

## **APPENDIX 9A**

### **TREATMENT RECOMMENDED PLAN ALTERNATIVES COST ESTIMATES**

		100 MGD	120 MGD
ISS Pump Station		\$ 63,590,000	\$ 69,107,000
Channel		\$ 330,000	\$ 380,000
<b>Subtotal</b>		<b>\$64,000,000</b>	<b>\$69,500,000</b>
Contingencies	25%	\$ 16,000,000	\$ 17,000,000
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>		<b>\$ 80,000,000</b>	<b>\$ 87,000,000</b>
Non-Construction Cost	35%	\$ 28,000,000	\$ 30,000,000
<b>CAPITAL COSTS</b>		<b>\$ 108,000,000</b>	<b>\$ 117,000,000</b>

NOTES:

- 1) ISS Pump Station expansion would mostly be to existing ISS Pump Station rock cavern. Therefore assume no need to purchase land; possibly a tunnel easement from the Harbor Commission
- 2) The above are June 2007 costs. The ENR CCI for estimated Milwaukee for June 2007 equal to 10000.

**Annual O&M (at June 2007, ENR 10,000)**

Energy		\$ 126,000	\$ 150,000
Labor		\$ 10,000	\$ 10,000
Equipment Maintenance		\$ 795,000	\$ 864,000
Percent of Project Cost	1.00%		
Contingency	25%		
<b>Total Annual Costs</b>		<b>\$ 931,000</b>	<b>\$ 1,024,000</b>

**TOTAL PRESENT WORTH COSTS - June 2007**

<b>Basis:</b>	
Old June 2007 Milw ENR:	9900
Revised June 2007 Milw ENR:	10000
Annual discount rate:	5.125%
Planning period (years):	20

**1. Present Worth of O & M Costs:**

	Year	Present Worth of O & M	
	2007 1	\$931,000	\$1,024,000
<b>Total P.W. of O &amp; M</b>		<b>\$11,000,000</b>	<b>\$13,000,000</b>
<b>2. Capital Costs</b>		<b>\$108,000,000</b>	<b>\$117,000,000</b>
<b>3. Total Present Worth Costs</b>		<b>\$119,000,000</b>	<b>\$130,000,000</b>
Design Average Daily Flow, MGD		100	120
UNIT COST (\$/gal of ave flow)		\$1.19	\$1.08
salvage value @ 8.1%		\$8,748,000	\$9,477,000
net present worth		\$110,252,000	\$120,523,000



