Volume II – ECM/Cost Submission

Response to Request for Quotes

For A Guaranteed Energy Savings Project At:

PA Pennsylvania Department of Transportation (Penn DOT) – District 8, PA

Project No. GESA 2019-1
Contract No. GESA 2019-1.1

Commonwealth of Pennsylvania
Department of General Services
Harrisburg, PA

October 30, 2019

Submitted by:

Company Name: McClure Company
Company Address: 4101 North Sixth Street, Harrisburg, PA 17110
Contact Person: Jonathan Zeller, Account Executive
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jonzeller@mcclureco.com

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
GSBPSAS-147 (2009 Ed.) Bond No. AIA-35860

CONSTRUCTION BID BOND
(Please Complete All Blanks)

KNOW ALL MEN BY PRESENTS, that we, McClure Company (hereinafter called the "Principal") as Principal and Arch Insurance Company a corporation duly organized under the laws of the State of Missouri (hereinafter called the "Surety") as Surety, are held and firmly bound unto The Department of General Services, Harrisburg, Pennsylvania (hereinafter called the "Obligee"), in the sum of Ten (10%) Percent of the ECM/Cost Submittal Amount for the payment of which sum, well and truly to be made, we, the said Principal, and the said Surety, bind ourselves, our heirs, our administrators, successors, and assigns, jointly and severally firmly by these presents.

Sealed with our seals and dated this 30th day of October A.D.

Two Thousand and Nineteen.

WHEREAS the Principal has submitted a bid upon Contract
No. GESA 2019-1.1
For Guaranteed Energy Savings Project At:
Pennsylvania Department of Transportation, District 8, PA

NOW, THEREFORE, the conditions of these obligations are such that if the Principal shall not withdraw its bid prior to the expiration of the award period after the opening of the bids; and shall comply with all requirements set forth in the "Quote" and the "Instructions to Bidders;" and if the said contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the contract in writing, and give bond, with Surety acceptable to the Obligee, covering the faithful performance of the said contract and payment of claims for labor, material, and equipment rental, all of which shall be supplied on the forms as specified by said Obligee; or if the Principal shall fail to do so, pay to the Obligee the lesser of the following amounts: 1) the amount of this bond as herein above set forth, or 2) the difference between the amount specified in the Principal's bid and such larger amount for which the Obligee may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be void; otherwise to remain in full force and effect.

WITNESS (OR ATTEST IF A CORPORATION) **PRINCIPAL** McClure Company

_____ _____

(CORPORATE SEAL)

SURETY Arch Insurance Company

_____
Kristen D. Shive, Attorney-in-Fact

AIC 0000279585

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON BLUE BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated. Not valid for Note, Loan, Letter of Credit, Currency Rate, Interest Rate or Residential Value Guarantees.

POWER OF ATTORNEY

Know All Persons By These Presents:

That the Arch Insurance Company, a corporation organized and existing under the laws of the State of Missouri, having its principal administrative office in Jersey City, New Jersey (hereinafter referred to as the "Company") does hereby appoint:

Anthony S. Phillips, Kristen D. Shive and Robert N. Striewig, Jr. of Mechanicsburg, PA (EACH)

its true and lawful Attorney(s)in-Fact, to make, execute, seal, and deliver from the date of issuance of this power for and on its behalf as surety, and as its act and deed:

Any and all bonds, undertakings, recognizances and other surety obligations, in the penal sum not exceeding
Ninety Million Dollars ($90,000,000.00).

This authority does not permit the same obligation to be split into two or more bonds In order to bring each such bond within the dollar limit of authority as set forth herein.

The execution of such bonds, undertakings, recognizances and other surety obligations in pursuance of these presents shall be as binding upon the said Company as fully and amply to all intents and purposes, as if the same had been duly executed and acknowledged by its regularly elected officers at its principal administrative office in Jersey City, New Jersey.

This Power of Attorney is executed by authority of resolutions adopted by unanimous consent of the Board of Directors of the Company on September 15, 2011, true and accurate copies of which are hereinafter set forth and are hereby certified to by the undersigned Secretary as being in full force and effect:

"VOTED, That the Chairman of the Board, the President, or the Executive Vice President, or any Senior Vice President, of the Surety Business Division, or their appointees designated in writing and filed with the Secretary, or the Secretary shall have the power and authority to appoint agents and attorneys-in-fact, and to authorize them subject to the limitations set forth in their respective powers of attorney, to execute on behalf of the Company, and attach the seal of the Company thereto, bonds, undertakings, recognizances and other surety obligations obligatory in the nature thereof, and any such officers of the Company may appoint agents for acceptance of process."

This Power of Attorney is signed, sealed and certified by facsimile under and by authority of the following resolution adopted by the unanimous consent of the Board of Directors of the Company on September 15, 2011:

VOTED, That the signature of the Chairman of the Board, the President, or the Executive Vice President, or any Senior Vice President, of the Surety Business Division, or their appointees designated in writing and filed with the Secretary, and the signature of the Secretary, the seal of the Company, and certifications by the Secretary, may be affixed by facsimile on any power of attorney or bond executed pursuant to the resolution adopted by the Board of Directors on September 15, 2011, and any such power so executed, sealed and certified with respect to any bond or undertaking to which it is attached, shall continue to be valid and binding upon the Company.

In Testimony Whereof, the Company has caused this instrument to be signed and its corporate seal to be affixed by their authorized officers, this 31st day of May, 2019.

Attested and Certified

Arch Insurance Company

Patrick K. Nails, Secretary

David M. Finkelstein, Executive Vice President

STATE OF PENNSYLVANIA SS

COUNTY OF PHILADELPHIA SS

I, Michele Tripodi, a Notary Public, do hereby certify that Patrick K. Nails and David M. Finkelstein personally known to me to be the same persons whose names are respectively as Secretary and Executive Vice President of the Arch Insurance Company, a Corporation organized and existing under the laws of the State of Missouri, subscribed to the foregoing instrument, appeared before me this day in person and severally acknowledged that they being thereunto duly authorized signed, sealed with the corporate seal and delivered the said instrument as the free and voluntary act of said corporation and as their own free and voluntary acts for the uses and purposes therein set forth.

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
MICHELE TRIPODI, Notary Public
City of Philadelphia, Phila. County
My Commission Expires July 31, 2021

Michele Tripodi, Notary Public
My commission expires 07/31/2021

CERTIFICATION

I, Patrick K. Nails, Secretary of the Arch Insurance Company, do hereby certify that the attached Power of Attorney dated May 31, 2019 on behalf of the person(s) as listed above is a true and correct copy and that the same has been in full force and effect since the date thereof and is in full force and effect on the date of this certificate; and I do further certify that the said David M. Finkelstein, who executed the Power of Attorney as Executive Vice President, was on the date of execution of the attached Power of Attorney the duly elected Executive Vice President of the Arch Insurance Company.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the Arch Insurance Company on this 30th day of October, 2019.

Patrick K. Nails, Secretary

This Power of Attorney limits the acts of those named therein to the bonds and undertakings specifically named therein and they have no authority to bind the Company except in the manner and to the extent herein stated.

PLEASE SEND ALL CLAIM INQUIRIES RELATING TO THIS BOND TO THE FOLLOWING ADDRESS:

Arch Insurance – Surety Division
3 Parkway, Suite 1500
Philadelphia, PA 19102

The following security features exceed state mandates.

Security Features	Document Appearance if Altered
Hidden Pantograph	• The word "VOID" appears when copied.
Coin Reactive Ink	• Ink changes color when rubbed with a coin.
Artificial Watermark	• Special paper containing "watermarking".
Uniform Background Color: BLUE	• If someone tries to erase or copy, the consistent background color will look altered and will show the color of the underlying paper.
Microprinting	• Frame around features list box is composed of type "SECURITYGUARDPLUSMICROPRINTINGFEATURE" and can be viewed with a magnifier.
Features List	• Complete list of security features on the paper for compliance purposes.
Erasure Protection	• Erase any of the signatures and the background will look altered.

2-6.D.1 Investment Grade Audit (IGA)

D.1-a Investment Grade Audit Scope

Provided below is a clear and thorough description of the scope-of-work that McClure Company proposes to further investigate and develop during the Investment Grade Audit (IGA). The description includes systems covered, personnel involved, methodology for the calculation of the energy baseline and schedule with milestones.

McClure Company's systematic approach to a guaranteed energy saving project is divided into three major phases:

1. ***Scoping Audit Phase / RFQ:*** McClure will conduct an initial feasibility study of Penn DOT sites. The study includes, but is not limited to, a review of the utility bills, site surveys, interview of major stakeholders and personnel, preliminary energy conservation cost / savings estimates, and financial models. From this information, McClure assembles a list of recommended energy conservation measures (ECMs), based upon cost effectiveness, the needs of the facility, and the goals of Penn DOT. This RFQ Response is the result of the scoping audit phase.
2. ***Investment Grade Audit (IGA) Phase:*** The Investment Grade Audit is a detailed study of the energy conservation measures identified and selected by Penn DOT. Detailed within the sections below, McClure Company will perform an Investment Grade Audit in accordance with the RFQ and timeline schedule requirements.
3. ***Final Scope Selection & Design Phase:*** McClure Company will complete the final engineering and design phase for all ECMs requiring engineering design and will properly coordinate with the Commonwealth for the review and approval process.

Outlined below is McClure's approach towards conducting the IGA for the Penn DOT – District 8 GESA project.

D.1-a.1 Systems Covered

In consideration of the Core ECMs defined by the RFQ and the goals of both the Commonwealth and Penn DOT, McClure Company proposes the below listed ECMs as the "Base" self-funded program for RFQ evaluation. **This "Base" scope encompasses and fully addresses all 14 Core ECMs defined by the RFQ.** In addition to this "Base" program, McClure has also developed many additional, innovative measures for Penn DOT's consideration, and are presented within "Option 1" GESA program. "Option 1" utilizes guaranteed energy savings in combination with a Energy Related Cost Savings needed to further address known deferred maintenance items and capital improvement needs of these facilities (*identified within Bulletin #4*). When implemented, the ECMs included under either the "Base" or "Option 1" GESA programs will provide for more energy efficient, cost-effective, sustainable Penn DOT operations over the long-term.

