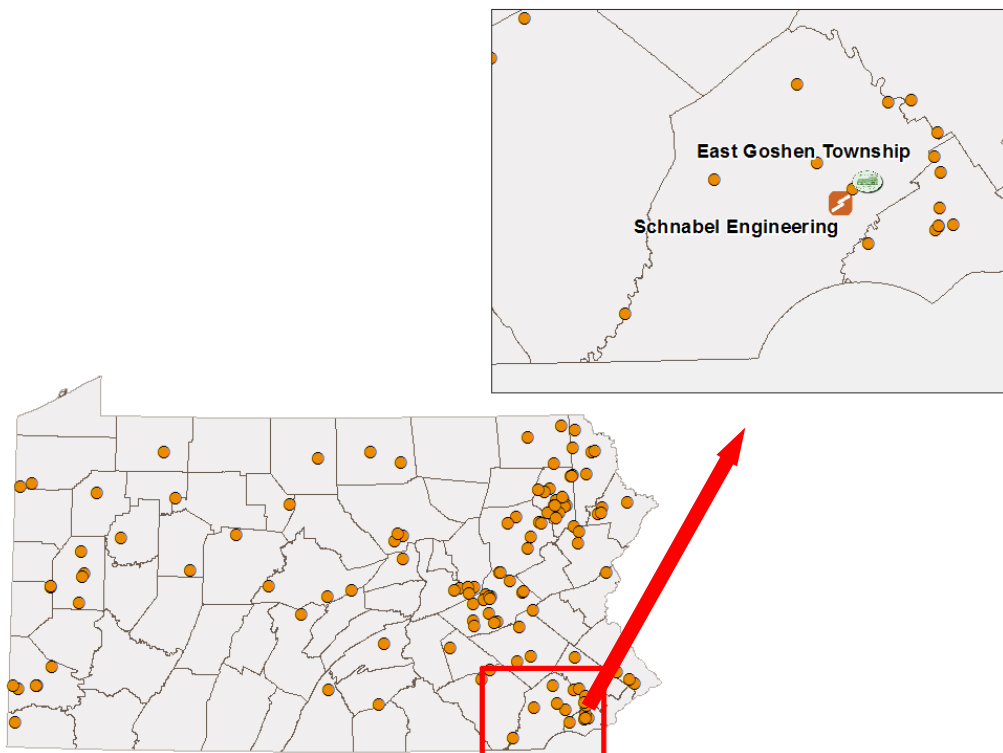
Schnabel is a nationally recognized leader in dam engineering, with a local office to serve you. Since 1994, Schnabel has provided engineering services for over 1,000 dams. Satisfied clients for these projects include federal, state, and local governments, water suppliers, lake associations, and other consulting engineers. Dam engineering comprises about 35% percent of Schnabel's total business, illustrating our strong commitment to this service area. Schnabel is a sustaining member of the Association of State Dam Safety Officials (ASDSO) and the United States Society on Dams (USSD), and several of our dam engineers are active in various committees within these organizations.

Schnabel has five offices that are dedicated to dam engineering: **West Chester, PA**, Albany, NY, Alpharetta, GA, Greensboro, NC, and Knoxville, TN.

Schnabel's staff of nearly 100 dedicated dam engineering professionals work on dam projects full time, not as an occasional sideline. Our staff has experience in all engineering disciplines relevant to dams, including civil engineering, hydrology and hydraulics, geotechnical and geologic engineering, structural analysis and design, and construction engineering. We advocate this interdisciplinary approach and our dam engineers "see the big picture" to best serve our clients. Our dam engineers are supported by extensive additional staff credentials in geostructural engineering, geotechnical engineering, geology, geophysics, and environmental permitting.

Pennsylvania Dam Experience

Schnabel has provided engineering services for more than 120 dam projects in Pennsylvania.