Item	Quantity	Unit	Unit Cost	Unit	Cost	Comments
<b>Temporary Facilities</b>						
Constructed barrier between station and new excavation	250	CY	\$1,750	CY	\$437,500	
Dewatering	3	LS	\$220,000	LS	\$660,000	
Temporary Wet Well for Dewatering Pumps	1	LS	\$90,000	LS	\$90,000	
Temporary Electrical	1	LS	\$175,000	LS	\$175,000	
Temporaray HVAC	3	LS	\$125,000	LS	\$375,000	
Temporary Piping	1	LS	\$105,000	LS	\$105,000	
Equipment Crane for Temp. Eqmnt.	1	LS	\$75,000	LS	\$75,000	
<b>Cavern Excavation</b>						
Drill & blast excavation for cavern expansion	4,575,000	gallons	\$4.00	\$/gallon	\$18,300,000	Includes crane and buckets for rock removal and rock disposal
Drill & blast excavation required for pump suction lines	4.5	LS	\$250,000.00	\$/gallon	\$1,125,000	For three 50-mgd suction headers, one 25 mgd suction header, and one 5 mgd suction header
Drill & blast excavation for vertical pipe shaft	1	LS	\$4,000,000.00	LS	\$4,000,000	
<b>Structural Upgrades in the Cavern</b>						
Grouting	600	cy	\$175	cy	\$105,000	For suction header and cavern walls
Cavern Floor	580	cy	\$1,100	cy	\$638,000	
False Ceiling	15,400	sf	\$50	sf	\$770,000	
Misc. Structural Members	3	each	\$125,000	\$/each	\$375,000	
Additional Structural Allowance	3	each	\$200,000	\$/each	\$600,000	Grating, handrails, stairs, equipment pads,
<b>Piping and Valves</b>						
10-foot diam. RCP Suction Header	140	ft	\$2,700	ft	\$378,000	Header piping is 10' diameter RCP.
Piping						
60-inch DIP						
54-inch DIP	75	ft	\$850	ft	\$63,750	
48-inch DIP	150	ft	\$315	ft	\$47,250	
36-inch DIP	1500	ft	\$295	ft	\$442,500	
Valves						
60-inch Ball Valves						
54-inch Ball Valves	3	each	\$96,000	each	\$288,000	
48-inch Ball Valves						
36-inch Ball Valves	3	each	\$52,000	each	\$156,000	
48-inch Swing Check Valves						
36-inch Swing Check Valves	3	each	\$80,000	each	\$240,000	
Additional Pump Eq. Piping Allow.	1	LS	\$1,250,000	LS	\$1,250,000	Includes piping and valves for 25 mgd pump and 5 mgd pump-out pump
Additional Large Diameter Piping Allowance	3	LS	\$750,000	LS	\$2,250,000	
Small Diam. Piping Allow.	3	LS	\$200,000	LS	\$600,000	
<b>Pumping Equipment</b>						
Large Pumps & Motors	6	each	\$630,000	\$/each	\$3,780,000	Three sets of Two 50 mgd pumps in series. Two sets duty, one set backup. (Fairbanks 5700 Angleflo 30" w/ 2500 hp motors)
Intermediate Pumps & Motors	2	each	\$420,000	\$/each	\$840,000	One set of two 25 mgd in series (Fairbanks 5700 Angleflo pumps)
Header/Grit Pump-Out Pumps & Motors	2	each	\$105,000	\$/each	\$210,000	One set of two 5 mgd pumps in series (Fowserv TKL Mining Pump)
<b>Additional Mechanical</b>						
Bridge Crane	3	each	\$175,000	\$/each	\$525,000	
Suction Header Sediment Agitation System	3	each	\$68,000	\$/each	\$204,000	Air piping, compressor, electrical, water purge for pump suction line
Miscellaneous Mech. Allowance	3	each	\$250,000	\$/each	\$750,000	Sump pumps including wet well, misc. equipment, undefined detail
<b>Electrical Equipment</b>						
Electrical Allowance	9	each	\$390,000	\$/each	\$3,510,000	Six 50 mgd pumps, two 25 mgd pumps & two 5 mgd pumps + ancillaries
Additional Electrical Supply						
<b>Instrumentation &amp; Controls</b>						
Instrumentation & Controls	9	each	\$110,000	\$/each	\$990,000	Six 50 mgd pumps, two 25 mgd pumps & two 5 mgd pumps + ancillaries
HVAC Upgrades Installed	1	LS	\$900,000	LS	\$900,000	Cavern HVAC Only
Control and Electrical Building Expansion	1900	sf	\$275	\$/sf	\$522,500	
HVAC for Electrical Building	1900	sf	\$30	\$/sf	\$57,000	
Subtotal					\$45,777,500	
Contractors General Conditions (@ 14%)					\$6,408,850	Includes Division 1 and crane (Typical is 8%)
Contractors Overhead and Profit (@ 12%)					\$6,262,362	Includes Overhead on General Conditions
Materials Shipping & Handling (@ 8% of Material)					\$1,435,760	
Contractors Startup and Testing (@ 2% of Material)					\$358,940	
Subtotal					\$60,243,412	
Bonds and Insurance (@ 4.5%)					\$2,710,954	
<b>Construction Cost</b>					<b>\$62,954,366</b>	
Additional pump capacity (MGD)					100	

Notes:

1. Unless otherwise noted, equipment costs presented are shown as installed cost.
2. Costs provided are at old Milwaukee ENR, June 2007 of 9900. Corrected in main spreadsheet.



### Surface Channel to Connect to Existing Pumpout

Design Criteria:	FLOW (MGD)	100	120
For Peak Hourly Flow	5 ft/s		
Channel Cross Sectional Area, sq.ft.:			
Based on peak hourly flow:		30.95	37.14
Channel dimensions required: Min width, ft.		5.2	5.3
Full width, ft. <sup>1</sup>	25%	6.5	7.0
depth, ft. <sup>2</sup>		6.0	7.0

### Cost Estimate Per Linear Foot of Length - 100 MGD

	Length (feet)	Width (feet)	Height (feet)	Volume (cf)	Thickness Roof (feet)	Wall (feet)	Bottom Slab (feet)	Volume of Concrete Roof (cy)	Walls (cy)	Bottom Slab (cy)	Unit Cost of Concrete <sup>3</sup> Roof (\$/cy)	Walls (\$/cy)	Bottom Slab (\$/cy)	Mud Mat (\$/cy)	Unit Cost of Excavation <sup>3</sup>	TOTAL COST (\$)
Channel	1	6.5	6.0	39	0	1	2	0.00	4.22	1.89	750	550	425	300		\$3,692
Excavation	13	18.5	9	2,165											\$ 20.00	\$1,603
Subtotal																\$5,295
Pile Cost <sup>4</sup>																\$530
TOTAL/Linear foot of channel																\$5,825
Total Cost for Channel for 100 MGD Capacity, rounded (Nov, 2004) <sup>5</sup>																\$290,000
Total Cost for Channel for 100 MGD Capacity, rounded (June, 2007) <sup>6</sup>																\$330,000

