

Lower Merion Township

Energy Savings Project

Phase 1
Data Analysis

Data Mining and
Utility Usage
Baseline

PHASE 2
Engineering
and Design

Engineering and
Design Workshop
Process

Project
Priority

PHASE 3
Construction
Preparation

Construction
Preparation
Process



ESG Project Team

Mark Winters
Mechanical
Design

- P.E. PA, NY, MD
- CEM
- AEE member
- ASES member

Frank Fazlone
TPD Inc.
Roadway
Lighting

- P.E. PA, Del
- PSPE member

Jim Anderson
Construction
Manager

- AEE member
- ASHE member

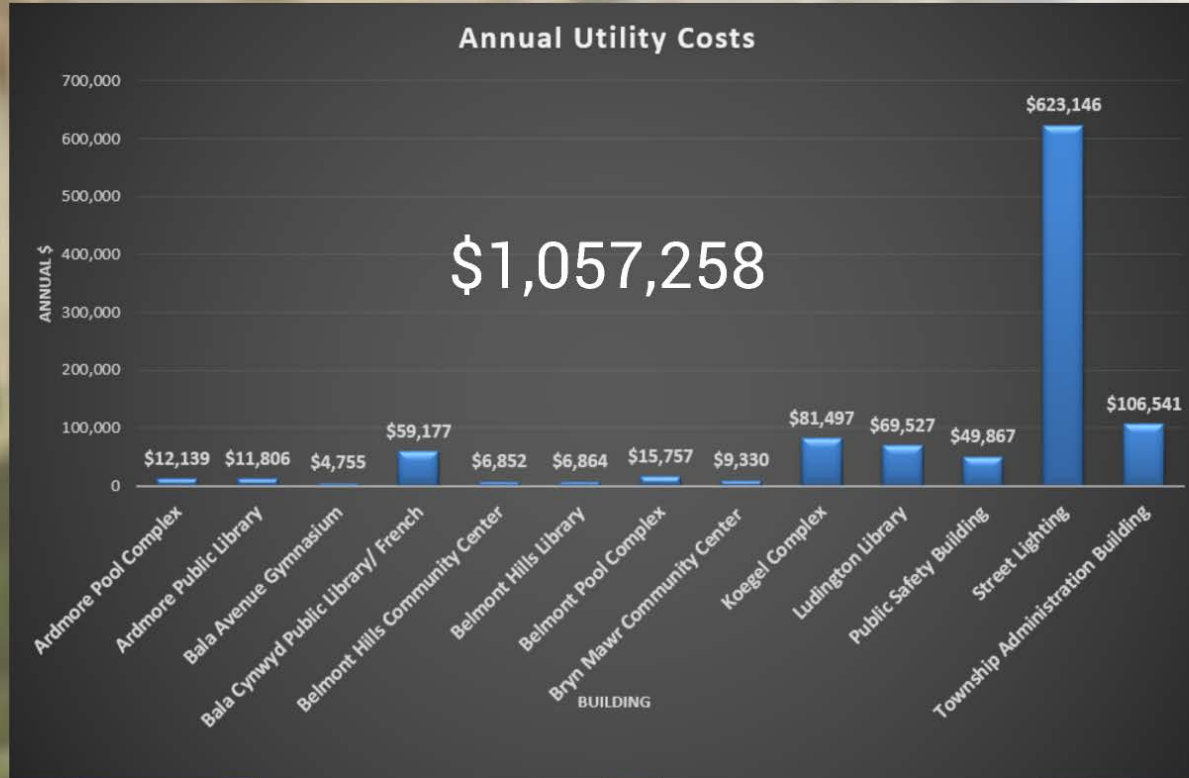
John Schmid
Project
Design Lead

- LEED AP
- CEM
- AEE member
- ASHRE member

Mike Bayesa
Project
Lead

- LEED AP
- CEM
- CSDP
- AEE member

Energy Usage Baseline



Buildings - 41%

Street Lighting - 59%

RFP Focus

Streetlights

- Roadway Lighting
- Ornamental Roadway Lighting
- Parking lot Lighting

RFP Focus

Buildings

- Belmont Hills Community Center
- Koegel Complex
- Ardmore Ave Pool Complex
- Belmont Hills Pool Complex
- Bala Ave Gym
- Public Safety
- Township Admin
- Ardmore Library

