

Appendix B
Cost Estimating Worksheets

North Central Arizona Water Supply Study—Report of Findings

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 1 OF 2

PLANT ACCOUNT		PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
FEATURE: Alternative 1: Lake Powell Source to Cameron plus Bitter Springs Spur Appraisal Level Estimate			PROJECT: North Central Arizona Water Supply Study					
			REGION		LC	PRICE LEVEL: Jan 06		
			FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Alt. 1					
<p>The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.</p>								
Intakes								
330 foot inclined bore				D-8140	3	Each	\$595,000.00	\$1,785,000.00
30 inch bore holes with 18-inch casings and 12 inch Carrier Pipe					990	Lin Ft	Included in Item Above	
Submersible Pump/Motor, 3600 gpm, 300 ft lift					3	Each	Included in Item Above	
Forebay Tank, 10 FT Dia. X 20 FT High, Concrete,								
11 required				D-8140	11	Each	\$60,000.00	\$660,000.00
Total Concrete					88	CY	Included in Item Above	
Total Steel, Reinforcement					38,500	LB	Included in Item Above	
Pumping plants:								
22.51 CFS, 400 FT Head				D-8140	5	Each	\$1,150,000.00	\$5,750,000.00
22.51 CFS, 387 FT Head				D-8140	1	LS	\$1,150,000.00	\$1,150,000.00
22.51 CFS, 153 FT Head				D-8140	1	LS	\$670,000.00	\$670,000.00
17.42 CFS, 400 FT Head				D-8140	1	LS	\$920,000.00	\$920,000.00
17.42 CFS, 82 FT Head				D-8140	1	LS	\$430,000.00	\$430,000.00
1.38 CFS, 400 FT Head				D-8140	1	LS	\$180,000.00	\$180,000.00
1.38 CFS, 305 FT Head				D-8140	1	LS	\$160,000.00	\$160,000.00
Air Chamber, Tank, Steel, Spherical, 20 FT Dia., 10								
11 required, Total Weight					671,000	LBS	\$4.50	\$3,019,500.00
Excavation, Rock (assuming 60%)				D-8140	978,000	CY	\$10.00	\$9,780,000.00
Excavation				D-8140	652,000	CY	\$4.00	\$2,608,000.00
Backfill				D-8140	1,166,000	CY	\$4.50	\$5,247,000.00
Embedment to O.D. +3", assumed commercial				D-8140	384,000	CY	\$30.00	\$11,520,000.00
Furnishing and Installing the following diameters of steel pipe (all 500 ft. head class):								
30", .1875" Thick, 63 lb/ft				D-8140	356,347	Ft	\$131.00	\$46,681,457.00
24", .1466" Thick, 40 lb/ft				D-8140	57,341	Ft	\$87.00	\$4,988,667.00
10", .1345" Thick, 14.77 lb/ft				D-8140	74,659	Ft	\$39.00	\$2,911,701.00
8", .1345" Thick, 11.89 lb/ft				D-8140	39,600	Ft	\$35.00	\$1,386,000.00
6", .1345" Thick, 9.01 lb/ft				D-8141	96,730	Ft	\$28.00	\$2,708,440.00
					624,677			
Subtotal this Sheet								\$102,555,765.00
QUANTITIES					PRICES			
BY Art Streffel		CHECKED			BY Dan Mar <i>DM</i>		CHECKED <i>BDV 7/18/06</i>	
DATE PREPARED July 18, 2006		PEER REVIEW			DATE PREPARED 07-18-06		PEER REVIEW <i>J 7/18/06</i>	

