

Rivanna Water & Sewer Authority
Ragged Mountain Dam and Related Facilities

Engineer's Opinion of Probable Construction Cost
Packages 1, 2, 3, and I-64 Embankment Modifications
August 11, 2008 Interim Estimate (During Preliminary Design)

GF Project 048782
Prepared by: DPR
Date: Aug-08
Checked by: DMW
Date: Aug-08

Package / Work Area	Estimated Cost (2008)	Estimated Cost (2009 or 2010) ¹
Package 1, Foundation Excavation (without contingency)	\$7,751,000	\$8,185,000
20% Contingency	\$1,550,000	\$1,637,000
Package 1, Foundation Excavation (with contingency)	\$9,301,000	\$9,822,000
Package 2, New Dam and Breaches		
Mobilization and Demobilization, Reservoir Road Maintenance and Traffic Control, Temporary Onsite Roads	\$6,255,000	\$6,975,000
New RCC Dam and Appurtenant Works	\$43,492,000	\$48,499,000
Breach Lower Ragged Mountain Dam	\$1,000,000	\$1,115,000
Breach Upper Ragged Mountain Dam	\$450,000	\$502,000
Package 2, New Dam and Breaches, Total (without contingency)	\$51,197,000	\$57,092,000
20% Contingency	\$10,239,000	\$11,418,000
Package 2, New Dam and Breaches, Total (with contingency)	\$61,436,000	\$68,510,000
Package 3, Reservoir Clearing, (without contingency)	\$1,052,000	\$1,173,000
20% Contingency	\$210,000	\$234,000
Package 3, Reservoir Clearing, (with contingency)	\$1,262,000	\$1,407,000
Packages 1, 2 and 3 (without contingency)	\$60,000,000	\$66,908,000
20% Contingency	\$11,999,000	\$13,381,000
Packages 1, 2 and 3 (with contingency)	\$71,999,000	\$80,289,000
I-64 Embankment Modifications, Alternate A, 100-Year Design (without contingency)	\$3,871,000	\$4,317,000
20% Contingency	\$774,000	\$863,000
I-64 Embankment Modifications, Alternate A, 100-Year Design (with contingency)	\$4,645,000	\$5,180,000
I-64 Embankment Modifications, Alternate B, PMF Design (without contingency)	\$13,838,000	\$15,431,000
20% Contingency	\$2,768,000	\$3,087,000
I-64 Embankment Modifications, Alternate B, PMF (with contingency)	\$16,606,000	\$18,518,000

Notes:

1. Costs escalated from 2008 to 2009 for Foundation Excavation Contract and from 2009 to 2010 for all other work (assume 5.6% annual inflation compounded)
2. Estimates without and with a contingency represent approximately a low to high range, respectively, of the estimated construction cost

Engineer's Opinion of Probable Construction Cost
 Package 1 - Foundation Excavation
 August 11, 2008 Interim Estimate (During Preliminary Design)

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1.	Mobilization & Demobilization				
a	General (~8%)	LS	Job	XXX	\$550,000
b	Bonds & Insurance (~5%)	LS	Job	XXX	\$340,000
2.	Care & Diversion of Water				
a	Erosion & Sediment Control	LS	Job	XXX	\$300,000
b	Cofferdam(s) and Divert Water	LS	Job	XXX	\$300,000
c	Foundation Dewatering	LS	Job	XXX	\$800,000
3.	Clearing and Grubbing	AC	10	\$20,000.00	\$200,000
4.	Demolition and Removal of Structures	LS	Job	XXX	\$20,000
5.	Excavation				
a	Unclassified Excavation & Stripping	CY	310,000	\$15.00	\$4,650,000
6.	Foundation Preparation				
a	Foundation Clean-Up, Preliminary	SY	19,200	\$15.00	\$288,000
7.	Water Supply Temporary Bypass Piping	LS	Job	XXX	\$150,000
8.	Overhead Electric Relocation	LS	Job	XXX	\$10,000
9.	Reservoir Road Modifications and Traffic Control	LS	Job	XXX	\$112,500
10.	Construct & Maintain Temporary Onsite Roads	LS	Job	XXX	\$30,000
Subtotal					\$7,751,000
20% Contingency					\$1,550,200
Total Estimated Cost Including Contingency					\$9,301,200

