



ACTON PUBLIC SCHOOLS ♦ ACTON-BOXBOROUGH REGIONAL SCHOOL DISTRICT

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GREEN COMMUNITY GRANT FINAL REPORT

Date of Final Report Submission: July 12, 2016

Name and Title of Person Submitting Final Report: Kate Crosby, Energy Manager, ABRSD

- I. **Descriptive narrative:** The Acton-Boxborough Regional School District (ABRSD) managed and implemented six energy efficiency projects that were awarded Green Communities grant funding in July, 2015. All projects were managed by JD Head, Director of Facilities & Transportation, and Kate Crosby, Energy Manager. Kate Crosby carried responsibility for day to day administration of the projects. All other aspects of the projects were managed flexibly as needed. The six projects were as follows:

a. **1. Interior LED Lighting (Acton-Boxborough Regional High School pool)**

- i. Description: Inefficient metal halide lighting fixtures in pool area at the high school were replaced with high-efficiency LED lighting.
- ii. Timeline:

July, 2015	Green Communities grant funding awarded
December, 2015	Removal of existing fixtures & installation of LED fixtures --> work complete

- iii. Cost:

\$52,617.54	Green Communities grant funding
\$47,292.85	Utility incentives
\$99,910.39	TOTAL COST

- iv. Procurement: Project procured under M.G.L. Chapter 25A, Section 14.

b. 2. Interior LED Lighting (RJ Grey Junior High School)

i. Description: 487 inefficient fluorescent lighting fixtures in classrooms at RJ Grey Junior High School were replaced with high-efficiency LED lighting.

ii. Timeline:

July, 2015	Green Communities grant funding awarded
November, 2015	Removal of existing fixtures & installation of most LED fixtures
February, 2016	Remaining fixtures installed --> work complete

iii. Cost:

\$58,328.06	Green Communities grant funding
\$41,395.00	Utility incentives
\$99,723.06	TOTAL COST

iv. Procurement: Project procured under M.G.L. Chapter 25A, Section 14.

c. **3. Interior LED Lighting (Parker Damon Building)**

i. Description: 281 inefficient U-lamp fluorescent lighting fixtures in the Parker Damon Building were replaced with high-efficiency LED lighting.

ii. Timeline:

July, 2015	Green Communities grant funding awarded
November, 2015	Removal of existing fixtures & installation of LED fixtures --> light output exceeds nat'l IES standards --> too bright
December, 2015	20 sample replacement fixtures swapped in --> light output falls below national IES standards --> too dim
January, 2016	20 sample replacement fixtures adjusted to correct light output levels
February, 2016	Additional replacement fixtures swapped in (adjusted while installation underway to address inadequate light output)
April, 2016	8 additional replacement fixtures swapped in --> light output falls below national IES standards --> too dim. Crew returns, fixtures adjusted.
May, 2016	4 additional replacement fixtures swapped in --> work complete

iii. Cost:

\$34,382.35	Green Communities grant funding
\$23,885.00	Utility incentives
\$58,267.35	TOTAL COST

iv. Procurement: Project procured under M.G.L. Chapter 25A, Section 14.

d. **4. HVAC Efficiency Upgrades (Parker Damon Building)**

i. Description: Demand Control Ventilation and other efficiency measures were integrated into building management at the Parker Damon Building

ii. Timeline:

July, 2015	Green Communities grant funding awarded
Jan-May, 2016	Installation and programming of CO2 Demand Control Ventilation, other bldng mgt efficiency measures --> work complete

iii. Cost:

\$37,763.00	Green Communities grant funding
\$18,706.00	Utility incentives
\$56,469.00	TOTAL COST

iv. Procurement: Project procured under M.G.L. Chapter 25A, Section 14.

e. **5. MDF Closet Efficiency Upgrades (MDF Closet at Acton-Boxborough Regional High School)**

i. Description: Inefficient units managing temperature and humidity for the MDF server closet at Acton-Boxborough Regional High School were replaced with a high-efficiency ductless mini-split unit.

ii. Timeline:

July, 2015	Green Communities grant funding awarded
April, 2016	Installation of ductless minisplit in server closet --> work complete

iii. Cost:

\$8,028.00	Green Communities grant funding
\$8,028.00	Utility incentives
\$16,056.00	TOTAL COST

iv. Procurement: Project procured under M.G.L. Chapter 25A, Section 14.

f. **6. WiFi Thermostats (RJ Grey Junior High School, Douglas Elementary School, Conant Elementary School)**

i. Description: Eight thermostats in modular units (electric heat during heating season, AC during cooling season) were replaced with wifi thermostats to allow for tighter control of set points and occupied/unoccupied/holiday schedules.

ii. Timeline:

July, 2015	Green Communities grant funding awarded
Feb, 2016	Installation of wifi thermostats
March-May, 2016	Troubleshooting at 2 of 8 locations --> resolution of issues

iii. Cost:

\$4,124.51	Green Communities grant funding
\$4,523.00	Utility incentives
\$397.49	ABRSD operating budget
\$9,045.00	TOTAL COST

iv. Procurement: Project procured under M.G.L. Chapter 25A, Section 14.