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 2 OF 2

FEATURE: Alternative 1: Lake Powell Source to Cameron plus Bitter Springs Spur Appraisal Level Estimate		PROJECT: North Central Arizona Water Supply Study <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%;">REGION</td> <td style="width:33%;">LC</td> <td style="width:34%;">PRICE LEVEL: Jan 06</td> </tr> </table> FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Alt. 1						REGION	LC	PRICE LEVEL: Jan 06
REGION	LC	PRICE LEVEL: Jan 06								
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.								
		Storage Tanks, Steel	D-8140							
		Coppermine, 100 ft Dia. X 25 ft High		1	LS	\$700,000.00	\$700,000.00			
		Bodayway Gap, 200 ft Dia. X 20 ft High		1	LS	\$2,200,000.00	\$2,200,000.00			
		Tuba City/Moenkopi, 500 ft Dia. X 25 ft High		1	LS	\$13,000,000.00	\$13,000,000.00			
		Cameron, 200 ft Dia. X 20 ft High		1	LS	\$2,200,000.00	\$2,200,000.00			
		Pressure Reducing Station								
		In-line PRV, 30 Inch Diameter	D-8140	3	Each	\$80,000.00	\$240,000.00			
		Designing, furnishing and erecting		3	Each	\$60,000.00	\$180,000.00			
		One steel tank -								
		height: 10 feet								
		diameter: 20 feet								
		Power lines	D-8140	118	Miles	\$200,000.00	\$23,600,000.00			
		SCADA/Control Systems	D-8140							
		(Approx. 3% of construction cost)		1	LS	\$4,340,000.00	\$4,340,000.00			
		Corrosion Monitoring	D-8140	1	LS	\$1,490,000.00	\$1,490,000.00			
		(Approx. 1% of construction cost)								
		Subtotal this Sheet					\$47,950,000.00			
		Subtotal all Sheets					\$150,505,765.00			
		Mobilization @ 5%					\$7,500,000.00			
		Subtotal w/ Mobilization					\$158,005,765.00			
		Unlisted Items @ 15%					\$21,994,235.00			
		Allowance for Procurement Strategies @ 0%								
		Contract Cost					\$180,000,000.00			
		Contingencies @ 25%					\$50,000,000.00			
		Field Cost					\$230,000,000.00			
		NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.								
QUANTITIES				PRICES						
BY Art Streffel		CHECKED		BY Dan Mar <i>DM</i>		CHECKED <i>DM 7/18/06</i>				
DATE PREPARED July 18, 2006		PEER REVIEW		DATE PREPARED 07-18-06		PEER REVIEW <i>G</i> 7/18/06				

Appendix B—Cost Estimating Worksheets

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 2 OF 2

FEATURE: Alternative 1: Two Guns Wellfield to Flagstaff C Aquifer Appraisal Level Estimate		PROJECT: North Central Arizona Water Supply Study						
		REGION	LC	PRICE LEVEL: Jan 06				
		FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Alt. 1-XII(X)						
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.						
		Pipeline:						
		Excavation, Rock (assuming 100%)	D-8140	701,000	CY	\$10.00	\$7,010,000.00	
		Backfill	D-8140	449,000	CY	\$4.50	\$2,020,500.00	
		Embedment to O.D.+3", assumed commercial	D-8140	202,000	CY	\$30.00	\$6,060,000.00	
		Furnishing and Installing the following diameters of steel pipe (all 500 ft. head class):						
		36", .25" Thick, 100 lb/ft	D-8140	184,694	Ft	\$202.00	\$37,308,188.00	
		Power lines	D-8140	35	Miles	\$200,000.00	\$7,000,000.00	
		SCADA/Control Systems (3% of construction cost)	D-8140	1	LS	\$3,010,000.00	\$3,010,000.00	
		Corrosion Monitoring (1% of construction cost)	D-8140	1	LS	\$1,030,000.00	\$1,030,000.00	
		Subtotal this Sheet					\$63,438,688.00	
		Subtotal all Sheets						\$104,427,046.00
		Mobilization @ 5%						\$5,200,000.00
		Subtotal w/ Mobilization						\$109,627,046.00
		Unlisted Items @ 15%						\$15,372,954.00
		Allowance for Procurement Strategies @ 0%						
		Contract Cost						\$125,000,000.00
		Contingencies @ 25%						\$35,000,000.00
		Field Cost						\$160,000,000.00
		NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.						
QUANTITIES			PRICES					
BY Art Streifel		CHECKED		BY D.L. Maag		CHECKED BSM 7/18/06		
DATE PREPARED July 18, 2006		PEER REVIEW		DATE PREPARED 07-18-06		PEER REVIEW 7/18/06		

