

**Opinion of Probable Costs - SUMMARY BAF  
Post Value Engineering Workshop**

J.L. Richards & Associates Limited  
23695

Client: City of Cornwall  
Project: Cornwall Wastewater Treatment Plant  
Location: Cornwall, Ontario  
Date prepared: 1-Dec-09

ELEMENT	DESCRIPTION	POST VALUE ENGINEERING (ADF: 65,318 m3/d; PDF: 135,000 m3/d)	PRE VALUE ENGINEERING (ADF: 65,318 m3/d; PDF: 160,000 m3/d)	NET CHANGE FOR PHASE 1
	PUMPING STATION IMPROVEMENTS	\$2,647,000	\$2,322,000	\$325,000
	GENERAL WORKS	\$988,000	\$988,000	\$0
	SERVICES & YARD PIPING	\$200,000	\$200,000	\$0
	NEW SCREENINGS/DEGRITTING BUILDING c/w ODOUR TREATMENT	\$2,545,000	PHASE 2	\$2,545,000
	NEW ODOUR TREATMENT FOR SCREENING AND FUTURE DEGRITTING	\$255,000	PHASE 2	\$255,000
	GRIT REMOVAL AND CHEMICAL SYSTEMS - IMPROVEMENTS	\$601,000	\$601,000	\$0
	PRIMARY CLARIFIERS - IMPROVEMENTS	\$546,000	\$546,000	\$0
	SECONDARY TREATMENT	\$23,475,000	\$26,500,000	(\$3,025,000)
	ULTRAVIOLET DISINFECTION	\$3,490,000	\$3,490,000	\$0
	NEW DIGESTER AND GALLERY	\$4,325,000	\$4,325,000	\$0
	EXISTING DIGESTER IMPROVEMENTS	\$644,000	\$644,000	\$0
	EXISTING DEWATERING FACILITY IMPROVEMENTS	\$1,546,000	\$1,546,000	\$0
	ELECTRICAL SERVICE AND EMERGENCY POWER	\$1,305,000	\$1,305,000	\$0
	FLARE STACK	PHASE 2	\$150,000	(\$150,000)
	NEW SERVICE TUNNELS (including process piping & electrical)	\$775,000	\$1,500,000	(\$725,000)
	OTHER	\$25,000	\$300,000	(\$275,000)
	<b>SUB TOTAL</b>	<b>\$43,367,000</b>	<b>\$44,417,000</b>	<b>(\$1,050,000)</b>
	GENERAL			
	Construction Phasing & Commissioning	\$434,000	\$444,000	(\$11,000)
	Permits	\$434,000	\$444,000	(\$11,000)
	General Contractor's Fees	\$4,337,000	\$4,442,000	(\$105,000)
	<b>TOTAL - OPINION OF PROBABLE COST (CONSTRUCTION)</b>	<b>\$48,572,000</b>	<b>\$49,747,000</b>	<b>(\$1,177,000)</b>
	<b>ALLOWANCE FOR SYSTEM INTEGRATION</b>	included above with I&C Costing		
	<b>PROJECT MANAGEMENT, ENGINEERING AND CONTINGENCY (25%)</b>	\$12,143,000	\$12,437,000	(\$294,000)
	<b>TOTAL PHASE 1 (excl. HST)</b>	\$60,715,000	\$62,184,000	(\$1,471,000)
	<b>TOTAL PHASE 2 (excl. HST)</b>	\$3,983,000	\$6,846,000	(\$2,863,000)
	<b>TOTAL PHASES 1 &amp; 2 (excl. HST)</b>	\$64,698,000	\$69,030,000	(\$4,334,000)

