

Memo
East Goshen Township
1580 Paoli Pike
West Chester, PA 19380
Voice (610) 692-7171
Fax (610) 425-8950
E-mail rsmith@eastgoshen.org

Date: April 8, 2008
To: Board of Supervisors
From: Rick Smith, Township Manager
Re: Hershey Mill Dam

We have three options

Option #1 - Create a secondary spillway

Engineering	39,314
Construction	<u>220,293</u>
	\$259,607

Option #2 - Make the entire dam breast a spillway

Engineering	39,314
Construction	<u>241,181</u>
	\$280,495

Option #3 - Breach Dam

Engineering	29,876
Construction	<u>114,906</u>
	\$144,782

April 8, 2008

East Goshen Township
1580 Paoli Pike
West Chester, PA 19380

Attn: Rick Smith, Township Manager

Re: Hershey's Mill Dam - Engineering and Permitting Estimate

Dear Rick:

In conjunction with completing our construction cost estimate for upgrading or removing the dam, we have also prepared an estimate of the engineering and permitting work which will be required for either option.

The permit required will be a Pennsylvania Code, Article 25, Chapter 105 Dam Permit issued through the Pennsylvania Department of Environmental Protection (DEP). We will first schedule a pre-application meeting with DEP. These meetings are scheduled jointly with the Chester County Conservation District (CCCD) and the U.S. Army Corps of Engineers and will give all agencies the opportunity to preliminarily assess the project scope and advise/recommend special environmental and design considerations.

Required state notifications are for natural resources through the Pennsylvania Natural Diversity Inventory (PNDI) and for cultural resources through the Pennsylvania Historical and Museum Commission (PHMC).

Two areas of essential site-specific investigation will be required and are to be sub-contracted to specialists in those areas. Test borings and a geotechnical evaluation and report will be needed to classify and confirm the suitability of the native embankment soils. An environmental assessment will include wetland delineation and an alternatives analysis. A mitigation plan is only needed when wetland disturbance is necessary and exceeds allowable maximums. Therefore, it is premature to include a mitigation plan in the environmental scope at this time.

The engineering design will then commence and begin with a floodplain study. This study will confirm the hydraulic capacity of the proposed spillway expansion or the dam breach option. In addition, it will establish a new floodway and flood fringe limit locally upstream and downstream of the dam. The upstream and downstream study limits will extend to points of convergence with the existing flood study and floodplain mapping where the influence of the dam is no longer a factor. A comprehensive report will be generated from this study. This study will be subject to review by the DEP and should also be forwarded to FEMA for a map amendment. Construction plans and

Hershey's Mill Dam – Engineering and Permitting Estimate

April 8, 2008

Page 2 of 2

specifications will be prepared based on the final design. As a prerequisite to the dam permit submission, an Erosion and Sediment Control Plan will be prepared and must be reviewed and considered "adequate" by the CCCD. We estimate that the amount of earth disturbance associated with this project will exceed one acre and therefore an NPDES permit will also be needed.

An inspection, operation, and maintenance document will be developed for the dam in conformance with minimum DEP guidelines and specific characteristics of the site. We have also included 20 hours of construction administration for coordination in bidding, shop drawing review, and general coordination with the Township.

Our estimate for engineering and permitting for either of the two spillway improvement options is approximately \$ 39,314. For the breach option, engineering and permitting will be approximately \$ 29,876.

Should you have any additional questions about the estimates, please call.

Sincerely,

YERKES ASSOCIATES, INC.

