Attachment A

Narrative – Bromfield and Hildreth School Complex energy analytics and retrocommissioning project

Purpose

The purpose of this retrocommissioning project is to analyze data from electrical circuit monitoring and then identify low-cost/ no-cost recommendations that school and staff can act on to improve energy performance in Harvard's school complex.

Benefits

The proposed benefits of this project includes uncovering energy waste from equipment that runs more than it should, capturing energy savings through straightforward operational changes such as updates to equipment schedules and controls, documenting these savings, and ensuring those savings persist over time.

Timeline

Work on the project will begin when Harvard receives DOER's 25% preliminary grant disbursement. Please refer to page 3 of Peregrine's proposal for specific details of the project deliverables. Phase I will include the hardware and software Installation that will begin 2-4 weeks after contract award. Phase II will include the preliminary site walk and report that will begin 2-4 weeks after the hardware and software is installed. The preliminary report will be completed no later than December 2015. Phase III will include 5 bi-monthly reports that will begin after Harvard reviews and approves the preliminary report.

Procurement required and status

Harvard will coordinate with the Town's purchasing agent to procure the services in the attached proposal consistent with the Town's procurement guidelines. Harvard intends to contract for services for energy conservation projects allowed under M.G.L c.25A section 14(a). The total project is less than $100,000 and Peregrine is a provider of energy conservation services authorized under c. 25A.

Anticipated impact, qualitatively and quantitatively

The proposed project will improve building energy performance information transparency and enable a broader review of building energy performance by the Town's energy stakeholders. The projects will also facilitate the tighter scheduling of building equipment and document the impact of these scheduling changes on energy use.

How the project supports the municipality's five year Energy Reduction Plan

The target energy savings from these projects is about 5% of the total energy use in the school buildings, or about 65,105 kWh and 4,823 therms per year. These projects will provide important contributions to the Town's 20% energy reduction plan.

Why grant funding is required to complete the project

Grant funding is required for this important energy project to supplement an already tight Town financial budget.

Identify any and all permits required and the status of each

The work does not require any permits or other local, state, or federal approvals.

Identify any other approvals required, e.g. local, state, federal, and the status of each

N/A

Opportunities for education and outreach and a concrete plan to accomplish them

The monitoring reports, which will include charts and graphs, will provide an excellent opportunity for the Town's Energy Committee to share the impact of the projects. Town officials will be able to clearly see how the energy efficiency measures recommended by the project change building energy use. In addition, our hope is that information gleaned from the energy monitoring reports will help to support future energy-related capital investments by the Town.

Provide a complete accounting/proposed budget for the project.

Please refer to the attached proposal from Peregrine Energy Group.

Other sources of funding, including any utility or Mass Clean Energy Center incentives

We propose to apply to National Grid's Pay for Performance energy efficiency incentive program.

Justification for any funds to be used for administrative costs

There are no resources within Town government dedicated to monitoring and reporting for these projects. Volunteers are helping to oversee the projects but dedicated resources that have access to Town employees and are able to complete reports in a timely manner are needed to meet the Green Community requirements.

Provide a description of the applicant and the project team

Applicant

The applicant for this proposal is the Harvard Energy Advisory Committee (HEAC), a committee appointed by the Board of Selectmen of the Town of Harvard to reduce energy usage in town buildings and chaired by Brian Smith. The members of the Energy Advisory Committee are all retired or active professionals with engineering backgrounds.

David Fay, a member of HEAC since its inception, will be overseeing the work carried out by Peregrine. He is an retired engineer with many years experience in data gathering and analysis in the telecommunications industry, most recently with Verizon Laboratories.

Dr. Fay will serve as a liaison between Peregrine and Mark Force, who is responsible for the operations and maintenance of the school complex, and Peter Jackson, of the Harvard Library Board of Directors, who serves a similar role for the Library.