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ELEMENT	DESCRIPTION	QUANTITY	UNIT	RATE	TOTALS	EXTENDED
<b>PUMPING STATION IMPROVEMENTS</b>						
	Demolition - E, I&C incl. Patching	1	allowance	\$ 50,000	\$50,000	
	New Pumps - Supply and Install (two 250 hp and two 300 hp)	1	lot	\$ 1,350,000	\$1,350,000	
	Electrical - Supply and Install a new Transformer	1	lot	\$ 300,000	\$300,000	
	Electrical (MCC)	1	lot	\$ 225,000	\$225,000	
	Electrical (Wiring)	1	lot	\$ 150,000	\$150,000	
	Instrumentation and Controls	1	lot	\$ 187,000	\$187,000	
	Back-up Generator (outdoor installation)	1	ea	\$ 300,000	\$300,000	
	Fencing around Generator	1	allowance	\$ 10,000	\$10,000	
	Transfer Switch for Back-up Generator	1	ea	\$ 75,000	\$75,000	\$2,647,000
<b>GENERAL WORKS</b>						
	Demolition - general	1	allowance	\$ 150,000	\$150,000	
	Demolition - CCT and Associated Systems	1	allowance	\$ 100,000	\$100,000	
	Site Clearing, Topsoil Stripping & Stockpiling	1	allowance	\$ 75,000	\$75,000	
	Temporary Works					
	Erosion and Sediment Control	1	allowance	\$ 50,000	\$50,000	
	Construction Trailer Complex	1	allowance	\$ 100,000	\$100,000	
	Temporary Power Fit-ups	1	allowance	\$ 100,000	\$100,000	
	Tower Crane Rentals	1	allowance	\$ 250,000	\$250,000	
	Landscaping					
	Perimeter Fence	380	m	\$ 38,000	\$38,000	
	New Gate	1	ea	\$ 15,000	\$15,000	
	Topsoil & Seed Reinstatement	1	allowance	\$ 25,000	\$25,000	
	New Roads - including granular & H.D. asphalt paving	500	sm	\$ 70	\$35,000	
	Site Lighting	1	lot	\$ 50,000	\$50,000	\$988,000
<b>SERVICES &amp; YARD PIPING</b>						
	Watermain & Hydrant Modifications	1	allowance	\$ 100,000	\$100,000	
	Storm and Sanitary Sewers	1	allowance	\$ 100,000	\$100,000	\$200,000
<b>NEW SCREENINGS/DEGRITTING BUILDING c/w ODOUR TREATMENT</b>						
	New Influent Channel and Flow Metering	1	ea	\$ 150,000	\$ 150,000	
	New Building	255	sm	\$ 4,000	\$1,020,000	
	Mechanical Process - two mechanical bar screens, screenings conveyor & compactor	1	ea	\$ 850,000	\$850,000	
	Electrical (MCC)	1	ea	\$ 75,000	\$75,000	
	Electrical (Wiring)	1	ea	\$ 125,000	\$125,000	
	Instrumentation and Controls	1	lot	\$ 125,000	\$125,000	
	Miscellaneous Metals (checker plates, hand gates, etc.)	1	ea	\$ 200,000	\$200,000	\$ 2,545,000
<b>NEW ODOUR TREATMENT FOR SCREENING AND DEGRITTING</b>						
	New Building					
	Mechanical Process - Odour Control System					
	Electrical (MCC)	1	ea	\$ 175,000	\$175,000	
	Electrical (Wiring)	1	ea	\$ 25,000	\$25,000	
	Instrumentation and Controls	1	ea	\$ 15,000	\$15,000	
	Miscellaneous Metals	1	ea	\$ 15,000	\$15,000	
		1	ea	\$ 25,000	\$25,000	\$255,000

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ELEMENT	DESCRIPTION	QUANTITY	UNIT	RATE	TOTALS	EXTENDED
<b>GRIT REMOVAL AND CHEMICAL SYSTEMS - E, I&amp;C IMPROVEMENTS</b>						
	Demolition - E, I&C incl. Patching	1	allowance	\$ 50,000	\$50,000	
	Electrical (MCC)	1	lot	\$ 75,000	\$75,000	
	Electrical (Wiring)	1	lot	\$ 50,000	\$50,000	
	Instrumentation and Controls	1	lot	\$ 426,000	\$426,000	\$601,000
<b>PRIMARY CLARIFIERS - IMPROVEMENTS</b>						
	Replace Existing Sludge Pumps	1	allowance	\$ 125,000	\$125,000	
	Demolition - E, I&C incl. Patching	1	allowance	\$ 50,000	\$50,000	
	Electrical (MCC)	1	lot	\$ 75,000	\$75,000	
	Electrical (Wiring)	1	lot	\$ 100,000	\$100,000	
	Instrumentation and Controls	1	lot	\$ 196,000	\$196,000	\$546,000