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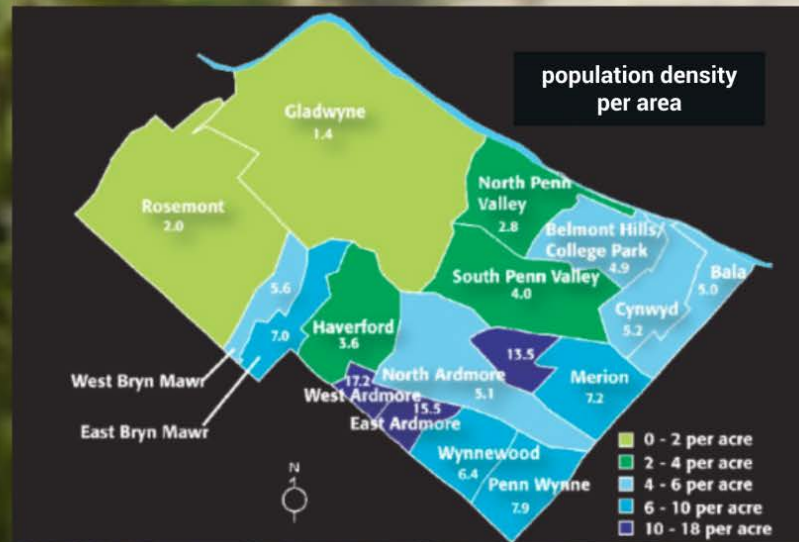
Project
Priority

PHASE 3
Construction
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Construction
Preparation
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Engineering and Design



Current
Inventory

Workshop and
Design Process

Detailed
Equipment and
System Audits

Workshop and
Design Process

Current Inventory



Cobra Head
Bill - 4046
Audit - 3,957

- Throughout LMT
- Mercury Vapor
- Sodium Vapor
- Metal Halide
- LED
- New Fixture



4 Sided Colonial
Bill - 854
Audit- 811

- Throughout LMT
- Mix of GE & Cooper
- Metal Halide
- Various Wattage's
- New Fixture



Center City Fixture
Bill - Acorn
Audit - 81

- Bala Ave
- City Ave
- Spring City fixture
- High Press Sodium
- Metal Halide
- New Fixture



Borough Fixture
Bill - Acorn
Audit - 3

- Meadow Edge Lane
- Spring City fixture
- High Press Sodium
- Metal Halide
- Re-lamp



Manchester Fixture
Bill - Acorn
Audit - 78

- Rittenhouse Ave
- Lancaster Ave area
- Spring City fixture
- Metal Halide
- Various Wattage's
- New Fixture

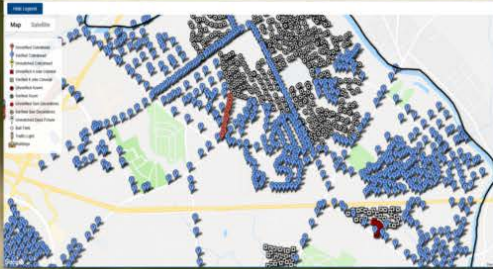


William and Mary
Bill - Acorn
Audit - 7

- Bryn Mawr Ave
- Spring City fixture
- Mercury Vapor
- Re-lamp

PECO bill labels all Decorative fixtures as Acorn Bill total - 168, Audit total 169

Workshop and Design Process



Raw Audit/Data Scrub

Prescriptive Design

Final Design

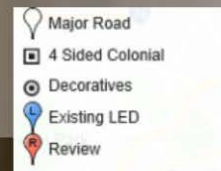
Workshop Staging Flow

- Raw Audit
- Roadway/Fixture
- Finals Design
- Construction
- Data Scrub #1, #2, #3
- Prescriptive Design
- ECM Development
- M & V
- Pilot Program