North Central Arizona Water Supply Study—Report of Findings

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 1 OF 1

FEATURE:		PROJECT:					
Alternative 1 Williams - R Aquifer Appraisal Level Estimate		North Central Arizona Water Supply Study					
		REGION	LC	PRICE LEVEL: Jan 06			
		FILE:					
		H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Alt. 1-R Aquifer					
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.					
		Well Field Gathering System	D-8140				
		10" PVC Pipe, DR25 C900		5,280	Lin Ft	\$19.00	\$100,320.00
		8" PVC Pipe, DR25 C900		10,560	Lin Ft	\$14.00	\$147,840.00
		6" PVC Pipe, DR25 C900		10,560	Lin Ft	\$12.00	\$126,720.00
		4" PVC Pipe, DR25 C900		31,680	Lin Ft	\$8.00	\$253,440.00
		Storage Tank, Steel, 200 ft Dia. X 28 ft High (863,136 ft ³ , 200 ft Dial.x28 ft High)		1	LS	\$2,200,000.00	\$2,200,000.00
		Wells with Pumps					
		12" Wells - 4000ft deep (Use \$5,000,000. per well)					
		150 hp Submersible pumps, 250 gpm	D-8140	6	Ea	\$5,000,000.00	\$30,000,000.00
		Excavation,Rock (assuming 60%)	D-8140	25,200	CY	\$10.00	\$252,000.00
		Excavation	D-8140	16,800	CY	\$4.00	\$67,200.00
		Backfill	D-8140	38,000	CY	\$4.50	\$171,000.00
		Embedment to O.D.+3", assume commercial	D-8140	3,000	CY	\$30.00	\$90,000.00
		Power lines	D-8140	6	Miles	\$200,000.00	\$1,200,000.00
		SCADA/Control Systems	D-8140				
		(3% of construction cost)		1	LS	\$1,040,000.00	\$1,040,000.00
		Subtotal all Sheets					\$35,648,520.00
		Mobilization @ 5%					\$1,800,000.00
		Subtotal w/ Mobilization					\$37,448,520.00
		Unlisted Items @ 15%					\$5,551,480.00
		Allowance for Procurement Strategies @ 0%					
		Contract Cost					\$43,000,000.00
		Contingencies @ 25%					\$11,000,000.00
		Field Cost					\$54,000,000.00
		NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.					
QUANTITIES			PRICES				
BY	CHECKED	BY	CHECKED				
Art Streifel		D.L. Maag	BDV 7/18/06				
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW				
		7-18-06	G 7/18/06				

Appendix B—Cost Estimating Worksheets

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 1 OF 2

FEATURE: <i>Alternative 1</i> Grand Canyon/Tusayan -Phantom Ranch Infiltration Gallery Grand Canyon Pipeline Project Bright Angel Creek Infiltration Gallery Appraisal Level Estimate				PROJECT: North Central Arizona Water Supply Project			
		REGION	LC	PRICE LEVEL: Jan 06			
FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\GC-TUSAYAN							
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	Excavation, Pipeline Assume 100% rock, trail 5 ft wide(cover=3 ft over pipe)	D-8140	1,858	CY	\$190.00	\$353,020.00
	2	Backfill, Pipeline	D-8140	1,752	CY	\$130.00	\$227,760.00
	3	Backfill, Select, Pipeline	D-8140	96	CY	\$880.00	\$84,480.00
	4	Excavation, Power Cable	D-8140	574	CY	\$640.00	\$367,360.00
	5	Backfill, Select, Power Cable	D-8140	546	CY	\$1,000.00	\$546,000.00
	6	Pipe, Steel 12B100, t=0.1345, 17.64 lb/ft 4B200, t=.1345, 6.14 lb/ft	D-8140	1,500 4,000	FT FT	\$100.00 \$35.00	\$150,000.00 \$140,000.00
	7	Power Cable - medium voltage 5 Kv line Installed in pipe trench and along existing pipeline Trench depth = 2 ft. & width = 6", backfill with select backfill	D-8140	15,500	FT	\$30.00	\$465,000.00
	8	Pumping Plant Concrete = 100 CY Excavation = 1,130 CY Backfill, Compacted = 785 CY 2 pumps: Q=3.36 cfs, H=4938 ft	D-8140	1	LS	\$1,800,000.00	\$1,800,000.00
	9	Infiltration Gallery 36D25 concrete pipe = 85 ft. Concrete = 10 CY Uniformly graded gravel = 90 CY Excavation = 290 CY Backfill, Compacted = 50 CY Riprap = 165 CY	D-8140	1	LS	\$700,000.00	\$700,000.00
	10	Conventional Treatment Plant at South Rim	D-8140	1	LS	\$5,000,000.00	\$5,000,000.00
	11	Treatment Plant, Package @ Phantom Ranch Q = 14,000 gal/day	D-8140	1	LS	\$50,000.00	\$50,000.00
	12	Tank, Storage, Concrete (65,000 gal., 23' high, 22' dia.)	D-8140	1	LS	\$130,000.00	\$130,000.00
Subtotal this Sheet							\$10,013,620.00
QUANTITIES				PRICES			
BY		CHECKED		BY		CHECKED	
				D.L. Maag for		BDW 7/18/06	
DATE PREPARED		PEER REVIEW		DATE PREPARED		PEER REVIEW	
				07-18-06		7/18/06	