Our Pennsylvania experience includes projects for the following owners and dams:

- **Aqua Pennsylvania Water Company** – Green Lane, Township Line, Ironworks, Pickering Creek, Springton, Lower Crum, Ridley Creek, Neshaminy, and Wetherill Dams
- **Borough of Tamaqua** – Upper and Lower Owl Creek Dams
- **Consumers Pennsylvania Water Company (now Aqua Pennsylvania, Roaring Creek Division)** – Bear Gap Dams 2 and 6, Kline's Dam, Mount Carmel Dams 1 and 2, and Trout Run Dam
- **Pennsylvania American Water** – Lake Oneida Dam; Nesbitt and Thorn Run Dams; and outlet and annual inspections for 27 high-hazard dams
- **Pennsylvania Department of Conservation and Natural Resources (DCNR)** – Chapman, Gouldsboro, Gunter Valley, Little Buffalo, Lower Lake, Lyman Run, Memorial Lake, Parker, Poe Valley, Promised Land, Riley's Pond, Tobyhanna, George B. Stevenson, and Pymatuning Dams
- **Pennsylvania Fish and Boat Commission (PFBC)** – Beaver Creek, Canonsburg, Colyer Lake, Dutch Fork, Glade Run, Lake Nessmuk, Leaser Lake, Lower Woods, Belmont Lake, Minsi Lake, Speedwell Forge Lake, and Upper and Lower Hereford Dams
- **Pennsylvania Game Commission** – Alder Marsh, Buzzard Swamp No. 6, Glades, Lower and Upper, Middle Creek, and Shohola Marsh Dams
- **Schuylkill County Municipal Authority** – Indian Run, Kauffman, Mount Laurel, and Pine Run Dams
- **Williamsport Municipal Water Authority** – Heller, Mosquito Creek Reservoir, and Youngman Dams

We have also performed engineering services for dams owned by Chester Water Authority, Berks County, New Oxford Municipal Authority, Boy Scouts of America, Penn State University, and numerous other satisfied Pennsylvania dam owners.

Project Spotlight

Woodlands at Greystone Dams Assessment, West Goshen Township, Pennsylvania



The proposed development "Woodlands at Greystone" includes rehabilitation of three small dams, which will become the property of West Goshen Township. The Township engaged Schnabel to assess the dams prior to issuing final approval. Our scope of work included conducting dam inspections, identifying dam safety deficiencies, providing recommendations for repair, and performing an independent review the rehabilitation designs developed by others as part of the subdivision plan. Schnabel completed the assessment in February 2015.

Through our experience on these projects, we have developed a strong relationship with Pennsylvania Department of Environmental Protection (PADEP) Division of Dam Safety, based upon mutual respect. We encourage you to contact any of the PADEP staff to verify our qualifications.

Dam Modifications, Rehabilitation and Upgrades

Schnabel specializes in dam rehabilitation and we have extensive experience in design and construction of rehabilitation and upgrading measures for dams with deficiencies, including:

- Seepage and piping issues for embankment dams
- Stability of concrete and masonry gravity dams
- Structural deterioration and/or undermining of concrete spillways
- Inadequate spillway capacity to pass the design flood

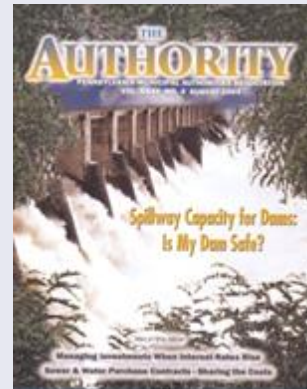
Schnabel has performed alternatives evaluations, detailed design, and/or provided construction services for hundreds of dams, including more than 50 Pennsylvania dams.

Spillway Capacity Upgrades

Typical upgrades for earth dams that do not meet spillway capacity criteria include:

- Spillway expansion to pass the design flood without overtopping the embankment
- Construction of an auxiliary spillway to increase hydraulic capacity
- Raising the dam to prevent overtopping and pass the flood through the spillway
- Armoring the embankment to allow overtopping during the design flood
- Combinations of these options

Schnabel has performed design services for hundreds of dams requiring upgrades for spillway capacity, and we are currently providing design and/or construction phase services for more than a dozen dam upgrading projects.



In 2004, Greg Paxson, manager of Schnabel's dam engineering group in West Chester, co-authored an article on dam spillway capacity. The article was published in PMAA's The Authority magazine.

Overtopping Protection Experience

Armoring of embankments with Roller Compacted Concrete (RCC) or Articulated Concrete Blocks (ACB) to allow overtopping is often a viable and cost effective solution to meet spillway capacity requirements. In addition to providing spillway capacity, this approach does not change the hydraulic performance of the dam and spillways during flood events, which is of particular concern when there are structures located upstream and downstream floodplains that would be sensitive to increases in discharge resulting from spillway expansion or dam raising.