Michael Conrad, P.E.

attachments: Engineering Cost Breakdown

**Hershey's Mill Dam
Engineering and Permit Coordination for Spillway Modification
April 8, 2008**

1.	Pre-Application Meeting (with Chester County Conservation District and PA DEP)	\$260.00
2.	Erosion and Sedimentation Control Plan (Submit to Chester County Conservation District)	\$4,920.00
3.	Geotechnical Testing and Report (Subcontract to <i>David Blackmore & Associates</i>)	\$5,950.00
4.	Floodplain Study (HEC-RAS Analysis)	\$9,840.00
5.	NFDES Permit (PAG 2)	\$3,000.00
6.	Environmental Impact Analysis	\$4,610.00
7.	PHMC Cultural Resources Notification	\$260.00
8.	Operation and Maintenance Document	\$500.00
9.	Engineering Design Plans & Specifications	\$3,940.00
10.	Construction Administration (20 hours)	\$2,460.00
	SUBTOTAL	\$35,740.00
	TEN PERCENT CONTINGENCY	\$ 3,574.00
	TOTAL	\$ 39,314.00

**Hershey's Mill Dam
Engineering and Permit Coordination for Dam Breach
April 8, 2008**

1.	Pre-Application Meeting (with Chester County Conservation District and PA DEP).....	\$260.00
2.	Erosion and Sedimentation Control Plan (Submit to Chester County Conservation District)	\$5,920.00
3.	Geotechnical: Testing and Report (Not Required).....	\$0.00
4.	Floodplain Study (HEC-RAS Analysis)	\$9,840.00
5.	NPDES Permit (PAG 2).....	\$3,000.00
6.	Environmental Impact Analysis (Provided by PA DEP, includes Alternatives Analysis)	\$0.00
7.	PHMC Cultural Resources Notification	\$260.00
8.	Operation and Maintenance Document	\$500.00
9.	Engineering Design Plans & Specifications	\$4,920.00
10.	Construction Administration (20 hours).....	\$2,460.00
	SUBTOTAL	\$27,160.00
	TEN PERCENT CONTINGENCY	\$ 2,716.00
	TOTAL	\$29,876.00



Yerkes Associates, Inc.

Consulting Engineers / Site Planners / Land Surveyors

March 28, 2008

RECEIVED
BY _____

MAR 29 2008

East Goshen Township
1580 Paoli Pike
West Chester, Pennsylvania 19380

Attn: Rick Smith, Township Manager

Re: Hershey's Mill Dam
Spillway Capacity Alternative Analysis

Dear Rick:

As requested, an alternative analysis has been prepared in response to the May 14, 2007 and November 16, 2007 letters from PADEP regarding the requirement for a Dam Permit for the Hershey's Mill Dam. The structure is an earth and masonry dam located across Ridley Creek at the northeast corner of the Hershey Mill Road and Green Hill Road intersection. The PADEP classification for the dam is category C-2, non-high hazard. The drainage area to the dam is approximately 1,152 acres. The height of the dam is approximately 12.5 feet and the crest length is approximately 430 feet. The dam's principal spillway is a 22-foot long by 2.2-foot high concrete weir. The normal depth of flow across the existing spillway is approximately four inches. The capacity of the spillway is slightly less than the two-year storm (245 cfs). The 100-year storm (1,475 cfs) overtops the dam crest by approximately 1.25 feet.

PADEP requires that the dam be modified to pass the 100-year storm either by increasing the spillway capacity or by providing overtopping protection. If the Township no longer wants the dam to remain, the dam may be breached or removed once a PADEP Restoration Waiver is approved. Sketch plans have been prepared in order to develop a preliminary construction cost estimate for each option.

The first option involves increasing the spillway capacity to pass the 100-year storm. This option preserves the existing spillway and allows the normal water surface elevation of the upstream pond to be maintained. In order to construct a secondary spillway, the existing trees, tree stumps, and ground cover would be removed and the stone wall on the downstream side of the dam would be replaced by a reinforced concrete retaining wall. The retaining wall would support a secondary 200 foot long concrete spillway located on the east side of the existing spillway and positioned at an elevation of 0.97 feet higher than the existing spillway crest. The height of the dam crest on either side of the principal and secondary spillways would be raised by approximately one foot so that the 100-year flow is

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contained within the spillway. As part of the spillway construction, it is assumed that the pond can be temporarily dewatered through the supply pipe to the downstream Mill House. The combined principal and secondary spillway would have sufficient freeboard to pass the 100-year storm with approximately 0.5 feet of freeboard. The preliminary construction cost estimate for the spillway capacity restoration option is \$ 220,293.13.