North Central Arizona Water Supply Study—Report of Findings

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 2 OF 2

PLANT ACCOUNT		PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
FEATURE: <i>Alternative 1</i> Grand Canyon/Tusayan -Phantom Ranch Infiltration Gallery Grand Canyon Pipeline Project Bright Angel Creek Infiltration Gallery Appraisal Level Estimate				PROJECT: North Central Arizona Water Supply Project						
				REGION	LC	PRICE LEVEL: Jan 06				
				FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\GC-TUSAYAN						
Grand Canyon to Tusayan										
	13		SCADA/Control Systems (3% of construction cost)	D-8140	1	LS	\$360,000.00	\$360,000.00		
	14		Power lines	D-8140	7	MI	\$200,000.00	\$1,400,000.00		
	15		Corrosion Monitoring (1% of construction cost)	D-8140	1	LS	\$140,000.00	\$140,000.00		
	16		Forebay Tank, 10 FT Dia. X 20 FT High, Concrete, 1 required Total Concrete Total Steel, Reinforcement	D-8140	1 8 3,500	Each CY LB	\$60,000.00	\$60,000.00 Included in Item Above Included in Item Above		
	17		Pumping plants: 1.17 CFS, 284 FT Head	D-8140	1	LS	\$150,000.00	\$150,000.00		
	18		Air Chamber, Tank, Steel, Spherical, 20 FT Dia., 10 1 required, Total Weight	D-8420	61,000	LBS	\$4.50	\$274,500.00		
	19		Excavation,Rock (assuming 60%)	D-8140	25,800	CY	\$10.00	\$258,000.00		
	20		Excavation	D-8140	17,200	CY	\$4.00	\$68,800.00		
	21		Backfill	D-8140	39,000	CY	\$4.50	\$175,500.00		
	22		Embedment to O.D.+3', native material	D-8140	4,000	CY	\$30.00	\$120,000.00		
	23		Furnishing and installing the following diameters of steel pipe (all 500 ft. head class): 6", .1345" Thick, 9.01 lb/ft	D-8140	34,400	FT	\$28.00	\$963,200.00		
Subtotal This Sheet								\$3,970,000.00		
Subtotal all Sheets								\$13,983,620.00		
Mobilization @ 35% (Helicopter Influenced)								\$4,900,000.00		
Subtotal w/ Mobilization								\$18,883,620.00		
Unlisted Items @ 15%								\$3,116,380.00		
Allowance for Procurement Strategies @ 0%										
Contract Cost								\$22,000,000.00		
Contingencies @ 25%								\$5,000,000.00		
Field Cost								\$27,000,000.00		
NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.										
QUANTITIES				PRICES						
BY	CHECKED			BY	CHECKED					
				D.L. Maag	TAM 7/18/06					
DATE PREPARED	PEER REVIEW			DATE PREPARED	PEER REVIEW					
				07-18-06	7/18/06					