"Base" Program - All 14 Core ECMs	
System Covered (PennDOT)	**Investment Grade Audit (IGA) Process Overview**
ECM-1: Site-Wide LED Lighting	· Audit fixture counts, light levels, voltage, wattage and fixture/ballast equipment types
	· Record operation and maintenance items and hours of occupancy per space
	· Select new fixtures based upon facility goals, feedback, and cost effectiveness
ECM-2: Lighting Controls	· Evaluate and confirm any existing control technologies
	· Evaluate system usage, control application suitability; consider day-light harvesting strategies
	· Select optimum system and strategy for local Penn DOT operations that achieve energy savings
ECM-3: Building Envelope Upgrades	· Identify key areas of high building infiltration/exfiltration and any physical deficiencies
	· Estimate requirements for weather stripping, caulking, sheathing and sealing
	- Account for impact on Penn DOT operations, and if needed, adjust accordingly
ECM-4: Water Conservation Measures	· Audit fixture counts for faucets, water closets, showers, and wash facilities
	· Develop operational and maintenance baseline and determine water flow rates of existing systems
	· Develop plan for upgrades and installation strategy for identified locations
ECM-5: Building Control Upgrades	· Evaluate existing control of facilities

"Base" Program - All 14 Core ECMs	
System Covered (PennDOT)	**Investment Grade Audit (IGA) Process Overview**
	· Evaluate system usage
	· Select control system and strategy to fit design
ECM-6: Domestic Water Heater (DWH) Upgrades	· Audit sites for all existing DHW heaters
	· Develop strategy to upgrade domestic water heaters to higher efficiency or fuel source
	· Develop plan for upgrades and installation strategy for identified locations
ECM-7: Steam Trap Repairs & Improvements	· Conduct audit of existing steam systems and identify type and quantities of failed traps
	· Develop strategy to repair &/or replace failed traps
ECM-8: Exhaust Fan Control	· Evaluate existing systems to identify strategies that minimize run times
	· Evaluate condition of existing systems, for adaptive reuse opportunities
	· Select optimization control system strategy
ECM-9: Adams County Steam to Gas Conversion	· Evaluate fuel sources and storage available to each park
	· Develop cost analysis model to determine which fuel source is most advantageous
	· Select optimum system to achieve energy savings
ECM-10: Cumberland County Radiant Heater Improvements	- Confirm locations within main repair garage to receive additional radiant heaters.
	- Confirm new installations results in minimizing runtime of makeup air units
	- Develop plan for upgrades and installation strategy for identified locations
ECM-11: Cumberland Road Stopes #45 & #46 Toilet Replacements	· Audit fixture counts, usages and fixture equipment types
	· Record operation and maintenance items and hours of occupancy per space
	· Select new fixtures based upon facility goals, feedback, and cost effectiveness
ECM-12: Franklin County Natural Gas Conversion	· Evaluate fuel sources and proximity to each site
	· Develop cost analysis model to determine which fuel source is most advantageous
	· Select optimum system to achieve energy savings
ECM-13: Dauphin County Chilled Water System Upgrades	- Verify chiller water pumps for VFD upgrade/installation
	- Confirm Chiller sizing and installation location and logistics
	- Develop plan for upgrades and installation strategy
ECM-14: Dauphin Server Farm Operational Upgrades	· Evaluate existing system and obtain current sequence of operation
	· Evaluate condition of existing systems, for adaptive reuse opportunities
	· Select optimization control system strategy

D.1-a.2 Personnel

Our in-house energy auditing and development team consists of seasoned professional engineers (P.E.s) and analysts with decades of PA GESA industry experience. They have audited and developed over 200 successful GESA solutions representing millions of square feet of facility space; many of these projects serving other PA State Agency and municipal type clients. McClure Company's IGA will be managed and lead by Chris Stultz (Project Development Manager), with support from selected specialist contractors for lighting, building envelope, solar, and electrical related measures. In addition, Brian Moore (Engineering Manager) and William Smith (Building Automation System Engineer) will provide overview of the mechanical and control related scope. Richard Skinner (M&V) and Andrew McKenna (Commissioning Manager) will begin the commissioning plan in this phase as well. This team will be overseen by Shayne Homan (Vice President of Energy Services) and Jon Zeller (Account Executive).

D.1-a.3 Methodology

McClure Company's systematic approach towards undertaking the Investment Grade Audit includes, but is not limited to:

- Kickoff meeting with the Commonwealth and Penn DOT to review McClure's RFQ Response
- Analysis of utility bills, past Measurement and Verification studies and overall facility benchmarking

- Selecting Energy Conservation Measures (ECMs) that meet the needs and goals of Penn DOT
- Collection of general information for each building (square footage, floors, hours, etc.)
- Site surveys of all buildings at each Penn DOT site, with a focus on the major/Core or selected ECMs
- Understanding of the operating characteristics of existing lighting, environment control system, waste-water treatment plants, and HVAC (heating/cooling/distribution)
- Identify any additional cost saving opportunities that may have a cost-effective impact to the program
- Conceptualize and determine the feasibility of the ECMs identified
- Iterative review with Penn DOT and the Commonwealth to show progress and ensure goals are met
- Perform simple payback and life cycle cost analysis on each ECM and the associated equipment/technology
- Internal design peer reviews, estimating reviews, and 360° risk reviews completed by the project team
- Provide definitive cost and savings estimates for proposed final ECMs
- Complete a final project cash flow with revised cost/savings for each identified and selected ECM
- Final review with Penn DOT and the Commonwealth

D.1-a.4 Schedule Milestones

Below is a table summarizing the Investment Grade Audit schedule milestones. As specified by the RFQ, McClure will deliver its final IGA report to the Commonwealth within 60 calendar days of the date on the Commonwealth's Notice of Selection. Please also see our more comprehensive project schedule included with **Volume 1: Technical Proposal**, which incorporates our IGA schedule and key project milestones.

Milestone	Timeline
Kick-off Meeting upon Selection	**January 2020**
Investment Grade Audit (IGA)	**January-March 2020**
Interim IGA Review Meeting (s)	**February-March 2020**
Final IGA Review	**March 2020**
GESA Contract Execution	**April 2020**

D.1-a.5 Energy Baseline

The baseline for this project was calculated using the utility data provided by PA DGS. The usage was analyzed on a monthly basis and totaled for the year. The utility baseline varies by site based on the information provided as part of the RFQ and is noted as missing key accounts for proper baseline determination. The baselines for each site have been selected as the most comprehensive and recent information available at the time of this submission and should be revised as part of the IGA. The baselines are as follows:

- Adams County Office: Electric – June 2017 – May 2019
- Cumberland County Office: Electric – June 2017 – May 2019
- Cumberland Road Side Rest Area Site 45: Electric – June 2017 – May 2019
- Cumberland Road Side Rest Area Site 46: Electric – June 2017 – May 2019
- Franklin County Office: Electric and Natural Gas – June 2017 – May 2018
- Franklin Welcome Center: Electric – October 2017 – May 2018
- Dauphin Engineering Office: Electric – June 2017 – May 2019
- Dauphin County Office: Electric – June 2017 – May 2019
- Dauphin Maintenance District Office (Satellite): Electric – June 2017 – May 2019
- Dauphin Fleet Management Division: Electric – June 2017 – May 2019
- Dauphin Server Farm: Electric – June 2017 – May 2019 and Natural Gas – May 2019 Only
- Lancaster County Office: Electric – June 2017 – May 2019
- Lebanon County Office: Electric – June 2017 – May 2019
- Lebanon Eastern PA Training Facility: Electric – June 2017 – May 2019
- York Welcome Center: Electric – June 2017 – May 2019

During the IGA, a full review of the baseline reports and acceptance by PA DGS will be required to verify the usage amounts for all Penn DOT sites as there is known missing utility data which required calculated assumptions for rates as detailed in "***Attachment 1: Energy Baseline***"

As part of the IGA, other circumstances which require the baseline to be adjusted will be evaluated. These circumstances include, but are not limited to, changes in the facilities use, changes in occupancy, adjustments for weather compared to the baseline heating and cooling degree days as provided by NOAA, and modification to the outside air ventilation flow rates as required by code.

The anticipated utility unit cost is the annual cost divided by the annual usage for the baseline period or as provided in the RFQ or subsequent addenda. Please find McClure's established baseline usages and rates provided in ***"Attachment 1: Energy Baseline"*** located at the end of this proposal.

D.1-a.6 Investment Grade Audit Fee - $25,000

Based upon the scope of our proposed Penn DOT – District 8 "Base" GESA program, and with the understanding that, upon selection by Penn DOT as its ESCO partner, McClure will be tasked to provide IGA services to all Penn DOT facilities within District 8, McClure has estimated the total cost to complete a comprehensive IGA Report for all Penn DOT - District 8 sites to be $25,000. McClure has established a reasonable cost for preparing an Investment Grade Audit for this scope-of-work in compliance with the methodology discussed within this Cost Submission. We estimate that the IGA will take approximately 45-60 days to complete for Penn DOT facilities located within District 8. We look forward to getting started and working with Penn DOT to coordinate next steps on this very important program

Energy Conservation Measures (ECMs)

Table 1 on the following page presents a summary listing of all fourteen (14) "Core" ECMs evaluated by our team during the development of this proposal. This information was utilized to develop McClure's "Base" self-funded program. In addition to this "Base" program, McClure has also developed additional, innovative measures, presented as an alternate "Option 1" program, which utilizes a level of "Energy Related Cost Savings" to supplement guaranteed energy savings to further address known deferred maintenance items and other identified capital improvement needs of Penn DOT. McClure's GESA programs are flexible, and with Penn DOT and DGS input/feedback, will be further customized to ensure that Penn DOT's project expectations are realized. ***All upgrades proposed under McClure's "Base" and "Option 1" proposed GESA programs can be discussed during the interview process and explored further during the IGA.***

Table 1 – ***Summary: "Base" Self-Funded and "Option 1" ECMs By Site***

Table 1a
"Base" Core & "Option 1" Additional ECMs By Site
Penn DOT - District 8 GESA ECM Summary

ECM ID#	ECM Type (Core or Additional)	Energy Conservation Measure (ECM)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			"Base" & "Option 1" Scopes-of-Work Presented by Site														
			Adams County Office	Cumberland County Office	Cumberland Road Side Rest Area Site 45	Cumberland Road Side Rest Area Site 46	Franklin County Office	Franklin Welcome Center	Dauphin Engineering District Office 8	Dauphin County Office	Dauphin Maintenance District Office (Satellite)	Dauphin Fleet Management Division	Dauphin Server Farm	Lancaster County Office	Lebanon County Office	Lebanon Eastern PA Training Facility	York Welcome Center
1	Core	Site-Wide LED Lighting	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	Core	Lighting Controls	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	Core	Building Envelope Upgrades	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	Core	Water Conservation Measures	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	Core	Building Control Upgrades	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	Core	Domestic Water Heater (DWH) Upgrades	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	Core	Steam Trap Repairs & Improvements	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	Core	Exhaust Fan Control	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	Core	Adams County Steam to Gas Convers	X														
10	Core	Cumberland County Radiant Heater Improvements		X													
11	Core	Cumberland Road Stops #45 & #46 Toilet Replacement			X	X											
12	Core	Franklin County Natural Gas Conversion					X										
13	Core	Dauphin County Chilled Water System Upgrades							X	X							
14	Core	Dauphin Server Farm Operational Upgrades											X				
15	Additional	Waste Oil Heater Conversion															
16	Additional	Window Film Improvements	X	X			X			X		X		X	X		
17	Additional	Destratification Fan Improvements	X				X			X	X	X		X	X		
18	Additional	Solar	X	X	X	X	X	X	X	X		X	X	X	X		X
19	Additional	Electric Vehicle Charging Stations			X	X		X									X
20	Additional	Bulletin 4 Deficiencies	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21	Additional	Fleet Management Roof Replacement										X					

Environmental & Economic Impact Summary – "Base" GESA Program: Through the implementation of the ECMs comprising our proposed "Base" GESA program, Penn DOT will also realize significant greenhouse gas, environmental, and economic benefits as detailed below. McClure will update and track all environmental & economic benefits generated by this GESA program as the final program scope-of-work is defined through the IGA process.