### Cost Estimate Per Linear Foot of Length - 120 MGD

	Length (feet)	Width (feet)	Height (feet)	Volume (cf)	Thickness Roof (feet)	Wall (feet)	Bottom Slab (feet)	Volume of Concrete Roof (cy)	Walls (cy)	Bottom Slab (cy)	Unit Cost of Concrete <sup>3</sup> Roof (\$/cy)	Walls (\$/cy)	Bottom Slab (\$/cy)	Mud Mat (\$/cy)	Unit Cost of Excavation <sup>3</sup>	TOTAL COST (\$)
Channel	1	7.0	7.0	49	0	1	2	0.00	5.19	2.00	750	550	425	300		\$4,302
Excavation	13	19	10	2,470											\$ 20.00	\$1,830
Subtotal																\$6,131
Pile Cost <sup>4</sup>																\$613
TOTAL/Linear foot of channel																\$6,745
Total Cost for Channel for 120 MGD Capacity, rounded (Nov, 2004) <sup>5</sup>																\$340,000
Total Cost for Channel for 120 MGD Capacity, rounded (June, 2007) <sup>6</sup>																\$380,000

#### Notes:

- 1) Increased width by 25% to plan for future loss of capacity due to grit or other deposits
- 2) Assumed reasonable depth to keep channel width and depth about equal
- 3) Unit costs based on construction estimating experience, at Milw ENR, November 2004 = 8995
- 4) Building on piles assumed to increased the cost by 10%
- 5) Estimated channel on a per length basis before multiplying by assumed length of 50 feet.
- 6) Milwaukee ENR for June 2007 = 10000

## Original Cost Estimates<sup>1</sup>

Pumping Rate	100 MGD	120 MGD	<b>Assumptions:</b>	
			Annual Events	12
			Hours per event	36.00
			Annual Hours of Operation =	432 hrs
			Usage Charge	12 mo/yr
<b>Energy</b>				
Pump Head (ft)	380	380		
Quantity (hp)	6670	8000		
Pump efficiency	85%		Energy Charge =	\$0.04 per KWHr
Motor efficiency	90%		Demand Charge	\$11.00 per KW
			Hourly Rate	\$45 per hour
Quantity (kW)	6510	7804 not used		
Annual Usage (kWhr)	2812235	3371294		
Annual Cost	\$113,000	\$135,000	Annual energy cost	
<b>Labor</b>				
Storm Event				
Times Per Year	12	12		
Hrs/employee	4	4		
# Employees	2	2		
Storm Total Hours	96	96		
O&M				
Times Per Year	12	12		
Hrs/employee	4	4		
# Employees	2	2		
O&M Total Hours	96	96		
Total Hours	192	192		
Annual Cost	\$9,000	\$9,000	Annual Labor Cost	

## Scale up to ENR 10000 for June 2007<sup>2</sup>

	<b>ENR</b>		
<b>Energy</b>	<b>10000</b>	<b>\$125,625</b>	<b>\$150,083</b>
<b>Labor</b>	<b>10000</b>	<b>\$10,006</b>	<b>\$10,006</b>

### Notes:

- 1) Original costs estimated at a Milw ENR for November 2004 of 8995
- 2) New costs estimated to bring all costs to June 2007 costs with a Milwaukee ENR of 10,000

Ave Day		50	
Max Day		150	Information Source <sup>1</sup>
Physical-Chemical Treatment (Ballasted Flocculation)		<b>\$39,644,000</b>	Technical Evaluation Memo
Disinfection - UV		<b>\$12,800,000</b>	Technical Evaluation Memo
Yard Piping		<b>\$4,507,000</b>	Technical Evaluation Memo
Effluent Pumping <sup>2</sup>		<b>\$5,447,000</b>	
Outfall <sup>3</sup>		<b>\$9,905,000</b>	See Note
<b>Subtotal</b>		<b>\$72,303,000</b>	
Electrical and I & C (15%)	15%	<b>\$10,845,000</b>	
Piping (1%) <sup>4</sup>	1%	<b>\$723,000</b>	Technical Evaluation Memo %
Yardwork (0.1%)	0.10%	<b>70,000</b>	
Demolition <sup>5</sup>		<b>61,000</b>	See Note
<b>Subtotal</b>		<b>84,000,000</b>	
Mobilization/Demobilization (7%)	7%	<b>6,000,000</b>	
Land (See Below)		<b>\$0</b>	
<b>Subtotal</b>		<b>90,000,000</b>	
Contingencies (25%)	25%	<b>22,500,000</b>	
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>		<b>\$112,500,000</b>	
Non-Construction Cost (35%)	35%	<b>\$39,500,000</b>	
<b>TOTAL ESTIMATED PROJECT COST, 6/07 Present Worth<sup>6</sup></b>		<b>\$152,000,000</b>	
<b>PROJECT COST/GALLON</b>		<b>\$3.04</b>	