The second option involves the installation of articulated concrete blocks to the dam crest for overtopping protection. This option also preserves the existing spillway and allows the normal water surface elevation of the upstream pond to be maintained. The existing trees, tree stumps, and stone wall would be removed and the embankment for a length of 200 feet east of the existing spillway would be graded and compacted. The prepared surface would then be overlain with geotextile fabric and open cell, cable concrete blocks that extend across the dam crest to the toe of slope on the downstream side of the dam. The open cell concrete blocks are to be filled with topsoil and grass seed is to be spread across the surface. The crest height of the concrete blocks would be positioned at an elevation of 0.97 feet higher than the existing spillway crest. The height of the dam crest on either side of the existing spillway and the concrete block spillway would be raised by approximately one foot so that the 100-year flow is confined to the existing spillway and the concrete block area. As part of the concrete block installation, it is assumed that the pond can be temporarily dewatered through the supply pipe to the downstream Mill House. The existing spillway and the concrete block area have sufficient capacity to convey the 100-year storm with approximately 0.5 feet of freeboard. The preliminary construction cost estimate for the cable concrete option is \$ 241,181.25.

The third option is the dam breach. This option involves removing the existing spillway, removing a portion of the existing stone walls, removing an average two-foot depth of accumulated sediment at the bottom of the pond, and creating new channels for each of the two tributary streams that drain into the pond. It is assumed that the accumulated sediment to be removed is free of contaminants and can be retained and respread on-site. The new channels are to be lined with geotextile fabric and the exposed area of the former pond is to be hydroseeded for stabilization. The preliminary construction cost estimate for the dam breach option is \$ 114,906.25

The existing conditions plan, the sketch plans for each option, and the preliminary construction cost estimates for each option are attached. Please contact me if you have any questions or if you require additional information.

Sincerely,

YERKES ASSOCIATES, INC.



Michael Conrad, P.E.

**Hershey's Mill Dam
Preliminary Construction Cost Breakdown
March 28, 2008**

Spillway Restoration			Quantity	Unit Price	Total Amount
Site Preparation					
1	Construction Entrance		2	EA \$	2,000.00
2	Silt Fence (18" Flight)		480	LF \$	960.00
3	Limit of Disturbance Fence		960	LF \$	1,680.00
4	Tree Removal		7	EA \$	5,600.00
5	Stump Removal		4	EA \$	4,000.00
6	Remove Stone Wall		210	LF \$	2,100.00
7	Sandbag Cofferdam		300	LF \$	3,500.00
8	Dewater Work Zone		1	LS \$	2,000.00
9	Downstream Rock Filter		2	EA \$	2,000.00
Earthwork					
10	Strip and Stockpile Topsoil		220	CY \$	1,100.00
11	Barrow		310	CY \$	2,480.00
12	Fill and Compact		310	CY \$	1,240.00
13	Respread Topsoil, Fine Grads, and Seed		200	SY \$	600.00
14	Leaf Reinforcement Matting		410	SY \$	1,845.00
Embankment Protection					
15	Reinforced Concrete Retaining Wall		200	LF \$	60,000.00
16	Stone Veneer (optional)		1850	SF \$	18,500.00
17	Geotextile Fabric (M.rari 160N)		85	SY \$	357.00
18	Cast-in-Place Concrete Spillway		185	CY \$	37,000.00
19	Raise West Wall		70	LF \$	1,750.00
20	PA DGT No. 2A Stone		75	CY \$	4,987.50
21	Cut & Hair Drainage Swale		250	CY \$	1,500.00
22	Geotextile Fabric (M.rari HP670)		110	SY \$	505.00
23	AASH TO 57		55	CY \$	2,860.00
24	R-7 Rip-Rap		110	CY \$	7,370.00
Subtotal					\$ 176,234.50
25% Surcharge for Inflation					\$ 44,058.63
Wage and Contingency					\$
Total					\$ 220,293.13