Penn DOT GESA "Base" Project Greenhouse Gas (GhG) & Emission Reductions, Economic Benefits	Utility & Unit	Summary – Annual GHG Emission Reductions (Lbs.)	Environmental Benefits Avoided Emission Production	Total (Annual)	Total (18 Yrs)
	Electric (kWh)	1,922,384	Cars Not being Driven	243	4,374
	Oil (Gallon)	139,283	Houses Powered	138	2,484
	Natural Gas (CCF)	470,572	Acres of Trees Planted	1,351	24,318
	Total (Annual)	2,532,239	Local Economic Benefits – Projected New Jobs Created		
	Total (18 Yrs.)	45,580,302	New Direct, Indirect, &/or Induced Jobs	40-45	

D.1-b Energy Conservation Measures (ECMs)

After analysis of the utility data, the inspections conducted of each Penn DOT site, and consideration of all seven (7) DGS issued Bulletins, McClure Company has prepared a "Base" self-funded GESA program that encompasses all of the defined "Core Energy Conservation Measures" described under Appendix S. In addition to our "Base" program, McClure also includes an "Option 1" program, which combines guaranteed energy savings with a level of Energy Related Costs Savings to more cost-effectively address a larger project scope for Penn DOT. The additional ECMs included within our Option 1 program address additional deferred maintenance and capital improvement needs (*identified within Bulletin #4*), complement the proposed Core ECMs, and provide added savings and value to Penn DOT over the long-term. As part of Option 1 scope, McClure believes there is great potential to convert Penn DOT rest areas and "Welcome Center" type facilities to becoming **Net Zero** facilities by installing Solar PV and other power-strategies

McClure's Goal ➡ Realizing Net Zero Facilities for Penn DOT Sites:

McClure's scope addresses all 14 Core ECMs, and includes many additional, innovative measures and flexible options for Penn DOT's consideration that further enhance the project's overall economic, environmental, and technical benefits. As part of our proposed "Option 1" scope, McClure believes there is great potential to convert Penn DOT rest areas and "Welcome Center" type facilities to becoming Net Zero facilities by installing Solar PV and other power-strategies. McClure will further evaluate this potential for Penn DOT during the IGA process, and the possibility of expanding its application across Penn DOT's larger portfolio of facilities where technically and economically feasible.

McClure's overall approach to GESA project development is to remain conservative with savings levels that are included within the GESA model. However, considering the significant capital improvement and infrastructure replacement needs defined by Penn DOT and the "Core ECMs", and assumptions/interpretations an ESCO can make in regard to the level at which Capital Cost Avoidance and O&M "Material" Savings can be used at this phase of the project, we believe it helpful to provide Penn DOT and the Commonwealth with this information to better understand and consider all of its options.

Table 2 on the following page outlines McClure's "Base" and "Option 1" GESA programs. These programs utilize a responsible level of annually applied energy savings, Energy Related Cost savings (*under "Option 1"*), and O&M "Material type savings. Act 129 energy rebate dollars and SRECS (*under "Option 1"*) are also included to help buy-down overall installation costs. Detailed information relating to the Core ECMs addressed under our proposal can be found in D.1-b.1. Information on our proposed "Additional" ECMs not already included in the core project can be found in section D.1.g. All detailed energy savings calculations for our proposed "Base" ECMs can be found in "***Attachment 2 – Energy Calculations***".

Table 2
Penn DOT - District 8 GESA Program Options Summary
Scope, Costs and Savings Totals

ECM ID/#	Energy Conservation Measure (ECM) / Scope	Installed Costs	Total Annual Energy Savings	"Base" GESA	"Option 1" GESA
ECM-1	Site-Wide LED Lighting	$ 891,240	$ 97,568		
ECM -2	Lighting Controls	*Included as part of ECM 1			
ECM-3	Building Envelope Upgrades	$ 194,953	$ 19,222		
ECM-4	Water Conservation Measures	$ 118,818	$ 12,869		
ECM-5	Building Control Upgrades	$ 77,568	$ 7,580		
ECM-6	Domestic Water Heater (DWH) Upgrades	$ 50,483	$ 27,864		
ECM-7	Steam Trap Repairs & Improvements	$ 129,535	$ 6,652		
ECM-8	Exhaust Fan Control	$ 43,649	$ 4,704		
ECM-9	Adams County Steam to Gas Conversion	$ 202,991	$ 3,652		
ECM-10	Cumberland County Radiant Heater Improvements	$ 64,722	$ 1,364		
ECM-11	Cumberland Road Stops #45 & #46 Toilet Replacement	$ 58,970	$ 5,061		
ECM-12	Franklin County Natural Gas Conversion	$ 65,914	$ 5,169		
ECM-13	Dauphin County Chilled Water System Upgrades	$ 120,324	$ 894		
ECM-14	Dauphin Server Farm Operational Upgrades	$ 32,361	$ 17,442		
ECM-15	Waste Oil Heater Conversion	$ 155,333	$ 13,105		
ECM-16	Window Film Improvements	$ 15,040	$ 1,145		
ECM-17	Destratification Fan Improvements	$ 223,591	$ 19,088		
ECM-18	Solar	$ 2,302,794	$ 106,380		
ECM-19	Electric Vehicle Charging Stations	$ 94,236	$ -		
ECM-20	Bulletin 4 Deficiencies	$ 1,931,741	$ -		
ECM-21	Fleet Management Roof Replacement	$ 1,371,539	$ 2,688		
	Total Installation Costs with Bond($):			$2,069,942	$8,202,605
	Consultant Fee ($):			$144,896	$492,156
	Energy Savings (18 Year Total):			$4,223,940	$7,119,670
	Act 129 Energy Rebates (Total):			$96,441	$96,441
	O&M "Material" Savings (5 Year			$71,190	$71,190
	Energy Related Cost Savings (18 Year			$0	$5,626,604
	Total Program Savings (18 Year Total):			$4,391,571	$12,913,905

D.1-b.1 Recommended "Core Energy Conservation Measures"

ECM-1 & 2: Site-Wide LED Lighting and Lighting Controls

Existing Conditions

Lighting throughout PennDOT Region 8 was surveyed and identified to be a majority T8 fluorescent technology utilizing 28W-32W linear tubes on the interior of the buildings. In select areas, compact fluorescents or incandescent were used for down lighting. Much of the lighting on the exterior of the buildings utilize Metal Halide, Mercury Vapor and High Intensity Discharge (HID) technology which is becoming obsolete and is very energy intensive.

Proposed Solution

McClure Company is proposing to retrofit the existing exterior fixtures and interior fluorescent/incandescent fixtures with new LED Lamps. Lighting controls will be installed were applicable.

Assumptions

No corrections to existing code violations or deficiencies were found during survey, however, these system deficiencies will be brought to the attention of customer at the conclusion of the Investment Grade Audit. Scope includes cost for EPA approved recycling of fluorescent and HID lamps/ballasts. New LED lamps to be direct wired to existing fixture socket as existing fixtures are in good, serviceable condition.

Preliminary Lighting Burn Hours:

Garages:	2,080 Hours	Offices:	2,340 Hours
Restrooms:	3,863 Hours	Exterior:	4,380 Hours

Annual Savings / Benefits

Energy savings are calculated using wattage reductions from the manufacturer's provided specification sheets for the applicable lamp. These reductions are multiplied by the stipulated hours provided to generate the kWh savings. The cost savings are calculated using this kWh savings multiplied by each buildings baseline electric rate.

Savings:

- 891,240 kWh

ECM-3: Building Envelope Upgrades

Existing Conditions

The facilities were surveyed for areas of infiltration that would result in unnecessary load for the mechanical system. Infiltration can be defined as unregulated outside air entering a building unintentionally. This air must be treated (heated or cooled) by the building's heating or cooling system to maintain acceptable indoor temperatures.

Common areas of infiltration include worn or missing door weather stripping, gaps along the interface of the roof and wall, insulation of attic spaces, air sealing of attic spaces, and air sealing any penetration between interior and exterior areas.

Proposed Solution

McClure Company is proposing to reduce the amount of infiltration air and increase critical insulation areas as detailed above. Please reference Attachment 3 – Supplemental ECM Information and Documentation for details and locations within the facility.

Assumptions

Calculations are based on ASHRAE Method for estimating air infiltration using a degree day calculation.

Annual Savings / Benefits

This measure will reduce the untreated infiltration of outdoor air and loss of conditioned interior air resulting in a more stable interior environment.

Savings:

- 90,460 kWh
- 12,928 CCF of Natural Gas

ECM-4: Water Conservation Measures

Existing Conditions

The facilities were surveyed for water savings opportunities. Most of the facilities exhibited high flow toilets with flow rates greater than 1.28 GPF and sinks with flow rates greater than 0.5 GPM. The majority of urinals and showers appeared to already be low flow.

Proposed Solution

McClure Company is proposing to replace the existing flushometer and tank toilets with new 1.28 GPF and 0.8 GPF fixtures. Select urinals will be fitted with new 0.125 GPF flush valves. The existing high flow sinks will be retrofitted with 0.5 GPM aerators and select kitchenette/hand sinks will be retrofitted with 1.5 GPM aerators.

Assumptions

Calculations are based on the reduction in water flow at each fixture pre and post flow rates. Occupancy at each facility was determined during the surveyed and used to determine total consumption.

Annual Savings / Benefits

This measure will reduce water use as well as the amount of domestic hot water (DHW) needed.

Savings:

- 3,211 kWh
- 45 Gal of Propane
- 366 CCF of Natural Gas

ECM-5: Building Control Upgrade

Existing Conditions

The facilities were surveyed to identify shortfalls within the buildings control systems. Several items were identified in some of the buildings such as hot water reset, economizer control, and demand control ventilation. District wide setback and sequencing will need to be further identified during IGA when more data is available.

Proposed Solution

McClure Company is proposing several control changes in the facilities. In locations with hot water heating systems, a hot water reset schedule will be implemented to reduce boiler firing rates. Air side economizer control provides cooling to spaces in place of using electricity for compressors. Many jurisdictions now require air side economizer cooling by the building code and economizer control is required by ASHRAE 90.1-2004 for all new equipment with cooling capacities greater than eleven tons in Pennsylvania.

Demand control ventilation provides a control sequence that will allow the amount of required ventilation air to change to meet the fluctuating occupancy of a zone. The energy savings results from minimizing the amount of ventilation air which results in less energy required to both heat and cool the outside (ventilation) air. As with air side economizer control ASHRAE 90.1 requires demand control ventilation for all larger zones (gymnasiums, cafeteria, libraries).

Assumptions

Calculations are based on the reduced run time of equipment from assumed hours of operation.

Annual Savings / Benefits

This measure will reduce run time of equipment resulting in savings.

Savings:

- 65,273 kWh
- 2,885 CCF of Natural Gas

ECM-6: Upgrade Domestic Water Heaters

Existing Conditions

The existing building water heaters vary from electric and natural gas storage type heaters to propane instantaneous. The sources of water include city treated water, well softened and raw water.

Proposed Solution

McClure Company is proposing to replace the (5) existing electric tank type water heaters with instantaneous gas fired water heaters. At sites with natural gas, piping will be routed and connected to the new DWH's. At sites without natural gas, the new DWH's will be installed and gas piping ran to a location on the outside of the building. Due to purchasing powers, we will let the state determine the appropriate propane supplier and tank for each site.

Assumptions

For many facilities the water conservation measures associated with ECM-4 reduces the required storage capacity.

- Electric tank type heaters have reduced volume which corresponds to reduced standby losses.
- Water Quality is compatible to equipment selections

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results reducing storage tank standby losses, fuel switch from electric to natural gas/propane , and/or elimination of standby losses with tankless system installation.