Fixture Data
system



Roadway
Selection



Photometric Analysis

Workshop and Design Process



Raw Audit/Data Scrub



Prescriptive Design

Final Design

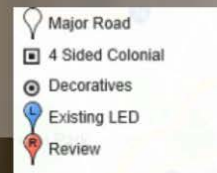
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- Pilot Program

Fixture Data system



Roadway Selection



Photometric Analysis

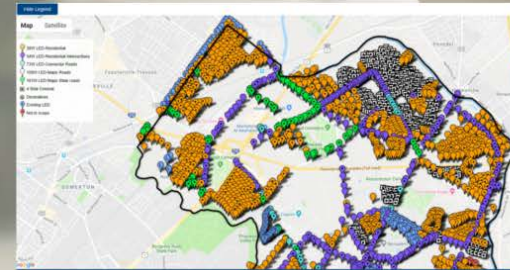
Workshop and Design Process



Raw Audit/Data Scrub



Prescriptive Design



Final Design

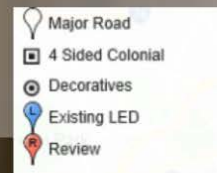
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Fixture Data system



Roadway Selection



Photometric Analysis

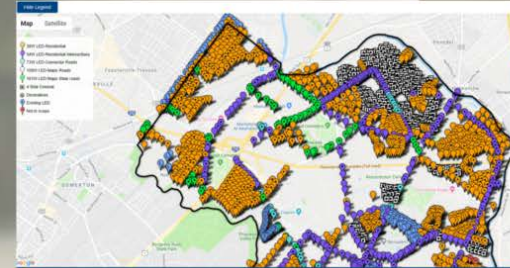
Workshop and Design Process



Raw Audit/Data Scrub



Prescriptive Design



Final Design



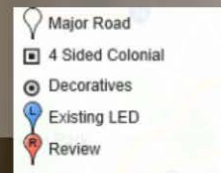
Fixture Data system

Workshop Staging Flow

- Raw Audit
- Roadway/Fixture
- Finals Design
- Construction
- Data Scrub #1, #2, #3
- Prescriptive Design
- ECM Development
- M & V
- Pilot Program



Roadway Selection



Photometric Analysis

Workshop and Design Process



Raw Audit/Data Scrub



Prescriptive Design



Final Design

Unique ID: 36761001 Pole ID: 20332

Pole: Fixture: ID:

Fixture: Cobrahead - Watts:100 - Lamp: MH
 Recommended Fixture: Cobrahead-3000L-III
 Road Type: Residential Road 2
 Road Width: 27
 Pole Location: Intersection
 Address: 1588 Briar Hill Rd, Gladwyne, PA 19035, USA

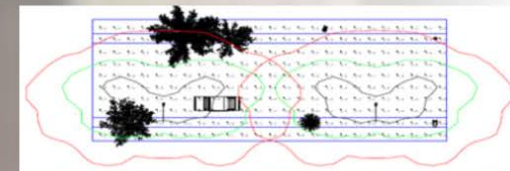
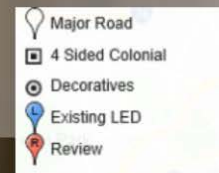
Fixture Data system