Schnabel's **current** experience with overtopping protection includes:

- Schnabel is currently evaluating options to upgrade the gabion overtopping protection at Aqua Pennsylvania's **Township Line Dam** located in West Goshen Township, Pennsylvania.
- Construction is underway at **Speedwell Lake Dam** (Lancaster County) and **Colyer Lake Dam** (Centre County), both owned by the Pennsylvania Fish and Boat Commission (PFBC). Both dams will be armored with RCC and were designed by Schnabel. We are also providing full time observation of the construction.
- **Glade Run Lake Dam** (Butler County), also owned by PFBC, is currently advertised for bid, and will include ACB embankment armoring. Schnabel developed the design and will provide full time construction phase services.
- We are preparing a RCC armoring design at **Lunga Lake Dam** located in Quantico Marine Corps Base, Quantico, Virginia.
- Construction recently kicked off for the upgrading of **Lake Laura Dam**, located in Shenandoah County, Virginia. Schnabel developed the design for RCC overtopping protection and will provide full time construction phase services.



Technical Manual: Overtopping Protection for Dams

Best Practices for Design, Construction, Problem
Identification and Evaluation, Inspection,
Maintenance, Renovation, and Repair

FEMA P-1015/May 2014



While at the Bureau of Reclamation, Schnabel's, Tom Hepler was one of four primary authors of the FEMA Technical Manual on Overtopping Protection for Dams.

Schnabel has extensive experience in design and construction of overtopping protection for dams and spillways on more than 25 projects, including those tabulated below.

Project	Location	Completion (Design or Construction)	Overtopping Protection Material
Glade Run Lake Dam	Pennsylvania	Est. Constr. 2016	ACB
Lunga Lake Dam	Virginia	Est. Constr. 2016	RCC
Lake Laura Dam	Virginia	Est. Constr. 2016	RCC
Colyer Lake Dam	Pennsylvania	Est. Constr. 2015	RCC
Speedwell Forge Lake Dam	Pennsylvania	Est. Constr. 2015	RCC
Huntsman Lake Dam	Virginia	2014	ACB
Bear Creek Dam	Virginia	2014	RCC
Oneida Dam	Pennsylvania	2013	RCC
Mount Laurel Dam	Pennsylvania	2013	ACB
Stoney Creek Dam	Virginia	2013	RCC
Lake Townsend Dam	North Carolina	2012	ACB
Fox Creek #4	Kentucky	2012	RCC
Lower Owl Creek Dam	Pennsylvania	2012	RCC
Poe Valley Dam	Pennsylvania	2009	RCC

Lake Inverness	Georgia	2008	ACB
Reeves Lake Dam	New Jersey	2006	ACB
Yellow River No. 16	Georgia	2006	RCC
Marrowbone Dam	Virginia	2006	RCC
Ryker Lake Dam	New Jersey	2005	ACB
Locust Lake Dam	New Jersey	2005	RCC
Great Gorge Dam	New Jersey	2003	RCC
McKinney Lake Dam	North Carolina	2003	RCC
Harbison Pond Dam	South Carolina	2002	ACB
Putnam Dam	Connecticut	2001	ACB
Robinsons Branch Dam	New Jersey	2001	RCC
Douthat Dam	Virginia	1998	RCC

Dam Removal Experience

As a last resort, Milltown Dam may need to be removed, which will require a project team with a unique set of qualifications. A sample of Schnabel's extensive experience in dam removal is presented below.

- Schnabel is currently developing a plan to remove Aqua Pennsylvania's **Red Shale Dam No. 2** located in Wayne County, Pennsylvania.
- In addition to conducting annual dam inspections at **Brinton Lake Dam**, Schnabel has evaluated options to rehabilitate or decommission this high hazard dam located on the West Branch of the Chester Creek in Thornbury Township, Pennsylvania. The owner is currently pursuing publically available funding to remove the dam and to establish wetlands within the impoundment. Schnabel anticipates leading the dam removal design along with our teaming partner Pennoni.
- While under contract to evaluate alternatives to upgrade **Speedwell Forge Lake Dam**, flooding from Hurricane Irene and Tropical Storm Lee damaged the concrete chute spillway, which prompted the Pennsylvania Fish and Boat Commission to perform an emergency breach of the embankment to divert stream flow from the damaged spillway. Schnabel developed design documents for the emergency breach and provided bid and construction phase services. Schnabel also worked closely with various permitting agencies and local and state government to address environmental and public safety concerns.
- Schnabel recently performed dam removal services for three projects of similar size and scope throughout Georgia. **Wellborn Lake Dam** was a 17-ft high, earthfill dam impounding an 11.5-acre lake; **Old Saw Mill Dam** was a 34-ft high, earthfill dam impounding a five-acre lake; and **Kemp Lake Dam** was a 19-ft high, earthfill dam impounding a 9.5-acre lake. All three of these