Savings:

- 122,283 kWh

New Usage

- 5,061 Gal of Propane
- 234 CCF of Natural Gas

ECM-7: Steam Trap Repairs & Improvements

Existing Conditions

The facilities which utilize steam as a heat source were surveyed in order to identify failed steam traps. Steam traps are prone to failure as they age, resulting in large steam losses and requiring substantial maintenance. A total of 163 steam traps were identified during the survey.

Proposed Solution

McClure Company is proposing to replace the existing steam traps with (86) new mechanical traps and (77) new thermostatic traps. McClure company also recommends a periodic testing program to identify and repair/replace failed traps as they arise.

Assumptions

Calculations are based on reduced steam/condensate losses from trap failure. It was assumed that 5% of the traps were plugged (failed closed), 10% blowing (failed open), and 10% leaking. Steam system on/off times were estimated based on temperature bin analysis for Harrisburg, PA and information provided during the RFQ.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are the result of reduced steam/condensate losses in the systems.

Savings:

- 7,242 CCF of Natural Gas

ECM-8: Exhaust Fan Control

Existing Conditions

It is necessary that all public restrooms at the rest stops always remains fully operational. To accommodate the requirement that the restrooms are always operational: the lights and exhaust fans are in operation in the restrooms twenty-four hours per day each day.

While it is not necessary that the restrooms in office type environments remain fully functional twenty-four hours per day. While it is not necessary that the exhaust fans in office restrooms remain energized, in most cases unless the building has an automation system, restroom exhaust fans always remain energized.

Proposed Solution

Since the operational requirements for exhaust fans is not consistent, McClure proposes to offer two different approaches to exhaust fan control. For exhaust fans that must remain functional twenty-four hours per day, McClure will install an occupancy sensor in each restroom. The occupancy sensor will de-energize the exhaust fans when the restroom is unoccupied but will keep the exhaust fan energized for a fixed time period after the occupancy sensor determines the restroom is unoccupied. The exhaust fan will re-start immediately once the occupancy sensor determines the zone is occupied. For office type environments, that generally have a fixed occupancy time period, McClure will install time clocks for gang toilets. If the building has an automation system and the gang toilet restrooms have not been incorporated into the automation system, McClure will work with the automation system provider to add the exhaust fans to the automation system.

Restrooms can be a difficult location for occupancy sensors because there is not always a clear line of site to the occupant. New technologies have improved the ability of occupancy sensors to not turn off the controlled equipment while the restroom is still occupied. McClure Company will provide a dual technology occupancy sensor combining both infrared technology with ultrasonic technology.

McClure will provide a timeclock for gang toilets in office type environments. The occupied time period will be determined by McClure Company and the facility staff and set up by McClure Company. The timeclock will have fully adjustable time setting and once of the training discussion points will be how to adjust the occupied time period, should the building occupancy time change. The time clock will be in the electrical room that has the electrical panel for the exhaust fan and

clearly marked which exhaust fan is being controlled by the time clock. If the building already has an automation system, any gang toilet exhaust fan that will get occupancy control will be added to the automation system.

Assumptions

Calculations are based on the reduced run time of equipment from assumed hours of operation. Assumed CFMs of exhaust air are to be further identified during IGA.

Annual Savings / Benefits

This measure will reduce run time of equipment resulting in savings.

Savings:

- 9,362 kWh
- 5,605 CCF of Natural Gas

ECM-9: Adams County Steam Heat to Natural Gas Radiant and Gas PTACs

Existing Conditions

The garage and garage offices of the Adams County Office are served by an original underground steam infrastructure. This 50-year-old piping system has, and is experiencing multiple leaks and a replacement heat source is needed. The office areas contain steam radiators and window mounted air conditioners.

Proposed Solution

McClure Company is proposing to replace the existing steam system with a natural gas solution as follows:

- Gas radiant tube heaters for garage areas.
- Gas unit heaters in storage and restroom areas.
- Gas heat packaged terminal air conditioning (PTAC) in the offices.

We will extend the natural gas piping serving the demolished boilers to these new equipment locations. Each zone to have independent automatic temperature control.

Assumptions

During the IGA phase the following assumptions will be verified.

- Hazardous materials are not present on material being removed, or disturbed.

Annual Savings / Benefits

Energy and conservation savings associated with this measure result from the increased efficiency of the radiant tube heaters and PTACs over the existing steam system. Cooling savings will also be seen when converting from the Window Units to PTAC's.

Savings:

- 4,381 kWh
- 3,589 CCF of Natural Gas

ECM-10: Reduce Makeup Air Unit Runtime with Radiant Heaters

Existing Conditions

The garage area at the Cumberland County Office contains both gas-fired radiant tube heaters and makeup air recovery ventilators. Anecdotal information identified that during the winter the air flows from the makeup air producing cold air drafts.

Proposed Solution

McClure Company proposes to provide additional radiant tube heaters, connected to the existing gas piping. The supply and exhaust fans for the garage bays will be controlled to a low or off position to the greatest extent possible.

We will extend the natural gas piping serving the space to these new equipment locations. Each zone to have independent automatic temperature control.

Assumptions

During the IGA phase the following assumptions will be verified.

- The makeup air and exhaust can be reduced using the existing controls.
- Existing Fan HP in Makeup Air units is 5HP
- Winter runtime data is estimated based on temperature bin analysis for Harrisburg, PA and is assumed it can be reduced by 50%.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results increasing control awareness through web application availability and implementing standard set points and schedules with limiting varying factors.

Savings:

- 14,267 kWh

ECM-11: Cumberland Road Stops #45 & #46 Toilet Replacement

Existing Conditions

The existing toilets in both of the Cumberland County I-81 rest stops utilize compressed air to assist in flushing. Each location has an air compressor in a mechanical space which supplies the required compressed air to each toilet fixture.

Proposed Solution

McClure Company is proposing to replace the existing toilets with standard low flow flushing fixtures. This will reduce the need for compressed air in the facility and allow for the removal of the air compressors.

Assumptions

Calculations are based on the reduction in electric use from the air compressors. The new low flow toilets would increase water use in the facility as the existing compressed air toilets only flush at 0.6 gpf. However, these sites do not pay for city water or sewer, so the water usage is assumed to be negligible.

Annual Savings / Benefits

This measure will reduce electrical use from the air compressors.

Savings:

- 12,815 kWh

ECM-12: Franklin County Natural Gas Conversion

Existing Conditions

The heating system at the Franklin County Office is currently a fuel oil boiler system. Natural gas utility is located on the adjacent street to the complex.

Proposed Solution

McClure Company proposes to coordinate with the gas utility to have gas extended to the building. Natural gas burners will be installed in the existing boilers, and gas piping will be routed to serve the burners and for the for the domestic water heater.

Assumptions

During the IGA phase the following assumptions will be verified.

- The domestic water heater upgrade from electric to natural gas will part of ECM-6
- The Utility will provide gas meter to building.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are a result of a fuel switch from Fuel Oil to Natural Gas.

Savings:

- 7,109 Gal of Oil

New Usage

- 5,412 CCF of Natural Gas
-

ECM-13: Dauphin County Chilled Water System Upgrades

Existing Conditions

The ground floor of the District Engineering Office is conditioned with chilled water fan coils. The chiller installation was part of a HVAC upgrade in 1999. The chiller, two pumps, and chilled water fan coils make up this system.

Proposed Solution

McClure Company recommends a new air-cooled chiller and variable flow pumps. Converting many of the valves to two-way operation will save energy by pumping less water. The new chiller is also more efficient at partial loads.

Assumptions

During the IGA phase the following assumptions will be verified.

- Existing Fan coils units can be converted from three way to two way.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results decreased pump energy required and increased chiller efficiency.

Savings:

- 11,838 kWh

ECM-14: Dauphin Server Farm Operational Upgrades

Existing Conditions

The Server Farm is currently experiencing higher than expected gas usage during the summer. The equipment that populated the two server rooms has steadily decreased in the last few years. As a result of this reduction the cooling equipment is oversized for the current building state.

Proposed Solution

McClure Company recommends modifying the chilled water system operations and controls to reduce excess cooling. By installing variable speed drives for chilled water pumps and converting most of the system to two-way valves the system becomes variable primary saving pump energy. In addition, we recommend several of the air handlers be shut down in the control system as the cooling load they were designed for is no longer present. The space that housed the servers, can be half the ventilation air based on its new space type reducing ventilation air quantities.

Assumptions

During the IGA phase the following assumptions will be verified.

- Existing Gas Use in the Facility as only two months of data were provided in the RFQ.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results decreased pump energy required and eliminated fan energy for the units shut down. The reduced ventilation air saves heating, cooling, and dehumidification energy.

Savings:

- 68,577 kWh
- 13,773 CCF of Natural Gas

D.1-b.2 Energy Conservation Measures Not Included in Base Program

This is not applicable to McClure's proposal. McClure has included and addressed all Core Energy Conservation Measures defined by Appendix S of the RFQ. These ECMs are included under both McClure's "Base" and "Option 1" GESA program options. Please see Section D.1-b.1 (above) for detailed information relating to the Core ECMs addressed under our proposal.

D.1-c Preliminary Assessment of Energy Conservation Measures (ECMs)

McClure Company has evaluated and provided a preliminary assessment for each energy conservation measure (ECM) opportunity, which includes estimated implementation costs, energy cost savings, and detailed savings calculations that support implementation of each ECM under this GESA program. Detailed calculations for the energy cost savings can be found under **Attachment 2**. Our preliminary assessment of the identified Core ECM opportunities is based upon the

information and data provided under this RFQ and the two (2) allotted site visits per Penn DOT site, not exceeding 3-hour durations per visit, that our team conducted.

Table 3A and 3B provided below summarize total implementation costs and annual savings generated by all Energy Conservation Measures (*Core ECMs + McClure's Additional ECMs*) proposed by McClure Company.

- **Table 3A-** ***Proposed Energy Conservation Measures – "Base" GESA Program: Total Installation Costs and Annual Savings***. Note, McClure's "Base" GESA project presented under Table 3A below has no financial shortfalls and is a fully self-funded GESA program utilizing guaranteed energy savings, O&M "Material" type savings and Act 129 energy rebate dollars.