Peregrine team

John Snell, Peregrine's Director of Analytical Services, will serve as the team lead. John works with a range of clients to develop and implement strategies for utility cost control through a series of technical support services, such as retro-commissioning, energy audits, program planning, renewable energy assessments, and strategies for financing. John also leads Peregrine's energy monitoring business. He is currently working with a range of Green Communities to implement monitoring projects and has conducted extensive monitoring and data analysis within affordable housing and municipal buildings. John has more than 25 years of experience working on municipal, state, and federal energy projects. Before joining

Peregrine, John spent 15 years at Citizens Conservation Corporation, an energy services company that used performance contracting for energy efficiency projects in multifamily housing. John currently chairs the Green Energy Technology Committee in his hometown of Lincoln, MA. He received a BA from Colorado College.

Kaj Huld will serve as the lead engineer. Kaj brings 20 years of engineering experience in the energy industry that includes mechanical upgrades and energy-reduction-focused projects at industrial, commercial, and institutional facilities. He offers in-depth engineering expertise and the practical knowledge needed to identify and resolve equipment and system problems. He has extensive experience interfacing with utility energy efficiency programs, and he has prepared large-campus, multiple-building energy assessments and provided project design and implementation support. He has been active in building commissioning, retro-commissioning, design reviews, construction management, and training, and he is well versed in mechanical and electrical systems, with a focus on building controls, HVAC systems, central plant, and industrial processes. Kaj holds a BS in Mechanical Engineering from the Rochester Institute of Technology.

PEREGRINE
ENERGY GROUP

March 18, 2015

Brian Smith
Chairman, Harvard Energy Advisory Committee
45 Candleberry Lane
Harvard, MA 01451

Dear Brian,

Enclosed is our updated proposal to provide retrocommissioning services for **Bromfield School, Hildreth Elementary School,** and **Harvard Public Library**. Those services include analyzing data from electrical circuit monitoring and building management system trend logs, and then providing specific recommendations for improving energy performance.

Our services are designed to uncover energy waste from equipment that runs more than it should, capture energy savings through straightforward operational changes, such as updates to equipment schedules and controls, document those savings, and ensure those savings persist over time.

The following pages detail our specific recommendations and pricing for electricity and building management system monitoring and data analysis. To maximize each building's energy performance, our proposal includes a full year of services.

If this proposal is acceptable, please sign it and return it to us.

Thank you for the opportunity to submit this proposal. Please don't hesitate to contact me with any questions at jsnell@peregrinegroup.com / 617.409.5230.

John Snell
Director, Analytical Services

Project proposal

We propose providing a combination of three services to help Harvard to improve its building energy performance: Detailed circuit-level electricity monitoring, building management system monitoring, and data analysis and reporting.

The combined services will enable a comprehensive understanding of how each building uses energy. From there we can provide specific recommendations for reducing energy use and improving building performance.

Circuit-level electricity monitoring

Circuit-level monitoring on targeted electrical panels can uncover precisely how much electricity individual circuits consume and exactly when lights, appliances, and major equipment turn on and off. We propose installing electrical circuit monitoring equipment in a total of 13 electric panels across the two schools and 2 electric panels at the library. The monitoring equipment will collect and monitor minute-to-minute electricity use data from these panels, three utility meters, one for each building, and the supply and return heating system temperatures in the Hildreth Elementary School, which can then be access via a password-protected Internet connection.

Our services include:

- Hiring and overseeing an electrician to install the monitoring equipment. Our quote includes the cost of the electrician.

- Provisioning the monitoring equipment, which means verifying that data is being read/transmitted correctly, and activating recorders, gateways, and sensors.

- Collecting and monitoring electricity use data from the monitoring equipment.

Please note: The monitoring requires a wireless Internet connection. Our services do not include installing the connection or ensuring communication across that connection.

Building management system monitoring

Building management systems record and store a wealth of data about building operation and about the performance of building equipment, such as heating, cooling, domestic hot water, and ventilation systems. We propose to collect and analyze control system data for up to 75 assets that the building management system controls across both the Bromfield School and Hildreth Elementary School, in concert with circuit-level electricity monitoring data, to generate a comprehensive understanding of building energy performance.

The version of the controls software installed at the Bromfield School that operates the building and the heating system at Hildreth Elementary School does not have a data archive feature. To access data collected by the Andover Controls system, we propose to install a BMS data analytics software system called Facility Connex.

