

Photo 1: Emerald Lake Dam after the demolition and removal of former spillway and outlet control structure. The temporary cofferdam and road detour is visible in the background.

Photo 2: Temporary cofferdam and road detour following temporary stabilization. The metal pipe is part of the dewatering system to be used during construction of the new spillway.

Project: Emerald Lake Dam – 2017 SPLOST

Date:07/31/17



**EMERALD LAKE DAM  
ORDER OF MAGNITUDE  
OPINION OF CONSTRUCTION COST  
40 FT. LABYRINTH & RAISE DAM**

Description	Quantity	Units	Unit Price	Cost
<b>40 FT. LABYRINTH &amp; RAISE DAM</b>				
Mobilization	1	LS	\$25,000.00	\$25,000
Erosion Control	1	LS	\$20,000.00	\$20,000
Clearing & Grubbing	1.5	AC	\$5,000.00	\$7,500
Demolition of Roadway, Curbing, Flumes.etc.	1.0	LS	\$25,000.00	\$25,000
Control of Water	1	LS	\$30,000.00	\$30,000
Demolition of Riser, Control Box & Culverts	1	LS	\$20,000.00	\$20,000
Demolish Riprap & Misc, Concrete	1	LS	\$10,000.00	\$10,000
Slipline 30" CMP	140	LF	\$100.00	\$14,000
Pressure Grouting Annulus	140	LF	\$190.00	\$26,600
New Gate Structure	1	EA	\$15,000.00	\$15,000
Under Drain Sand	40	TN	\$50.00	\$2,000
Under Drain # 89 Stone	40	TN	\$39.50	\$1,580
Under Drain # 57 Stone	90	TN	\$39.50	\$3,555
Under Drain Pipe	400	LF	\$20.00	\$8,000
Concrete	485	CY	\$1,000.00	\$485,000
Earthwork	8,000	CY	\$10.00	\$80,000
Grassing	8,300	SY	\$2.50	\$20,750
Rip Rap	560	TN	\$80.00	\$44,800
Blanket / Chimney Drain	1,750	TN	\$50.00	\$87,500
Toe Drain	620	LF	\$80.00	\$49,600
Toe Drain Outlets / Clean Outs	5	EA	\$2,500.00	\$12,500
Roadway Construction (5" A + 8" G)	2,550	SY	\$27.00	\$68,850
Bridge	1,764	SF	\$200.00	\$352,800
<b>SUBTOTAL</b>				<b>\$1,410,035</b>
GENERAL CONDITIONS (7%)				\$98,702
OVERHEAD & PROFIT (15%)				\$211,505
<b>SUBTOTAL</b>				<b>\$310,208</b>
<b>Total Estimated Construction Cost Budget</b>				<b>\$1,720,243</b>

The American Association of Cost Engineers recommends dividing engineering construction cost estimates into three basic categories: Order-of-Magnitude, Budget and Definitive Estimates. The Order of Magnitude Estimate is defined as follows:

This is an estimate made without detailed engineering data. Examples are estimate from cost-capacity curves, an estimate using scale-up or scale-down factors and an approximate ratio estimate. This type of estimate would be accurate within +50 percent to -30 percent.

**COST ESTIMATE REVISION BY FAYETTE COUNTY**

Order-of-Magnitude Construction Estimate from Walden, Ashworth and Associates Inc.	\$1,720,243
Further excavation and more complicated traffic management - (+20%)	\$343,757
<b>TOTAL</b>	<b>\$2,064,000</b>



*Where Quality Is A Lifestyle*

TO: Steve Rapson, County Administrator

FROM: Phil Mallon, Public Works

DATE: July 18, 2016

RE: Emerald Lake Dam – Options for Repair Update

### **Background**

Emerald Lake Dam in the Woodlands Subdivision is classified by the Georgia Safe Dams Program as a Category 2 structure. It is approximately 600 feet long and impounds a 20-acre lake. Emerald Lake Drive is located on top of the dam and is the only means of ingress and egress for the 90+ homes within the subdivision. Fayette County owns and operates the dam.

Significant work is needed on the dam in a timely manner. The most pressing issue is active and on-going seepage erosion around the dam's principal spillway. Repair work is needed on these pipes immediately. Other maintenance and repair items include, but are not limited to: removal of vegetation, control of seepage, outlet stabilization, repair of riser pipe, and extension of the dam's back slope.

A long-term consideration is the future classification of the dam by the Georgia Safe Dams Program. County staff, third-party engineers, and the Safe Dams Program all believe a reclassification to Category 1 standards is likely. If this occurs, Fayette County would have to:

- Upgrade the dam;
- Breach the dam;
- Modify the dam to remove the downstream flood risk; or
- Remove or modify the downstream structures at risk.

Fayette County authorized Walden, Ashworth & Associates to serve as the "Engineer of Record" for this project and develop options for County review. Their findings are summarized below.

### **Findings**

Walden collected field data from the dam and surrounding land, including a geotechnical investigation. They also reviewed the project's records and ran hydrology and hydraulic models for the watershed and outlet controls. Their work confirmed that the existing structure is

designed to pass flows associated with the 24-hour, 10-year storm event. Larger storms will result in the dam being overtopped. That is, during any year, there is less than a 10 percent chance that the road will be overtopped and access limited (or prohibited) into and out of the subdivision.

Ultimately, four options were identified and an Order-of-Magnitude estimate was developed for each. Staff reviewed these options and narrowed the list to two alternatives.

***Slip-line Existing Pipes & Install a Seepage Drain*** – This option addresses the immediate repair and maintenance needs of the dam. It includes clearing and grubbing, draining the lake, water control, slip-lining the five 80-ft long corrugated metal pipes (48" diameter each), pressure grouting around the pipes, installation of a new riser pipe, installation of comprehensive drain system, and stabilization. The estimated construction cost for this work is \$694,000.

Advantages of this option include a substantially lower cost, resolution of immediate structural issues, and minimal impacts to traffic during construction. This option, however, does not improve the hydraulic capacity of the dam; so the probability of the road being overtopped remains as it currently is. Furthermore, the work associated with slip-lining the pipes (approximately 25% of the total project cost) plus some of the grading, stabilization and other tasks would have to be modified or replaced if the dam is classified as a Category 1 structure in the future.

***40-ft Labyrinth Weir & Raise Dam*** – This option also addresses the immediate repair and maintenance needs of the dam plus substantially increases the hydraulic capacity of the structure. Work items include: clearing & grubbing; draining the lake; water control; demolition of roadway, pipes, and concrete weir; construction of 40-ft labyrinth weir; placement of bridge over weir; roadway reconstruction; installation of a new riser pipe; installation of comprehensive drain system; and stabilization.

This option address immediate structural issues and substantially increases flow capacity of the dam. The new outlet control would be designed to meet Category 1 standards so no re-work of the outlet control and spillway is anticipated. This option also reduces the chance of road overtopping to less than 1 percent per year.

The original estimated construction cost for this work was \$1,720,000. The weir, bridge and road reconstruction account for over \$900,000. Further engineering design work has identified poor subsoils which will result in more excavation and a more complicated traffic management plan. Because of these issues a new estimate based on a 20 percent increase of the Engineer's Order of Magnitude estimate is advised. This increases the estimated cost from \$1,720,243 to an estimated \$2,064,000.

### ***Recommendation***

Staff recommends the 40-ft labyrinth weir option. Although nearly 2.5 times the cost this options provides the triple benefit of 1) repairing immediate needs; 2) reducing the probability of stranding homeowners during flood events; and 3) meeting Category 1 standards should they become applicable.