Table 3A:
Costs & Savings Summary
PA Department of Transportation (Penn DOT) – District 8 GESA Project
"Base" Self-Funded GESA – Core ECMs (Only)

ECM ID	ECM Description	Total Installation Cost ($)	Electric (kWh/Yr)	Electric ($/Yr)	Oil (Gal/Yr)	Oil ($/Yr)	Waste Oil (Gal/Yr)	Waste Oil ($/Yr)	Propane (Gal/Yr)	Propane ($/Yr)	Natural Gas (CCF/Yr)	Natural Gas ($/Yr)	Water (kGal/Yr)	Water ($/Yr)	Rebates / Incentives ($)	Total Cost Savings ($)*
1	Site-Wide LED Lighting	$ 891,240	839,981	$ 97,568											$ 96,441	$ 1,925,230
2	Lighting Controls	*Included as part of ECM 1														
3	Building Envelope Upgrades	$ 194,953	90,460	$ 7,274							12,928	$ 11,758			$ -	$ 317,373
4	Water Conservation Measures	$ 118,818	3,211	$ 379					45	$ 67	366	$ 331	997	$ 11,965	$ -	$ 136,179
5	Building Control Upgrades	$ 77,568	65,273	$ 4,881							2,885	$ 2,624			$ -	$ 153,231
6	Domestic Water Heater (DWH) Upgrades	$ 50,483	122,283	$ 27,751					(5,061)	$ (6,579)	(234)	$ (163)			$ -	$ 188,480
7	Steam Trap Repairs & Improvements	$ 129,535									7,242	$ 6,587			$ -	$ 143,364
8	Exhaust Fan Control	$ 43,649	9,362	$ 753							5,605	$ 5,098			$ -	$ 64,467
9	Adams County Steam to Gas Conversion	$ 202,991	4,381	$ 352							3,589	$ 3,264			$ -	$ 214,577
10	Improvements	$ 64,722	14,267	$ 1,351											$ -	$ 80,340
11	Replacement	$ 58,970	12,815	$ 5,011											$ -	$ 76,796
12	Franklin County Natural Gas Conversion	$ 65,914			7,109	$ 8,886					(5,412)	$ (3,768)			$ -	$ 72,729
13	Upgrades	$ 120,324	11,838	$ 885											$ -	$ 133,047
14	Dauphin Server Farm Operational Upgrades	$ 32,361	68,577	$ 4,743							13,773	$ 12,527			$ -	$ 131,981
	Totals:	$ 2,051,528	1,242,448	$ 150,948	7,109	$ 8,886			-5,016	$ (6,512)	40,742	$ 38,258	997	$ 11,965	$ 96,441	$ 96,441
	DGS Energy Consultant Fee ($):	$ 18,412.00													Escalated:	1%
	Bond Cost ($):	$144,896.00														
	Total Project Cost ($)	$2,214,838														

- **Table 3B-** ***Proposed Energy Conservation Measures – "Option 1" GESA Program: Total Installation Costs and Annual Savings***. Note, McClure's "Option 1" GESA project presented under Table 3B below utilizes a responsible level of annually applied energy savings, O&M "Material type savings, Act 129 energy rebate dollars, and SRECS. In addition, it also includes $5,626,604 in total Energy Related Costs Savings, which are being utilized to further address identified deferred maintenance items and capital improvement needs.

  - Note, Energy Related Cost Savings are a form of stipulated savings requiring capital dollar contribution by Penn DOT for each year over the 18-year project term and can be adjusted to a level of contribution that is acceptable to Penn DOT. McClure's proposed level of Energy Related Costs Savings at this time, and which are included within "Option 1", are based upon Penn DOT's deferred maintenance items and capital improvement needs identified within Bulletin #4, and the additional capital needed to address this work. Penn DOT and DGS feedback regarding the level of Energy Related Costs Savings included within the project model will be incorporated by McClure during the IGA phase, and the scope-of-work adjusted accordingly.

Table 3B:
Costs & Savings Summary
PA Department of Transportation (Penn DOT) – District 8 GESA Project
"Option 1" GESA w/ Energy Related Cost Savings – Core & Additional ECMs

ECM ID	ECM Description	Total Installation Cost ($)	Electric (kWh/Yr)	Electric ($/Yr)	Oil (Gal/Yr)	Oil ($/Yr)	Waste Oil (Gal/Yr)	Waste Oil ($/Yr)	Propane (Gal/Yr)	Propane ($/Yr)	Natural Gas (CCF/Yr)	Natural Gas ($/Yr)	Water (kGal/Yr)	Water ($/Yr)	Rebates / Incentives ($)	Total Cost Savings ($)*
1	Site-Wide LED Lighting	$ 891,240	839,981	$ 97,568											$ 96,441	$ 194,009
2	Lighting Controls	*Included as part of ECM 1														
3	Building Envelope Upgrades	$ 194,953	90,460	$ 7,274							12,928	$ 11,758			$ -	$ 19,032
4	Water Conservation Measures	$ 118,818	3,211	$ 379					45	$ 67	366	$ 331	997	$ 11,965	$ -	$ 12,742
5	Building Control Upgrades	$ 77,568	65,273	$ 4,881							2,885	$ 2,624			$ -	$ 7,505
6	Domestic Water Heater (DWH) Upgrades	$ 50,483	122,283	$ 27,751					(5,061)	$ (6,579)	(234)	$ (163)			$ -	$ 21,009
7	Steam Trap Repairs & Improvements	$ 129,535									7,242	$ 6,587			$ -	$ 6,587
8	Exhaust Fan Control	$ 43,649	9,362	$ 753							5,605	$ 5,098			$ -	$ 5,851
9	Adams County Steam to Gas Conversion	$ 202,991	4,381	$ 352							3,589	$ 3,264			$ -	$ 3,616
10	Improvements	$ 64,722	14,267	$ 1,351											$ -	$ 1,351
11	Replacement	$ 58,970	12,815	$ 5,011											$ -	$ 5,011
12	Franklin County Natural Gas Conversion	$ 65,914			7,109	$ 8,886					(5,412)	$ (3,768)			$ -	$ 5,118
13	Upgrades	$ 120,324	11,838	$ 885											$ -	$ 885
14	Dauphin Server Farm Operational Upgrades	$ 32,361	68,577	$ 4,743							13,773	$ 12,527			$ -	$ 17,270
15	Waste Oil Heater Conversion	$ 155,333					10,821	$ 2,705			14,266	$ 12,975			$ -	$ 15,680
16	Window Film Improvements	$ 15,040	14,097	$ 1,134											$ -	$ 1,134
17	Destratification Fan Improvements	$ 223,591									20,780	$ 18,899			$ -	$ 18,899
18	Solar	$ 2,302,794		$ 123,914											$ -	$ 123,914
19	Electric Vehicle Charging Stations	$ 94,236													$ -	$ -
20	Bulletin 4 Deficiencies	$ 1,931,741													$ -	$ -
21	Fleet Management Roof Replacement	$ 1,371,539									3,131	$ 2,662			$ -	$ 2,662
	Totals:	$ 8,145,804	$1,256,545	$ 275,996	$ 7,109	$ 8,886	$10,821	$ 2,705	$(5,016)	$ (6,512)	$ 78,919	$ 72,794	$ 997	$ 11,965	$ 96,441	$ 462,275
	DGS Energy Consultant Fee ($):	$ 492,156													Escalated:	1%
	Bond Cost ($):	$ 56,802														
	Total Project Cost ($)	$ 8,694,762														

McClure Company commits that the total energy savings projected in the final scope of work will be at least 95% of the savings projected in this Quote proposal, the actual ECM costs shall be within 10% of the costs listed within the CEA, and that this project will be self-funded over the financial term of the project (maximum term of 18 years).

D.1-d The Degree to Which the Proposal Demonstrates the Technical Feasibility, Suitability, Reasonableness, Comprehensiveness and Acceptability of the Proposed ECMs

McClure's evaluation of the proposed energy conservation measures (ECMs) includes the technical feasibility, suitability, reasonableness, comprehensiveness and acceptability as demonstrated below. For transparency purposes, McClure has included the proposed equipment and level of quality of the equipment for the proposed savings.

The ***Technical Feasibility*** of the proposed ECMs was taken from McClure's vast energy project experience on past projects implemented across the Commonwealth. Many of the ECMs proposed were designed specifically for the required building application. The lighting scope was also customized for office and public-space facilities, interior and exterior applications, to ensure light levels met code requirements. While the systems proposed were created with Penn DOT specifically in mind, these system types have been instituted across other McClure facility projects implemented throughout the Commonwealth. With our direct knowledge and experience of design, implementation, and post construction monitoring and servicing of these systems, McClure's Design/Build expertise and comfort in servicing these systems ensures a successful final GESA project that will sustainably generate savings for Penn DOT over the long-term.

The ***Suitability*** of the ECMs proposed will be reviewed with Penn DOT during the Investment Grade Audit phase of the project. From initial kick-off meeting, to interim and bi-weekly meetings, and the final close-out meeting, McClure will maintain open communication with Penn DOT staff and stakeholders to ensure the proposed ECMs are suitable and align with both Penn DOT's operations, goals, needs, and future facility requirements.

The ***Reasonableness*** of the ECMs proposed will be identified, quantified and communicated to the project team through a variety of metrics. These metrics will ensure optimization of an ECM at each level, from each unit component to the full system application. This protocol is essential to ensuring that the ECMs proposed not only meet the goals of Penn DOT and the Commonwealth over the long-term but are also reasonable and make implementation sense from multiple metric aspects.

The ***Comprehensiveness*** of the ECMs proposed starts with the Investment Grade Audit (IGA). McClure understands that the scope of each ECM shall not be applied without careful monitoring; that significant due diligence analysis and understanding of the client's operation needs to be taken into consideration for all future ECMs. A blanket solution is not always viable or may not make financial or physical sense. McClure's approach to ECM identification and scope determination is comprehensive, time intensive, and extensive. Not only is every ECM system reviewed, but each system component is carefully analyzed, measured, metered and/or evaluated for reasonableness, suitability and technical

feasibility, including interaction with other measures. This upfront peer review and quality control process ensures that a fully customized scope is produced through our Investment Grade Audit, in addition to multiple ECM options presented to Penn DOT and the Commonwealth for consideration.

The ***Acceptability*** of the ECMs proposed is an important step for a successful project. A kick-off meeting, interim meeting(s) and final meeting will ensure the ECMs proposed are suitable for Penn DOT and Commonwealth staff's goals, needs, and future facility requirements.

D.1-e Training for Penn DOT Personnel

McClure will provide extensive training to the Penn DOT staff on all newly installed systems and technology. Below is a summary of the training scope that will be provided to Penn DOT personnel. If preferred, this training may also be videotaped for future Penn DOT use. Each training seminar will review the basic operational and maintenance (O&M) practices, introducing new technology and procedures to Penn DOT staff. The training seminars, along with the documentation, will be coordinated with Penn DOT staff and will be fully customized to meet the goals and needs of Penn DOT.

Training scope selection is paramount for a successful energy savings project. To achieve long-term success of ECM system operability and savings potential, the in-house maintenance personnel must have an understanding of the ECM design and be capable of operating the equipment, especially in emergency situations. The initial training we provide to Penn DOT staff includes a comprehensive review of each ECM. This review will include an explanation of the energy savings expected with each ECM, a description of the construction that was included to achieve the savings, and O&M procedures of the new equipment. McClure's Project Development Engineer will provide this training due to their direct knowledge and understanding of the overall scope. Training is the most important component for an energy project to ensure long-term success. During project commissioning and closeout, training will be customized for each ECM system.

Penn DOT Personnel being provided the training shall be a necessary component for project closeout and throughout the life of the contract. McClure Company will provide a qualified instructor on all new energy conservation measure (ECM) systems. We have the ability to train personnel both on and off-site, including the use of our local Harrisburg headquarters, based upon preference. Onsite training allows all training session to be attended by all applicable Penn DOT personnel. To ensure increased training outreach, there is no limitation on the number of personnel allowed to attend any training class. Onsite training is proposed for all ECM's.

A videotape of the training may also be provided for future training use. In addition, McClure Company can also provide an on-going annual training program which can be used to provide training to new employees or provide assistance to the maintenance staff to resolve any on-going issues. McClure Company will provide sixty (60) annual hours of consultative services. The intention of these annual hours is to demonstrate expected system operation, system calibration, troubleshooting problems for the purpose of training in house personnel. These hours could also be used to provide training to new employees on systems that training had previously occurred at project close-out. The amount and use of these annual training hours will be determined during the Investment Grade Audit (IGA) phase.