The Harvard Public Library has a separate building management system. We do *not* propose to analyze data from this system because the circuit-level monitoring at the electrical panels will capture most of the equipment that the building management system equipment controls, while also capturing other sources of electricity consumption in the building.

Our services include:

- Installing and provisioning Facility Connex software on the school's BMS computer.

- Collecting and displaying historic data from the building management system.

- Providing real-time building management system data.

Data analysis and reporting

Data analysis and reporting are key to unlocking the value of any energy monitoring effort. Our data analysis focuses on uncovering energy waste from building equipment that runs more than it should. Our reports recommend specific operational changes to help you capture that energy waste and improve the energy performance of your buildings. Reports are written to be readable and useful to both energy experts and non-experts alike.

Our services include:

- Assessing building energy performance through a combination of on-site observations and analysis of the electrical panel monitoring data and building management system data.

- Mapping the connections from the main electrical meter to the primary sub-panels. We will use these maps for our monitoring effort and also provide them to the town for its records.

- Identifying energy waste from building equipment that runs more than it should.

- Providing recommendations for changes in building equipment operations to improve overall equipment energy performance.

Harvard will receive seven deliverables for each of the three buildings:

- A preliminary operations-based site walk and BMS assessment report by our senior retrocommissioning engineer. The report will include observations from and a log of BMS questions or equipment deficiencies identified during the assessment. In addition the report will include energy cost savings estimates for operations-related low cost measures and adjustments that we identify.

- One baseline report: Based on our initial analysis, we will prepare one concise baseline building performance report that establishes the top three energy performance priorities for each building and provides our top three specific recommendations for building and equipment operational changes. The content of this baseline report will then serve as the framework for monitoring and energy performance improvements over the course of the one-year engagement.

- Five bi-monthly update reports: Following the baseline report, we will provide bi-monthly update reports. To facilitate the data analysis required for these subsequent reports, we will download updated BMS and circuit-level electricity monitoring data regularly and add the new information to our database. We will then use this data to measure the impact of operational or other changes Harvard has made to the facilities and to identify any new issues that may arise around building performance.

In addition, we will provide all supporting documentation for Harvard to apply for MA DOER's Green Community Grant Program and National Grid's Pay-for-Performance incentive program.

Pricing

Total project cost is **$83,981**. The cost breakdown for the two schools (combined) and the Harvard Public Library is:

	Bromfield School and Hildreth Elementary School	Harvard Public Library
1. Circuit-level electricity monitoring & equipment (equipment list attached)	$23,717	$6,527
2. Building management system monitoring	$9,020	$0
3. Data analysis & reporting	$19,586	$5,131
4. Software and equipment repair allowance	$20,000	
Total	**$72,323**	**$11,658**

We propose a target energy savings from this project for these three buildings of **approximately 5% of the FY 2013 total annual electricity and gas consumption, or approximately $17,200 per year**.

In addition, Harvard can apply for utility incentive assistance through National Grid's Pay for Performance retrocommissioning program. Current incentives for this program are now $.12 per kWh and $1.20 per therm for documented energy savings. With a total 5% target energy consumption savings of 74,700 kWh and 5,400 therms, **Harvard could qualify for up to $15,444 incentive under this program.**

Conditions

1. Pricing is valid for 30 days from the date of the proposal.

2. Electrical panel monitoring equipment warranty will be provided by equipment manufacturer. Peregrine is not responsible for servicing the monitoring equipment.

3. Proprietary software associated with PowerHouse Dynamic's SiteSage system is made available to the Town under a license agreement. Proprietary software used by Peregrine Energy Group to analyze the circuit level and building management data remains the property of Peregrine Energy Group.

4. A down payment of 50% of the total equipment and installation cost will be required prior to installation. Equipment and installation costs are as follows:

Both schools	$23,717
Harvard Public Library	$6,527
Total equipment cost	**$30,244**
X	.5
Amount due prior to installation:	**$15,122**

5. The two year license service begins the day the electrical circuit monitoring equipment begins transmitting data and ends that same calendar day two years later.