Hershey's Mill Dam
Preliminary Construction Cost Breakdown
March 28, 2008

Cable Concrete Block	Quantity	Unit Price	Total Amount
Site Preparation			
1 Construction Entrance	2 EA	\$ 2,000.00	\$ 4,000.00
2 Silt Fence (1.8" Hgt)	480 LF	\$ 2.00	\$ 960.00
3 Limit of Disturbance Fence	960 LF	\$ 1.75	\$ 1,680.00
4 Tree Removal	7 EA	\$ 800.00	\$ 5,600.00
5 Stump Removal	4 EA	\$ 250.00	\$ 1,000.00
6 Remove Stone Wall	210 LF	\$ 10.00	\$ 2,100.00
7 Sandbag Cofferdam	300 LF	\$ 45.00	\$ 13,500.00
8 Downstream Work Zone	1 LS	\$ 3,500.00	\$ 3,500.00
9 Downstream Rock Filter	2 EA	\$ 1,000.00	\$ 2,000.00
Earthwork			
10 Strip and Stockpile Topsoil	220 CY	\$ 5.00	\$ 1,100.00
11 Borrow	490 CY	\$ 8.00	\$ 3,920.00
12 Fill and Compact	490 CY	\$ 4.00	\$ 1,960.00
13 Reshape Topsoil, Fine Grade, and Seed	300 SY	\$ 3.00	\$ 900.00
Embankment Protection			
14 Armorflex Class 30S Cable Concrete w/ Geotextile Fabric Liner	11,500 SF	\$ 12.50	\$ 143,750.00
15 Raise West Wall	70 LF	\$ 25.00	\$ 1,750.00
16 Turf Reinforcement Matting	410 SY	\$ 4.50	\$ 1,845.00
17 Spillway Wall Extension	96 SF	\$ 33.00	\$ 3,168.00
		Subtotal	\$ 192,945.00
		25% Surcharges: Prevailing Wage and Inflation	\$ 46,236.25
		Total	\$ 241,181.25

**Hershey's Mill Dam
Preliminary Construction Cost Breakdown
March 28, 2008**

Dam Removal		Quantity	Unit Price	Total Amount
Site Preparation				
1	Construction Entrance	2 EA	\$ 2,000.00	\$ 4,000.00
2	Silt Fence (18" High)	175 LF	\$ 2.00	\$ 350.00
3	Sand Bag Cofferdam	360 LF	\$ 45.00	\$ 16,200.00
4	Crews: Work Zone	1 LS	\$ 5,000.00	\$ 5,000.00
5	Downstream Rock Filter	2 EA	\$ 1,000.00	\$ 2,000.00
Dam Breach				
6	Stems Wall and Soilway Demolition	1 LS	\$ 5,000.00	\$ 5,000.00
7	Grading (Cut)	675 CY	\$ 2.60	\$ 1,767.50
8	Haul Cur Material	675 CY	\$ 3.50	\$ 2,362.50
9	Resprc Topsoil, Fine Grade and Seed	500 SY	\$ 3.00	\$ 1,500.00
10	Geotextile Fabric (SC250) for Channels	500 SY	\$ 5.50	\$ 2,750.00
Pond Remediation				
11	Hydroseeding	8000 SY	\$ 0.75	\$ 6,000.00
12	Gracing (Cut)	8000 CY	\$ 2.60	\$ 20,800.00
13	Gracing (Fill)	8000 CY	\$ 2.00	\$ 16,000.00
14	Geotextile Fabric (SC250) for Channels	1650 SY	\$ 5.60	\$ 9,275.00
Subtotal				\$ 91,925.00
Wage and Agency				\$ 22,991.25
Total				\$ 114,906.25