II. **Narrative re: public involvement & support, lessons learned, other energy-related activities in the community:**

Lessons learned

ABRSD encountered significant challenges over the course of the major LED lighting projects undertaken. Based on this experience, we recommend the following for school districts undertaking LED retrofits:

- We recommend that school districts require vendors to assess and report light levels after installing LED fixtures to ascertain that light output falls within IES national standards for K-12 schools.
- We recommend that school districts require vendors to install sample fixtures before major retrofits so that color temperature (Kelvin scale) may be assessed for desirability.
- We recommend that school districts strive to schedule LED retrofits during summer vacation weeks if possible, in order to ease adjustment to the new lighting by faculty and staff.
- We recommend that the Green Communities program consider adjusting the calendar of the grant award cycle, as the July announcement of awards makes it extremely challenging for school districts to initiate and complete projects during the summer vacation weeks.

Additional detail is offered below, as it may be of value for other school districts undertaking LED lighting retrofits.

The largest challenges occurred at the **Parker Damon Building** (which houses two elementary schools). The project comprised installing 281 LED fixtures in place of U-lamp fluorescent fixtures located in several classrooms, several offices, the library and the faculty lounge. Due to the timing of the grant cycle (with grant awards not announced until early July), work could not be scheduled for the summer vacation weeks, and instead had to be scheduled while the school year was underway (during second shift on weekday evenings).

After the 281 new LED fixtures were installed over two evenings in November, ABRSD faculty and staff identified that the light output was significantly *too bright* and *exceeded* IES national standards for K-12 spaces, causing discomfort and alarm among Parker Damon Building occupants. ABRSD immediately communicated this problem to the vendor, who had not checked light levels as spaces were completed. Had the vendor done so, they would have easily identified the error as the installation began and could have paused the project rather than replacing all 281 fixtures.

The process of resolving this error was convoluted, and very frustrating and time-consuming for facilities staff and for Parker Damon Building occupants. The steps that followed in brief:

- December 2015: twenty replacement LED fixtures were ordered and installed, but these fixtures proved to be *too dim*, with light levels *below* IES national standards.
- February 2016: replacement LED fixtures were installed with correct light levels in most areas - one space with twelve fixtures not completed due to insufficient fixtures on hand.
- April 2016: eight replacement LED fixtures installed in the remaining space – but these once again proved to be *too dim*, with light levels *below* IES national standards – error identified by ABRSD staff & communicated to vendor. Light output corrected the following day.
- May 2016: final four replacement LED fixtures installed in the remaining space – project complete.

At **RJ Grey JHS**, LED fixtures were installed in place of fluorescent fixtures in nearly all classrooms (total of 487 fixtures). The light output was within range for IES national standards for K-12 schools (a welcome outcome given the frustrating situation in the Parker Damon Building). The new fixtures included a relatively minor color shift (4100 Kelvin for new fixtures vs. 3500 Kelvin for the existing fluorescent fixtures), but this shift was enough to unsettle faculty members, with many complaints received by facilities staff. The unease was exacerbated by the fact that the installation was scheduled while the school year was underway – had the project proceeded during summer vacation, the change in lighting would have been far less noticeable. Within two weeks, faculty appeared to have adjusted sufficiently to the new lighting, and no further complaints were received.

At the **high school pool**, the LED lighting retrofit was a wonderful success. The quality and quantity of the lighting in the pool area were both dramatically improved, garnering much praise from those using the pool area. In addition, the LED fixtures improved the light level in the actual pool itself, improving the ability to monitor the pool for safety. The LED fixtures also eliminated the re-strike issue associated with the previous metal halide fixtures. These notable gains were accomplished while also significantly reducing electricity consumption.

Other energy-related activities

- ABRSD has committed to purchase 80% renewable energy as part of the new 3-year electricity supplier contract
- ABRSD is pursuing agreements with a solar developer for the purchase of net metering credits, with support via a DOER META grant

- ABRSD was recently awarded a DOER grant for purchase of electric school bus and charging station
- Energy conservation programming continues district-wide, with a statewide award to Gates Elementary School as the Massachusetts Junior School of the Year from NEED (National Energy Education Development Project).

Public involvement & support

Information about these energy efficiency projects has been shared with the public through the Green Advisory Board, the School Committee, across the K-12 school network, and through Green Acton.

- III. **Photos:** Photos are included in zip file labeled “Acton.ABRSD.Photos.zip”.
- IV. **Invoices:** Invoices are included in zip file labeled “Acton.ABRSD.Invoices.zip”.
- V. **Documentation of funds expended:** Scans of checks documenting expended funds are included in zip file labeled “Acton.ABRSD.Funds expended.zip”.
- VI. **Grant Application Table:** Jane Pfister reviewed information about schools projects submitted in a January, 2016 quarterly report, and she returned an updated Grant Application Table at that time. That table contains complete and current information on the six schools projects – there have been no further revisions of information about the schools projects since that time.
- VII. **Contact person:**

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