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1) GENERAL QUALIFICATIONS

A. PERSONNEL INFORMATION

1) FULL-TIME PERSONNEL.

Quantum employs 10 Full time personnel.

- 3 Project Managers
- 2 Construction Managers
- 1 Project Engineer
- 3 Commissioning Technicians
- 1 Administrative Assistant

2) QUALIFICATIONS AND EXPERIENCE OF PROJECT PERSONNEL.

Please See Attachment No. 3 - Key Personnel Resumes

Our Team

The same project team members will work on the project from start to finish. We do not perform “hand-offs” of responsibility; the whole team is involved from audit, through design, construction, commissioning and monitoring & verification. A Project Manager that is involved and knowledgeable of every aspect of the job closely manages the team. These team members will include:

Project Director: Mike O’Connor would act as Project Director. His role would be to support the Project Managers, and to assure continuity between multiple projects, should we be in the position of performing audits at multiple facilities simultaneously. Mr. O’Connor would act as backup for all Project Managers working on these audits. The Project Director role is one of support to the Project Managers; and one which assures that lessons or opportunities learned at one facility get passed on for other such facilities.

Project Manager: Quantum’s Project Managers have successfully performed the audits, designs, construction, and project management of ESCO projects throughout the State. Our Project Manager is the *primary contact for the project from start to finish*, and will take personal responsibility for all details of the project; from [energy analysis](#) to construction meetings, he will be the on-site presence that will insure the success of each project. The Project Manager and the Project Engineer (Quantum personnel) will perform or [manage the design](#) of the project. A Principal of Quantum will provide Quality Control oversight of all project deliverables, independent of the Project Manager. Our Project Managers available to the Oregon projects include Mike O’Connor, Lonn Inman and Grant Thorsland.

Project Engineer: Typically, the Project Engineer will perform [monitoring and engineering calculations](#) during the audit, will assist in the design effort, and will answer design questions in the construction phase. Our Project Engineer available to the Oregon projects is Deborah Larson. The detailed design will be performed by subconsultants.

Subconsultant Design Engineers: No one firm can house all the various disciplines and expertise needed to provide the specialized knowledge and experience that is required to meet the challenges of a complex retrofit project. Quantum tackles this challenge by teaming up with the best engineering resources in the industry. These sub-consultants will only be used where approved by ODOE and the Owner, and will only be called in when the Project Team agrees that the measure is viable. One sub-consultant that we anticipate using is Interface Engineering.

Construction Manager: The Construction Manager is involved in the audit phase as a cost estimator, and in verifying “constructability”. In the design phase, he will review the drawings for construction issues. In the construction phase, the Construction Manager will have [oversight of all contractor issues](#); from pre-selection of bidders, through bidding, weekly construction meetings, to project closeout and warranty. Our Construction Managers available to the Oregon projects include Gordon Helgeson and Randy McPherson.

Commissioning Manager and Technicians: This individual will either personally perform the balancing and **commissioning**, or will design and oversee the commissioning & balancing. He/she will also assist in monitoring activities in the audit, perform reviews throughout the design phase, and will oversee vendor training or personally perform [system training](#) (especially on HVAC control systems). In the construction phase, the Commissioning Manager typically performs “interim commissioning”, to assure that the installed systems operate properly as soon as they are enabled. We have found that, if we wait for substantial completion before performing commissioning, we risk having comfort problems. Our Commissioning personnel available to the Oregon projects are Marcus Eidal & Jason Hite.

Monitoring & Verification Auditor: This individual will assist in creating the [monitoring & verification](#) plan in the audit phase, will assure that the plan does not change in the design phase, and will perform initial monitoring & verification upon completion of construction. Ongoing M&V will be performed throughout the project term. Our Monitoring & Verification Auditor available to the Oregon projects are Deborah Larson & Brian Chandler.

Administrative Assistant: This individual will assist in maintaining all contract and project requirements and paperwork. She will assist in financial payments and billing as well as preparing all necessary close-out paperwork i.e. subcontractor prevailing wage forms and warranties. Our Administrative Assistant available to the Oregon projects is Elissa Martino.

3) AREAS OF EXPERTISE.

Systems that we work with:

Mechanical

HVAC Systems

- Fans & Pumps
- Boilers & Chillers
- Heat Exchangers
- VAV & CV Systems

Domestic hot & cold water systems

Controls/Energy Management Systems

Gas, Electric, Water Meters

Gas, steam, water piping

Pools, Spas, Therapy Tubs & Hot Tubs

- Mechanical Systems
- Water Treatment Systems
- Saline & Ozonation Technologies

Irrigation Systems

Sewage Treatment Systems

Laundry Systems

Building Envelope Analysis and

Modifications

Ice & Thermal Storage

Free Cooling Systems

Co-generation Systems

Fuel switching

Refrigeration Systems

Refrigerant & CFC Analysis

Deduct water meters

Plumbing systems

Electrical

Lighting Systems

- Interior lighting
- Exterior lighting
- Decorative fixtures
- Occupancy sensors
- Controls

Variable Speed Drives

High Efficiency Motors

Motor Analysis Services

Corrective Capacitors

Electrical Service Analysis

Emergency Generators/Power

Uninterruptible Power Supplies

Fire Alarm Systems

Security Systems

Local and Wide Area Networks

Fiber Optic & Radio Communications

New Technologies

Wind turbines

Solar Energy

Fuel Cells

Microturbines

Stirling engine for power production from waste gas

Cogeneration

Geothermal heat pump systems

4) **CONTRACT NEGOTIATIONS PERSONNEL.** Michael J. O'Connor, President; 14900 Interurban Ave. S., Ste. 208, Seattle, WA 98168 206-523-5640; moconnor@quantum-engr.com

5) **SUBCONTRACTORS.** Quantum intends to subcontract all construction work to local, qualified, pre-selected bidders. The bidders will be selected based on qualifications: Prior work experience with Quantum or the Owner (quality of work, attitude, capabilities), references, availability of qualified personnel, financial standing, and general capability and interest in performing the project. The [Project Team will pre-approve a short list of \(at least three\) contractors in each discipline](#), and Quantum will solicit bids from this list.

