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January 14, 2011

Nancy Tinker, Director
Facilities Management & Planning
Eastern Connecticut State University
83 Windham Street
Willimantic, CT 06226

RE: ECSU – Library
Encelium Lighting System Upgrade

Dear Nancy:

Automated Building Systems, Inc. is pleased to quote you on the following proposal to furnish and install an Encelium BACnet Lighting Control System in the library building, as outlined below.

The Encelium BACnet Lighting Control System (LCS) is the only lighting control system that simultaneously employs six different strategies on a facility wide basis to realize maximum energy savings and documents the savings. These strategies work independently and are cumulative in their effect on overall building energy savings. The six strategies are:

- Task Tuning – Setting default (maximum) light levels to suit the particular task or use of a workspace in order to eliminate over lighting.
- Personal Control – Through the Personal Control Software, individuals can control (dim) the light levels in their workspace to suit their personal preferences from their desktop PC.
- Smart Time Scheduling – In areas of a building where occupancy control is not appropriate, time scheduled switching or dimming of lights can be employed for zones as small as a room or even individual light fixture.
- Occupancy Control – Through the use of occupancy sensors, lights are automatically turned on or off or dimmed based on occupancy detection.
- Daylight Harvesting – Through the use of photo sensors, light levels are automatically adjusted to take into account ambient natural sunlight. Appropriate light levels are maintained and artificial lighting is dimmed when necessary.
- Variable Load Shedding – The automatic reduction of electrical demand in a building by shedding lighting loads dynamically (through dimming or switching) either to shave peak demand or reduce energy consumption. Load shedding can be done selectively by lowest priority areas first.

With the ability to shed lighting load dynamically, the Encelium BACnet Lighting Control System can be used for energy peak shaving or demand response strategies.

The Encelium BACnet Lighting Control System will be integrated into the existing Alerton campus-wide Building Management System.

Scope of Work:

- **Perimeter Offices:** Lighting will be retrofitted with dimming ballasts, new lamps, and one I/O module per fixture. Lighting controls includes I/O module powered occupancy sensors for each room and strategically placed I/O module powered photo sensors for daylight harvesting where applicable (rooms w/windows). In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.
- **Non Perimeter Office:** Lighting will be retrofitted with dimming ballasts, new lamps, and one I/O module per fixture. Lighting controls includes I/O module powered occupancy sensors for each room. In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.
- **Open Offices:** Lighting will be retrofitted with dimming ballasts, new lamps, and one I/O module per fixture. Lighting controls includes strategically placed Zone controllers and an I/O module powered occupancy sensors. In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.
- **Open Offices w/ Windows:** Lighting will be retrofitted with dimming ballasts, new lamps, and one I/O module per fixture. Lighting controls includes strategically placed Zone controllers, I/O module powered occupancy sensors and I/O module powered photo sensors for daylight harvesting where applicable (areas w/windows). In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.
- **Hallways/Common Areas:** Lighting will be retrofitted with dimming ballasts, new lamps, and one I/O module per fixture. Fully configurable override switches (Zone Controllers in certain Areas) allow on/off control of any programmed system lighting and configurable timer control (for cleaning crews and weekend use). In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.
- **Conference Rooms:** Lighting will be retrofitted with dimming ballasts, new lamps, and individual I/O modules. Lighting controls include an I/O module powered occupancy sensor and scene controller. In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.
- **Conference Rooms w/ Windows:** Lighting will be retrofitted with dimming ballasts, new lamps, and one I/O module per fixture. Lighting controls includes I/O module powered occupancy sensors for each room and strategically placed I/O module powered photo sensors for daylight harvesting where applicable (rooms w/windows). In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.
- **Bathrooms:** Bathrooms will get one I/O module for switching control of a couple lights (optimized for I/O module electrical load capacity), or an I/O module and powerpack where load requires, and an I/O module powering a dual technology occupancy sensor(s).
- **Mechanical Rooms/Storage:** The larger rooms will receive powerpacked control of lights with I/O modules controlling logical groups of lights, and control being provided by local wall controllers. Where sensible, smaller areas/larger closets will be fitted with occupancy sensors for additional energy savings. In addition, control is possible from Encelium's Polaris facility management software and PCS/PCW end user software.