Workshop Staging Flow

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Roadway Selection



Photometric Analysis

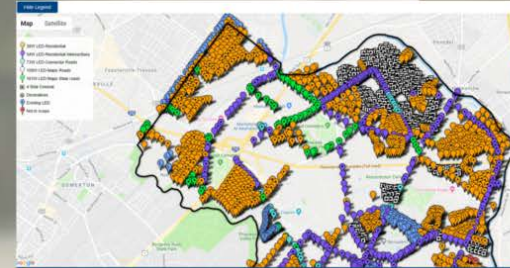
Workshop and Design Process



Raw Audit/Data Scrub



Prescriptive Design



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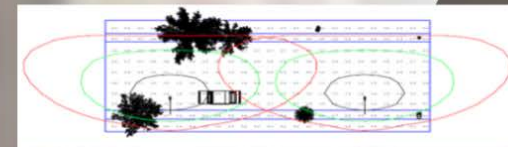
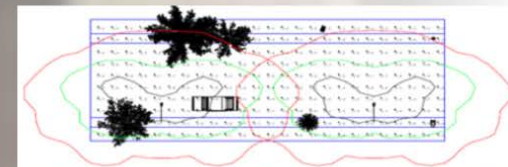
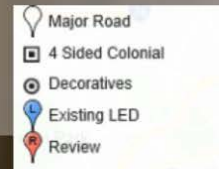
Fixture Data system