Engineer's Opinion of Probable Construction Cost
 Package 2 - New Dam and Dam Breaches
 August 11, 2008 Interim Estimate (During Preliminary Design)

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1.	Mobilization & Demobilization				
	a General (~8%)	LS	Job	XXX	\$3,620,000
	b Bonds & Insurance (~5%)	LS	Job	XXX	\$2,270,000
2.	Reservoir Road Maintenance and Traffic Control	LS	Job	XXX	\$275,000
3.	Construct / Maintain / Restore Temporary Onsite Roads	LS	Job	XXX	\$90,000
Subtotal, Items 1 through 3					\$6,255,000
20% Contingency					\$1,251,000
Subtotal, Items 1 through 3, with Contingency					\$7,506,000
<u>New Dam and Appurtenant Works</u>					
4.	Care & Diversion of Water				
	a Erosion & Sediment Control	LS	Job	XXX	\$400,000
	b Cofferdam(s) and Divert Water	LS	Job	XXX	\$300,000
	c Foundation Dewatering	MO	15	\$46,000.00	\$690,000
5.	Clearing and Grubbing	AC	2	\$20,000.00	\$40,000
6.	Demolition and Removal of Structures	LS	Job	XXX	\$10,000
7.	Excavation				
	a Unclassified Excavation & Stripping	CY	5,000	\$15.00	\$75,000
8.	Foundation Preparation				
	a Foundation Clean-Up, Secondary	SY	9,600	\$15.00	\$144,000
	b Foundation Clean-Up, Final	SY	9,600	\$20.00	\$192,000
	c Rock Trimming	CY	5,800	\$75.00	\$435,000
	d Rock Fracture Treatment	LF	200	\$20.00	\$4,000
9.	Foundation Drilling and Grouting	LF	26,600	\$100.00	\$2,660,000
10.	Fill				
	a Select Fill	CY	22,000	\$6.00	\$132,000
	b Random Fill	CY	48,000	\$5.50	\$264,000
	c Rock Fill	CY	105,000	\$9.00	\$945,000
	d Fine Drain fill	CY	2,500	\$55.00	\$137,500
11.	Slope Protection				
	a Riprap	CY	500	\$100.00	\$50,000
	b Slush-Grouted Riprap	CY	320	\$175.00	\$56,000
	c Bedding Material (Coarse Aggregate)	CY	200	\$65.00	\$13,000
12.	Conventional Concrete (Includes Waterstops)				
	a Structural Concrete	CY	2,600	\$1,000.00	\$2,600,000
	b Outlet Works Encasement Concrete	CY	280	\$1,000.00	\$280,000
	c Corewall Concrete	CY	2,800	\$1,000.00	\$2,800,000
	d Downstream Facing Concrete	CY	4,900	\$800.00	\$3,920,000
	e Paving Concrete	CY	450	\$450.00	\$202,500
	f Dental Concrete	CY	6,300	\$350.00	\$2,205,000
	g Backfill Concrete	CY	1,500	\$350.00	\$525,000
13.	Steel Reinforcing Bars	Lbs	568,000	\$2.80	\$1,590,400

