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August 14, 2009

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

**Re: Hershey’s Mill Dam Restoration – Engineer’s Opinion of Probable Project Cost**

Dear Mr. Smith:

Attached please find Gannett Fleming’s report “Engineer’s Opinion of Probable Project Cost” for the prospective Hershey’s Mill Dam Restoration Options 1 and 2, including engineering and construction costs. Information for Options 1 and 2 was transmitted to Gannett Fleming by email dated July 17, 2009. Option 1 provides for a secondary spillway consisting of concrete wall and slab construction; Option 2 also provides for a secondary spillway consisting of a cable concrete system. The costs are summarized below.

**Summary of Engineer’s Opinion of Probable Project Cost**

<b>Engineer’s Opinion</b>	<b>Option 1 Concrete Wall and Slab</b>	<b>Option 2 Cable Concrete System</b>
Probable Construction Cost	\$347,700	\$327,400
Probable Construction Cost for Budgeting	\$350,000	\$330,000
Probable Engineering Services Cost	\$21,900	\$20,600
Probable Engineering Services Cost for Budgeting	\$22,000	\$21,000
Probable Total Project Cost for Budgeting	\$372,000	\$351,000

This letter and report are provided solely for East Goshen Township internal information and budgeting purposes. Gannett Fleming makes no representations or guarantee that the costs included herein will accurately predict prospective contractors’ actual bid. Presuming that one option is selected for implementation, actual bids submitted may be higher or lower than the estimate herein as a result of variations in material, equipment and construction costs; construction methods; market conditions; competitive bidding and other factors.

Our “opinion” of probable project cost for each option reflects a level of accuracy based on the preliminary nature the designs (prepared by others), estimating quantities from available drawings, accounting for variables inherent in the estimating/bidding process, and our experience with similar projects.



We appreciate this opportunity to provide engineering services to East Goshen Township. Please do not hesitate to call the undersigned at 610-650-8101, ext 7126, if you have any questions.

Very truly yours,

GANNETT FLEMING, INC.



RICHARD E. HORVATH, P.E.

Project Manager

REH/rh

c. File



**Report, Engineer's Opinion of Probable Project Cost**

Hershey's Mill Dam (D15-125) Existing Conditions

- Top of Dam (wall) = 449.0 (datum unknown)
- Length of Dam = approximately 315 feet
- Spillway Crest = 446.78 (freeboard = 2.22 feet)
- Existing Spillway Length = 22 feet
- Drainage Area = 1,152 ac. = 1.8 sq mi
- Maximum Height = 14 feet
- Drawdown System = 18-inch diameter pipe (reported to be operational)

Option 1 – New Secondary Concrete Spillway 0.97 feet higher (Elev. 447.75) than existing spillway (estimated cost by others = \$259,607)

Option 2 – New Secondary Cable Concrete System Spillway 0.97 feet higher (Elev. 447.75) than existing spillway (estimated cost by others = \$280,495)

Sheets for Options 1 and 2 are attached.

The Engineer's Opinion of Probable Project Cost is prepared solely for the benefit of the East Goshen Township, and no other parties may rely upon the estimates for any reason. Nothing contained herein shall confer any rights upon or create any duties on the part of Gannett Fleming toward any third party. Gannett Fleming further advises that preparation of estimates herein does not endorse design adequacy of either option and that the estimates include construction items identified on the drawings and other work considered appropriate for construction (i.e. erosion and sediment control). It is further noted that foundation information is not available and that the information provided on the drawings does not appear to be final design.

Notes

1. Cost estimate preparation does not verify adequacy of design.
2. No foundation information available.
3. Some proposed feature dimensions not indicated; dimensions scaled from drawings.
4. Review of information included on drawings prepared for Options 1 and 2 indicates "raise top of dam to elevation 450.00' & line w/turf reinforcement matting" and "raise top of wall to elevation 450.00' & line w/turf reinforcement matting"; on the east and west sides of the improvement. Information to develop quantities for these improvements is limited. The cross-section for raising the embankment is assumed (for quantity estimate) to be a trapezoid 15 ft wide by 3 ft high (for over-excavation/foundation preparation) and 2h:1v side slopes.