Speedwell Forge Lake Dam

dams were regulated as high hazard structures by the Georgia Safe Dams Program. Schnabel performed hydrologic and hydraulic studies to size the breach openings to prevent future impoundment of a reservoir during significant storm events. Inlet controls were designed to meter the flows and serve to create a forebay to retain sediments. The outlet channels were protected with rip rap. In addition to breaching of the dams, detailed erosion and sediment control plans were developed to stabilize the sediments within the reservoirs. In each case, the sediments were to remain within the reservoir area. Re-vegetation plans for the reservoirs were developed to accomplish this goal.

- **X-way Dam** is located the sandhills region of North Carolina. The spillway was severely damaged by Hurricane Francis in September 2004, during which some of the downstream slabs were completely displaced or undermined by erosion of the foundation sand. Schnabel completed an investigation of the existing spillway to determine the feasibility of repair or replacement. During review of alternatives, NCDOT, in consultation with North Carolina Department of Environment and Natural Resources, determined that the dam would be permanently breached at the location of the old original bridge and spillway. The breach section was designed for the 100-year flow capacity for the bridge opening without impinging on the new planned bridge beams. The breach area included a steel sheet piling coffer dam to protect the work area during construction, and then the steel pilings were cut off at the planned inlet weir shape and elevation to retain the lake sediment and provide uniform flow into the rock riprap lined breach channel.

Project Manager Experience

As Project Manager, **Jeremy Young** will be the primary contact for the Township, and lead our project team from Schnabel's West Chester, Pennsylvania Office.

Jeremy will be responsible for the overall management and allocation of the team's resources for the project. He will ensure that all tasks are complete on time and within budget, and will make certain that all contract terms and conditions are met. He will work closely with the Township's Project Manager, and will manage and maintain the project schedule and budget control, and oversee the development of project deliverables. This will allow Schnabel's staff to focus on the technical aspects of the project.

Jeremy has more than 14 years of experience with design, analysis, and construction on a variety of dam engineering projects. He excels in project management and serves on Schnabel's companywide Project Management Improvement Group, tasked with improving Schnabel's tools for project management and providing training to staff. His dam engineering experience includes leading, reviewing or managing more than 35 dam rehabilitation projects. The Construction Specifications Institute recognizes Jeremy as a Certified Construction Specifier, which demonstrates comprehensive knowledge of the design and construction process, contractual relationships, and use of construction documents. Jeremy is also a member of the ASTM Subcommittee on Articulating Concrete Block Revetments.

Schnabel has led an International RCC Dams Seminar and Study Tour seven times since 1998. The last week-long offering was held in Nashville, Tennessee in early May 2015. The course covered RCC for the design of new dams and the rehabilitation of existing dams. Jeremy was an organizer for the event and presented on RCC Overtopping Construction Case Studies and Lessons Learned.

Jeremy's recent project experience particularly relevant to Milltown Dam includes:

- **Lake Oneida Dam, Butler County, Pennsylvania:** Project Manager and Lead Designer responsible for the evaluation and rehabilitation design of a high hazard earth dam with a maximum height of 31 ft. Various rehabilitation alternatives were evaluated and contract documents were developed for the selected alternative, which consisted of RCC armoring and a replacement structural spillway. An embankment drainage system was also incorporated with the RCC armoring. Coordinated a phased subsurface investigation, piezometer installation, and embankment evaluation. Construction was completed with limited to no reservoir drawdown due to water supply demands. Provided technical support during construction and assisted with construction contract administration



Lake Oneida Dam

- **Lower Owl Creek Dam, Tamaqua, Pennsylvania:** Project Manager and Lead Designer responsible for the evaluation and design of rehabilitation alternatives to safely pass the Spillway Design Flood (SDF) for this 32-ft high, high hazard dam. Evaluated several rehabilitation alternatives, and developed design documents for the selected alternative, which included a replacement box-inlet drop spillway, RCC embankment armoring, and raising top of dam with earthfill. Coordinated the subsurface investigation and installation of piezometers. Performed slope stability, seepage, and hydrologic and hydraulic analyses as part of the design. Also provided technical support to the prime consultant and performed site observations during construction.