D.1-f Methodology & Explanation of Proposed ECMs

McClure's methodology towards developing our proposed Energy Conservation Measures (ECMs) is based upon the needs and priorities of our clients, such as those specified by the RFQ's Core ECMs (Appendix S), future facility projects defined by Penn DOT under Bulletin #4, and other critical needs our team identified through site inspection of Penn DOT facilities. In parallel to tailoring this GESA program to Penn DOT's needs and expectations, we separately evaluate all ECM opportunities for energy and cost savings potential while identifying efficiency strategies that compliment and/or optimize Penn DOT operations for the long-term, and further reduce carbon and greenhouse gas emissions. We utilize industry proven best practices while applying "lessons learned" experience, earned from our implementation of over 200 PA GESA programs, to help guide our equipment / technology selections, streamline schedules, and ensure quality installations. McClure will maintain open communication and prepare various ECM scope and program options for Penn DOT's consideration throughout the IGA process, thus ensuring the program is customized to its unique needs and requirements.

From complex mechanical, HVAC and direct digital control (DDC) systems to LED lighting, roofing, windows and other customized measures, our staff will provide detailed explanation and rationale for all ECMs. Manufacturer "cut sheets" for all proposed equipment, material and technology; detailed energy savings calculations along with complete explanation of

IPMVP based M&V option being utilized for each ECM; and comprehensive equipment listings with O&M manuals, including lighting line-by-line installation data and as-built drawings, will be furnished to Penn DOT to ensure the entire scope is thoroughly explained and documented. Based within our local Harrisburg headquarters, McClure professionals are readily available to provide detailed explanation of any/all ECMs implemented under this GESA program; capable of clarifying any scope-of-work or provide additional training or insight into the operation of each system and deployed technologies.

D.1-g Additional Innovative Energy Conservation Measures Not Already Included in the Project

ECM 15: Waste Oil Heater Conversion

Existing Conditions

The County Office Garages and Fleet Management Garage change the oil and hydraulic fluid on the vehicles. These waste oils are collected in storage tanks and collected by a third party at a cost to the using agency.

Proposed Solution

McClure Company recommends the installation of a waste oil unit heater in the large garage bays, near the waste oil tank. The unit shall be controlled by an automatic transfer signal when tanks are fuel of waste oil.

Assumptions

During the IGA phase the following assumptions will be verified.

- Waste oil dumped in tank is engine oil and hydraulic oil compatible with burner.
- The amount of waste oil generated at each site per year.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results from on-site generation fuel source being used over natural gas, and the elimination for cost of collection and disposal by third party.

Savings:

- 10,821 Gal of Waste Oil Collected
- 14,266 CCF of Natural Gas

ECM 16: Window Film Improvements

Existing Conditions

The existing windows in each of the selected buildings are of typical single or double pain window design with no glazing or treatment to help reduce heat and solar gain into the buildings.

Proposed Solution

Traditional window tinting only gives the glass minimal insulating properties. New window film added to existing windows can change those properties of the window and add up to 92% more insulating power. The new window film is developed with a low-emissivity (low-e) coating which blocks solar energy and radiation for penetrating into the building in the summer and holding warmth within the building in the winter. The resulting affect is a much more efficient building where the HVAC system can work at a higher efficiency.

Assumptions

During the IGA phase the following assumptions will be verified.

- All window treatments will be placed on (36) windows at the I-81 rest stops.

Annual Savings / Benefits

Energy saving are calculated by taking into consideration the existing shading coeffect of clear double pane glass and replace it with the new shading coefficient of the windows film coated glass. Other benefits besides savings are the increased comfort inside the building, and the ability for the HVAC equipment to run less hours in order to maintain temperature.

Savings:

- 14,097 kWh

ECM 17: Destratification Fan Improvements

Existing Conditions

The County Office Garages and Fleet Management Garages are constructed with high ceilings. During winter hot air stratifies at the ceiling level, and space heaters waste energy putting additional heat into the space when enough heat exists above the occupant level.

Proposed Solution

McClure Company recommends the installation of destratification fans to move the heated air from the ceiling to the occupied zone. The fans will have automatic temperature controls at the ceiling at occupant levels. These fans can also operate in the summer and aid increasing comfort. This would be used for the garages utilizing forced air heat as the main heating source.

Assumptions

During the IGA phase the following assumptions will be verified.

- Structure supports fan installation
- Sites 5,8,9,10,12, and 13 use unit heaters, while Sites 1 and 2 are radiant heating.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results from reduced energy losses of heated air at the ceiling, and increased heat input into the space.

Savings:

- 20,780 CCF of Natural Gas

ECM 18: Solar

Existing Conditions

Currently none of the site surveyed appeared to have any solar. Although no solar was present, the sites offer ample space to add solar PV fields.

Proposed Solution

McClure Company recommends the installation of Solar PV fields on the roofs of the County Offices, Fleet Management Building, and ground mounted systems at the rest areas making them Net Zero.

Assumptions

During the IGA phase the following assumptions will be verified.

- Roofs can accept the solar fields.
- System sizes are acceptable for the proposed loads in the buildings.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results from on-site electric generation through Solar.

Rate Savings:

- $123,914 Cost Savings Per Year

ECM 19: Electric Vehicle Charging Station

Existing Conditions

The fleet management building currently has a section designated for electric vehicle (EV) charging. However, that is a private facility that residents and commuters cannot access. Placing EV charging stations at the rest stops and welcome centers would provide motorist another location to stop and charge.

Proposed Solution

McClure Company proposes the installation of Level 2 EV charging stations at the (2) rest areas and (2) Welcome Centers.

Assumptions

During the IGA phase the following assumptions will be verified.

- Charges can be placed within 100 feet of an existing electric source.

Annual Savings / Benefits

No energy savings have been assumed at this time however offering charging at a cost could provide PennDOT with additional capital.

ECM 20: Bulletin 4 Deficiencies

Existing Conditions

PennDOT released Bulletin 4 which identified additional deficiencies in the region buildings that need to be addressed.

Proposed Solution

McClure Company proposes an allowance of cost to implement and complete all of the deficiencies identified within Bulletin 4.

Assumptions

During the IGA phase the following assumptions will be verified.

- Quantities and complete scope of each item.

Annual Savings / Benefits

No energy savings have been assumed at this time.

ECM 21: Fleet Management Roof Replacement

Existing Conditions

During our surveys it was identified that the Fleet Management Building was in need of a roof replacement.

Proposed Solution

McClure Company recommends the replacement of the existing EPDM roof on the Fleet Management building with a new EPDM rubber roof with insulation values that meet current code. In addition, the roof would be set up to handle the new Solar Systems recommended as part of ECM-18.

Assumptions

During the IGA phase the following assumptions will be verified.

- Core samples will be taken to confirm existing R-Value of Roof
- Determination of which skylights and roof equipment need to remain.

Annual Savings / Benefits

Energy and conservation savings associated with this measure are results increased insulation values in the roof

Savings:
3,131 CCF of Natural Gas

Costs

D.1-h Annual Financial Projections

Utilizing the RFQ provided Cash Flow Templates, please find McClure Company's annual financial projections for both the "Base" and "Option 1" GESA Program options modeled to 18-year contract terms presented on the following pages. These projections provide various project options available to Penn DOT, and are presented as:

- ***Table 4A: Annual Financial Cash Flow – "Base" Self-Funded GESA – Core ECMs (Only)***
- ***Table 4B: Costs & Savings Summary – "Base" Self-Funded GESA – Core ECMs (Only)***
- ***Table 4C: Annual Financial Cash Flow – "Option 1" GESA w/ Energy Related Cost Savings – Core & Additional ECMs***
- ***Table 4D: Costs & Savings Summary – "Option 1" GESA w/ Energy Related Cost Savings – Core & Additional ECMs***

Our cash-flow and annual financial projections are prepared in accordance to the format and requirements defined by the RFQ. All energy savings presented on these tables are guaranteed directly by McClure Company. McClure's proposal fully encompasses the RFQ defined Core ECMS, thus an "ECMs Evaluated but not Included" table is not applicable and is not included.

- Note, Energy Related Cost Savings included within "Option 1" are a form of stipulated savings requiring capital dollar contribution by Penn DOT for each year over the 18-year project term and can be adjusted to a level of contribution that is acceptable to Penn DOT. McClure's proposed level of Energy Related Costs Savings ("Option1") at this time are based upon Penn DOT's deferred maintenance items and capital improvement needs identified within Bulletin #4, and the additional capital needed to address this work. Penn DOT and DGS feedback regarding the level of Energy Related Costs Savings included within the project model will be incorporated by McClure during the IGA phase, and the scope-of-work adjusted accordingly.

Detailed energy and cost calculations for each ECM can be found in **Attachment 2**. For purposes of developing this proposal and the many assumed variables at this phase of the project, we have de-rated the calculated savings for an added level of conservatism. When the Investment Grade Audit (IGA) is conducted, many variables will be measured and verified and the savings will be adjusted accordingly.

Table 4A: Annual Financial Cash Flow – "Base" Self-Funded GESA – Core ECMs (Only)

Table 4A: Annual Financial Cash Flow
"Base" Self-Funded GESA – Core ECMs (Only)
PA Department of Transportation (Penn DOT) – District 8 GESA Project
4% Rate / 18 Year Term

	Total Project Cost:	$ 2,214,838			Interest Rate:	4%
	Rebates /Incentives:	$ 96,441			Annual Utility Escalation Rate:	1%
Net Project Cost to be Financed:		$ 2,118,397			Construction Period (Months):	12
First Year Energy Savings:		$ 210,041			Payment Frequency:	Annual

Year	A Annual Energy Costs without Improvements	B Annual Energy Costs with Improvements	C Annual Energy Cost Savings (A-B)	D O&M (Includes ACT 129)	E Total Savings (C + D)	F Payments for Financing Equipment	G Energy Related Cost Savings	H Payments for Monitoring & Maintenance Services	I Net Annual Benefit	J Cumulative Cash Flow
Const.	$387,171	$285,882	$101,289		$101,289		$0		$101,289	$101,289
1	$391,043	$186,439	$204,603	$62,177	$266,780	$173,789	$0	$8,000	$84,991	$186,280
2	$394,953	$188,304	$206,649	$62,316	$268,966	$173,789	$0	$8,000	$87,177	$273,457
3	$398,903	$190,187	$208,716	$14,237	$222,952	$173,789	$0	$8,000	$41,164	$314,621
4	$402,892	$192,089	$210,803	$14,379	$225,182	$173,789	$0		$51,393	$366,014
5	$406,921	$194,009	$212,911	$14,523	$227,434	$173,789	$0		$53,645	$419,659
6	$410,990	$195,950	$215,040		$215,040	$173,789	$0		$41,251	$460,910
7	$415,100	$197,909	$217,191		$217,191	$173,789	$0		$43,402	$504,312
8	$419,251	$199,888	$219,363		$219,363	$173,789	$0		$45,574	$549,886
9	$423,443	$201,887	$221,556		$221,556	$173,789	$0		$47,767	$597,653
10	$427,678	$203,906	$223,772		$223,772	$173,789	$0		$49,983	$647,636
11	$431,954	$205,945	$226,009		$226,009	$173,789	$0		$52,221	$699,857
12	$436,274	$208,004	$228,270		$228,270	$173,789	$0		$54,481	$754,337
13	$440,637	$210,084	$230,552		$230,552	$173,789	$0		$56,763	$811,101
14	$445,043	$212,185	$232,858		$232,858	$173,789	$0		$59,069	$870,170
15	$449,494	$214,307	$235,186		$235,186	$173,789	$0		$61,398	$931,567
16	$453,988	$216,450	$237,538		$237,538	$173,789	$0		$63,749	$995,317
17	$458,528	$218,615	$239,914		$239,914	$173,789	$0		$66,125	$1,061,441
18	$463,114	$220,801	$242,313		$242,313	$173,789	$0		$68,524	$1,129,965
Totals:	$8,057,375	$3,942,842	$4,114,533	$167,631	$4,282,164	$3,128,198	$0	$24,000	$1,129,965	