**ESTIMATED QUANTITIES - OPTION 1**

1. Mobilization and Demobilization: By percent
2. Dewatering: Partial or full drawdown of impoundment will be required
3. Control of Water: By percent
4. Erosion and Sediment Control: By percent
5. Demolition: Demolish existing masonry wall, wall is approximately 3 ft wide by 8 ft (446-438) high x 200 ft; volume is 177.8 cy (use 180 cy)
6. Excavation: Stripping in improvement area is not considered advantageous to Project, include stripping volume in excavation volume, do not separate. Contractor is responsible for excavation safety and may decide to sheet/shore or construct more moderate side slopes. Pay limits for estimate are 1 foot outside of footing width and 1h:1v. Volume =  $(8.25 + 25)/2 \times 14 \times 200/27$  – masonry wall demolition = 1,724 – 180 = 1,544 (use 1,550 cy)

Add excavation for swale (Item 13) = 420 cy

Total excavation volume = 1,550 + 420 = 1,970 cy

7. Four-Inch Perf VC Pipe – No spacing given: Assume 10 ft ctrs. Number =  $200/10 = 20$   
Assume each drain is 3 ft long

8. Reinforced Concrete:

Concrete for wall: footing is 6.25 (1.5 + 1 + 3.75) ft by 1 ft, bottom Elev of ftg is 434.25, Stem is 1 ft

Volume of wall = 140 cy

9. Slab on Grade: Area = 200 ft x 33.3 ft = 6,660 sf

Forms are per 100 sf of area = 66.6 SFCA, use 70 SFCA

Reinforcement: Assume 5 lbs/cf, wt =  $5 \times 6,660 \times 15/12 = 2,756$  lbs = 1.38 tons use 1.5 tons

10. Nonwoven Geotextile: Area is approximately  $13 \text{ ft} \times 200\text{ft}/9 = 96$  sy, say 100 sy), increase by 20 percent for overlap, use 120 sy

11. No. 57 Coarse Aggregate: Volume is approximately  $1 \text{ ft} \times 11.5 \times 200/27 = 85$  cy (use 90 cy).

12. Stone Veneer: Area =  $10.5 \text{ ft} \times 200 \text{ ft}/9 = 233$  sf (use 240 sf)



13. Compacted Fill: Volume = Volume is approximately  $(5 + 17)/2 \times 12.5 \times 200/27 = 1,018$  cy (use 1,020 cy)
14. Excavation for Swale: No dimensions given, assume bottom width = 10 ft, average 4 ft deep and 1h:1v side slopes. Area =  $4 \times (10+18)/2 = 56$  sf, volume =  $56 \times 200/27 = 415$  cy (use 420 cy)  
  
Mirifi HP570 Geotechnical Liner for Swale  $(10 + 2 \times 5.6 + 8) \times 200/9 = 648$  sy, say 650 sy, increase by 20 percent for overlap, use 780 sy
15. Riprap (R-7): Use volume for swale excavation = 420 cy
16. Modified Stone Placement (4-inch base for top slab): Volume =  $4/12 \times 33 \times 200/27 = 81$  cy, use 90 cy.
17. Raise Masonry Wall, west side of dam: Area = 1 ft high x 100 ft long = 100 sf
18. Large Tree Removal = use 4 each
19. Excavation/Foundation Preparation, east side of dam: Volume =  $2 \text{ ft} \times 15 \text{ ft} \times 90/27 = 100$  cy
20. Raise Embankment, east side of dam: Volume =  $48 \text{ sf} \times 90/27 = 160$  cy
21. Turf Reinf Matting (limits not defined on drawings) = say  $200 \text{ ft} \times 50 \text{ ft}/9 = 1,111$  sy, use 1,200 sy
22. Site Restoration



## ESTIMATED QUANTITIES - OPTION 2

1. Mobilization and Demobilization: By percent
2. Dewatering: Partial or full drawdown of impoundment will be required
3. Control of Water: By percent
4. Erosion and Sediment Control: By percent
5. Masonry wall demolition =  $0.88 \times 16 \times 200/27 = 104.3$  cy (use 110 cy)  
Stripping: Stripping - include in excavation volume
6. Excavation: Area by polar planimeter (=  $2.44$  sq in  $\times 16$  sf/sq in =  $39$  sf. Volume =  $39 \times 200/27 = 288.9$  use 290 cy
7. Compacted Fill (adjacent to existing masonry wall):  $2.5 \times 5.5 \times 0.5 \times 200/27 = 50.9$  cy, use 50 cy
8. Woven Geotextile Surface area =  $60$  ft  $\times 200$  ft =  $12,000$  sf. Note woven geotextile is continuous beneath cable concrete system. Area is the same but increase by 20 percent for overlap, use  $14,400$  sy.
9. Cable Concrete System: Surface area =  $60$  ft  $\times 200$  ft =  $12,000$  sf. Note typical CCS includes coarse aggregate base and cutoff. These are not shown on Option 2 section and have not been included in the cost estimate.
10. Ground Anchors: No layout provided, assume 10 ft ctrs, say  $6 \times 20 = 120$
11. Raise Masonry Wall, west side of dam: Area = 1 ft high  $\times 100$  ft long = 100 sf
12. Large Tree Removal = use 4 each
13. Excavation/Foundation Preparation, east side of dam: Volume =  $2$  ft  $\times 15$  ft  $\times 90/27 = 100$  cy
14. Raise Embankment, east side of dam: Volume =  $48$  sf  $\times 90/27 = 160$  cy
15. Turf Reinf Matting (limits not defined on drawings) = say  $200$  ft  $\times 50$  ft/ $9 = 1,111$  sy, use 1,200 sy
16. Site Restoration