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ELEMENT	DESCRIPTION	QUANTITY	UNIT	RATE	TOTALS	EXTENDED
<b>BIOLOGICAL AERATED FILTERS - SECONDARY TREATMENT</b>						
	BAF Building incl. Blower/Mechanical/MCC/SCADA Rooms (2 storeys)	800	sm	\$ 4,000	\$3,200,000	
	Stairwell for Exiting from BAF Gallery per Code	1	ea	\$ 100,000	\$100,000	
	Excavation	55000	cu.m.	\$ 10	\$550,000	
	Temporary Shoring (between BAF and ex. CCT)	Not anticipated to be required based on Geotechnical conditions				
	Lifting Devices - Manual Bridge Crane in Gallery (no elevator)	1	allowance	\$ 75,000	\$75,000	
	Concrete for Lower Gallery, Influent & Effluent Channels	1	lot	\$ 2,250,000	\$2,250,000	
	Concrete for BAF Cells	1	lot	\$ 2,200,000	\$2,200,000	
	Backwash Residual Storage Tanks	2	ea	\$ 500,000	\$1,000,000	
	Groundwater Drainage for Backwash Tanks to Control Uplift	1	allowance	\$ 100,000	\$100,000	
	Exterior Concrete - Stairs, ramps, retaining walls, etc.	1	allowance	\$ 100,000	\$100,000	
	Mechanical Process Systems					
	Biofilters & Blowers (pre-selected package)	1	lot	\$ 8,000,000	\$8,000,000	
	Labour for pre-selected Biofilter/Blower Package	1	lot	\$ 1,600,000	\$1,600,000	
	Net Incremental Cost for High-Efficiency Turbo Blowers	1	lot	\$ 300,000	\$300,000	
	BAF Cell Effluent Manual Gates (4 per cell)					
	Flow Metering at 2 BAF Cells					
	Backwash Residual Pumping/Piping					
	Miscellaneous Piping/Manual (Supply & Install)	1	lot	\$ 2,600,000	\$2,600,000	
	Electrical (MCC)	1	lot	\$ 250,000	\$250,000	
	Electrical (Wiring)	1	lot	\$ 600,000	\$600,000	
	Instrumentation and Controls - Materials					
	Instrumentation and Controls - Installation					
	Miscellaneous Metals	1	lot	\$ 75,000	\$75,000	
	Primary Effluent Channel (from Primary Clarifiers to BAF)	65	m	\$ 2,500	\$162,500	
	Secondary Effluent Channel (from BAF to UV)	25	m	\$ 2,500	\$62,500	
						<b>\$23,475,000</b>