Workshop Staging Flow

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Roadway Selection



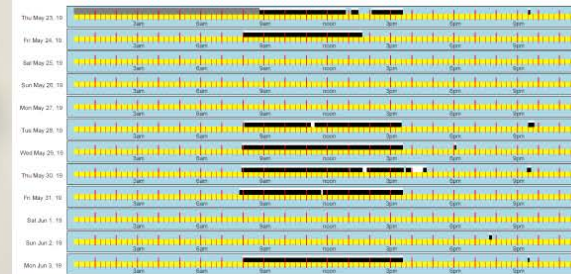
Photometric Analysis

Detailed Equipment and System Audits

Room Info			Existing Fixture Info							Lighting Fixture Upgrades					Lighting Upgrade Savings	
Floor	Dwg. Key	Location	No. of Fix.	Fixture Type	Input kW /Fix.	Total kW	Annual Oper. Hours	Annual kWh	ECM No.	Upgrade Description	Upgrade kW /Fix.	Total kW	Annual kWh	kWh Saved	Upgrade Savings	
Ground Floor		Vestibule	4	Sconce-PL42	0.048	0.192	3276	629	I45	(1) 11.5w Vertical LED 4-Pin PL B	0.012	0.046	151	0.146	478	
Ground Floor		Stairwell	2	1x8-2F032-W	0.058	0.116	3276	380	T8L22	(2) 10.5w 4' T8 LED B	0.021	0.042	138	0.074	242	
Ground Floor		Library	147	1x8-3FP21-Skt	0.079	11.613	3276	38044	5RE11	40w 1x8 LED Strip Retro Kit	0.040	5.880	19263	5.733	18781	
Ground Floor			16	1x4-1FP28-Skt	0.032	0.512	3276	1677	3RE16	20w 1x4 LED Strip Retro Kit	0.020	0.320	1048	0.192	629	
Ground Floor			20	H88-PL42	0.048	0.960	3276	3145	I42	(1) 10.5w Horizontal LED 4-Pin PL B	0.011	0.210	688	0.750	2457	
Ground Floor			12	H8-LEDPL12	0.012	0.144	3276	472	-	No Upgrade	0.012	0.144	472	0.000	0	
Ground Floor			19	1x8-3LED1275-Skt	0.036	0.684	3276	2241	-	No Upgrade	0.036	0.684	2241	0.000	0	
Ground Floor			2	1x4-1LED1375-Skt	0.013	0.026	3276	85	-	No Upgrade	0.013	0.026	85	0.000	0	
Ground Floor		Young Adult	12	1x8-3FP21-Skt	0.079	0.948	3276	3100	5RE11	40w 1x8 LED Strip Retro Kit	0.040	0.480	1572	0.468	1533	
Ground Floor			3	1x4-1FP28-Skt	0.032	0.096	3276	314	3RE16	20w 1x4 LED Strip Retro Kit	0.020	0.060	197	0.036	118	
Ground Floor		Mechanical (Locked)	1	1x4-2F032-IH	0.058	0.058	500	29	T4L22	(2) 10.5w 4' T8 LED B	0.021	0.021	11	0.037	19	
Ground Floor		Mechanical (Locked)	4	1x4-2F032-IH	0.058	0.232	500	116	T4L22	(2) 10.5w 4' T8 LED B	0.021	0.084	42	0.148	74	
Ground Floor		Conference Room	2	2x4-3FP28-Vol (In/O)	0.095	0.190	2500	475	TRE37	40w 2x4 LED Troffer Retro Kit	0.040	0.080	200	0.110	275	
Ground Floor			6	H88-PL42	0.048	0.288	2500	720	I42	(1) 10.5w Horizontal LED 4-Pin PL B	0.011	0.063	156	0.225	563	
Ground Floor		Office	2	2x4-3FP28-Vol (In/O)	0.095	0.190	2500	475	TRE37	40w 2x4 LED Troffer Retro Kit	0.040	0.080	200	0.110	275	
Ground Floor		Periodicals	2	1x8-2F032-IH	0.058	0.116	3276	380	T8L22	(2) 10.5w 4' T8 LED B	0.021	0.042	138	0.074	242	
Ground Floor			2	1x8-2LED18-IH	0.036	0.072	3276	236	-	No Upgrade	0.036	0.072	236	0.000	0	
Ground Floor		Men's Restroom	2	1x4-2F032-Cove	0.058	0.116	3276	380	T4L22	(2) 10.5w 4' T8 LED B	0.021	0.042	138	0.074	242	
Ground Floor			1	H88-PL42	0.048	0.048	3276	157	I42	(1) 10.5w Horizontal LED 4-Pin PL B	0.011	0.011	34	0.038	123	
Ground Floor			3	H8-LEDPL12	0.012	0.036	3276	118	-	No Upgrade	0.012	0.036	118	0.000	0	
Ground Floor		Women's Restroom	3	1x4-2F032-Cove	0.058	0.174	3276	570	T4L22	(2) 10.5w 4' T8 LED B	0.021	0.063	206	0.111	364	
Ground Floor			2	H88-PL42	0.048	0.096	3276	314	I42	(1) 10.5w Horizontal LED 4-Pin PL B	0.011	0.021	69	0.075	246	
Ground Floor			3	H8-LEDPL12	0.012	0.024	3276	79	-	No Upgrade	0.012	0.024	79	0.000	0	
Ground Floor		Loading Dock	2	1x4-2F032-IH	0.058	0.174	3276	570	T4L22	(2) 10.5w 4' T8 LED B	0.021	0.063	206	0.111	364	
Ground Floor			2	2x4-2F032-L	0.058	0.116	3276	380	T4L22	(2) 10.5w 4' T8 LED B	0.021	0.042	138	0.074	242	

Light Fixture line by line

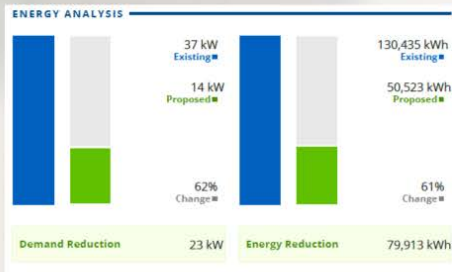
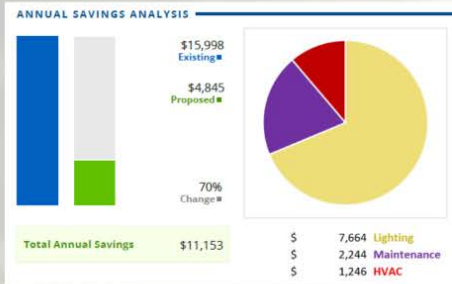
BRYN MAWR- OFFICE
Area Type: Office, Logger: 0000221B, Time Delay: 10 minutes
GES, Lower Merion Twnshp



Light meter interval data

- Create Equipment Inventory
- Inventory all Lighting fixtures
- Inventory RFP focus Equipment
- Equipment Assessment
- Data Log Operating Hours
- Field Measurements
- Determine Equipment Energy Usage