PLANT ACCOUNT		PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
FEATURE: Alternative 2: Hopi/Navajo/Flagstaff - Lake Powell Pipeline plus Bitter Springs Spur			PROJECT: North Central Arizona Water Supply Study					
Appraisal Level Estimate			REGION		LC	PRICE LEVEL: Jan 06		
			FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Alt. 2					
<p>The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.</p>								
Intakes (7 of these required)				D-8140				
		330 foot inclined bore			7	Each	\$595,000.00	\$4,165,000.00
		30 inch bore hole with 18-inch casings and			2,310	Lin Ft	Included in Item Above	
		12 inch carrier pipes			2,310	Lin Ft	Included in Item Above	
		Submersible Pump/Motor, 3600 gpm, 300 ft lift			7	LS	Included in Item Above	
Forebay Tank, 10 FT Dia. X 20 FT High, Concrete,				D-8140				
		19 required			19	Each	\$60,000.00	\$1,140,000.00
		Total Concrete			152	CY	Included in Item Above	
		Total Steel, Reinforcement			66,500	LB	Included in Item Above	
Pumping plants:								
		50.95 CFS, 400 FT Head	D-8140		6	Each	\$2,400,000.00	\$14,400,000.00
		50.95 CFS, 400 FT Head	D-8140		1	LS	\$2,400,000.00	\$2,400,000.00
		28.43 CFS, 400 FT Head	D-8140		1	LS	\$1,400,000.00	\$1,400,000.00
		28.43 CFS, 400 FT Head	D-8140		1	LS	\$1,400,000.00	\$1,400,000.00
		28.43 CFS, 400 FT Head	D-8140		1	LS	\$1,400,000.00	\$1,400,000.00
		28.43 CFS, 400 FT Head	D-8140		1	LS	\$1,400,000.00	\$1,400,000.00
		28.43 CFS, 400 FT Head	D-8140		1	LS	\$1,400,000.00	\$1,400,000.00
		28.43 CFS, 400 FT Head	D-8140		1	LS	\$1,400,000.00	\$1,400,000.00
		28.43 CFS, 210 FT Head	D-8140		1	LS	\$950,000.00	\$950,000.00
		17.42 CFS, 400 FT Head	D-8140		1	LS	\$920,000.00	\$920,000.00
		17.42 CFS, 109 FT Head	D-8140		1	LS	\$480,000.00	\$480,000.00
		1.38 CFS, 400 FT Head	D-8140		1	LS	\$180,000.00	\$180,000.00
		1.38 CFS, 293 FT Head	D-8141		1	LS	\$160,000.00	\$160,000.00
Air Chamber, Tank, Steel, Spherical, 20 FT Dia.,				D-8420				
		19 required, Total Weight			1,159,000	LBS	\$4.50	\$5,215,500.00
		Excavation, Rock (assuming 60%)	D-8140		1,975,200	CY	\$10.00	\$19,752,000.00
		Excavation	D-8140		1,316,800	CY	\$4.00	\$5,267,200.00
		Backfill	D-8140		2,112,000	CY	\$4.50	\$9,504,000.00
		Embedment to O.D.+3", assume commercial	D-8140		937,000	CY	\$30.00	\$28,110,000.00
Subtotal this Sheet								\$102,443,700.00
QUANTITIES				PRICES				
BY Art Streifel		CHECKED		BY Dan Mar		CHECKED BON 7/18/06		
DATE PREPARED July 18, 2006		PEER REVIEW		DATE PREPARED 07-18-06		PEER REVIEW 7/18/06		