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ELEMENT	DESCRIPTION	QUANTITY	UNIT	RATE	TOTALS	EXTENDED
<b>ULTRAVIOLET DISINFECTION</b>						
	New UV Building (15 m x 25 m)	375	sm	\$ 4,000	\$ 1,500,000	
	Excavation	3000	cu.m.	\$ 10	\$30,000	
	Process Mechanical					
	UV System (pre-selected package)	1	lot	\$ 1,000,000	\$ 1,000,000	
	Labour for pre-selected UV Package	1	lot	\$ 300,000	\$300,000	
	Electrical (MCC)	1	lot	\$ 75,000	\$75,000	
	Electrical (Wiring)	1	lot	\$ 100,000	\$100,000	
	Instrumentation and Controls	1	lot	\$ 25,000	\$25,000	
	Effluent Serpentine Weir & Metering	1	lot	\$ 150,000	\$150,000	
	Effluent Pumping Upgrades	1	lot	\$ 250,000	\$250,000	
	Secondary Effluent Pipe (from UV to Ex.)	40	m	\$ 1,500	\$60,000	\$3,490,000
<b>NEW DIGESTER &amp; GALLERY</b>						
	New Digester Tank incl. gas proofing	1	ea	\$ 1,800,000	\$ 1,800,000	
	Digester Complex Building at New Digester	250	sm	\$ 4,000	\$ 1,000,000	
	Pre Selected Equipment (supply and install)					
	New Sludge Heat Exchanger (for Mesophilic)	1	ea	\$ 250,000	\$250,000	
	New Heat Recovery Heat Exchanger (for Thermophilic)	nil	nil	nil	nil	
	Mixing System for New Digester (supply and install)	1	ea	\$ 450,000	\$450,000	
	Process Mechanical					
	Digester Liquid Train	1	allowance	\$ 400,000	\$400,000	
	Digester Gas Train	1	allowance	\$ 200,000	\$200,000	
	Electrical (MCC)	1	lot	\$ 75,000	\$75,000	
	Electrical (Wiring)	1	lot	\$ 75,000	\$75,000	
	Instrumentation and Controls	1	lot	\$ 75,000	\$75,000	\$4,325,000
<b>EXISTING DIGESTER - E. I&amp;C IMPROVEMENTS</b>						
	Demolition - E. I&C incl. Patching	1	allowance	\$ 50,000	\$50,000	
	Electrical (MCC)	1	lot	\$ 125,000	\$125,000	
	Electrical (Wiring)	1	lot	\$ 200,000	\$200,000	
	Instrumentation and Controls	1	lot	\$ 269,000	\$269,000	\$644,000

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ELEMENT	DESCRIPTION	QUANTITY	UNIT	RATE	TOTALS	EXTENDED
<b>EXISTING DEWATERING FACILITY IMPROVEMENTS</b>						
	New Centrifuges	2	ea	\$ 375,000	\$750,000	
	Replace Existing Polymer System	nil	nil	nil		
	Automatic Cake Conveyor	1	ea	\$ 125,000	\$125,000	
	Re-Convert Centrate Holding Tanks to Sludge Holding Tanks	2	ea	\$ 50,000	\$50,000	
	Pipe Centrate directly to East trunk Sewer	1	allowance	\$ 50,000	\$50,000	
	Demolition - E, I&C Incl. Patching	1	allowance	\$ 50,000	\$50,000	
	Electrical (MCC)	1	lot	\$ 175,000	\$175,000	
	Electrical (Wiring)	1	lot	\$ 100,000	\$100,000	
	Instrumentation and Controls	1	lot	\$ 246,000	\$246,000	\$1,546,000
<b>ELECTRICAL SERVICE AND EMERGENCY POWER</b>						
	New Transformer for Plant including High-Voltage Pole Line Extension	1	ea	\$ 300,000	\$300,000	
	Service Entrance Duct Bank	1	ea	\$ 120,000	\$120,000	
	Grounding Modifications	1	ea	\$ 30,000	\$30,000	
	Hydro Metering Modifications	1	ea	\$ 10,000	\$10,000	
	Back-up Generator (outdoor installation)	1	ea	\$ 300,000	\$300,000	
	Transfer Switch for Back-up Generator	1	ea	\$ 75,000	\$75,000	
	Power factor Correction	1	ea	\$ 50,000	\$50,000	
	Electrical (Installation and Wiring)	1	lot	\$ 250,000	\$250,000	
	System Integrator (included in I&C items)	1	lot	\$ -	\$0	
	SCADA hardware and software	1	lot	\$ 120,000	\$120,000	
	Vibration Analysis	1	allowance	\$ 50,000	\$50,000	\$1,305,000
<b>NEW SERVICE TUNNELS (including process piping &amp; electrical)</b>						
	Tunnel from Primary Clarifiers to BAF	30	m	\$ 10,000	\$300,000	
	Temporary Works until CCT Demolished and Tunnel to BAF in service	1	allowance	\$ 75,000	\$75,000	
	Tunnel from Ex. Tunnel to New Digester Complex	40	m	\$ 10,000	\$400,000	
	Tunnel from BAF to UV	nil	nil	nil		\$775,000
<b>OTHER</b>						
	Renovate existing Admin. Bldg. - Create new SCADA room	1	allowance	\$ 25,000	\$25,000	
	LEED Initiatives		No allowance carried			\$25,000
<b>SUB TOTAL</b>					\$43,367,000	\$43,367,000
<b>GENERAL</b>						
	Construction Phasing & Commissioning	1.0%		\$ 43,367,000	\$434,000	
	Permits	1.0%		\$ 43,367,000	\$434,000	
	General Contractor's Fees	10.0%		\$ 43,367,000	\$4,337,000	\$5,205,000
<b>TOTAL - OPINION OF PROBABLE COST (CONSTRUCTION) - excl. HST</b>						\$48,572,000