Land: *No Additional land needed - enough land available at south end of plant where Administration buildings are currently located to fit PCI systems*

#### LAND REQUIREMENTS

Total Land Requirement, acre 1.5 Tech Eval w/assump

#### ANNUAL COSTS

**TOTAL ANNUAL O & M COST** **\$1,670,000** Tech Eval Data

## TOTAL PRESENT WORTH COSTS - June 2007

<b>Basis:</b>	
June 2007 Milw ENR:	10000
Annual discount rate:	5.125%
Planning period (years):	20

### 1. Present Worth of O & M Costs:

2007	1	\$1,670,000
<b>Total P.W. of O &amp; M</b>		<b>\$21,000,000</b>

### 2. Capital Costs

**\$152,000,000**

### 3. Total Present Worth Costs

**\$173,000,000**

Design Average Daily Flow, MGD	50.0
UNIT COST (\$/gal of ave flow)	\$3.46

### NOTES:

- 1) All costs were interpolated from *Technology Evaluation & Preliminary Engineering for High-Rate Treatment of Wet-Weather Flows* Technical Memorandum, dated March 2006, unless otherwise indicated.
- 2) Effluent pumping costs were taken from construction cost estimates for similar WWTP pump stations  
Cost estimated back in 11/04 - the Milw ENR: 8995
- 3) Cost of outfall is to replicate the existing 300 MGD outfall for all treatment capacities. The assumption was made that it would be cost effective to install a 300 MGD outfall even if treatment capacity was less since most of the cost is the marine installation of the outfall pipe and the potential cost to install a third outfall would be avoided indefinitely.  
Milw ENR: 8183
- 4) Piping cost of 1% is for all other piping other than influent and effluent - chemicals, etc...
- 5) No demolition costs included in Technology Evaluation Memo except for 200 MGD system but figures show PCI on top of where existing empty administration building located. Therefore added estimated cost relative to demolition cost at JI offsite.
- 6) Tech Evaluation Memo costs were estimated to June 2007 but with old ENR estimate of 9900 - corrected in this spreadsheet



		Information Source <sup>1</sup>
		150 MGD
Physical-Chemical Treatment (Chemical Flocculation)		<b>\$14,369,000</b> CEPT Evaluation
Disinfection - UV		<b>\$12,800,000</b> Tech Evaluation Memo
Yard Piping		<b>\$3,821,000</b> CEPT Evaluation
Effluent Pumping <sup>2</sup>		<b>\$5,447,000</b>
Outfall <sup>3</sup>		<b>\$9,905,000</b> See Note
<b>Subtotal</b>		\$46,342,000
Electrical and I & C (15%)	15%	<b>\$6,951,000</b>
Piping (1%) <sup>4</sup>	1%	<b>\$463,000</b> Tech Evaluation Memo %
Yardwork (0.1%)	0.10%	<b>\$50,000</b>
<b>Subtotal</b>		\$53,800,000
Mobilization/Demobilization (7%)	7%	<b>\$3,800,000</b>
Land		<b>\$0</b>
<b>Subtotal</b>		\$57,600,000
Contingencies (25%)	25%	\$14,400,000
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>		<b>\$72,000,000</b>
Non-Construction Cost (35%)	35%	<b>\$25,000,000</b>
<b>TOTAL ESTIMATED PROJECT COST, 6/07 Present Worth<sup>6</sup></b>		<b>\$97,000,000</b>

### TOTAL PRESENT WORTH COSTS - June 2007

Revised June 2007 Milw ENR:	10000
Annual discount rate:	5.125%
Planning period (years):	20

#### 1. Present Worth of O & M Costs:

	2007	150 MGD	
		<b>\$1,350,000</b>	CEPT Evaluation
	<b>Total P.W. of O &amp; M</b>	<b>\$17,000,000</b>	
<b>2. Capital Costs</b>		<b>\$97,000,000</b>	
<b>3. Total Present Worth Costs</b>		<b>\$114,000,000</b>	



NOTES:

- 1) All Technical Evaluation Memo costs were interpolated from *Technology Evaluation & Preliminary Engineering for High-Rate Treatment of Wet-Weather Flows Technical Memorandum*, dated March 2006  
CEPT Evaluation costs are taken from *Physcial/Chemical Treatment - CEPT Process* evaluation dated October 20, 2006.
- 2) Effluent pumping costs were taken from construction cost estimates for similar WWTP pump stations  
Cost estimated back in 11/04 - the Milw ENR 8995
- 3) Cost of outfall is to replicate the existing 300 MGD outfall for all treatment capacities. The assumption was made that it would be cost effective to install a 300 MGD outfall even if treatment capacity was less since most of the cost is the marine installation of the outfall pipe and the potenital cost to install a third outfall would be avoided indefinitely.  
Milw ENR: 8183
- 4) Piping cost of 1% is for all other piping other than influent and effluent - chemicals, etc...
- 5) No demolition costs in included in Technology Evaluation Memo except for 200 MGD system but figures show PCI on top of where existing empty administration building located. Therefore added estimated cost relative to demolition cost at JI offsite.
- 6) CEPT Evaluation and Tech Evaluation Memo costs were estimated to June 2007 but with old ENR estimate of 9900 - corrected in this spreadsheet

Average Day		46.7
Max Day		140
Physical-Chemical Treatment (Ballasted Flocculation)		<b>\$38,810,000</b>
Disinfection - UV		<b>\$11,950,000</b>
Yard Piping <sup>2</sup>		<b>\$8,930,000</b>
Effluent Pumping		<b>\$3,790,000</b>
<b>Subtotal</b>		<b>\$64,000,000</b>
Electrical and I & C (15%)	15%	<b>\$9,600,000</b>
Piping (1%) <sup>3</sup>	1%	<b>\$640,000</b>
Yardwork (0.1%)	0.10%	<b>\$64,000</b>
Demolition		<b>\$60,000</b>
Piles		<b>\$2,200,000</b>
<b>Subtotal</b>		<b>\$76,600,000</b>
Mobilization/Demobilization (7%)	7%	<b>\$5,400,000</b>
Land (See Below)		<b>\$7,700,000</b>
<b>Subtotal</b>		<b>\$89,700,000</b>
Contingencies (25%)	25%	<b>\$22,300,000</b>
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>		<b>\$112,000,000</b>
Non-Construction Cost (35%)	35%	<b>\$39,000,000</b>
<b>TOTAL ESTIMATED PROJECT COST, 6/07 Present Worth<sup>4</sup></b>		<b>\$151,000,000</b>
<b>LAND REQUIREMENTS</b>		
Total Land Requirement, acre		1.48
Total Land Cost at <b>\$5,200,000</b> per acre		<b>\$7,720,000</b>
Land acquisition costs :		
<b>Per JIWWTP Environmental Assessment, 1980:</b>		<b>\$1.40</b>
<b>ENR to 6/07 (1980 - 3368, 6/07 Tech Eval Est - 10,000<sup>4</sup>)</b>		<b>\$4.16</b>
<b>Add 25% Contingency to 25 yr old estimate</b>		<b>\$5.20</b>
<b>ANNUAL COSTS</b>		
<b>TOTAL ANNUAL O &amp; M COST</b>		<b>\$1,602,000</b>

## TOTAL PRESENT WORTH COSTS - June 2007

Old June 2007 Milw ENR <sup>4</sup> :	9900
June 2007 Milw ENR:	10000
Annual discount rate:	5.125%
Planning period (years):	20

### 1. Present Worth of O & M Costs:

Year	
2007	\$1,602,000
<b>Total P.W. of O &amp; M</b>	<b>\$20,000,000</b>
<b>2. Capital Costs</b>	<b>\$151,000,000</b>
<b>3. Total Present Worth Costs</b>	<b>\$171,000,000</b>

### NOTES:

- 1) All costs were interpolated from the Tech Eval Tab are from *Technology Evaluation & Preliminary Engineering for High-Rate Treatment of Wet-Weather Flows* Technical Memorandum, dated March 2006, unless otherwise indicated.
- 2) Yard piping costs decreased on a unit price per MGD basis when system was moved offsite
- 3) Piping cost of 1% is for all other piping other than influent and effluent - chemicals, etc...
- 4) Tech Evaluation Memo costs were estimated to June 2007 but with old ENR estimate of 9900 - corrected in this spreadsheet