Engineering and Design



Building Lighting savings analysis

Workshop Flow

- Baseline
- Scope #1
- Scope #2
- Final Scope & Savings
- ECM
- Construction
- M & V

- Scope of Work Development
- Initial Cost Estimates
- Savings Calculations
- Guaranteed Energy Savings Analysis
- ECM Constructability Review
- Equipment Evaluations
- ECM Priority Rankings

ECM scope of work development

Option 2:
ESG recommends replacing one (1) existing hot water boiler and installing two (2) new high efficiency condensing hot water Boiler, Lookmark Knight Wall Mount or equivalent.

ENERGY STAR Most Efficient Recognition

- > 90% DOE AFUE Efficiency
- > Modulating Burner with 8:1 Turndown
- > Direct Spark Ignition
- > Low-NOx Operation
- > AFUE Stainless Steel Heat Exchanger
- > 30 psi AFUE Relief Valve
- > Vertical & Horizontal Direct Vent
- > PVC, CPVC, Polypropylene or SS Venting up to 100 feet
- > Smart System Control
- > Condensate Trap
- > Other Features
- > Automatic Reset High Limit
- > Adjustable High Limit on Manual Reset
- > Boiler Circulating Pump
- > Wall-Mount Bracket
- > Zero Clearances to Combustible Materials
- > 12-Year Limited Warranty (See Warranty for Details) Optional Equipment
- > Modbus Communication > Flow Switch > Low-Water Cutoff on Manual Reset & Test
- > Alarm Bell
- > Concentric Vent Kit
- > SMART SYSTEMS IFC Software
- > Condensate Neutralization Kit

> BUS Gateway to LON or BACnet
> Multi-Temperature Loop Control
> SideWall Vent Termination

- Demolition of 1000 McLean sectional cast iron hot water boilers and dispose
- Furnish and install (2) new Knight VPHC25 (or equivalent) wall mount, in accordance with the manufacturer's instructions
- Furnish and install new fuel and vent to exterior of the building
- Furnish and install new Victaulic type pipe and fittings to connect boiler hot water supply and return lines to existing hot water supply and return piping
- Connect boiler to natural gas supply and electric circuit
- Coordinate with controls contractor to reconnect new boiler controls to existing building automation system, communications board shall allow third party Building Automation System (BAS) to control and monitor the boiler via BUS Gateway to LON or BACnet, communications
- Fill hot water system
- Start up and check out system
- Provide a 12 Year Boiler Manufacturer warranty

Assumptions:

- (1) Existing boiler plant efficiency: 65%
- (2) Proposed boiler efficiency: 83.2%
- (3) Proposed boiler efficiency for condensing: 95%

Boyn Mawer Community Center

Existing:

The current boiler plant contains one (1) 2007 Burdus gas fired HW boiler that provides hot water to heating zones in the building via (1) 3HP circulating pumps.

The Burdus is showing signs of age and is approaching the end of useful life. The boiler is rated at 500,000 MBH output and is fired by a power flame burner rated at 540 max MBH.

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Construction Preparations



Request for
Proposal

Local
sourcing

ECM's
Evaluated

ECM's
Prioritization

Request for Proposal

- Identification of Local Contractors and Suppliers
- Development of Proposal Documents
- Competitive Proposals from all Trades
- Analysis of Proposal Results
- Joint Project ECM Selection
- Joint Selection of Product
- Joint Selection of Contractors

Project Development Tool Resources Request for Proposal - General Conditions and Scope

REQUEST FOR PROPOSAL (RFP)

SCOPE ISSUED TO: Installation Contractor

Project Name: Lower Merion Township

Project Number: DPBW100551

ECM Title: Mechanical - Boilers, Chiller, RTU

Date: 4/9/2019

The proposals will be evaluated based on price, ability to complete the work within the specified timeframe, the contractor's understanding of the scope of work, and the contractor's recommended scope changes to provide a better project to the owner. Please submit with your RFP a brief description of your proposed systems.