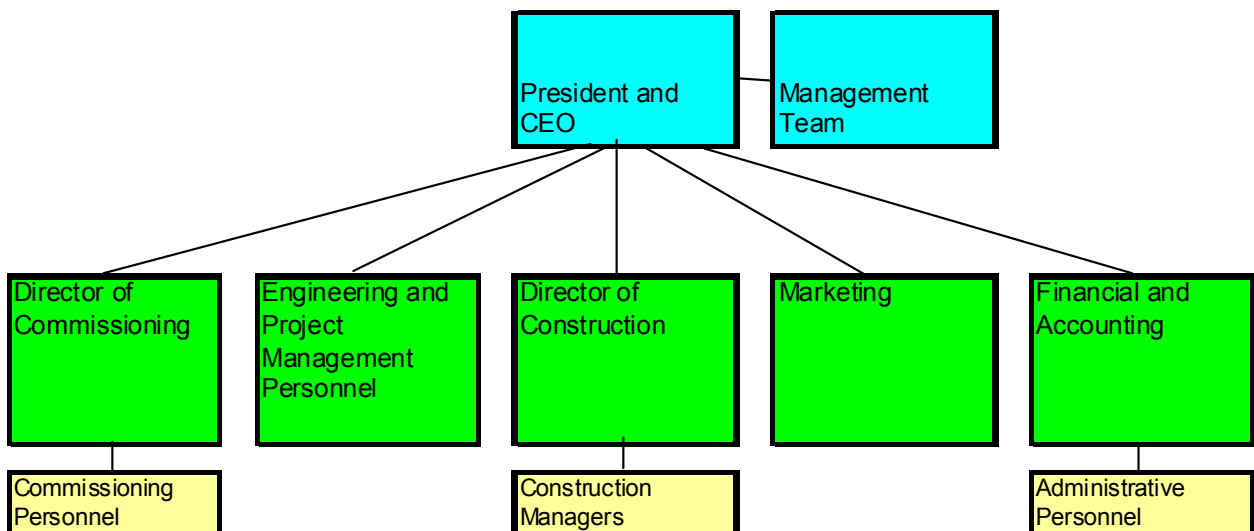
- 6) **SUB-CONSULTANTS.** Quantum typically performs all audit work in-house, and sub-contracts out the detailed design work. We use design sub-consultants that are pre-approved by the Owner and ODOE. As such, we may not use the same sub-consultant on all projects. If the owner has a preferred firm, we endeavor to use that firm. One local firm that we intend to present as an option for these projects is Interface Engineering, an Oregon based Consulting Firm with which we have had excellent experience. Quantum has used Interface for numerous projects in both the electrical and mechanical disciplines.

Interface Engineering provides multi-disciplinary mechanical/electrical/plumbing engineering services from four offices on the West Coast. With nearly 200 professional and technical associates, they approach each project with a process for integrated design, addressing building operational needs, thermal and acoustical comfort, energy and water conservation, maintenance and repair cost, environment impact and sustainability.

Interface has extensive experience with the US Green Building Council LEED rating system. They have successfully certified 26 projects and have over 100 projects in various stages of design or completion with LEED goals. Currently, 39 members of their staff are LEED Accredited Professionals. Interface has a team of energy analysts and design engineers with in-depth experience in energy retrofit projects.

7) **ORGANIZATIONAL CHART.**

Quantum Organizational Chart



8) KEY PERSONNEL REFERENCES.

Any of the following references can be used for all key personnel. Also, please refer to Attachment 4, Project Experience.

REFERENCE	KEY PERSONNEL	<i>Mike O'Connor</i>	<i>Gordon Helgeson</i>	<i>Randy McPherson</i>	<i>Grant Thorsland</i>	<i>Lonn Inman</i>	<i>Deborah Larson</i>	<i>Marcus Eidal</i>	<i>Jason Hite</i>	<i>Brian Chandler</i>	<i>Elissa Martino</i>
Jim Hayes - Owner WA Dept. of General Administration/E&AS 360-902-7281	X	X	X	X	X						X
Roger Wigfield - Owner WA Dept. of General Administration/E&AS 360-902-7198	X	X		X							
Dwight Johnson - Owner Washington Corrections Center 360-432-1508	X	X		X			X				
Denise Hays – Owner Washington Corrections Center for Women (253) 858-4234	X	X			X		X				X
Jim Stevens – Owner City of Edmonds, WA 425-771-0235 x1379	X	X					X	X			X
Shane Pettit -Lighting Subcontractor Light Doctor, LLC 425-481-5001	X	X	X	X			X				X
Matt Campbell -Mechanical & Plumbing Sub General Mechanical, Inc. (253) 627-8155	X	X	X	X	X	X	X	X	X	X	X
Lucy Stockton - Controls Subcontractor ATS Automation (425) 251-9680	X	X	X	X	X	X	X	X	X		
Jim Avery - Subcontractor Scott & From, Inc. (253) 473-6644	X	X	X	X	X		X	X			
Ted Veach – Design Subconsultant Veach Consulting Engineers, Inc. 253-274-5701	X	X		X	X						X
Jeff Nichols - Mechanical Subconsultant Engineering Economics, Inc (206) 622-1001	X	X	X	X	X						
Kevin Wartelle -Electrical Subconsultant Travis Fitzmaurice & Associates (206) 285-7228	X	X	X	X	X						

B. PROJECT HISTORY.

Please see Attachment #4 *Project Experience*

Most Quantum projects have been contracted through WA State Department of General Administration with the Division of Engineering and Architectural Services' ESPC Program acting as the Owner representative. All Quantum projects have contract terms of Guaranteed Savings. We typically guarantee 90% of the energy savings; not the cost savings. This means that our guarantee is stated in terms of kWh, kW, Therms, and cubic feet of water. The savings on each project is measured in post-project monitoring & verification by analyzing the performance of each conservation measure. While the savings typically appears on the utility bills, the performance of each measure determines the true project savings. Typically, our projects exceed savings projections due to our detailed and conservative audit approach. We generally do not show excess savings in our monitoring reports unless it can be clearly demonstrated that performance of the conservation measure, rather than operation improvements, resulted in the excess savings. All Quantum projects obtain funding through the WA State Treasurer's lease purchase program, Bank of America's municipal bond program, and owner capital funds.

McNeil Island Corrections Center, Steilacoom, WA (2008): Construction began 6/06, project completed 9/08. \$2,950,000 project cost, \$301,000 annual energy savings, \$27,000 utility incentive. Mike O'Connor acted as Project Manager and Project Engineer with Marcus Eidal as Commissioning Technician and Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. Project included 25 buildings and over 850,000 square feet. Measures included replacement of an existing main walk-in freezer, replacement of existing heating systems with air-source heat pumps in three buildings, installation of T-bar ceilings, and a window infill and replacement using inmate labor. We cleaned coils and installed a filter rack to improve existing heat recovery systems and replaced a leaking hot-water tank/exchanger with a new, horizontal steam to hot-water converter system. Controls upgrades included expanding and upgrading the EMS to new hardware, adding CO₂ sensors and restoring communication to the EMS in some buildings. Facility wide we added pipe insulation to un-insulated pipe in mechanical rooms, insulated hot water piping, commissioned all HVAC systems and added a steam flowmeter to the boiler plant main feed.