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
14.	Roller-Compacted Concrete	CY	155,000	\$100.00	\$15,500,000
15.	Bedding Mix	LS	Job	XXX	\$1,400,000
16.	Dam Contraction Joints	LS	Job	XXX	\$100,000
17.	Trial RCC Placement and Testing	LS	Job	XXX	\$300,000
18.	Precast Concrete Panels with Geomembrane Liner	SF	84,000	\$40.00	\$3,360,000
19.	External Geomembrane Liner	SF	17,000	\$30.00	\$510,000
20.	Precast Parapet Walls	LF	1,600	\$60.00	\$96,000
21.	Drilled and Grouted Anchor Bars	EA	80	\$500.00	\$40,000
22.	Drilled Drains	LF	3,600	\$40.00	\$144,000
23.	Outlet Works				
	a Ductile Iron Pipe and Fittings, 42-Inch Diameter	LF	540	\$500.00	\$270,000
	b Ductile Iron Pipe and Fittings, 24-Inch Diameter	LF	800	\$300.00	\$240,000
	c 6-Inch Diameter Minimum Release	LS	Job	XXX	\$12,000
	d Sluice Gates and Accessories, 42-Inch	EA	5	\$60,000.00	\$300,000
	e 42-Inch Blowoff Valve	EA	1	\$30,000.00	\$30,000
	f Water Intake Trash Racks	EA	5	\$15,000.00	\$75,000
	g Valve Vault Accessories	LS	Job	XXX	\$20,000
24.	Chain-Link Fencing	LF	120	\$45.00	\$5,400
25.	Instrumentation	LS	Job	XXX	\$200,000
26.	Rock-Lined Swale	LF	1,500	\$60.00	\$90,000
27.	Select Material Surfacing - Access Roads	SY	2,500	\$12.00	\$30,000
28.	Guide Rail	LF	780	\$50.00	\$39,000
29.	Security Gates	EA	2	\$5,000.00	\$10,000
30.	Landscaping and Site Restoration				
	a Topsoil, Permanent Seeding and Mulching	AC	5	\$10,000.00	\$50,000
Subtotal, Items 4 through 30					\$43,492,000
20% Contingency					\$8,698,400
Subtotal, Items 4 through 30, with Contingency					\$52,190,400

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price	
Breach Existing Lower Ragged Mountain Dam						
31.	Dam Breach	LS	Job	XXX	\$1,000,000	
Subtotal, Item 31					\$1,000,000	
					20% Contingency	\$200,000
Subtotal, Item 31, with Contingency					\$1,200,000	
Breach Existing Upper Ragged Mountain Dam						
32.	Dam Breach	LS	Job	XXX	\$450,000	
Subtotal, Item 32					\$450,000	
					20% Contingency	\$90,000
Subtotal, Item 32, with Contingency					\$540,000	
Total, Items 1 through 32					\$51,197,000	
					20% Contingency	\$10,239,400
Total, Items 1 through 32, with Contingency					\$61,436,400	

Engineer's Opinion of Probable Construction Cost
 Package 3 - Reservoir Clearing
 August 11, 2008 Interim Estimate (During Preliminary Design)

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1.	Mobilization & Demobilization				
	a General (~8%)	LS	Job	XXX	\$74,000
	b Bonds & Insurance (~5%)	LS	Job	XXX	\$47,000
2.	Reservoir Clearing¹	AC	140	\$5,300.00	\$742,000
3.	Reservoir Road Maintenance and Traffic Control	LS	Job	XXX	\$70,000
4.	Construct / Maintain / Restore Temporary Onsite Roads	LS	Job	XXX	\$118,800
Subtotal, Items 1 through 4					\$1,052,000
20% Contingency					\$210,400
Subtotal, Items 1 through 4, with Contingency					\$1,262,400

Notes: 1. Clearing cost does not include potential benefit of timber value

Rivanna Water & Sewer Authority
 Ragged Mountain Dam and Related Facilities

GF Project 048782
 Prepared by: DPR
 Date: Aug-08
 Checked by: DMW
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Engineer's Opinion of Probable Construction Cost
 I-64 Embankment Modifications, Alternate A, 100-Year Design
 August 11, 2008 Interim Estimate (During Preliminary Design)