- **Schuylkill County Municipal Authority Rehabilitation Designs:** Project Manager responsible for the evaluation and rehabilitation design of four high hazard earth dams, with maximum embankment heights ranging from 39 to 94-ft. The rehabilitation designs focused on addressing embankment seepage and stability issues, and inadequate spillway capacity. Coordinated subsurface investigations, piezometer installations and embankment evaluations, and performed hydrologic and hydraulic analyses to support spillway designs. Pine Run Dam (labyrinth spillway) was completed in 2011; Indian Run Dam (labyrinth spillway) was completed in 2012; and Mount Laurel Dam (ACB armoring and drop box-inlet spillway) and Kauffman Dam (labyrinth spillway) were completed in 2013. Technical support and observation services were provided during construction, which was completed with limited to no reservoir drawdown due to water supply demands.



Mount Laurel Dam

- **Huntsman Lake Dam, Fairfax County, Virginia:** Associate Engineer responsible for reviewing the design of an auxiliary spillway armored with ACB. The ACB design was developed as part of major rehabilitation for this high hazard NRCS earth dam with a maximum

height of 43 ft. Hydraulic modeling was performed with HEC-RAS to estimate parameters used to evaluate ACB stability. Design calculations, plans and performance specifications were prepared to support the ACB design in accordance with VA DCR and NRCS criteria. Served as Project Manager, Construction Contract Administrator and Design Liaison during construction.

- **Pennsylvania Fish and Boat Commission Dam Rehabilitation Designs:** Designer for the rehabilitation of four high hazard dams found to have inadequate spillway capacity. Maximum embankment heights for each dam range between 26.5-ft and 43.5-ft. Designed RCC overtopping protection at Colyer Lake and Speedwell Forge Dams; also designed ACB overtopping protection at Glade Run Lake Dam. Embankment drainage systems were incorporated into each design. Coordinated subsurface investigations and piezometer installations. Performed embankment seepage and slope stability analyses, and hydrologic and hydraulic analyses to support design.



Poe Dam

- **Poe Dam, Centre County, Pennsylvania:**

Lead Designer responsible for the preparation of contract documents and a Pennsylvania Dam Permit for the rehabilitation of this high hazard earth dam. Rehabilitation measures included armoring the downstream slope of the 33-ft high embankment with roller compacted concrete to safely pass the PMF. Coordinated the subsurface investigation and installation of piezometers. Performed slope stability analyses, a seepage assessment, and hydrologic and hydraulic analyses as part of the design. Provided engineering support during bidding and construction phases, and assisted with construction contract administration.

III. REFERENCES

Through our project work, we have developed a strong reputation with project owners, contractors, regulators, and other consulting engineers. We encourage you to contact the following references to verify our qualifications as they relate to the services required for your project.

Edward “Woody” Raptosh, PE

Pennsylvania Department of
Conservation and Natural Resources
400 Market Street, 8th Floor
Harrisburg, PA 17101
P/ 717-783-3329
E/ eraptosh@pa.gov

“This letter...recognizes the exemplary services that [Schnabel] has provided to DCNR...your firm has provided DCNR with outstanding geotechnical and dam design expertise...I look forward to working with [Schnabel] on future projects.” – Woody Raptosh

For nearly 15 years, Schnabel has supported DCNR in inspections, evaluations, and rehabilitation design for a dozen of their dams, including the armoring of Poe Dam.

Tony Fernandes, PE

Aqua Pennsylvania
726 West Lancaster Ave.
Bryn Mawr, PA 19010
P/ 610-645-1144
E/ tfernandes@aquaamerica.com

Schnabel’s relationship with Aqua Pennsylvania (formerly Philadelphia Suburban Water) spans 15 years. We have performed inspections, evaluations and developed rehabilitation designs for numerous Aqua Pennsylvania-owned dams. We are currently evaluating alternatives to upgrade Township Line Dam and preparing a plan to remove Red Shale Dam No. 2.