NPV of Cashflow (Column I): $794,703.44

Table 4B: Costs & Savings Summary – "Base" Self-Funded GESA – Core ECMs (Only)

Table 4B: Costs & Savings Summary
"Base" Self-Funded GESA – Core ECMs (Only)
PA Department of Transportation (Penn DOT) – District 8 GESA Project
4% Rate / 18 Year Term

ECM Chart

Project Column Description
A: Construction cost to supply, install and start-up ECM
B: Preliminary Calculated Utility Rebate
C: Preliminary Calculated Energy Savings
D: Operation and Maintenance (O&M) Savings (provided in RFQ)
E: C + D
F: (B - C) / E
G: Calculated Utility Savings (energy constant by ESCO)
H: Additional Funds Needed Annually for 18 Year Simple Payback

Self Funded Project (18 Year Payback)

ECM #	ECM Description	A	B	C	D	E	F	G Annual Utility Savings					H
		Construction Cost	Utility Rebate	Annual Energy Savings	O&M Savings	Total Energy and O&M Savings	Simple Payback	Natural Gas (MCF)	Electric (kWh)	Water / Sewer (Kgal)	Propane (Gal)	Oil (Gal)	Annual SPB Shortfall
1	Site-Wide LED Lighting	$891,240	$96,441	$97,568	$71,190	$168,758	5.3						
2	Lighting Controls	*Included at part of ECM 1											
3	Building Envelope Upgrades	$194,953		$19,032		$19,032	10.2	1,293	90,460				
4	Water Conservation Measures	$118,818		$12,742		$12,742	9.3	37	3,211	997	45		
5	Building Control Upgrades	$77,568		$7,505		$7,505	10.3	289	65,273				
6	Domestic Water Heater (DWH) Upgrades	$50,483		$21,009		$21,009	2.4	(23)	122,283		(5,061)		
7	Steam Trap Repairs & Improvements	$129,535		$6,587		$6,587	19.7	724					
8	Exhaust Fan Control	$43,649		$5,851		$5,851	7.5	561	9,362				
9	Adams County Steam to Gas Conversion	$202,991		$3,616		$3,616	56.1	359	4,381				
10	Cumberland County Radiant Heater Improvements	$64,722		$1,351		$1,351	47.9		14,267				
11	Cumberland Road Stops #45 & #46 Toilet Replacement	$58,970		$5,011		$5,011	11.8		12,815				
12	Franklin County Natural Gas Conversion	$65,914		$5,118		$5,118	12.9	(541)				7,109	
13	Dauphin County Chilled Water System Upgrades	$120,324		$885		$885	136.0		11,838				
14	Dauphin Server Farm Operational Upgrades	$32,361		$17,270		$17,270	1.9	1,377	68,577				
	Bond Cost	$18,412											
	Energy Consultant Fee (4%)	$144,896											
	Totals:	$2,214,838	$96,441	$203,545	$71,190	$274,735	8.1	$4,074	$402,467	$997	-$5,016	$7,109	$0

Utility Rebates	$96,441
Energy Related Cost Savings	$0
Total Financed Amount	$2,118,397

Table 4C: Annual Financial Cash Flow – "Option 1" GESA w/ Energy Related Cost Savings – Core & Additional ECMs

Table 4C: Annual Financial Cash Flow
"Option 1" GESA w/ Energy Related Cost Savings – Core & Additional ECMs
PA Department of Transportation (Penn DOT) – District 8 GESA Project
4% Rate / 18 Year Term

	Total Project Cost:	$ 8,694,762			Interest Rate:	4%
	Rebates /Incentives:	$ 96,441			Annual Utility Escalation Rate:	1%
Net Project Cost to be Financed:		$ 8,598,321			Construction Period (Months):	12
First Year Energy Savings:		$ 348,532			Payment Frequency:	Annual

Year	A Annual Energy Costs without Improvements	B Annual Energy Costs with Improvements	C Annual Energy Cost Savings (A-B)	D O&M (Includes ACT 129)	E Total Savings (C + D)	F Payments for Financing Equipment	G Energy Related Cost Savings	H Payments for Monitoring & Maintenance Services	I Net Annual Benefit	J Cumulative Cash Flow
Const.	$387,171	$213,278	$173,893		$173,893				$173,893	$173,893
1	$391,043	$42,511	$348,532	$62,177	$410,709	$682,241	$312,589	$21,000	$20,057	$193,950
2	$394,953	$42,936	$352,017	$62,316	$414,334	$682,241	$312,589	$21,000	$23,682	$217,633
3	$398,903	$43,365	$355,538	$14,237	$369,774	$682,241	$312,589	$21,000	-$20,877	$196,755
4	$402,892	$43,799	$359,093	$14,379	$373,472	$682,241	$312,589		$3,820	$200,575
5	$406,921	$44,237	$362,684	$14,523	$377,207	$682,241	$312,589		$7,555	$208,131
6	$410,990	$44,679	$366,311		$366,311	$682,241	$312,589		-$3,341	$204,790
7	$415,100	$45,126	$369,974		$369,974	$682,241	$312,589		$322	$205,112
8	$419,251	$45,577	$373,674		$373,674	$682,241	$312,589		$4,022	$209,134
9	$423,443	$46,033	$377,410		$377,410	$682,241	$312,589		$7,759	$216,893
10	$427,678	$46,493	$381,184		$381,184	$682,241	$312,589		$11,533	$228,426
11	$431,954	$46,958	$384,996		$384,996	$682,241	$312,589		$15,345	$243,771
12	$436,274	$47,428	$388,846		$388,846	$682,241	$312,589		$19,195	$262,966
13	$440,637	$47,902	$392,735		$392,735	$682,241	$312,589		$23,083	$286,049
14	$445,043	$48,381	$396,662		$396,662	$682,241	$312,589		$27,011	$313,059
15	$449,494	$48,865	$400,629		$400,629	$682,241	$312,589		$30,977	$344,036
16	$453,988	$49,353	$404,635		$404,635	$682,241	$312,589		$34,983	$379,020
17	$458,528	$49,847	$408,681		$408,681	$682,241	$312,589		$39,030	$418,050
18	$463,114	$50,345	$412,768		$412,768	$682,241	$312,589		$43,117	$461,166
Totals:	$8,057,375	$1,047,113	$7,010,262	$167,631	$7,177,893	$12,280,331	$5,626,604	$63,000	$461,166	

NPV of Cashflow (Column I): $334,992.94

Table 4D: Costs & Savings Summary – "Option 1" GESA w/ Energy Related Cost Savings – Core & Additional ECMs

Table 4D: Costs & Savings Summary
"Option 1" GESA w/ Energy Related Cost Savings – Core & Additional ECMs
PA Department of Transportation (Penn DOT) – District 8 GESA Project
4% Rate / 18 Year Term

ECM Chart

Project Column Description
A: Construction cost to supply, install and start-up ECM
B: Preliminary Calculated Utility Rebate
C: Preliminary Calculated Energy Savings
D: Operation and Maintenance (O&M) Savings (provided in RFQ)
E: C + D
F: (B - C) / E
G: Calculated Utility Savings (energy constant by ESCO)
H: Additional Funds Needed Annually for 18 Year Simple Payback

Proposed Project With Energy Related Cost Savings (18 Year Payback)

		A	B	C	D	E	F	G Annual Utility Savings						H
ECM #	ECM Description	Construction Cost	Utility Rebate	Annual Energy Savings	O&M Savings	Total Energy and O&M Savings	Simple Payback	Natural Gas (MCF)	Electric (kWh)	Water / Sewer (Kgal)	Propane (Gal)	Waste Oil (Gal)	Oil (Gal)	Annual SPB Shortfall
1	Site-Wide LED Lighting	$891,240	$96,441	$97,568	$71,190	$168,758	5.3							
2	Lighting Controls	*Included at part of ECM 1												
3	Building Envelope Upgrades	$194,953		$19,032		$19,032	10.2	1,293	90,460					
4	Water Conservation Measures	$118,818		$12,742		$12,742	9.3	37	3,211	997	45			
5	Building Control Upgrades	$77,568		$7,505		$7,505	10.3	289	65,273					
6	Domestic Water Heater (DWH) Upgrades	$50,483		$21,009		$21,009	2.4	(23)	122,283		(5,061)			
7	Steam Trap Repairs & Improvements	$129,535		$6,587		$6,587	19.7	724						
8	Exhaust Fan Control	$43,649		$5,851		$5,851	7.5	561	9,362					
9	Adams County Steam to Gas Conversion	$202,991		$3,616		$3,616	56.1	359	4,381					
10	Cumberland County Radiant Heater Improvements	$64,722		$1,351		$1,351	47.9		14,267					
11	Cumberland Road Stops #45 & #46 Toilet Replacement	$58,970		$5,011		$5,011	11.8		12,815					
12	Franklin County Natural Gas Conversion	$65,914		$5,118		$5,118	12.9	(541)					7,109	
13	Dauphin County Chilled Water System Upgrades	$120,324		$885		$885	136.0		11,838					
14	Dauphin Server Farm Operational Upgrades	$32,361		$17,270		$17,270	1.9	1,377	68,577					
15	Waste Oil Heater Conversion	$155,333		$ 15,680		$15,680	9.9	1,427				10,821		
16	Window Film Improvements	$15,040		$ 1,134		$1,134	13.3		14,097					
17	Destratification Fan Improvements	$223,591		$ 18,899		$18,899	11.8	2,078						
18	Solar	$2,302,794		$ 123,914		$123,914	18.6							
19	Electric Vehicle Charging Stations	$94,236												
20	Bulletin 4 Deficiencies	$1,931,741												
21	Fleet Management Roof Replacement	$1,371,539		$ 2,662		$2,662	515.2	313						
	Bond Cost	$56,802												
	Energy Consultant Fee (4%)	$492,156												
	Totals:	$8,694,762	$96,441	$365,834	$71,190	$437,024	19.9	$7,892	$416,564	$997	-$5,016		$7,109	$0

Utility Rebates	$96,441
Energy Related Cost Savings	$5,626,604
Total Financed Amount	$8,598,321

D.1-i Energy Analysis Demonstrates Sound Engineering Principles and the Reasonableness of the Proposed Savings

McClure Company has provided detailed energy analysis and calculations under industry accepted "best practices" and standards, demonstrating sound engineering principles that yield reasonable savings expectations for a project of this scope and magnitude. Our detailed energy analysis can be found in **Attachment 2 – Energy Calculations**, located at the end of this Volume.

Sound engineering principles and industry "best practices" were utilized to analyze all provided data and perform associated energy saving calculations relating to the Penn DOT GESA project. One internal process utilized by McClure is to compare cost reductions of this proposal to other past GESA projects having a similar scope. McClure's proposed cost savings (Self-Funded "Base" Scope of Work) for Penn DOT reduces the baseline annual utility expenses by $202,578, or 52.3%. This project falls into GESA project costs savings range of 40%-60% for primarily fuel switch and LED conversion-based projects.