Project Name: DOC McNeil Island Corrections Center

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 697,801	kWh: 628,021	kWh: 697,801
\$22,838		\$22,838
KW: 734	KW: 661	KW:734
\$4,207		\$4,207
Fuel Oil: 117,408	Fuel Oil: 111,405	Fuel Oil: 117,408
\$274,147		\$340,483
Total Projected: \$301,192		Total Actual: \$367,528

Cedar Creek Corrections Center, Little Rock, WA (2007): Construction began 11/06, project completed 8/07. Final contract price was \$581,000, \$66,390 annual savings, \$35,000 utility incentive. Grant Thorsland acted as Project Manager and Project Engineer, with Jason Hite & Marcus Eidal as Commissioning Technicians, and Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. The project consisted of retrofit at nine buildings at the campus totaling ~ 500,000 square feet. Mechanical and controls measures resulted in new and improved controls throughout the Alpine and Timberline Campus, the replacement of the steam boilers at Timberline Lodge with a new propane fired condensing boiler in the Olympic Living Unit. Lighting modifications retrofit any remaining T-12 lighting with T-8 lamps and electronic ballast technology and installed lighting occupancy sensors.

Project Name: DOC Cedar Creek Corrections Center

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 146,363	kWh: 131,727	kWh: 147,300
\$6,800		\$6,844
KW: 385	KW: 347	KW: 385
\$2,218		\$2,218
Propane: 17,831	Propane: 16,048	Propane: 17,831
\$27,102		\$27,102
Fuel Oil: 12,518	Fuel Oil: 11,266	Fuel Oil: 11,363
\$30,268		\$27,474
Total Projected \$: \$66,389		Total Actual \$: \$63,638

Coyote Ridge Corrections Center, Connell, WA(2007): Construction began 9/06, project completed 12/06. Final contract price \$736,286, \$39,900 annual savings, \$74,538 utility incentive. Grant Thorsland acted as Project Manager and Project Engineer with Marcus Eidal as Commissioning Tech. and Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. The project consisted of retrofit of systems at eight buildings and over 500,000 square feet. Mechanical and controls measures resulted in replacement of 44 failing gas/electric HVAC units with 44 new gas/electric HVAC units. Lighting retrofits replaced any remaining T-12 lamps and magnetic ballasts with T-8 technology. Irrigation system controls were upgraded. All lighting and irrigation equipment was provided as part of the energy project. All of the labor associated with the lighting & irrigation retrofit was provided by the DOC.

Project Name: DOC Coyote Ridge Corrections Center

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 366,139	kWh: 329,525	kWh: 366,139
\$14,151		\$14,151
KW: 687	KW: 619	KW: 687
\$5,630		\$5,630
Therms: 19,026	Therms: 17,123	Therms: 19,026
\$15,664		\$15,664
CCF: 5,202	CCF: 4,682	CCF: 5,945
\$4,474		\$5,113
Total Projected \$: \$39,919		Total Actual \$: \$40,558

Battle Ground School District, Battle Ground, WA (2007): Construction began 8/07, project completed 12/07. Final contract price \$777,000, \$80,571 annual savings, \$21,000 utility incentive. Grant Thorsland acted as Project Manager & Engineer and Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. A new Energy Management System was installed throughout Prairie High School; a new water side economizer was installed, as well as a new domestic hot water storage tank. Lighting modifications retrofit any remaining T-12 lighting with T-8 and electronic ballast technology, replaced HID fixtures with T-8, and replaced exit signs with LED. The water retrofit included installation of low flow flush kits for the water closets and urinals, and new low flow aerators for sinks. The ceiling insulation in the auxiliary gymnasium was also replaced

Project Name: Battle Ground School District

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Year 1
kWh: 1,258,522	kWh: 1,132,670	kWh: 2,212,008
\$53,550		\$94,231
KW: 2,576	KW: 2,318	KW: 2,873
\$16,587		\$16,893
Therms 7,936	Therms: 7,142	Therms: 8,112
\$9,840		\$11,357
Total Projected: \$80,571		Total Actual: \$122,481

Washington School for the Deaf Phase 1 & 2, Vancouver, WA (2008): Construction began 6/06, project completed 12/08 (on time for both phases). \$1,300,000 Combined project cost, \$48,722 combined annual energy savings. Grant Thorsland was Project Manager and Project Engineer, with Marcus Eidal as Commissioning Tech., and Gordon Helgeson as Construction Manager. Interface Engineers provided detailed mechanical and electrical design. The project was completed on time and per contract terms. Project included seven buildings on the campus and over 350,000 square feet. Mechanical measures at Northrop Primary School included installation of a new gas fired hot water boiler and domestic water heater, and new exhaust fans to provide building purge at night. A new electric water heater and new boiler were installed at Epperson Middle School. Clark Hall received a new boiler, complete controls commissioning along with replacement of a failed steam coil in the 3rd floor air handling system, and the kitchen and cafeteria was retrofit with new rooftop heat pumps, a new gas fired domestic water heater, and a new gas fired steam generator to serve the kitchen cooking equipment.

Project Name: Washington School for the Deaf Phase 1 & Phase 2

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 10,585	kWh: 9,526	kWh: 10,585
\$477		\$477
KW: (54)	KW: (49)	KW: (54)
-\$306		-\$306
Therms 52,634	Therms: 47,371	Therms: 52,634
\$48,550		\$48,949
Total Projected: \$48,722		Total Actual: \$49,121

Stafford Creek Corrections Center, Aberdeen, WA (2008): Construction began 2/09, project completed 11/08. \$2,080,000 project cost, \$145,000 annual energy savings, \$51,000 utility incentive. Mike O'Connor acted as Project Manager with Grant Thorsland as Project Engineer & Jason Hite as Commissioning Tech. and Gordon Helgeson as Construction Manager. Inventrix Engineers performed the detailed design. The project was completed on time and per contract terms. HVAC, Commissioning & Controls ECM's were performed in over 1M square feet of the campus. Measures included replacement of gas fired furnaces in five buildings with new, high efficiency condensing boiler systems and hot water coils. We created four new boiler rooms and one new boiler building. Commissioned all HVAC systems in facility, revised sequences & reprogrammed to save energy and lengthen equipment life.

Project Name: DOC Stafford Creek Corrections Center

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Year 1
kWh: 254,294	kWh: 228,865	kWh: 254,294
\$9,322		\$9,322
KW:	KW:	KW:
Therms: 124,298	Therms: 111,868	Therms: 124,298
\$136,107		\$136,107
Total Projected: \$145,429		Total Actual: \$145,529

WA State Patrol Bremerton/Bellevue Headquarters, Bellevue & Bremerton, WA: Construction began 6/06, project completed 7/07. Final Project Cost \$995,000, \$41,000 annual energy savings, \$132,000 utility incentive. Grant Thorsland acted as Project Manager and Project Engineer with Marcus Eidal as Commissioning Tech. and Gordon Helgeson as Construction Manager. EEI performed the detailed mechanical design. The project was completed on time and per contract terms. The project consisted of retrofit at the Bellevue and Bremerton Headquarters facilities of over 80,000 square feet. Measures at Bellevue resulted in a new Energy Management System, replacement of a failed boiler and chiller, and full commissioning and VAV Retrofit. Bremerton consisted of replacing heat pump units with split system heat pumps, new EMS and full TAB and commissioning. Lighting and water retrofits were also done at both facilities.