	Jones Island			South Shore					
	50	100	200	50	100	200	50	100	200
	MGD w/ UV	MGD w/ UV	MGD w/ UV	MGD w/ Cl2	MGD w/ Cl2	MGD w/ Cl2	MGD w/ UV	MGD w/ UV	MGD w/ UV
<b>PCI/HRT <sup>1</sup></b>									
Screening/Grit Removal	\$8,630,000	\$11,087,000	\$16,189,000	\$8,181,000	\$10,370,000	\$15,077,000	\$8,181,000	\$10,370,000	\$15,077,000
Actiflo	\$7,903,000	\$13,209,000	\$24,694,000	\$7,948,000	\$13,281,000	\$24,839,000	\$7,948,000	\$13,281,000	\$24,839,000
Chemical Feed	\$3,614,000	\$4,279,000	\$5,972,000	\$3,547,000	\$3,836,000	\$5,279,000	\$3,614,000	\$4,279,000	\$5,972,000
Gravity Thickener	\$1,268,000	\$1,968,000	\$4,325,000	\$1,159,000	\$1,773,000	\$3,648,000	\$1,159,000	\$1,773,000	\$3,648,000
<b>Subtotal</b>	<b>\$21,415,000</b>	<b>\$30,543,000</b>	<b>\$51,180,000</b>	<b>\$20,835,000</b>	<b>\$29,260,000</b>	<b>\$48,843,000</b>	<b>\$20,902,000</b>	<b>\$29,703,000</b>	<b>\$49,536,000</b>
<b>Other Unit Processes</b>									
UV Disinfection	\$4,319,000	\$8,538,000	\$16,800,000				\$4,322,000	\$8,550,000	\$16,821,000
Chlorination Basin				\$2,164,000	\$3,410,000	\$5,507,000			
Yard Piping <sup>2</sup>	\$7,022,000	\$7,443,000	\$12,689,000	\$3,389,000	\$4,693,000	\$7,401,000	\$2,523,000	\$3,486,000	\$5,452,000
Effluent Pump Station	\$2,006,000	\$3,040,000	\$4,608,000						
Outfall (South Shore only)									
<b>Subtotal</b>	<b>\$13,347,000</b>	<b>\$19,021,000</b>	<b>\$34,097,000</b>	<b>\$5,553,000</b>	<b>\$8,103,000</b>	<b>\$12,908,000</b>	<b>\$6,845,000</b>	<b>\$12,036,000</b>	<b>\$22,273,000</b>
<b>Miscellaneous Other</b>									
Demolition	\$1,210,000	\$56,000	\$56,000			\$10,000			\$10,000
Piles	\$1,337,000	\$1,741,000	\$2,870,000						
<b>Annual O&amp;M Cost<sup>3</sup></b>	<b>\$832,000</b>	<b>\$1,233,000</b>	<b>\$2,168,000</b>	<b>\$664,000</b>	<b>\$975,000</b>	<b>\$1,657,000</b>	<b>\$754,000</b>	<b>\$1,194,000</b>	<b>\$2,124,000</b>

- NOTES:
- 1) Data ONLY uses Actiflo estimates and not Densadeg to keep cost estimating simple
  - 2) After reviewing Technical Memorandum, determined that Yard Piping costs included both influent and effluent piping costs.
  - 3) Annual O&M Costs - dropped drastically between cost estimates in March 2006 draft of Technology Evaluation and August 2006 draft. Appears to be due to a reduction in the Annual O&M Repair and Maintenance % - in March, it was 3% of facility construction cost, and in August it was reduced to 1.5%
  - 4) At JIWWTP, assumed anything > 50 MGD has to be off site - demolition less, land costs more, yard piping unit costs less
  - 5) Additional Cost Estimates for capacities that were not provided are estimated based on best fit curves (included on the next page):

JONES ISLAND:

Additional Cost Estimate:	70	120	140
	MGD w/ UV	MGD w/ UV	MGD w/ UV
PCI	\$24,970,944	\$34,416,379	\$38,416,775
UV Disinfection	\$6,006,610	\$10,162,760	\$11,825,220
Yard Piping	\$7,014,240	\$8,022,440	\$8,836,760
Effluent Pumping	\$2,439,601	\$3,406,938	\$3,747,206
Piles	\$1,485,760	\$1,932,560	\$2,141,240
Demolition	\$56,000	\$56,000	\$56,000
Annual O&M	\$987,096	\$1,405,861	\$1,585,785