North Central Arizona Water Supply Study—Report of Findings

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 2 OF 2

FEATURE: Alternative 2: Hopi/Navajo/Flagstaff - Lake Powell Pipeline plus Bitter Springs Spur Appraisal Level Estimate		PROJECT: North Central Arizona Water Supply Study					
		REGION	LC	PRICE LEVEL: Jan 06			
		FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Alt. 2					
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.					
		Furnishing and Installing the following diameters of steel pipe (all 500 ft. head class):					
		42", .3125" Thick, 146 lb/ft	D-8140	356,347	Lin Ft	\$291.00	\$103,696,977.00
		36", .25" Thick, 100 lb/ft	D-8140	369,283	Lin Ft	\$202.00	\$74,595,166.00
		24", .1466" Thick, 40 lb/ft	D-8140	57,341	Lin Ft	\$87.00	\$4,988,667.00
		8", .1345" Thick, 11.89 lb/ft	D-8140	39,600	Lin Ft	\$35.00	\$1,386,000.00
		6", .1345" Thick, 9.01 lb/ft	D-8140	96,730	Lin Ft	\$28.00	\$2,708,440.00
				919,301			
		Storage Tanks, Steel	D-8140				
		Coppermine, 100 ft Dia. X 25 ft High		1	LS	\$700,000.00	\$700,000.00
		Bodaway Gap, 200 ft Dia. X 20 ft High		1	LS	\$2,200,000.00	\$2,200,000.00
		Tuba City/Moenkopi, 500 ft Dia. X 25 ft High		1	LS	\$13,000,000.00	\$13,000,000.00
		Cameron, 200 ft Dia. X 20 ft High		1	LS	\$2,200,000.00	\$2,200,000.00
		Pressure Reducing Station					
		In-line PRV, 30 Inch Diameter	D-8140	4	LS	\$80,000.00	\$320,000.00
		Designing, furnishing and erecting		4	Each	\$60,000.00	\$240,000.00
		One steel tank - height: 10 feet; Diameter: 20 feet					
		Power lines	D-8140	174	Miles	\$200,000.00	\$34,800,000.00
		SCADA/Control Systems (3% of Constr. costs)	D-8140	1	LS	\$10,300,000.00	\$10,300,000.00
		Corrosion Monitoring (1% of Constr. costs)	D-8140	1	LS	\$3,540,000.00	\$3,540,000.00
		Subtotal this Sheet					\$254,675,250.00
		Subtotal all Sheets					\$357,118,950.00
		Mobilization @ 5%					\$18,000,000.00
		Subtotal w/ Mobilization					\$375,118,950.00
		Unlisted Items @ 15%					\$54,881,050.00
		Allowance for Procurement Strategies @ 0%					
		Contract Cost					\$430,000,000.00
		Contingencies @ 25%					\$110,000,000.00
		Field Cost					\$540,000,000.00
		NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.					
QUANTITIES			PRICES				
BY Art Strefel	CHECKED	BY Dan Mar	CHECKED BDV 7/13/06				
DATE PREPARED July 18, 2006	PEER REVIEW	DATE PREPARED 07-18-06	PEER REVIEW g 7/18/06				

PLANT ACCOUNT		PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
FEATURE:			PROJECT:					
Alternative 2 Williams - R Aquifer Appraisal Level Estimate			North Central Arizona Water Supply Study					
			REGION		LC		PRICE LEVEL: Jan 06	
			FILE: H:\D8170\EST\Spreadsheets\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Att. 2-R Aquifer					
<p>The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.</p>								
Well Field Gathering System				D-8140				
10" PVC Pipe, DR25 C900					5,280	Lin Ft	\$19.00	\$100,320.00
8" PVC Pipe, DR25 C900					10,560	Lin Ft	\$14.00	\$147,840.00
6" PVC Pipe, DR25 C900					10,560	Lin Ft	\$12.00	\$126,720.00
4" PVC Pipe, DR25 C900					31,680	Lin Ft	\$8.00	\$253,440.00
Storage Tank, Steel, 200 ft Dia. X 28 ft High (863,136 ft ³ , 200 ft Dial.x28 ft High)					1	LS	\$2,200,000.00	\$2,200,000.00
Wells with Pumps								
12" Wells - 4000ft deep (Use \$5,000,000. per well)								
150 hp Submersible pumps, 250 gpm				D-8140	6	Ea	\$5,000,000.00	\$30,000,000.00
Excavation, Rock (assuming 60%)				D-8140	25,200	CY	\$10.00	\$252,000.00
Excavation				D-8140	16,800	CY	\$4.00	\$67,200.00
Backfill				D-8140	38,000	CY	\$4.50	\$171,000.00
Embedment to O.D.+3", assume commercial				D-8140	3,000	CY	\$30.00	\$90,000.00
Power lines				D-8140	6	Miles	\$200,000.00	\$1,200,000.00
SCADA/Control Systems (3% of construction cost)				D-8140	1	LS	\$1,040,000.00	\$1,040,000.00
Subtotal all Sheets								\$35,648,520.00
Mobilization @ 5%								\$1,800,000.00
Subtotal w/ Mobilization								\$37,448,520.00
Unlisted Items @ 15%								\$5,551,480.00
Allowance for Procurement Strategies @ 0%								
Contract Cost								\$43,000,000.00
Contingencies @ 25%								\$11,000,000.00
Field Cost								\$54,000,000.00
NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.								
QUANTITIES				PRICES				
BY Art Streifel			CHECKED		BY <i>DK</i> <i>fw</i> D.L. Maag		CHECKED <i>EDV</i> 7/18/06	
DATE PREPARED			PEER REVIEW		DATE PREPARED 07-18-06		PEER REVIEW <i>J</i> 7/18/06	