**Gannett Fleming**  
ENGINEERS AND PLANNERS

Subject: East Goshen Township, Hershey's Mill Dam  
Restoration DL15-125

By: REH Date: 8/14/2009 Chkd By: \_\_\_\_\_ Date: \_\_\_\_\_

Sheet 5 of 7  
Project No. 044224.024

**LUMP SUM OR UNIT PRICES (Information Source: 2009 Means Heavy Construction Cost Data Publication)**

Work	Description Material/ Equipment	Means Page/ID	Unit	Unit Cost
Reinforced Concrete Wall	CIP, 15" thick, 18' high	64/03 30 53.40 4500	CY	\$480.00
Reinforced Concrete Slab on Grade	CIP, 15" thick, no forms or rebar	64/03 30 53.40 4950	SF	\$7.15
Forms in Place	Edge forms , wood, over 12" high	48/03 11 13.65 3060	SFCA	\$6.10
Reinforcing in Place	Slab on grade, #3 to #7	60/03 21 10.60 0600	Ton	\$2,650.00
NonWoven Geotextile	120 lb tensile strength, in place	251/31 32 13.30 1550	SY	\$1.52
Coarse Aggregate	In place	275/32 11 23.23 1512	CY	\$54.50
Excavation	½ CY Power Shovel, load directly into trucks, two 12 cy dump trucks, 1 mile round trip	428/ G 1030 120 4100	CY	\$7.62
Cable Concrete System	70T Units. Use \$11.20 per sf to include woven geotextile. anchors are \$6 per, costs are materials delivered to site, installation extra.		SF	\$15.00
Structural Backfill	Borrow, loading and/or spreading, common earth, ½ cy bucket	228/31 23 23.15 4010	BCY	\$12.80
Backfill/Compaction	Sheepsfoot, 12 inch lifts , 2 passes	247/31 23 23.92 5680	ECY	\$0.37
Masonry Wall Demolition	Stone with mortar	24/02 41 13.33 1400	CF	\$4.75 \$128.25/cy
Masonry Wall Demolition Disposal	Urban, incl loading and five mile haul to dump	36/02 41 19.19 0400	CY	\$10.75
Excavation	Power shovel ½ cy, load directly into trucks, two 12 cy dump trucks, 1 mile round trip	428/G 1030 120 4100	CY	\$7.62
Vitrified Clay Pipe	Porous wall underdrain std strength, 4 inch diameter, assume 3 ft long (3 x \$7.55 = \$22.65 per drain installed)	332/33 46 16.20 3000	EA	\$22.65
Stone Veneer	Ashlar masonry, 4 inch +/-	90/04 43 10.05 1000	SF	\$30.00
Masonry	Random stone, to 6 feet high, 1'-6" thick, mortar set, add \$6/sf to include bonding surface preparation and anchors	292/32 32 60.10 0600	SF	\$80.00
Turf Reinf Matting	Nylon, 3-dimensional geomatrix, 9 mil thick	249/31 25 13.10 0060	SY	\$7.50
Large Tree Removal	Aerial lift truck, 48 inch diameter	209/31 11 10.10 7280	EA	\$1,500.00
Clear and Grub	Trees to 12 inch diam, grub stumps and remove	209/31 11 10.10 0200 and 0250	AC	\$8,975.00
Exca/Found Prep	Excavation, Bulk, Dozer, 150 ft haul, clay	222/31 23 16.46 2240	BCY	\$9.05
Embk Fill	Gannett Fleming Sources		CY	\$15.00