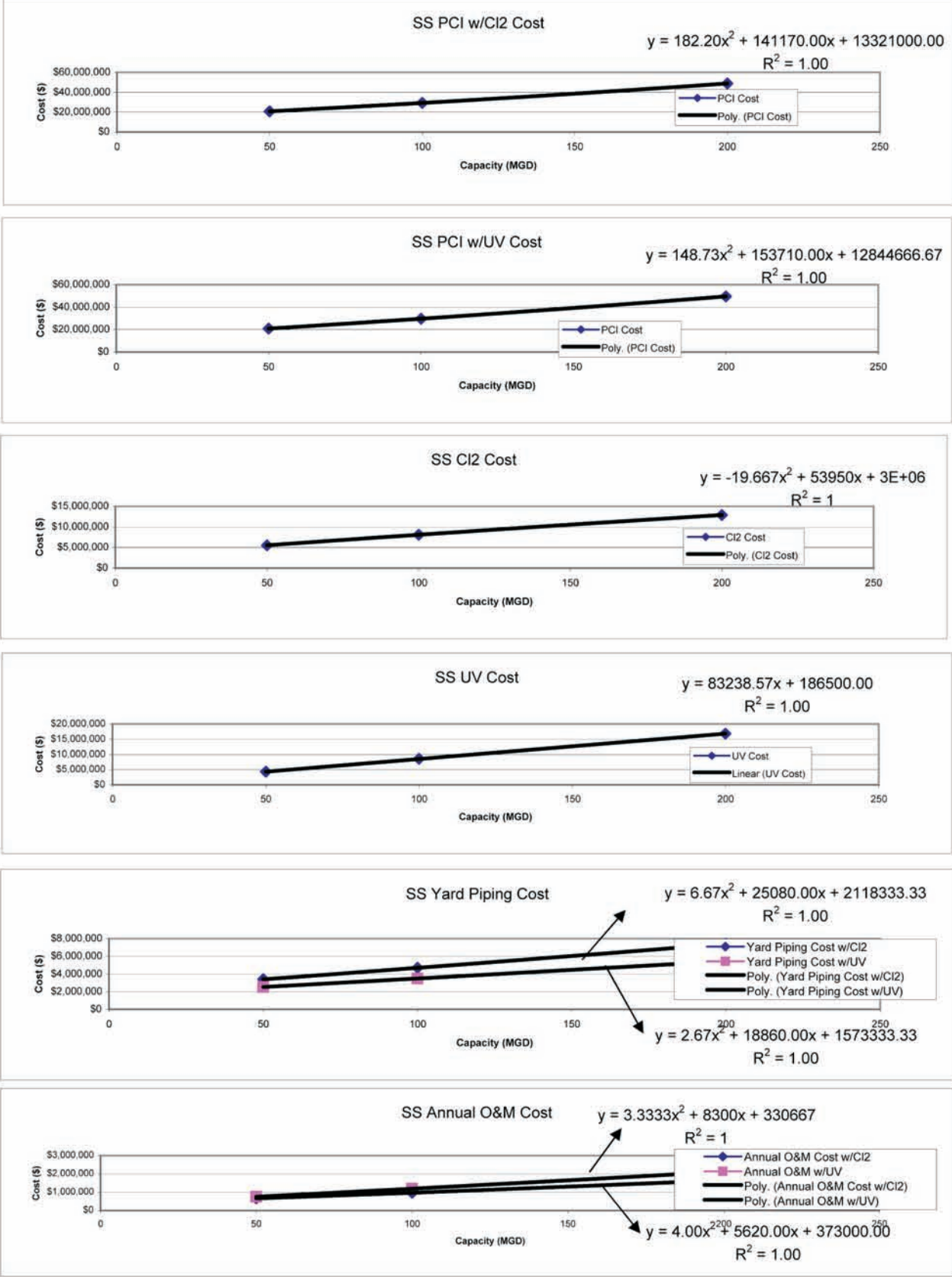
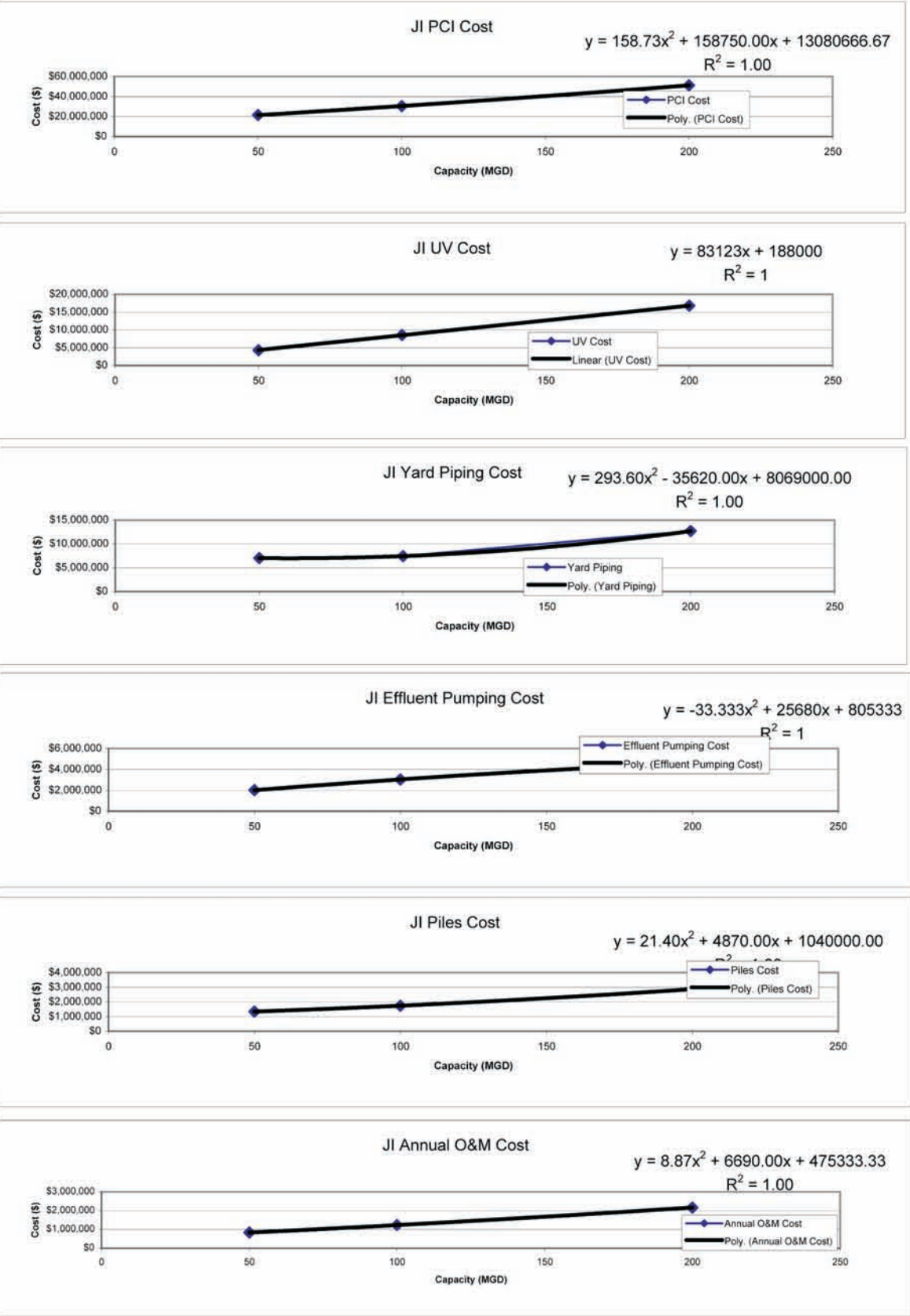
SOUTH SHORE