PLANT ACCOUNT		PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
FEATURE: <i>Alternative 2</i> Grand Canyon/Tusayan -Phantom Ranch Infiltration Gallery Grand Canyon Pipeline Project Bright Angel Creek Infiltration Gallery Appraisal Level Estimate				PROJECT: North Central Arizona Water Supply Project					REGION LC PRICE LEVEL: Jan 06	
				FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\GC-TUSAYAN (2)						
Subtotal this Sheet										
QUANTITIES				PRICES						
BY		CHECKED		BY <i>DM for</i>		CHECKED <i>TDV 7/18/06</i>				
DATE PREPARED		PEER REVIEW		DATE PREPARED <i>07-18-06</i>		PEER REVIEW <i>JF 7/18/06</i>				

Appendix B—Cost Estimating Worksheets

FEATURE:		ESTIMATE WORKSHEET						SHEET 2 OF 2
PROJECT:								
REGION		LC		PRICE LEVEL Jan 06				
FILE:								
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
	13	SCADA/Control Systems (3% of construction cost)	D-8140	1	LS	\$360,000.00	\$360,000.00	
	14	Power lines	D-8140	7	MI	\$200,000.00	\$1,400,000.00	
	15	Corrosion Monitoring (1% of construction cost)	D-8140	1	LS	\$140,000.00	\$140,000.00	
	Grand Canyon to Tusayan							
	16	Forebay Tank, 10 FT Dia. X 20 FT High, Concrete, 1 required	D-8140	1	Each	\$60,000.00	\$60,000.00	
		Total Concrete		8	CY	Included in Item Above		
		Total Steel, Reinforcement		3,500	LB	Included in Item Above		
	17	Pumping plants: 1.17 CFS, 284 FT Head	D-8140	1	LS	\$150,000.00	\$150,000.00	
	18	Air Chamber, Tank, Steel, Spherical, 20 FT Dia., 10 1 required, Total Weight	D-8420	61,000	LBS	\$4.50	\$274,500.00	
	19	Excavation, Rock (assuming 60%)	D-8140	25,800	CY	\$10.00	\$258,000.00	
	20	Excavation	D-8140	17,200	CY	\$4.00	\$68,800.00	
	21	Backfill	D-8140	39,000	CY	\$4.50	\$175,500.00	
	22	Embedment to O.D.+3", native material	D-8140	4,000	CY	\$30.00	\$120,000.00	
		Furnishing and Installing the following diameters of steel pipe (all 500 ft. head class):						
	23	6", .1345" Thick, 9.01 lb/ft	D-8140	34,400	FT	\$28.00	\$963,200.00	
		Subtotal This Sheet					\$3,970,000.00	
		Subtotal all Sheets					\$13,983,620.00	
		Mobilization @ 35% (Helicopter Influenced)					\$4,900,000.00	
		Subtotal w/ Mobilization					\$18,883,620.00	
		Unlisted Items @ 15%					\$3,116,380.00	
		Allowance for Procurement Strategies @ 0%						
		Contract Cost					\$22,000,000.00	
		Contingencies @ 25%					\$5,000,000.00	
		Field Cost					\$27,000,000.00	
		NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.						
QUANTITIES				PRICES				
BY	CHECKED	BY <i>DM for</i> D.L. Maag	CHECKED	<i>BSU 7/18/06</i>				
DATE PREPARED	PEER REVIEW	DATE PREPARED <i>07-18-06</i>	PEER REVIEW	<i>g 7/18/06</i>				