The Proposal is due Friday 5/17/2019 @ Noon.

Initial site walk is scheduled for Wednesday 5/1/2019 @ 9AM, 71 Lancaster Ave, Ardmore, PA 19003. Meet at the Elementary School Lobby. If additional site visits are required, schedule site visit with John Schmid @ 732-215-6647.

Please address any questions, in writing, (via email) to John Schmid at jschmid@esg_email

Scheduling of Work / Specific Instructions:

Work will need to commence as soon as heating season is officially ended and boilers are shut down for the season. ESG expects to award contracts in September 2019, pending Lower Merion Township's approval in August 2019 approval of ESG contract.

General Conditions:

The respondent shall perform all work in accordance with local, state, and national codes, and will comply with the prevailing wage law of the State of PA. Energy Systems Group (ESG) and the respondent shall confer and coordinate installation of projects with Customer. All installation services will be conducted during the first shift. Overtime and Holiday work are not included - unless specifically noted within individual scope descriptions.

- Certified payrolls will be required on a biweekly basis.
- The Contractor will prepare a Microsoft Project 2013 schedule indicating all items of the work. The schedule must be acceptable to ESG and the Owner.
- All electrical work required to power the new systems will be the responsibility of the Contractor. The contractor is responsible to run in a new electrical service and add panels if required.

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ESG 1 | 38
S.S.1 General Conditions and Scope

Local Sourcing

Cobra-head
Manufacturers
7

4 Sided Colonial
Manufacturers
4

Decorative Fixture
Manufacturers
6

HVAC
Manufacturers
3

Electrical
Contractor
(Streetlight)
7

Mechanical
Contractor
4

Electrical
Contractor
(Lighting)
(Buildings)
3

Electrical
Contractor
(HVAC)
(Controls)
3

Building
Envelope
Contractor
3

Lighting - Street Lighting / Parking Lots

- 4 Sided Colonial
- Cobra Head
- Tear Drop Pole Painting
- Decorative Fixtures

Lighting Interior / Exterior / Parks

- Ardmore Pool Complex
- Bala Avenue Gymnasium
- Bala Cynwyd Library
- Belmont Hills Community Center
- Belmont Pool Complex
- Bryn Mawr Community Center
- Koegel Complex
- Ludington Library
- Parks
- Penn Wynne Library
- Public Safety Building
- Township Administration Building
- Vernon Park
- Warner Ave (Park)
- Ash Bridge House

HVAC Mechanical Systems

- Ardmore Ave Pool Complex - DHW
- Ardmore Ave Pool Complex - Motors
- Ardmore Public Library- HE Boilers
- Bala Avenue Gymnasium - HE Boilers
- Belmont Hills Pool Complex - DHW
- Bryn Mawr Community Center- HE Boilers
- Domestic Animal Detention Center - HE Boilers
- Ludington Library - Chiller
- Ludington Library- HE Boilers
- PALM Building - DX Cooling
- Public Safety Building - RTU Replacements
- Public Safety Building- HE Boilers
- Township Administration Building - RTU Replacements
- Township Administration Building- HE Boilers
- Township Administration Building - Board RM RTU

RFP Focus ECM's Evaluated (53 ECM's)

HVAC Control Upgrades

- Ardmore Public Library
- Bala Avenue Gymnasium
- Belmont Hills Community Center
- Belmont Hills Library
- Bryn Mawr Community Center
- Public Safety Building
- Township Administration Building

Building Envelope Upgrades

- Ardmore Pool Complex
- Belmont Pool Complex
- Koegel Complex
- Ludington Library
- Public Safety Building
- Township Administration Building

Recommission Controls

- Ardmore Public Library
- Belmont Hills Community Center
- Bryn Mawr Community Center
- Ludington Library
- Public Safety Building
- Township Administration Building

Priority 1 & 2 (25 ECM's)