Additional Cost Estimate:	150	150
	MGD w/ Cl2	MGD w/ UV
PCI	\$38,596,000	\$39,247,592
Chlorination Basins	\$4,524,341	
UV Disinfection		\$12,672,286
Yard Piping	\$6,030,408	\$4,462,334
Demolition	\$10,000	\$10,000
Annual O&M	\$1,306,000	\$1,650,666





Technology Evaluation - Additional Capacity Cost Estimates Required, BEST FIT CURVES



Technology Evaluation - Land Requirements

	50	100	100	200	200
	MGD w/ UV	MGD w/ Cl2	MGD w/ UV	MGD w/ Cl2	MGD w/ UV
	(sf)	(sf)	(sf)	(sf)	(sf)
Preliminary Treatment	6175	6175	6175	8400	8400
Grit Chambers	1050	2700	2700	5400	5400
ACTIFLO	3419.25	5177	5177	10354	10354
Chemical Feed: Chlorination (SS only)		7150		8125	
Chemical Feed: UV	7150		8125		9425
Chlorine Disinfection (SS only)		21600		42900	
UV Disinfection	304		608		1216
Effluent Pumping	625	900	900	2025	2025
Gravity Thickener (ACTIFLO only)	3848	7854	7854	15708	15708
Subtotal	22600	51600	31500	92900	52500
TOTAL LAND <sup>1</sup>	33900	77400	47250	139350	78750

ADDITIONAL SIZES NEEDED <sup>2</sup>	70	120	150	150
	MGD w/ UV	MGD w/ UV	MGD w/ Cl2	MGD w/ UV
	(sf)	(sf)	(sf)	(sf)
Preliminary Treatment	6175	8400	8400	8400
Grit Chambers	1710	3150	4010	4010
ACTIFLO	4120	6470	7880	7880
Chemical Feed: Chlorination			8125	
Chemical Feed: UV	7540	8280		8730
Chlorine Disinfection (SS only)			32230	
UV Disinfection	430	730		910
Effluent Pumping (JI Only)	710	1060	1370	1370
Gravity Thickener (ACTIFLO only)	5450	9400	11770	11770
Subtotal	26100	37500	73800	43100
TOTAL LAND <sup>1</sup>	39150	56250	110700	64650

NOTES:  
1) Total land is an assumed value for this technology cost estimate which takes the subtotal from above and increases it by a factor as shown below.  
Land factor: 1.5  
2) Additional sizes needed footprints were based on a straight line estimate from the above given data as applicable  
Assumed 140 MGD system needed the same footprint as a 150 MGD system