- **Software Control:** Encelium's Polaris software allows full access to control, monitor, and program the lighting control system. A sample of operations includes: setting time schedules, adjusting occupancy sensor timeouts, modify lighting zones (without touching wiring), view/modify light levels, generate reports on energy savings and occupancy patterns from any fixture/room/building/campus, set up and activate loadshedding, adding/deleting devices, and changing keypad programming. This software allows a significant number of different users with different access rights, and can be accessed via a website page. Encelium's PCW software allows for simple end user adjustments of local area lighting through the use of simple sliders. It also allows end users to save their scenes. Light levels and scenes are shared instantly with the Polaris software. This software is login regulated and is used via web browser. These software packages do NOT require recurring software license fees.
- **Installation:** The bid includes Encelium equipment installation, fixture removal and disposal (where appropriate), connection of communications wiring, dressing of wiring between fixtures and back to ECU's, creation of floorplan software from supplied electronic drawing files, installation of SSU and ECU's with connections made to the client's network. If connection is not possible, networking wire will be pulled between ECU's and SSU. Incidentals and all reasonable permit fees are covered within the bid costs. Details regarding site storage and staging areas to be agreed upon with client during contracting phase of project. Work to be Monday – Friday, with a final schedule to be reviewed and agreed upon by customer.

1		Encelium ECS Lighting Control System, including the following:	
7	ECU-102	Energy Control Unit V2 (ECU)	
7	SWL-600	ECS Software	
1	SSU-200	System Support Unit (SSU)	
1	GBDT-400	GreenBus Diagnostic Tool	
1	BIF-600	BACnet Interface	
1	ETH-700	Ethernet Switch, Rack, 16 Port	
1	PWR-700	Power Bar, Rack	
1	RCK-700	Mounting Rack, Wall, 4U	
50	T-CONN	T-Connectors (Qty. 25)	
2418	IOM-302	Universal Input/Output Module (IOM))	
		1898	I/O Module (fixtures)
		443	I/O Module (Occupancy Sensors)
		25	I/O Module (Photo Sensors)
		52	I/O Module (Power Packs)
8	DSC-500	Dimming Scene Controller (DSC) (including faceplate)	
360	GBC-400-05	GreenBus Cable (5 ft. length)	
1500	GBC-400-10	GreenBus Cable (10 ft. length)	
400	GBC-400-20	GreenBus Cable (20 ft. length)	
100	GBC-400-25	GreenBus Cable (25 ft. length)	
100	GBC-400-50	GreenBus Cable (50 ft. length)	
2	NWC-400-B	Network Cable (Cat. 5 - 1000 ft. box)	
25	PHS-700	Photo sensor	
50	WSD-PDT-LV	WSD-PDT-LV	
300	CM-PDT-9	Sensor - Ceiling Mount - Dual Tech.	

93	CM-PDT-10	Sensor - Ceiling Mount - Dual Tech. - Ext. Range
52	PP-20-3	Power Pack, 120/347, 1-Pole
INCL	ENG-901	Engineering/Commissioning/Training

Project Cost Summary	
System Components ⁽¹⁾ (Inclusive of all control hardware, dimming ballasts, lamp sockets, software, engineering, installation, disposals, and training)	\$709,818
Projected CL&P Rebate	\$283,000
Post Rebate Costs	\$424,890

Energy Savings Summary	
Existing Annual Consumption	2,112,931.00 kWh
Estimated Annual Consumption after system deployment	1,690,344.80 kWh
Estimated Annual Lighting Consumption Reduction	422,586.20 kWh (20%)
Estimated HVAC savings ⁽³⁾	184,881.46 kWh
Total Estimated Energy Savings	607,467.46 kWh
Total Estimated Annual Savings (Lighting and HVAC) ⁽²⁾⁽³⁾	\$109,344.14
Estimated Average Annual Maintenance Savings ⁽⁴⁾	\$4,580
Estimated Annual Savings (Energy and Maintenance)	\$113,924
Simple Payback from Annual Savings	3.7yrs

Notes:

- (1) Applicable taxes not included.
- (2) Assumes \$0.18/kWh electric costs.
- (3) Assumes daytime cooling of most spaces 75% of the year.
- (4) Maintenance savings based on reduced ballast replacements during the payback period of the project for the 290 new ballasts being installed. Assume 15% less ballast replacement for replaced ballasts (43/year). Labor and materials saving of \$60/ballast.

Our price to do the work, as outlined above, is **\$709,818.00**

The project has a simple payback of four years based on conservative estimates. Additional savings can be achieved by controlling the Mechanical System more efficiently, based on actual occupancy in individual zones. We also assume that there would be rebate money available for this project from Northeast Utilities, which would further reduce the payback. We will work with Northeast Utilities to obtain the maximum amount of rebate dollars available for you.

Thank you for the opportunity to submit the above proposal. Please do not hesitate to contact me if you should have any questions.

Thank you,

Gerald A. Chesley