Appendix B—Cost Estimating Worksheets

PLANT ACCOUNT		PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
FEATURE: Alternative 3: Navajo/Hopi/Flagstaff/Williams/ Grand Canyon/Tusayan - Lake Powell Pipeline plus Bitter Spings Spur Appraisal Level Estimate				PROJECT: North Central Arizona Water Supply Study						
				REGION LC		PRICE LEVEL: Jan 06				
				FILE: H:\D8170\EST\Spreadsheet\Zander\2006 JWZ Estimates\N Central AZ Water Supply\New Est\NCAWSS Round 3 - Total Est.xls\Alt 3-1 Ea						
The estimates for the nine options are strictly comparative in nature, and represent costs only as an order of magnitude. They should not be taken to represent actual construction costs in any manner whatsoever. Refinements would be required for each option before an actual appraisal level cost estimate could be represented.										
Furnishing and Installing the following diameters of steel pipe (all 500 ft. head class):										
48", .3125" Thick, 166 lb/ft				D-8140	356,347	Ft	\$322.00	\$114,743,734.00		
36", .25" Thick, 100 lb/ft				D-8140	369,283	Ft	\$202.00	\$74,595,166.00		
24", .1466" Thick, 40 lb/ft				D-8140	57,341	Ft	\$87.00	\$4,988,667.00		
12", .1345" Thick, 17.64 lb/ft				D-8141	472,666	Ft	\$44.00	\$20,797,304.00		
8", .1345" Thick, 11.89 lb/ft				D-8142	39,600	Ft	\$35.00	\$1,386,000.00		
6", .1345" Thick, 9.01 lb/ft				D-8143	123,764	Ft	\$28.00	\$3,465,392.00		
Storage Tanks, Steel				D-8140						
Coppermine, 100 ft Dia. X 20 ft High					1	LS	\$700,000.00	\$700,000.00		
Bodaway Gap, 200 ft Dia. X 20 ft High					1	LS	\$2,200,000.00	\$2,200,000.00		
Tuba City/Moenkopi, 500 ft Dia. X 25 ft High					1	LS	\$13,000,000.00	\$13,000,000.00		
Cameron, 200 ft Dia. X 20 ft High					1	LS	\$2,200,000.00	\$2,200,000.00		
Pressure Reducing Station										
In-line PRV, 36 Inch Diameter				D-8140	4	Each	\$100,000.00	\$400,000.00		
Designing, furnishing and erecting One steel tank - height: 10 feet ; diameter: 20 feet					4	Each	\$60,000.00	\$240,000.00		
Power lines				D-8140	269	Miles	\$200,000.00	\$53,800,000.00		
SCADA/Control Systems (3% of Constr. Costs)				D-8140	1	LS	\$4,460,000.00	\$4,460,000.00		
Corrosion Monitoring (1% of Constr. Costs)				D-8140	1	LS	\$1,530,000.00	\$1,530,000.00		
Subtotal this Sheet								\$298,506,263.00		
Subtotal all Sheets								\$428,763,263.00		
Mobilization @ 5%								\$21,000,000.00		
Subtotal w/ Mobilization								\$449,763,263.00		
Unlisted Items @ 15%								\$70,236,737.00		
Allowance for Procurement Strategies @ 0%										
Contract Cost								\$520,000,000.00		
Contingencies @ 25%								\$130,000,000.00		
Field Cost								\$650,000,000.00		
NOTE: Non-contract costs are to be provided by others. This estimate does not include non-contract costs at this time.										
QUANTITIES				PRICES						
BY Art Streifel		CHECKED		BY Dan Mar		CHECKED DAN 7/18/06				
DATE PREPARED July 18, 2006		PEER REVIEW		DATE PREPARED 07-18-06		PEER REVIEW 7/18/06				