6. The town is responsible for ensuring the availability of a functioning Internet connection prior to the
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nstallation so that we can set up data transfer.

7. Building management system data collection will require Internet access to the BMS controller computer and 443 Outbound traffic allowed.

8. Safe installation of the monitoring equipment may require shutting down the electrical panel briefly. The final number of circuits that are monitored may vary slightly depending on the electrician's professional assessment of the condition, size, and layout of the wiring in the electrical panels.

Paul W. Gromer
CEO

Accepted: _____

Date: _____

Appendix – Circuit-level electricity monitoring equipment list

Following are the electric monitoring equipment components that we propose to install. We use monitoring equipment supplied by Powerhouse Dynamics under the label SiteSage. More information about the equipment is available on its website at: http://powerhousedynamics.com/about-sitesage/features1/. The Town would own the equipment it purchases. Powerhouse Dynamic licenses the software required to see the real-time data reports it posts online and requires a prepaid 2-year license agreement, the cost of which is included in the proposal. The Town would be able to renew its license after 2 years or collect the data directly from the equipment with authorization from the Powerhouse Dynamics.

Bromfield High School and Hildreth Elementary and Middle School combined

For selected circuits in electrical panels HDL1, HLP, HPM1, LPM1, PPM2, SWBD1, SBLP, SBKP Sec 1, and SBKP Sec 2 in Bromfield and electrical panels Main, EP1A, EP1B, EL1A, EL1B, and EPM in Hildreth:

- 3 42-channel electric panel recorder monitors with CTs
- 5 15-channel electric panel recorder monitors without CTs
- 7 xpods
- 10 6-packs of 150-amp CTS
- 7 10-packs of 20-amp CTs
- 4 gateway communication modules
- 2 temperature sensors (1-wire)
- 2 CO_2/RF/Temperature sensors and sPods (1-wire)
- 1 Basic monitoring license and expansion licenses for up to 315 circuits per building

Harvard Public Library

For selected circuits in electrical panels MP1 and PP1:

- 42-channel electric panel recorder monitors
- 1 10-pack of 50-amp CTs
- 1 gateway communication modules
- 2 temperature sensors (1-wire)
- 1 CO_2/RF/Temperature sensor and sPod (1-wire)
- 1 Basic monitoring license and expansion license for up to 90 circuits per building

FacilityConneX

Powered by GE Proficy™

Continuous Monitoring and Detection in the Cloud Anytime, Anywhere

Real-Time Operational Intelligence

Key Benefits

- ☐ Information Anytime, Anywhere
- ☐ Continuously Monitor and Detect
- ☐ Reduce Time to Resolution with Notify Now
- ☐ Enhanced Decision Making through Collaboration with Notes and Tasks
- ☐ Let the System Tell You with Detect and Know
- ☐ Increase Operational Efficiency
- ☐ Increased Productivity
- ☐ Be ahead of the Game with Cloud Based Proactive Information
- ☐ No Hardware or Maintenance Costs
- ☐ Lowest Total Cost of Ownership

FacilityConneX

Powered by GE Proficy software, the first advanced operational intelligence based system designed for Continuous Monitoring and Detection. Know the status of your assets 24 hours a day, anywhere you are. While Building Management Systems (BMS) and SCADA's bring system and site level monitoring and basic detection, FacilityConneX is an Enterprise Level intelligent monitoring and knowledge action system designed to bring smart asset monitoring, advanced predictive intelligence, continuous energy management and savings; all available in a hosted Cloud environment.

Continuous Monitoring in the Cloud

The first step in improving operational efficiency is to get the right information Anytime, Anywhere. No more guessing, Smart Assets TELL you what is happening continuously. You need a system that filters the disparate data everywhere into critical information in a single concise view. This is all done in the cloud requiring no additional administration, configuration, and hardware costs.

Going Mobile is Better in the Cloud!