Engineer's Opinion of Probable Project Cost - OPTION 1					
Item	Description.	Unit	Quantity	Cost or Percent	Total
1.	M and D	Job	LS	10.0%	\$24,394.22
2.	Dewatering	Job	LS	1.0%	\$2,439.42
3.	Control of Water	Job	LS	0.5%	\$1,219.71
4.	E and S Control	Job	LS	2.5%	\$6,098.56
5.	Masonry Wall Demo	CY	180	\$139.00	\$25,020.00
6.	Excavation/Found	CY	1,970	\$7.62	\$15,011.40
7.	VC Pipe	EA	20	\$22.65	\$453.00
8.	CIP Concete Wall	CY	140	\$480.00	\$67,200.00
9a.	CIP Concete Slab	SF	6,660	\$7.15	\$47,619.00
9b.	Reinforcement, Slab	Tons	1.5	\$2,650.00	\$3,975.00
9c.	Forms, Slab	SFCA	70	\$6.10	\$427.00
10.	Nonwoven Geotextile	SY	120	\$1.52	\$182.40
11.	No. 57 CA	CY	90	\$54.50	\$4,905.00
12.	Stone Veneer	SF	240	\$30.00	\$7,200.00
13.	Compacted Fill	CY	1,020	\$13.17	\$13,433.40
14.	Geotechnical Liner	SY	780	\$2.70	\$2,106.00
15.	Riprap	CY	420	\$60.00	\$25,200.00
16.	2A Modified	CY	90	\$54.50	\$4,905.00
17.	Raise Masonry Wall	SF	100	\$80.00	\$8,000.00
18.	Large Tree Removal	EA	4	\$1,500.00	\$6,000.00
19.	Exca/Found Prep/East Side,	CY	100	\$9.05	\$905.00
20.	Raise Embk/East Side	CY	160	\$15.00	\$2,400.00
21.	Turf Reinf Matting	SY	1,200	\$7.50	\$9,000.00
22.	Site Restoration	Job	LS	3.0%	\$7,318.27
Total: Items 1 -22					\$285,412.37
Project Overhead/Profit (10%)					\$28,541.24
Contingency (5%)					\$14,270.62
Location Correction					\$19,408.04
Engineer's Opinion of Probable Construction Cost					\$347,632.27
Engineer's Opinion of Probable Construction Cost (for budgeting)					\$350,000.00
Engineering Design					\$7,135.31
Prepare Contract Documents, Drawings and Technical Specifications					\$3,424.95
Prepare Bidding Documents					\$2,283.30
Prepare Permit Application/Support					\$2,283.30
Construction Phase Services (Management and Inspection)					\$5,708.25
Contingency (5%)					\$1,041.76
Engineer's Opinion of Probable Engineering Services Cost					\$21,876.86
Engineer's Opinion of Probable Engineering Services Cost (for budgeting)					\$22,000.00
Engineer's Opinion of Probable Total Project Cost					\$372,000.00



Engineer's Opinion of Probable Project Cost - OPTION 2					
Item	Description.	Unit	Quantity	Cost or Percent	Total
1.	M and D	Job	LS	10.0%	\$22,974.33
2.	Dewatering	Job	LS	1.0%	\$2,297.43
3.	Control of Water	Job	LS	0.5%	\$1,148.72
4.	E and S Control	Job	LS	2.5%	\$5,743.58
5.	Masonry Wall Demo	CY	110	\$139.00	\$15,290.00
6.	Excavation/Found	CY	290	\$7.62	\$2,209.80
7.	Compacted Fill	CY	50	\$13.17	\$658.50
8.	Woven Geotextile	SF	14,400	\$0.30	\$4,320.00
9.	Cable Concrete Sys	SF	12,000	\$15.00	\$180,000.00
10.	Ground Anchors	EA	120	\$8.00	\$960.00
11.	Raise Masonry Wall	SF	100	\$80.00	\$8,000.00
12.	Large Tree Removal	EA	4	\$1,500.00	\$6,000.00
13.	Exca/Found Prep/East Side,	CY	100	\$9.05	\$905.00
14.	Raise Embk/East Side	CY	160	\$15.00	\$2,400.00
15.	Turf Reinf Matting	SY	1,200	\$7.50	\$9,000.00
16.	Site Restoration	Job	LS	3.0%	\$6,892.30
Total: Items 1 -16					\$268,799.66
Project Overhead/Profit (10%)					\$26,879.97
Contingency (5%)					\$13,439.98
Location Correction					\$18,278.38
Engineer's Opinion of Probable Construction Cost					\$327,397.99
Engineer's Opinion of Probable Construction Cost (for budgeting)					\$330,000.00
Engineering Design					\$6,719.99
Prepare Contract Documents, Drawings and Technical Specifications					\$3,225.60
Prepare Bidding Documents					\$2,150.40
Prepare Permit Application/Support					\$2,150.40
Construction Phase Services (Management and Inspection)					\$5,375.99
Contingency (5%)					\$981.12
Engineer's Opinion of Probable Engineering Services Cost					\$20,603.49
Engineer's Opinion of Probable Engineering Services Cost (for budgeting)					\$21,000.00
Engineer's Opinion of Probable Total Project Cost					\$351,000.00