Anthony “Tony” Nokovich, PE

Pennsylvania-American Water
Company
852 Wesley Drive
Mechanicsburg, PA 17055
P/ 717-691-2138
E/ Anthony.Nokovich@amwater.com

“[Schnabel] exhibited professionalism through the project and worked as an extension of our staff...Schnabel’s staff was well rounded and committed to a successful project.” - Tony Nokovich

Under a five year contract, Schnabel has been inspecting PAWC’s 27 high hazard dams since 2013. Schnabel also developed the upgrading design of Lake Oneida Dam, which included RCC overtopping protection.

Patrick “Pat” Caulfield, PE

Schuylkill County Municipal Authority
221 South Centre Street, PO Box 960
Pottsville, PA 17901

P/ 570-622-8240

E/ pcaulfield@scmawater.com

Schnabel developed rehabilitation designs for four high hazard dams. Our design concepts included a variety of approaches to upgrade spillway capacity and ultimately saved SCMA millions of dollars over concepts developed by a previous consultant.

Jerry Woomer, PE

Pennsylvania Fish and Boat Commission
450 Robinson Lane
Bellefonte, PA 16823

P/ 814-359-5170

E/ gwoomer@pa.gov

“This letter...recognizes the expertise, ingenuity, and professionalism that [Schnabel] exercised in development of...dam rehabilitation projects...Each project has its own set of challenges...[Schnabel] has met each challenge and performed beyond expectation.” – Jerry Woomer

Schnabel’s experience with PFBC dates back to 1995, when we designed a new dam for a recreational lake. Since then we have developed rehabilitation design for five dams and supported PFBC design for three other dams.

IV. SCHEDULE

As required by the Request for Proposal, we have developed the following schedule to complete the scope of work as described in Section V. The schedule is based on the Township issuing a notice to proceed (NTP) on July 1, 2015.

Task	Date Start	Date Finish	Duration (Calendar Days)
NTP	7/1/2015	7/1/2015	0
Data Review	7/1/2015	7/15/2015	14
Prepare Meeting Presentation	7/15/2015	7/29/2015	14
Public Meeting No. 1	TBD		1
Public Meeting No. 2	TBD		1

V. COST PROPOSAL

As required by the Request for Proposal, we have developed the following cost proposal to provide services associated with Project Phase I.

OBJECTIVE

The objective of this study is to review the Township's documentation on Milltown Dam and to provide recommendations to repair or remove the dam. These services will be conducted under the supervision of a Professional Engineer registered in the Commonwealth of Pennsylvania.

SCOPE OF SERVICES

The proposed scope of services will include the following tasks:

Task 1: Data Review

Schnabel will review available correspondence, reports, analyses and site investigations prepared by various consultants. Our review will focus on identifying available data to support our recommendations for repairing or removing the dam. We have obtained a number of electronic files from the Township, but we will also visit PADEP's Harrisburg office to review and obtain copies of files that are not available through the Township. We will also visit the project site to familiarize ourselves with the dam layout and configuration.

Task 2: Prepare Meeting Presentation

Based on our review of available data and our observations from the site visit, we will develop recommendations for:

- Armoring the dam to prevent failure during an overtopping event
- Replacing the sluice gates
- Removing the dam and accumulated sediment
- Additional engineering studies

It appears that Pennoni only evaluated options to armor the dam as a means to upgrade spillway capacity. While armoring is likely the most cost effective and technically viable solution, we will perform a cursory evaluation of additional alternatives (e.g. raising top of dam, spillway expansion, etc.) as part of this task.

We will prepare conceptual level sketches to support estimating construction quantities to develop an opinion of probable construction cost for each option. We will also estimate annual maintenance costs for the recommended repair and removal option.

We will also develop project schedules to design and construct each recommended option.

The Request for Proposals did not specifically require preparation of an engineering report, so our findings and recommendations will be prepared in PowerPoint and presented to the Township during a public meeting. Copies of the presentation (hard copy and electronic) will be provided.

Task 3: Public Meetings

Schnabel will attend two public meetings to present our findings and recommendations to the Board of Supervisors.

LUMP SUM FEE

Our lump sum fee for the proposed services is **\$13,000**. This fee is for the specific scope of services detailed herein.

Work in excess of the agreed upon scope of services included in the lump sum will be billed on a time and expense basis in accordance with our prevailing unit rates for the type of services rendered or as a negotiated additional lump sum. We understand that contract terms and conditions, including payment, will be negotiated if we are accepted.