Going Mobile is better in the cloud. Not only are you connected anytime, anywhere – you are working in a mobile application that was made for the Industrial Internet and designed for the needs of the Operator and Maintenance personnel. Tailored to combine Performance, Alarming, Collaboration, and Predictive Analytics across your fleet providing real-time access to all your critical information via Browsers, Tablets, and Smart Phones.

Increase Productivity without Increasing Total Cost Ownership

Companies today watch the bottom line closer than ever before. Internal IT costs are constantly under pressure to reduce. Administration, hardware, and labor costs on systems that require training, maintenance, and configuration increases your total costs of ownership (TCO).

FacilityConneX dramatically brings TCO down by providing the system resources and system experts to drive your costs down without compromising reliability, security, or data privacy.

FCX

Structured Navigation

Using the power of Proficy navigation models, users can find the information they need quickly and easily. Once information is mapped into the equipment model, you then can add intelligence through easy to use modeling tools. These tools can outline relationships and connections to multiple disperse systems of information. The structured navigation features also give you the ability to analyze your existing SCADA alarms, Historian data or 3rd party sources, allowing you to add the necessary context to your existing data, no matter the source; One source of the truth. The built-in intelligence capability captures your key process indicators and equipment relationships forming plant wide and asset level detailed displays.

Asset and Process Key Performance Indicators (KPI)

Assets and processes are tracked using key performance indicators. These indicators allow users to be notified of information and alerts conditions and trends that may be occurring. GE Proficy, the power behind FacilityConneX, tracks and trends all key performance indicators from SCADA and other systems, and provides operators with the tools to view current, historical and predictive information.

Coupled with Patented GEO-Intelligence

GEO-intelligence technology enables the system to intelligently provide information to the user based on their location, role, and asset location. This technology uses situational awareness technology that combines criticality of situation with location and proximity to ensure that the user has the information they need, saving time and cost.

What is Smart Asset Monitoring?

Smart Monitoring is the next generation connection and visualization technology designed to take the machine level state and data, and transform it into human consumable operational information anywhere, anytime. No more guessing at what is wrong with your equipment; let the Assets tell you what they need!

Can You Resolve Issues Fast? Advanced Notification

Aggregated asset and fleet health displays intelligently alert the user to a current or predictive condition drawing attention to the most critical information. With advanced notifications and recommended condition-based actions, the operator reacts to alarms with state and severity as a leading indicator of a process or equipment in trouble. Notify Now takes to your action.

Can You Predict Failure? Advanced Predictive Intelligence

Temperature trending up? Is that related to the increase in Water Pressure? Is this a problem? Is this a crisis? Humans cannot predict failure, but your assets have the data and can tell you if they are trending out of control and if they are starting to fail. Let your assets intelligently tell the operators what is required to keep them running, what issues are occurring, and how to change a failure trend. Identifying and preventing failures will not only save money against your machine and output efficiency; it will limit unnecessary preventive maintenance costs and save on energy.

Features

Anytime, Anywhere

- ☐ Real Time Access to Key Data
- ☐ Equipment Health
- ☐ Collaboration of Information with Notes
- ☐ Patented Geo-Intelligence Technology
- ☐ Easy Web and Mobile Visualization

Notify Now

- ☐ Notifications to Alert Personnel
- ☐ Centralized Alarm Viewing
- ☐ Alarm Acknowledgement and Shelving
- ☐ Recommended Condition-Based Actions (SOPs)

Detect and Know

- ☐ Continuous Asset Optimization
- ☐ Equipment Risk Detection
- ☐ Top Offenders and Findings
- ☐ Probable Root Cause
- ☐ Fleet Analysis and Predictive Detection

Cloud Environment

- ☐ Connections to 100s of Data Sources
- ☐ Secure Information Access
- ☐ True Multi-Tenant Architecture

Secure the Solution

The Proficy Agent secures the data collection from the source to the server. This in conjunction with the advanced security elements of GE Proficy and FacilityConneX, help ensure secure access from data source to device. Each data source and device connection utilizes state of the art encryption, digital certification, and user authentication to help ensure secure access. This level of security enables the solution to be deployed within a company's intranet (control or business network) or be hosted on the internet for access without the need of a VPN.