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<b>GENERAL WORKS</b>						
	Demolition - general	1	ea	\$ 50,000	\$50,000	
	Temporary Works					
	Construction Trailer	1	allowance	\$ 10,000	\$10,000	
	Temporary Power Fit-ups	1	allowance	\$ 10,000	\$10,000	
	Asphalt Reinstatement	100	sm	\$ 100	\$10,000	\$80,000
<b>PUMPING STATION IMPROVEMENTS</b>						
	Replace Ex. Screen	1	ea	\$ 350,000	\$350,000	
	Replace Ex. Sluice Gate	1	ea	\$ 40,000	\$40,000	\$390,000
<b>NEW DEGRITTING BUILDING AND GRIT TANK IMPROVEMENTS</b>						
	New Building					
	Remove clam bucket system, improved channel accessibility, modify grit tanks to suit new conveyors	1	ea	\$ 150,000	\$150,000	
	Mechanical Process Improvements - New grit classifiers, new grit screw conveyors, new grit pumps, new slide gates	1	ea	\$ 600,000	\$600,000	
	Electrical (MCC)	1	ea	\$ 75,000	\$75,000	
	Electrical (Wiring)	1	ea	\$ 125,000	\$125,000	
	Instrumentation and Controls	1	ea	\$ 125,000	\$125,000	
	Miscellaneous Metals (checker plates, hand gates, etc.)	1	ea	\$ 200,000	\$200,000	
	New Blower for Grit Tanks & Influent Channels	1	ea	\$ 100,000	\$100,000	\$1,375,000
<b>CHEMICAL SYSTEM CONTAINMENT IMPROVEMENTS</b>						
	NEW OUTDOOR TANKS AND CONTAINMENT	1	allowance	\$ 300,000	\$300,000	
<b>PRIMARY CLARIFIERS - IMPROVEMENTS</b>						
	New Drives for Existing Chain and Flight Sludge Collectors	1	ea	\$ 250,000	\$250,000	
<b>FLARE STACK</b>						
	Replace Flare Stack	1	allowance	\$ 150,000	\$150,000	
<b>OTHER</b>						
	New Boilers to address increased Heat Load	1	allowance	\$ 300,000	\$300,000	
<b>SUB TOTAL</b>						\$2,845,000
<b>GENERAL</b>						
	Construction Phasing & Commissioning	1.0%		\$ 2,845,000	\$28,000	
	Permits	1.0%		\$ 2,845,000	\$28,000	
	General Contractor's Fees	10.0%		\$ 2,845,000	\$285,000	\$341,000
<b>TOTAL - OPINION OF PROBABLE COST (CONSTRUCTION)</b>						\$3,186,000
<b>ALLOWANCE FOR SYSTEM INTEGRATION</b>						Incl.
<b>PROJECT MANAGEMENT, ENGINEERING AND CONTINGENCY (25%)</b>						797,000
<b>TOTAL (excl. HST)</b>						3,983,000