Lighting - Street Lighting / Parking Lots

- 4 Sided Colonial
- Cobra Head
- Tear Drop Pole Painting
- Decorative Fixtures

Lighting Interior / Exterior / Parks

- Ardmore Pool Complex
- Bala Avenue Gymnasium
- Belmont Pool Complex
- Koegel Complex
- Parks
- Vernon Park

HVAC Mechanical Systems

- Ardmore Public Library- HE Boilers
- Bala Avenue Gymnasium - HE Boilers
- [Public Safety Building- HE Boilers](#)
- [Township Administration - HE Boilers](#)
- Township Administration - Board RM RTU

HVAC Control Upgrades

- Ardmore Public Library
- [Belmont Hills Library](#)
- Public Safety Building
- Township Administration Building

Recommission Controls

- Ardmore Public Library
- Belmont Hills Community Center
- Bryn Mawr Community Center
- Ludington Library
- Public Safety Building
- Township Administration Building

Priority

Description

- | | |
|----|--|
| 1 | High Energy Impact, Poor Material Condition or Obsolete Technology |
| 2 | Energy Impact, Declining Material Condition or Single Point of Failure |
| SP | Energy Impact, Project Implemented by LMT (Self Performed) |
| DF | Deferred Future Projects to CIP |

Self Perform (16 ECM's)

Lighting Interior / Exterior / Parks

- Bala Cynwyd Library
- Belmont Hills Community Center
- Bryn Mawr Community Center
- Ludington Library
- Penn Wynne Library
- Public Safety Building
- Township Administration Building
- Warner Ave (Park)
- Ash Bridge House

HVAC Mechanical Systems

- Domestic Animal Detention Center - HE Boilers
- Ludington Library - Chiller
- Ludington Library- HE Boilers
- PALM Building - DX Cooling
- Township Administration - RTU Replacements

Building Envelope Upgrades

- Ludington Library
- Public Safety Building

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Priority 1 & 2 (25 ECM's)

Lighting - Street Lighting / Parking Lots

- 4 Sided Colonial
- Cobra Head
- Tear Drop Pole Painting
- Decorative Fixtures

Lighting Interior / Exterior / Parks

- Ardmore Pool Complex
- Bala Avenue Gymnasium
- Belmont Pool Complex
- Koegel Complex
- Parks
- Vernon Park

HVAC Mechanical Systems

- Ardmore Public Library- HE Boilers
- Bala Avenue Gymnasium - HE Boilers
- Public Safety Building- HE Boilers
- Township Administration - HE Boilers
- Township Administration - Board RM RTU

HVAC Control Upgrades

- Ardmore Public Library
- Belmont Hills Library
- Public Safety Building
- Township Administration Building

Recommission Controls

- Ardmore Public Library
- Belmont Hills Community Center
- Bryn Mawr Community Center
- Ludington Library
- Public Safety Building
- Township Administration Building

Project Priority 1 & 2

Project Cost Priority 1 - \$3,738,825

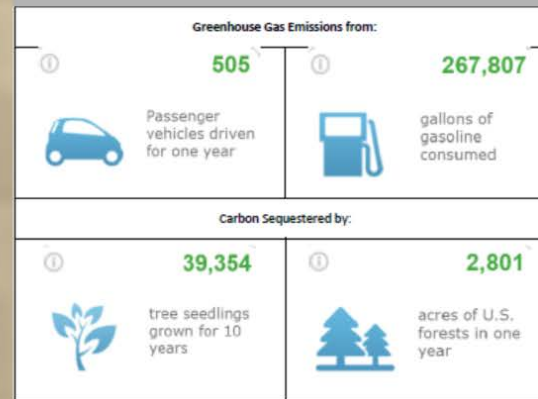
Project Savings - \$406,788_(annual)

Project Payback - 9.2 years

Priority 2 add - \$492,160

Priority 1 & 2 add - \$4,230,985

Greenhouse gas offset - 2,262 metric tons



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Design Workshop
Process

Project
Priority

PHASE 3
Construction
Preparation

Construction
Preparation
Process