Project Name: WSP Bellevue & Bremerton Headquarters

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 342,092	kWh: 307,883	kWh: 386,619
\$19,065		\$24,589
KW: 693	KW: 624	KW: 793
\$4,539		\$5,146
Therms: 16,049	Therms: 14,444	Therms: 17,598
\$15,478		\$17,595
CCF: 296	CCF: 4682	CCF: 296
\$2,048		\$2,048
Total Projected \$: \$41,131		Total Actual \$: \$49,378

WA State Patrol Training Academy, Shelton, WA(2008): Construction began 2/18, project completed 10/08. \$333,000 project cost, \$30,000 annual energy savings, \$26,000 utility incentive. Grant Thorsland acted as Project Manager with Marcus Eidal as Project Engineer & Commissioning and Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. Mechanical and controls measures throughout eight buildings covering 90 acres and resulted in new Energy Management System; installation of CO2 sensors for economizer control; installation of programmable thermostats & vending misers on all soda machines to set back the machines during unoccupied times. We also installed a high efficiency condensing boiler to accommodate the pool and domestic hot water and performed full commissioning of the control system. Lighting retrofits replaced any remaining T-12 lamps and magnetic ballasts with T-8 technology.

Project Name: WSP Shelton Training Academy

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 202,088	kWh: 181,880	kWh: 202,088
\$7,700		\$7,700
KW: 355	KW: 320	KW:355
\$2,331		\$2,331
Therms: 17,093	Therms: 15,384	Therms: 17,093
\$19,651		\$19,651
CCF: 447	CCF: 403	CCF: 403
\$0		\$0
Total Projected: \$29,681		Total Actual: \$29,681

Washington Corrections Center for Women Steam System De-centralization (WCCW), Purdy, WA (2008): Construction began 11/07, project completed 2/09. \$6,586,000 project cost, \$114,585 annual energy savings, \$614,472 utility incentive. Mike O'Connor acted as Project Manager with Lon Inman as Project Engineer with Marcus Eidal and Brian Chandler as Commissioning Technicians, and Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. Replaced the existing steam and condensate distribution systems and installed 22 new hot-water boilers throughout the campus of 23 buildings and 900,000 square feet. The boiler systems are located inside existing mechanical rooms and all of the buildings previously served by the distribution system received new boilers. The boilers replaced steam to hot water heat exchangers with new, high efficiency boilers. Installed campus-wide gas distribution system with propane-air backup, including a 13,000 gallon propane tank and vaporizer.

Project Name: WA Correction Center for Women (WCCW) Decentralization

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1
kWh: -	kWh: -	kWh:
-	-	-
KW: -	KW: -	KW:-
Therms: 117,353	Therms: 93,882	Therms: 117,353
\$114,565		\$114,565
Total Projected: \$114,565		Total Actual: \$114,565

Washington Corrections Center for Women Energy Conservation Measures (WCCW), Purdy, WA (2009): Construction began 1/08, completed 3/09. \$1,226,348 project cost, \$162,622 annual energy savings, \$204,383 utility incentive. Mike O'Connor acted as Project Manager with Lon Inman as Project Engineer with Marcus Eidal and Brian Chandler as Commissioning Technicians, and Randy McPherson as Construction Manager. The project completed on time and per contract terms. The project consisted of retrofit and of systems throughout the 23 building campus and over 900,000 square feet. Controls Upgrades and EMS improvements included the installation of a new campus-wide DDC EMS controls to replace the failed stand-alone controls. Converted on air handling unit from 100% outdoor air to a conventional return/outside air economizer configuration. Lighting measures retrofit or replaced remaining T-12, magnetic ballast and incandescent fixtures with T-8, electronic ballasts and compact fluorescent technology. Water measures replaced existing toilets with 1.6 gallon per flush units, retrofit the urinals with diaphragm kits, retrofit the faucets with aerators, and installed timers on showers.

Project Name: WA Correction Center for Women (WCCW) ESCO

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1
kWh: 1,220,290	kWh: 1,098,261	kWh:
\$40,560	-	-
KW: 2,191	KW: 1,972	KW:
\$12,746	-	-
Therms: 80,038	Therms: 72,034	Therms:
\$79,042		
CCF: 6,429	CCF: 5,786	CCF:
\$30,274		
Total Projected: \$114,565		Total Actual: \$114,565

Washington School for the Blind, Vancouver, WA (2008): Construction began 3/08, project completed 8/08. \$144,000 project cost, \$500 annual energy savings, \$15,000 utility incentive. Mike O'Connor acted as Project Manager & Project Engineer with Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. Project consisted of Design and installation of a 10 kW solar photovoltaic array, wiring, inverter, and kiosk.

Project Name: Washington School for the Blind

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 12,520	kWh: 11,268	kWh: 12,520
\$500		\$500
KW:	KW:	KW:
Total Projected: \$500		Total Actual: \$500

City of Edmonds Phase 1 & 2, Edmonds, WA (2008): \$1,360,000 project cost, \$68,400 annual energy savings, \$159,000 utility incentive. Mike O'Connor acted as Project Manager & Project Engineer with Marcus Eidal on Commissioning & Gordon Helgeson as Construction Manager. The project was completed on time and per contract terms. Phase 1 consisted of retrofit and replacement of various mechanical and control systems at the City of Edmonds Library, City Hall, and Public Safety buildings, over 85K square feet. At the Public Library & Plaza Room, measures included the retrofit of the existing air handler with a new packaged heat pump system, new VAV boxes, and new EMS controls. Full system commissioning was performed, as well. At the Public Safety Complex we added insulation to chilled-water piping to eliminate the corrosion, and relocated the outside air intake for air handlers. At the City Hall we replaced fan coil units throughout the building, fixed zoning problems throughout, and provided an individual unit to provide extra cooling to the server room. A measure also installed an emergency generator to provide emergency backup for the server, telephone, and data services in the City Hall building. This measure also required some electrical load redistribution between panels, to minimize the number of electrical panels that would need to be connected to the emergency generator.

Phase 2 consisted of retrofit and replacement of various lighting and control systems at the City of Edmonds Frances Anderson Center, Senior Center, public Works, Fire Station # 17 and #20, Old Public Works, Cemetery, and Buildings & Park Maintenance facilities, over 150K square feet. Controls Measures added EMS controls at the Senior Center, Public Works, Old Public Works, and Maintenance Buildings. Lighting measures retrofit or replaced any remaining T-12, magnetic ballast and incandescent fixture with T-8, magnetic ballast and compact fluorescent technology and also retrofit existing traffic signals incandescent lamps with LED throughout city intersections. Water measures retrofit the existing sinks, urinals and water closets with low flow devices.