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1.	Mobilization & Demobilization				
a	General (~8%)	LS	Job	XXX	\$270,000
b	Bonds & Insurance (~5%)	LS	Job	XXX	\$170,000
2.	Care & Diversion of Water				
a	Erosion & Sediment Control	LS	Job	XXX	\$50,000
b	Cofferdam(s) and Divert Water	LS	Job	XXX	\$50,000
c	Foundation Dewatering	LS	Job	XXX	\$150,000
3.	Clearing and Grubbing	AC	2	\$20,000.00	\$40,000
4.	Demolition and Removal of Structures	LS	Job	XXX	\$5,000
5.	Excavation				
a	Unclassified Excavation & Stripping	CY	16,000	\$15.00	\$240,000
6.	Fill				
a	Select Fill	CY	26,000	\$6.00	\$156,000
b	Rock Fill	CY	12,000	\$9.00	\$108,000
c	Coarse Drain Fill	CY	5,500	\$55.00	\$302,500
d	Geotextile	SY	12,500	\$3.50	\$43,750
7.	Conventional Concrete (Includes Waterstops)				
a	Structural Concrete (Riser Structure)	CY	300	\$1,450.00	\$435,000
b	Backfill Concrete	CY	250	\$350.00	\$87,500
c	HDPE Encasement Concrete	CY	1,700	\$500.00	\$850,000
8.	Steel Reinforcing Bars	Lbs	60,000	\$2.80	\$168,000
9.	Culvert Modifications				
a	54-Inch HDPE	LF	870	\$500.00	\$435,000
c	54-Inch Sluice Gate and Accessories	EA	1	\$50,000.00	\$50,000
10.	Construct / Maintain / Restore Temporary Onsite Roads				
a	North of I-64	LS	Job	XXX	\$90,000
c	South of I-64	LS	Job	XXX	\$150,000
11.	Landscaping and Site Restoration				
a	Topsoil, Permanent Seeding and Mulching	AC	2	\$10,000.00	\$20,000
Subtotal, Items 1 through 11					\$3,870,750
20% Contingency					\$774,150
Subtotal, Items 1 through 11, with Contingency					\$4,644,900

Engineer's Opinion of Probable Construction Cost
 I-64 Embankment Modifications, Alternate B, PMF Design
 August 11, 2008 Interim Estimate (During Preliminary Design)

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1.	Mobilization & Demobilization				
	a General (~8%)	LS	Job	XXX	\$980,000
	b Bonds & Insurance (~5%)	LS	Job	XXX	\$610,000
2.	Care & Diversion of Water				
	a Erosion & Sediment Control	LS	Job	XXX	\$150,000
	b Cofferdam(s) and Divert Water	LS	Job	XXX	\$150,000
	c Foundation Dewatering	LS	Job	XXX	\$800,000
3.	Clearing and Grubbing	AC	7	\$20,000.00	\$140,000
4.	Demolition and Removal of Structures	LS	Job	XXX	\$5,000
5.	Excavation				
	a Unclassified Excavation & Stripping	CY	62,000	\$15.00	\$930,000
	b Excavation Support	LS	Job	XXX	\$2,250,000
6.	Foundation Preparation	SY	1,400	\$20.00	\$28,000
7.	Grouting	LF	12,700	\$100.00	\$1,270,000
8.	Liner				
	a Liner	SF	220,000	\$2.00	\$440,000
	b Geotextile	SY	49,000	\$3.50	\$171,500
9.	Fill				
	a Random Fill	CY	50,000	\$5.50	\$275,000
	b Random Fill - Hauled from Dam	CY	106,000	\$16.50	\$1,749,000
10.	Conventional Concrete (Includes Waterstops)				
	a Structural Concrete (Riser Structure)	CY	300	\$1,450.00	\$435,000
	b Backfill Concrete	CY	1,200	\$350.00	\$420,000
	c HDPE Encasement Concrete	CY	1,700	\$500.00	\$850,000
	d Grout Cap	CY	700	\$800.00	\$560,000
11.	Steel Reinforcing Bars	Lbs	130,000	\$2.80	\$364,000
12.	Drilled and Grouted Anchor Bars	EA	170	\$500.00	\$85,000
13.	Culvert Modifications				
	a 54-Inch HDPE	LF	870	\$500.00	\$435,000
	c 54-Inch Sluice Gate and Accessories	EA	1	\$50,000.00	\$50,000
14.	Rock-Lined Swale	LF	1,800	\$100.00	\$180,000
15.	Instrumentation	LS	Job	XXX	\$200,000
16.	Construct / Maintain / Restore Temporary Onsite Roads				
	a North of I-64	LS	Job	XXX	\$90,000
	b South of I-64	LS	Job	XXX	\$150,000
17.	Landscaping and Site Restoration				
	a Topsoil, Permanent Seeding and Mulching	AC	7	\$10,000.00	\$70,000
Subtotal, Items 1 through 13					\$13,837,500
20% Contingency					\$2,767,500
Subtotal, Items 1 through 13, with Contingency					\$16,605,000