Integrated with YOUR Systems

Leveraging the flexibility of Proficy iFIX WebSpace and CIMPLICITY GlobalView, operators can go from their Proficy Mobile displays to Proficy HMI/SCADA screens with a single click, enabling them to not only see the KPI and health indicators, but also access the control capabilities of their HMI/SCADA system when required.

Connects with all Types of Data Sources

Integrates seamlessly with over 200+ Protocols and Data Sources. FacilityConneX can connect to PLC's, SCADA Systems, Historians, BMS and DCS Systems. Whether you are bringing industrial data and alarms, FacilityConneX connects you with your equipment, systems, and databases forming your data into operational intelligence ready to go to action!

For more info, please visit:

www.FacilityConneX.com
www.GE-IP.com
www.AutomaTech.com

Contact us directly at:

(508) 830-0088 Ext. 408
FCXSales@automatech.com

Cloud is the Difference

Moving to the cloud for your industrial application access is secure and easy. FacilityConneX provides all your industrial needs with the financial and costs benefits of the cloud. On-Premise considerations that disappear with the Cloud:
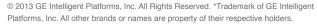
- How to get to Isolated Data from Disperse Locations
- Application and Database Maintenance in the form of updates, performance, and recovery
- Self-service creation and management of user accounts and role based information
- Server Hardware capital costs can be expensive and requires upfront investment
- Application, software, and IT expertise
- Securing your On-Premise environment from hackers

Hybrid Solution is an Option

Some companies still require sensitive information and process data to remain on-site. Although FacilityConneX offers complete secure data hosted options across multiple years, the cloud solution is flexible enough to provide hybrid solutions as well. You can keep your data locally and still let FacilityConneX handle your application.

We provide the right people with the right information, limiting access to only what those users are allowed to see, while accessing only the data you want exposed. FacilityConneX Hybrid Cloud Offering is encrypted, secure, and cost effective allowing you the freedom of the Cloud, while keeping your sensitive data close to home.
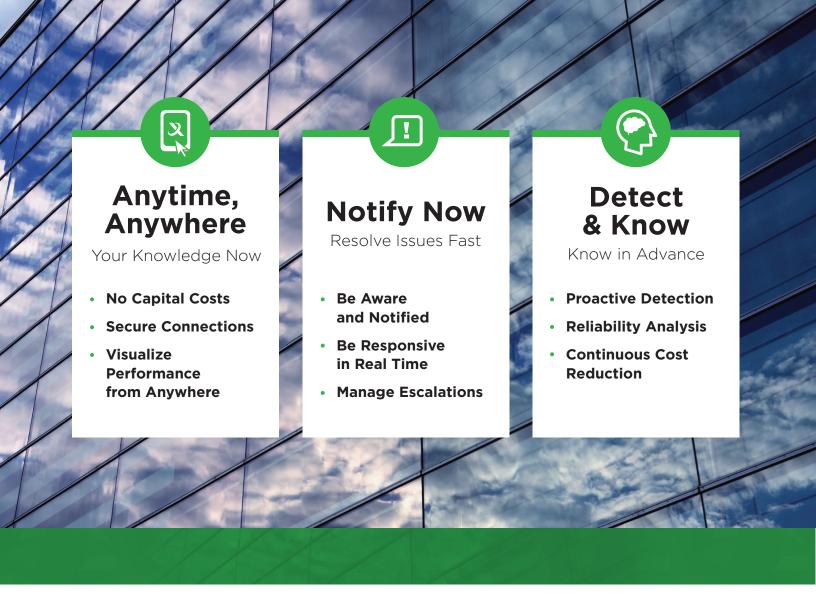
Anytime, Anywhere

Your Knowledge Now

- **No Capital Costs**
- **Secure Connections**
- **Visualize Performance from Anywhere**

Notify Now

Resolve Issues Fast

- **Be Aware and Notified**
- **Be Responsive in Real Time**
- **Manage Escalations**

Detect & Know

Know in Advance

- **Proactive Detection**
- **Reliability Analysis**
- **Continuous Cost Reduction**

FacilityConneX

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