Project Name: City of Edmonds Phase 1 & 2 Combined

Projected Annual Savings	Guaranteed Annual Savings	Actual Annual Savings Years 1 & 2
kWh: 731,449	kWh: 658,304	kWh:
\$47,511		
KW: 167	KW: 150	KW:
\$583		
Therms: 15,583	Therms: 14,024	Therms:
\$16,673		
CCF: 737	CCF:	CCF:
\$3,656		
Total Projected: \$68,396		Total Actual:

Project References

<u>Name</u>	<u>Agency</u>	<u>Affiliation</u>	<u>Project</u>	<u>Address</u>	<u>Phone Number</u>
Jim Hayes	WA Dept. of General Administration – E&AS	Owner	DOC Cedar Creek	PO Box 41014, Olympia WA 98504	360-902-7281
Bob Johnson	WA Dept. of General Administration – E&AS	Owner	WA State Patrol	PO Box 41014, Olympia WA 98504	360-902-7267
Denise Hays	WA, Department of Corrections	Owner	DOC WCCW	9601 Bujacich Rd NW Gig Harbor, WA 98332	253 858-4234
Warren Pratt	WA School for the Deaf	Owner	WA School for the Deaf	611 Grand Blvd., MS: S-26 Vancouver WA 98661	360 418-4293
Shane Pettitt	Light Doctor, LLC	Sub - contractor	DOC McNeil Island	21706 66th Ave W Mountlake Terrace, WA 98043	425-481-5001
Matt Campbell	General Mechanical, Inc.	Sub - contractor	DOC WCCW	2701 S J St Tacoma, WA 98409	253 627-8155
Randy Owen	Northwest Edison	Sub - contractor	WSP Belle/Brem	16330 N Hwy 21 Republic WA 99166	509-775-0446
Andy Frichtle	Interface Engineering	Sub - consultant	WA School for the Deaf	708 SW 3 rd Avenue #400 Portland, OR 97204	503 382-2751

2. PERFORMANCE CONTRACTING APPROACH

A) PROJECT SUMMARY

Please see Attachment #5 *Sample Project Schedule*

Quantum’s Range of Services

System Analysis & Project Development Quantum personnel have performed resource conservation audits of over 60,000,000 square feet of facility space throughout the Northwest over the past five years. These audits have focused on analysis of existing systems with the goal of improving them; saving energy or water, and solving indoor air quality (IAQ) or comfort problems. Our audits are comprehensive and based extensively on monitored data.

Engineering Design: Quantum provides a full range of mechanical, plumbing, electrical, controls, and lighting design capabilities. Quantum personnel have designed over \$60 Million of performance contracting projects, and Quantum’s industry partners provide over \$600 Million in experience with mechanical and electrical design projects. For Oregon projects, we will use qualified Oregon design firms for detailed system designs.

Construction/General Contracting: Quantum will select the best value among subcontractors and vendors that are pre-approved by the Owner; work will typically be competitively bid. **All costs will be open book to the Owner**, and any unused construction costs revert to the Owner. Our construction Manager will closely manage construction from start to finish; including weekly construction meetings in which project status, schedule, and budget are reviewed. Construction will be performed in a manner that minimizes impact to the clients and staff, and provides a high quality system. System outages will be closely coordinated with the facility manager. **Quantum will frequently pre-purchase equipment to provide savings and timely**

delivery to the Owner. The Construction Manager will be on-site throughout construction to assure that the measures are installed professionally, and in keeping with the design intent. His presence on-site will be continual during critical installations (placement of boilers and major equipment, etc.). The *Construction Manager, Project Manager, and Project Engineer will be available 24 hours per day to respond to the needs of the client.* The Owner will have our cell phone, work phone, and home phone numbers.

Testing & Balancing: Quantum has the equipment and qualified personnel to perform testing and balancing of HVAC projects. We have full resources to perform testing & balancing; we typically only do this for smaller systems where it is not worth bringing in another firm dedicated to this work.

Commissioning: As one of the most important steps in the process, **Quantum will perform full commissioning on all systems.** This critical step will actually take place throughout construction, as components are brought on line. Due to the critical mission of municipal facilities, systems cannot be “down” for long periods. Commissioning will typically be done by the Quantum Commissioning Engineer, who was also involved in the audit and design phase. We have full resources to commission any mechanical, electrical and control system, as well as balancing capabilities for air and water. Quantum has in-house commissioning resources, and has teamed up with the top firms in Washington State to provide commissioning on larger jobs.

Monitoring & Verification: Monitoring & verification is critical to assure that the project performs as promised. Quantum will provide detailed monitoring & verification that clearly tracks the actual savings. **Savings verification will be clear, understandable, and will accurately reflect system operating conditions.**

Financing: Quantum will work closely with the Owner in choosing the best financing alternatives: direct financing by Quantum, financing through our financial industry partners; private, third party or municipal loans.

Guarantees: **We guarantee the resource savings, performance, and cost of our projects.** If it doesn't perform, we fix it; if it doesn't save, we pay for the lost savings. At Quantum, we stand by and guarantee our work; and we realize that the best guarantee of quality is performing the job right the first time.

Price: We reduce construction costs through competitive bidding and direct purchase of equipment. Also, due to low overhead, Quantum charges less for its services than other firms do.

Warranty: Quantum quickly & effectively handles all warranty issues on its equipment. Further, we frequently negotiate extended warranties on equipment; assuring that the Owner is protected for the long term.

Quantum is committed to assuring that every project exceeds the Owner's expectations with regard to performance, price, and resource savings. We do this through teamwork with the Owner and all other project stakeholders, and by maintaining a high level of service, competence and professionalism throughout the entire project. Our goal is to provide the best level of service in the industry, at a price below that of our competition.

Audit & Project Development Phase Services

Feasibility Studies

Detailed Resource Conservation Audits

- Energy – Mechanical/Elec./Lighting
- Water (Mechanical and Irrigation)
- Tenant Energy/Water Metering
- Refuse Disposal and Recycling
- Operations & Maintenance Savings

Detailed Baseline Measurement & Metering

Computer Modeling of Energy Use

Life Cycle Cost Analysis

Financing of Improvements

Utility Incentive Calculations

Utility Bill Analysis

Utility Rate Structure Analysis

Gas and Electricity Procurement Services

Energy Information Systems

- Real Time Equipment Monitoring
- Internet Access to Energy Meters

Indoor Air Quality Surveys

Boiler emissions analysis

Steam Trap Surveys

Hazardous Material Identification

Power Quality Surveys

Additional Services

O&M Manuals

Maintenance Management System Analysis

System Maintenance

Design Phase Services

Mechanical Systems Design

Plumbing Systems Design

Electrical Systems Design

Controls Systems Design

AutoCAD Drafting

Preparation of Specifications

Construction Phase Services

Construction Management

Construction of Conservation Measures

- Mechanical
- Electrical
- Lighting
- Structural

Hazardous Material Abatement/Removal

Equipment Prepurchasing

Training of Facility Personnel

Balancing & Commissioning

Ongoing Services

Warranty Services

Savings Guarantees

Performance Guarantees

Monitoring & Verification

Engineering Analysis of Changes to Facility

Educational Seminars for Students/Personnel

B) ENGINEERING DESIGN

The detailed designs of the selected conservation measures will be performed by Quantum or their sub-consultant, and reviewed by the Owner. System designs will be practical and will use accepted technology. On many past projects, Quantum has successfully coordinated their design effort with other ongoing projects. Sub-consultants will consist of those firms selected by the Owner, ODOE, and Quantum.

Quantum will typically perform schematic level design in the audit phase. This establishes the design scope, and is fully reviewed by the Owner prior to detailed design work. Quantum's Project Manager will oversee the work of the design sub-consultant. Designs will be reviewed by the Quantum Project Manager, Project Engineer, and Construction Manager, as well as the Owner. At least one review will take place on site – looking at the drawings while looking at the existing system and space.

Because Quantum does not represent any product or service, we can assure that the design truly responds to the Owners needs. Any equipment will be pre-approved by the Owner before it goes into the design. Quantum will work closely with the Project Team throughout the design phase to assure that the Owner gets an effective, efficient system that is maintainable and long lasting.

C) TECHNICAL ENERGY AUDIT/PROJECT DEVELOPMENT PLAN

Please See Attachment #6 *Sample Technical Energy Audit & Project Development Plan*

Audit and Development

In order to effectively lead the audit, development, and design of the project, the Project Manager must become intimately familiar with the facility and its systems. The Quantum Project Manager will be a familiar presence on-site; both performing audit and design functions and managing others in these duties. By teaming up with the ODE project manager and the Owner, Quantum's Project Manager will act as the driving force to develop the project from a concept to a reality.

Initial Site Meeting: The Project Manager and Project Engineers will first meet with the Owner and ODE to itemize the expectations for the project. Frequently the Owner has clear expectations with regard to conservation measures; this is where Quantum *listens to the Owner and documents those desires*. Also, there is a discussion of other projects that may impact the energy project, as well as discussion of other past energy projects.

Preliminary Walkthrough: The Project Manager and Project Engineers will walk through the facility with the Owner, and will make a *list of potential conservation measures*. These measures will also include those that the Owner indicated in the Initial Site Meeting, as well as those that Quantum discovers in the walkthrough.

Audit Proposal: Quantum develops a proposal for the audit; including the detailed list of measures to be audited, and an audit fee. This proposal is modified per Owner and ODE recommendations, and an audit agreement is made.

Detailed Audit - Quantum's Total System Evaluation Approach ©:

1) Total System Monitoring©: We are unique in the depth of knowledge and information that we gather on existing systems. Quantum will monitor all motors and systems over 3 HP at each facility for a period of at least two weeks during heating season. We will perform extensive on-site analyses of the systems, in addition to evaluating utility bills and past operating logs. Combined, this information will be used to develop a load profile and energy use profile for relevant systems. For example, for the following specific systems, we would do the following:

- Fan systems for would be logged for mixed, return and discharge temperatures as well as power. This data would be logged every two minutes for two weeks. Actual airflow would be measured using flow hoods or pitot tube scans across the ductwork. Economizer and heating/cooling valve control may be analyzed from field tests, or temperature logging.
- Boiler systems would be analyzed by using on-site combustion efficiency readings, ultrasonic flowmeter logging of fuel or water flow every two minutes, and temperature (or pressure) logging of inlet and outlet fluid temperatures.

2) Total System Modeling©: For HVAC systems, Quantum has developed proprietary software that accepts the Total System Monitoring data, and translates it into system energy use based on typical weather data. This energy use profile is provided on an hourly basis for a typical year, and matches precisely to the monitored data as well as to the utility bills. The result will be a clear, understandable analysis of baseline operating conditions that correlate with utility bills. **By metering individual systems, and matching our calculations to the metered system data, we accurately establish a baseline without the use of individual building meters.**

For lighting and plumbing systems, Quantum provides a spreadsheet showing the baseline and proposed technology, energy or water use, and cost for each fixture in the facility. This results in a simple payback analysis of each individual recommended retrofit. This analysis is then “winnowed” to meet the client’s financial criteria.

The audit proposal will include *full open book pricing*, and a *clear, detailed analysis* of the existing systems, proposed measures, guaranteed project costs and energy savings, and detailed financial analysis. Typically, measures that have survived this far in the process are presented at the 30% to 50% design level.

Quantum will work collaboratively with ODOE, the facility representative, and the utility in successfully developing the project. One of our strengths lies in successfully conveying the technical and financial aspects of energy projects to Owners. This frequently means that we perform *presentations to School Boards or City Councils*. Upon approval of the proposal, Quantum will move forward with detailed design.

D) BASELINE CALCULATION METHODOLOGY

Existing system configuration and operation:

Our Total System Monitoring approach described above provides extensive data on existing system operation and configuration. We will perform extensive on-site analyses of the systems, in addition to evaluating utility bills and past operating logs. Combined, this information will be used to develop a load profile and energy use profile for relevant systems. The result will be a clear, understandable analysis of baseline operating conditions that correlate with utility bills.

While most facilities do not have individual building meters, our baseline would typically correlate to the campus meter. **By metering individual systems, and matching our calculations to the metered system data, we accurately establish a baseline without the use of individual building meters.**

Engineering calculations or computer modeling:

Once actual system configuration and operational data are collected, Quantum will make use of standard engineering calculations or computer models to calculate energy consumption of the systems. Computer models we have used include Power DOE, ELITE, and TRACE; while these models can be useful, they can also provide misleading results if not used judiciously. We have avoided extensive use of computer models in the past because of their ability to obscure the true operating conditions in the analysis. Wherever possible, we use straight-forward, easily understood calculations to determine energy use:

- Fan system (constant volume) energy use (or lighting energy use) would simply be the instantaneous kW demand (as measured by our Extech clamp-on meter) times the operating hours (as measured by a data logger).
- Heating system energy use would be calculated using monitored data extrapolated to typical weather data. This is done by monitoring system return air, discharge air, mixed air and outside air every 2 minutes for at least two weeks. On a single zone system, heating btu's per hour would be: $Btuh = 1.08 * CFM * (Mixed\ Air\ Temp. - Discharge\ Air\ Temp.)$
- Boiler systems energy use would involve creating a load profile from actual measured efficiencies, temperatures and flows, and applying this profile to average temperature conditions for the applicable area. Hourly load is: $Btuh = 500 * Gallons\ per\ Minute * (boiler\ inlet\ temp. - boiler\ outlet\ temp.)$. On steam boilers, we would measure feedwater flow every 2 minutes to establish baseline load. Load (pounds per hour) = Average GPM for hour * 60 * 8.337.
- Water use would be calculated by multiplying instantaneous, measured demand (gallons per minute) times operating time (minutes). Operating time for urinals, hand basins and toilets is determined based on experience and industry standards.

Once we have established hourly load profiles for systems based on monitored data, we extrapolate this load data using typical weather data to an 8760 hour model; showing hourly load for every hour of a typical year. The sum of the results from these "Total System Models" are then matched to utility bills to verify accuracy. **Calculations and measurements follow the guidelines of the Option B of the North American Energy Measurement and Verification Protocol.**

E) ADJUSTMENT TO BASELINE METHODOLOGY.

The baseline is adjusted due to changes in weather or in facility use. The baseline adjustments are easily incorporated into Quantum's Total System Model by modifying weather data or operating hours. We rarely need to perform such baseline modifications because our savings analyses are conservative, and account for normal changes to weather or operating hours.

F) DOLLAR SAVINGS CALCULATIONS.

Dollar savings are calculated through simple calculation of current utility rates times proposed energy savings (in kWh, kW, Therms, or gallons of fuel). We do not typically include maintenance savings in our calculations unless the savings is from reduced use of outside contractors, or reduced parts and supplies.

G) GUARANTEED SAVINGS CALCULATIONS.

Please See Attachment #7 – *Monitoring & Measurement Capabilities*

Savings Computation in the Audit Phase

After reviewing the baseline energy use for each system, Quantum would narrow the list of proposed measures, or add measures where applicable. At this point, it typically becomes apparent which ECM's will meet the Owner's financial criteria. Additional meetings with the Owner help to refine the list of measures. The resulting list of measures is then analyzed by Quantum, using standard and understandable engineering principles. Quantum primarily utilizes our Total System Model to calculate the proposed energy use and savings.

We may make use of BIN analysis, simple spreadsheet calculations, or detailed computer simulations (Power DOE and TRACE) where applicable. We would typically use the same calculation for the proposed measure as that used for the baseline. For instance, when replacing a boiler, we would use the baseline load profile and apply it to the new boiler efficiencies to determine the proposed energy use. For controls on a fan, we would use the baseline model, then modify the operating hours or the percent outside air to determine proposed energy use. Typically, all calculations are based on actual data derived from system monitoring. The only assumption made in our calculations is that, on average, weather will not change dramatically from historic trends. Sample calculations are provided in item D.) Baseline Calculation Methodology, and on the CD provided with the sample audit.

The Total System Model easily performs modifications to the baseline energy use profile in order to show the future, or proposed energy use. We modify the Total System Model by reducing operating hours, improving efficiency of heating or cooling equipment, or improving use of outdoor air economizers, or by installation of variable speed drives. **The result is a clear, accurate reporting of baseline and proposed system use, tied to actual monitored data. This greatly reduces the risk to the Owner of lost savings.**

Capabilities:

Quantum makes extensive use of metering to determine baseline and post-installation energy use and equipment performance. The majority of this metering is done at the system level: metering of individual fan motors, luminaire, or boilers, for instance. In this way, the true profile can be made of baseline or post-installation performance of each ECM. Quantum personnel capable of monitoring energy usage include all project managers, engineers, and commissioning technicians. We have over 150 individual pieces of logging equipment to perform measurements.

H) TRAINING PROVISIONS.

Please see Attachment # 8 *Sample Training Plan*

Training is typically performed throughout the construction period. Because the facility personnel are part of the Project Team, they are knowledgeable regarding the measures. Facility personnel typically work with the contractor during key points of construction to gain system knowledge. For instance, if facility personnel are present during the startup of a boiler system, and can ask questions, they will gain much more from formal training later on. At the Washington Corrections Center for Women, HVAC technicians are following our commissioning personnel onsite and turning the entire commissioning process into a training opportunity.

Because Quantum is made up of hands-on engineers, we know the value of good training. Formal training will take place on all systems. Each system involved in one of our projects will be explained in detail with the Owners personnel, and hands-on maintenance demonstrations will be performed. Training will be done by the installer of the system and the vendor or manufacturer. It is our policy to sit in on and sometimes videotape training sessions to assure that they are valuable. *Quantum will provide training until the facility manager says "enough"!* These training sessions may be videotaped to provide the Owner with a resource for future training.

I) MEASUREMENT AND VERIFICATION METHOD AND SAMPLE.

Please see Attachment #9 – Sample M&V Reports

Quantum will provide at least three services in this phase:

Detailed monitoring & verification: This critical phase will entail detailed monitoring of each conservation measure, to be sure that it is saving energy and operating as intended. Detailed metering of the end-use equipment (fans, pumps, boilers, lighting systems) will be done to verify savings. This actual metered data (and metered performance parameters) is then inserted into the same calculation used in the energy study to determine post-installation energy use and savings. All work is *in accordance with the international Performance Measurement & Verification (IPMVP)* protocols. This is performed for each conservation measure involved in the project. This metering is done at the system level: metering an individual fan motor, luminaire, or boiler, for instance. In this way, the true profile can be made of actual performance of each system. Should any measure fail to perform or to meet its energy savings, Quantum will respond quickly to remedy the situation. If we fail to achieve performance and savings, we will pay for the lost savings.

Utility bill analysis: It is our experience that the savings has to appear on the bill, in order for the project to be a success. While the detailed monitoring & verification can act as an “early response” system, the energy and water bills are the bottom line. Quantum will provide clear, concise reports showing the savings on the bills.

Engineering services: Quantum will periodically visit the site throughout the life of the project. We will check the installed measures to insure proper operation, and provide engineering guidance on any modifications to the systems. Our goal is to establish and maintain a long-term relationship with each Owner.

Ongoing monitoring services for the first 1-3 years are typically included in the project fees. The monitoring is generally performed every 6 months in the first year, then annually. After the end of Year 3, the ESCO will present a proposal to the Owner for ongoing monitoring & verification services. These services will monitor energy savings and energy savings measures, provide engineering assistance in maintaining the savings.

J) COST SAVINGS GUARANTEE CALCULATIONS.

Project Cost Guarantees and Policies

Cost Guarantee: Quantum will also guarantee the project cost. We will use open book pricing throughout the project to assure that the Owner knows the actual project costs. Any cost related to the original project scope over the guaranteed maximum will be borne by Quantum. If the actual construction cost falls below the value guaranteed by Quantum, the Owner may keep the difference, or use it to implement additional measures. Quantum typically does not mark up the use of contingency funds for any item related to the original scope.

We track project costs throughout the project, and provide monthly reports to the Owner on the status of the budget. All costs are based on subcontractor invoices that are shared with the Owner.

Quantum's owners have extensive experience in project cost estimating, and we make use of our construction subcontractors to verify estimates. Because we are not affiliated with any product, you can be sure that our costs are the true project costs, and that our profit is fair and reasonable.

Energy Savings Guarantees:

[Quantum will pay for any lost savings due to the failure of a measure to perform as guaranteed.](#)

Our guarantees are very simple:

1. A set of parameters are measured to verify system performance.
2. These parameters are used to determine the energy use of the system.
3. Actual energy use is compared to the baseline energy use to determine actual savings.
4. If the actual energy savings do not meet the guaranteed savings, Quantum pays the Owner the difference.

We typically guarantee the energy savings; not the cost savings. This means that our guarantee is stated in terms of kWh, kW, Therms, and cubic feet of water. In this way, as the utility rates increase, the Owner receives the benefit of more savings without the guarantee being diminished. We have never seen the utility rates decrease over the long term, resulting in lower cost savings. Should an Owner desire a purely cost savings guarantee, we make every effort to provide it.

Because of our technical excellence, the resource savings for projects developed and engineered by our personnel have always exceeded the guarantees. At Quantum we stand by and guarantee our work; and we realize that the best guarantee of quality is performing the job right the first time. Our technical capabilities assure that this is the case.

K) ESCO FEE CALCULATION.

On a typical ESCO project, we establish a fee for the audit upon agreement of the conservation measures to be analyzed. The audit fee ranges from 12 to 16 cents per square foot of building space, and is dependent upon building size and level of complication regarding the energy conservation measures. This fee is a fixed fee.

Upon completion of the audit, we present a project proposal to the client. This proposal includes all of the other fees associated with the project:

Design @ 6.0% to 10.0% of Labor & Material
Construction Mgt @ 5.0% to 6.0% of Labor & Material
ESCO overhead and profit @ 15.0% to 17.0% of Labor & Material
Bonding Costs are "passed through" at no additional markup

All fees are based on the Guaranteed Maximum Labor & Material Cost. This Cost is, as its name implies, a guaranteed maximum value. All actual costs are open book to the client, and any unspent funds remain the property of the client. Because Quantum does not represent a product nor directly perform construction, we can provide true open book pricing.

L) OPEN BOOK PRICING.

Upon approval by the Owner of detailed design documents, Quantum will collaborate with the project team to obtain equipment and select contractors. **Because we do not directly perform the construction (we subcontract it out), and we don't represent any equipment or controls, we are one of the few ESCO's that can provide true open book pricing.** The following methods will be used.

Selection of equipment:

Only equipment approved by the Project Team will be considered, and the facility manager will have "veto" authority over any equipment options. Quantum will competitively bid large pieces of equipment, and the best value will be chosen; with Project Team approval. These items will frequently be purchased by Quantum prior to bringing a contractor on board. In this way, we reduce the contractor's markup on the equipment, and it gets delivered faster.

Selection of sub-contractors:

Pre-selection of Qualified Bidders: The Project Team will pre-approve a short list of (at least three) contractors in each discipline, and Quantum will solicit bids from this list. Quantum will act as a true general contractor; we will solicit bids from subcontractors, and not from other general or prime contractors, as is done by other ESCO's. By directly hiring plumbers, pipefitters, sheet metal companies, and electricians, we eliminate the markup that a prime or other general contractor would add.

Sub-contractor selection: Upon receiving the bids, the best value among the pre-approved sub-contractor bids will be selected. The Project Team will do this via a thorough review of the bid proposals. The Owner will be requested to actively participate in this selection.

M) BILLING AND INVOICES.

Please See Attachment #10 – *Sample Billing Invoice*

Quantum typically does not bill for any services until the conservation measures are installed and operating properly. At that time, we would bill for services up to that date. For small projects (less than \$500,000), this typically means one invoice at the end of the project. Larger projects may be invoiced based on completion of large conservation measures (breaking out lighting, mechanical, and controls measures, for instance).

Our invoicing for services work is based on a percent completion basis, and is a fixed fee. Our invoicing for construction work is based on subcontractor invoices for work completed. All subcontractor invoices are attached and included with our invoice. In this way, all construction costs can be tracked back to the subcontractors.

N) ECM VENDORS.

We will use any qualified vendor that the Owner chooses to purchase equipment and supplies from, as long as the equipment is of good quality. The vendors included here represent some firms that we have had good experiences with. As such, they have met Quantum’s basis for qualifications as an Industry Partner. However, this list is not exclusive. Whenever the Owner has a preference we will work with the Owner to choose the best team players and the best equipment

Vendor Company	Contact	Phone Number
Proctor Sales	Greg English	(503) 496-1354
Part Works	Morgan Kennedy	(206) 632-8900
Familian Northwest	Dave Anderson	(425) 641-5700
Cole Industrial	Dale Moser	(425)-774-6602
Trane	Michael Woods	(425) 586-1624

O) PROVISION OF INSURANCE AND PERFORMANCE/PAYMENT BOND(S).

Quantum Engineering & Development, Inc. can provide all insurance in conformance to the State of Oregon General Conditions for Public Improvement Contracts, and the Supplemental General Conditions. We are compliant with all State of Oregon and CCB Insurance & Bonding Requirements. Upon request, we will provide Liability, E&O, Builders Risk and General insurance certificates at the levels required for this project. Our performance and payment bonding limits are flexible, but we have bonded past projects of \$4.5 million, and we typically have open bonds totaling ~ \$15 million at any time.

P) PROVISION OF WARRANTIES.

We work hard to get the maximum warranty available on equipment; this means 5 years on lighting ballasts, 3 to 5 years on lamps, 3 years on variable speed drives. We negotiate the longest guarantees affordable on all equipment. Most boilers and mechanical systems have a standard warranty of 1 year, as does subcontract labor.

Regardless of the longevity of the equipment warranty, Quantum will warrant all materials and workmanship for a period of at least one year from date of substantial completion. During this period, we are a “one stop shop” for all warranty issues. We ask that the Owner contact us, and we will respond immediately to make sure that systems are brought back into operation quickly and effectively.

If the Owner experiences equipment failure after the warranty period, Quantum will assist the Owner in obtaining effective service expeditiously. We have extensive industry contacts and relationships, and we will use these to assure that the Owner gets proper service. Should a major equipment failure occur early in the life of a piece of ESCO installed equipment, Quantum will work with vendors and suppliers to get the equipment replaced or repaired without cost to the Owner, whenever possible. We value our relationship with our clients, and we will do what it takes to support them and to keep the project successful in their eyes.

Q) SUSTAINABILITY.

We are committed to incorporating sustainable design concepts into our projects; building projects both to protect the environment and to exceed our clients' expectations of performance.

Quantum maintains stringent policies and procedures for recycling of lamps, ballasts, and major construction material. We also encourage recycling or re-use of any materials that have a component that can be of future use.

Materials where we require recycling or re-use:

1. *Lamps and Ballasts:* Quantum requires recycling of all fluorescent lamps and ballasts, as well as proper disposal of any hazardous materials associated with these items. In this recycling process, the re-useable materials (metals, glass, mercury) are scavenged and re-used to make new products, and the PCB materials are properly disposed of.
2. *Steel and other metals:* All metals that are removed from the job site are sent to a recycler to be melted down and re-used in new products.
3. *Any recyclable material that signifies a substantial amount of waste.* These materials include:
 - Ceiling tiles
 - Concrete
 - Wood
 - Bricks or other masonry
 - Gypsum wallboard
 - Rigid foam insulation
 - Asphalt shingles
 - Window Glass
 - Carpet & carpet pad
 - Plastic film
 - Polystyrene
 - HDPE
 - Cardboard, paper, packaging
 - Aluminum cans
 - Ethylene glycol
 - Oils and other lubricants

If any of the above materials constitute a significant quantity of waste on a project, Quantum will require recycling or re-use. The term "significant" typically means anything over ~ 50 lbs. of waste, and may depend upon the material being considered.