Monitoring and Maintenance

D.1-j Ongoing Monitoring and Maintenance Services

Provided below is a thorough summary of the ongoing project monitoring and maintenance services that McClure will provide, including a description of the methods, schedule, scope and personnel who will be providing these services to Penn DOT. Per the RFQ, there is no service contract included at this time.

Methods for providing ongoing project monitoring and maintenance services through McClure Company are extensive. McClure will monitor the energy use of each facility throughout the construction year. This benchmarking provides an early indicator of whether the Year 1 savings will be fully realized, or if adjustments to ECM scope are needed

For ongoing maintenance services, McClure has an in-house 24-hour mechanical emergency service department ready to respond to Penn DOT needs over the entire contract term. Our local service team consists of over ninety (90) full time field service and maintenance technicians.

Scope for ongoing project monitoring is included for all proposed energy conservation measures (ECMs) and associated equipment, including lighting, lighting controls, building management system and components, and all building envelope installations. Utilizing industry approved "best practices" and standards, McClure will measure and verify the associated savings for each ECM. The goal is to successfully measure and cost-effectively verify the energy savings calculated, in accordance with the selected International Performance Measurement and Verification Protocol (IPMVP) Option, one year after the systems being installed.

Personnel for the ongoing project monitoring are critical in quantifying and calculating the total energy savings associated with the project. Richard Skinner, P.E., McClure's Measurement and Verification (M&V) manager, will be the supervisor responsible for all ongoing project monitoring. Shayne Homan, Vice President - Energy Services, will oversee Richard's work and manages the entire process.

D.1-k Measurement and Verification

McClure Company's proposed Measurement and Verification (M&V) plan for the Penn DOT GESA project, which adheres to all IPMVP standards, is further described below. Our plan demonstrates scalability for measurement and verification of the proposed energy baseline, adjustment factors and energy cost savings. To ensure Penn DOT receives the greatest value from its M&V plan, McClure considered the reasonableness and cost/benefits of all IPMVP options for each respective ECM and based our plan recommendations upon the overall suitability to the applicable ECM and cost effectiveness to Penn DOT over the contract term.

McClure's M&V Plan Adheres to all IPMVP Standards. Information presented below includes procedures and guidelines utilized to quantify savings resulting from the installation of ECMs under PA GESA projects, and are designed to comply with the International Performance Measurement & Verification Protocol (IPMVP) being utilized for this Penn DOT GESA program:

- **Option A – Partially Measured Retrofit Isolation**

- **Option B – Retrofit Isolation**
- **Option C – Utility Bill Comparison** *(where applicable)*
- **Option D – Computer Simulation**

ECM-1	Site-Wide LED Lighting	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-2	Lighting Controls		*Included as part of ECM 1
ECM-3	Building Envelope Upgrades	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-4	Water Conservation Measures	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-5	Building Control Upgrades	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-6	Domestic Water Heater (DWH) Upgrades	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-7	Steam Trap Repairs & Improvements	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-8	Exhaust Fan Control	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-9	Adams County Steam to Gas Conversion	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-10	Cumberland County Radiant Heater Improvements	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-11	Cumberland Road Stops #45 & #46 Toilet Replacement	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-12	Franklin County Natural Gas Conversion	IPMVP Option A/Option C as applicable	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM. The utility bills can be used to verify results obtained by Option A
ECM-13	Dauphin County Chilled Water System Upgrades	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-14	Dauphin Server Farm Operational Upgrades	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-15	Waste Oil Heater Conversion	IPMVP Option A/Option C as applicable	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM. The utility bills can be used to verify results obtained by Option A
ECM-16	Window Film Improvements	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-17	Destratification Fan Improvements	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.
ECM-18	Solar	IPMVP Option D	In order to determine savings for solar, it requires computer modeling. The computer model can determine kWh output and provide savings before actual installation.
ECM-19	Electric Vehicle Charging Stations	No Savings Associated with ECM	
ECM-20	Bulletin 4 Deficiencies	No Savings Associated with ECM	
ECM-21	Fleet Management Roof Replacement	IPMVP Option A	Not all components of the buildings are being touched or replaced. Spot measurements and stipulated variables most accurately determine savings for the specific ECM.

During the post-installation M&V verification process, McClure Company and Penn DOT will mutually agree that the proper equipment components or systems were installed as contracted, are operating correctly and as specified, and have the potential to generate the projected savings. Verification methods may include surveys, inspections and/or continuous

metering of equipment and systems. A critical step in the process will commence during system/equipment commissioning of each installed ECM, which McClure will coordinate with Penn DOT staff, representatives from DGS and installing subcontract partners. McClure Company and Penn DOT will determine energy savings in accordance with an agreed-upon M&V method using verification techniques defined within this M&V plan.

The Scalability for the Measurement and Verification Plan of the Proposed Energy Baseline, Adjustment Factors and Energy Cost Savings will be quantified and mutually agreed to between Penn DOT, DGS and McClure Company. McClure's M&V plan is scalable, from one ECM's measurement and verification criteria to the entire program and portfolio of ECMs. Scaling allows McClure's team to separately measure each ECM and calculate the aggregate of savings attributed to the program. Below is a summary of the scalability components of the plan:

- ***Proposed Energy Baseline*:** During the performance period, it may be necessary to adjust the baseline for changes in the facilities use. Some common adjustments are made for items such as:
  - Changes in building occupancy
  - Additions to the building footprint
  - Weather
  - Operational (schedule and /or temperature set point, equipment operation, etc) changes
  - Equipment maintenance changes
- ***Energy Cost Savings:*** To calculate the energy cost savings, McClure will conduct building surveys, monitor the facilities for occupation and usage, and verify energy savings. There are four industry-accepted options to verifying energy savings that were created as part of the International Performance Measurement and Verification Protocol (IPMVP); Option A, B, C & D. A summary explanation of these four options are presented on the following page. These industry standards will be utilized to determine and justify guaranteed energy cost savings associated with the PENN DOT GESA program.

The Basis of McClure's M&V Plan:

Summary Description of International Performance Measurement & Verification Protocol (IPMVP) Options

Measurement and Verification Options	Description	Examples
Option A—Retrofit Isolation with Key Parameter Measurement	This option is based on a combination of measured and estimated factors. Measurements are short-term, periodic, or continuous, and are taken at the component or system level for both the baseline and the retrofit equipment. Measurements should include the key performance parameters that define the energy use of the energy conservation measure. Estimated factors are supported by historical or manufacturers' data. Savings are determined by means of engineering calculations of baseline and reporting period energy use based on measured and estimated values.	Lighting retrofit projects. The key parameters are the power draws of the baseline and retrofit light fixtures. The operating hours are estimated based on facility use and occupant behavior. Energy savings are calculated as the difference in power draw multiplied by the operating hours.
Option B—Retrofit Isolation with All Parameter Measurement	This option is based on short-term, periodic, or continuous measurements of baseline and post-retrofit energy use (or proxies of energy use) taken at the component or system level. Savings are determined from analysis of baseline and reporting-period energy use or proxies of energy use.	Installation of a variable-speed drive and associated controls on an electric motor. Electric power is measured with a meter installed on the electrical supply to the motor. Power is measured during the baseline period to verify constant loading. The meter remains in place throughout the post-retrofit period to measure energy use. Energy savings are calculated as the pre-retrofit energy use (adjusted to correspond to the length of the reporting period) minus the measured energy use during the reporting period.
Option C—Whole-Facility Measurement	This option is based on continuous measurement of energy use (such as utility billing data) at the whole facility or sub-facility level during the baseline and post-retrofit periods. Savings are determined from analysis of baseline and reporting-period energy data. Regression analysis is conducted to correlate energy use with independent variables such as weather and occupancy. Because this option requires a detailed inventory of all equipment included in the meter reading (as well as knowledge of equipment use patterns, building occupancy, and other factors affecting energy use), it is rarely used in federal projects. It can be appropriate for short periods or where equipment included in the meter reading is limited or can be controlled.	Replacement of a gas boiler. Using billed natural gas use data for 12 months during the baseline period, a baseline regression model is developed of monthly natural gas use with monthly heating degree days. Given the monthly heating degree days in a typical year at the site, the baseline model is used to determine baseline gas use in a typical year. Annually during the post-retrofit period a similar regression model is developed using billed natural gas and heating degree day data from the previous 12-month period. The reporting-period model is normalized to determine natural gas use in a typical year. Savings are defined as the normalized baseline gas use minus the normalized reporting-period gas use.
Option D—Calibrated Computer Simulation	Computer simulation software is used to model energy performance of a whole facility (or sub-facility). Models must be calibrated with actual hourly or monthly billing data from the facility. Implementation of simulation modeling requires engineering expertise. Inputs to the model may include facility characteristics; performance specifications of new and existing equipment or systems; engineering estimates; spot, short-term, or long-term measurements of energy use of system components; and long-term whole-building utility meter data. After the model has been calibrated, savings are determined by comparing a simulation of the baseline with either a simulation of the performance period or actual utility data.	Comprehensive retrofit involving multiple interactive conservation measures in a large building. A simulation model of the building with baseline equipment is developed and calibrated to a minimum of 12 months of utility billing data. The baseline model is used to determine baseline energy use in a typical year at the site. Retrofit measures are implemented in the simulation model, and the model is run to estimate the post-retrofit energy use in a typical year. Energy use is determined as baseline energy use minus reporting-period energy use. Spot measurements of equipment are made during the performance period to ensure that equipment performance conforms to the parameters used in the model.

ATTACHMENT 1 – ENERGY BASELINE

McClure Company has provided an energy baseline for Penn DOT based upon the provided utility usage data sheets. The baseline selected is described above in section D.1-a.5. Located in this attachment are the energy baseline rates utilized to calculate the energy savings for each energy conservation measure. The data provided by PennDOT during the RFQ did not fully provide information for each site. Assumption where made and can be seen in the energy calculations.

Base Utility Rates					
Site	Electric $kWh	Oil $/Gal	Natural Gas $/Therm	Propane $/Gal	Water/Sewer $/Gal
Adams County Office	$0.80		$0.91		$12.00
Cumberland County Office	$0.95		$0.85		$12.00
Cumberland Road Side Rest Area Site 45	$0.47			$1.30	
Cumberland Road Side Rest Area Site 46	$0.16			$1.30	
Franklin County Office	$0.10	$1.25	$0.70		$12.00
Franklin Welcome Center	$0.23			$1.30	$12.00
Dauphin Engineering District Office 8	$0.07		$0.91		$12.00
Dauphin County Office	$0.09		$0.91		$12.00
Dauphin Maintenance District Office (Satellite)	$0.92		$0.91	$1.30	$12.00
Dauphin Fleet Management Division	$0.09		$0.85		$12.00
Dauphin Server Farm	$0.07		$0.91		$12.00
Lancaster County Office	$0.08		$0.91		$12.00
Lebanon County Office	$0.11		$0.91		$12.00
Lebanon Eastern PA Training Facility	$0.44			$1.50	$12.00
York Welcome Center	$0.12			$1.30	$12.00

Energy Consumption:

Site	Base Utility Usage and Costs									
	Electric		Oil		Natural Gas		Propane		Water / Sewer	
	Usage kWh	Cost	Usage Gal	Cost	Usage Therm	Cost	Usage Gal	Cost	Usage Gal	Cost
Adams County Office	268,762	$21,611								
Cumberland County Office	30,294	$2,868								
Cumberland Road Side Rest Area Site 45	856	$400								
Cumberland Road Side Rest Area Site 46	4,003	$649								
Franklin County Office	213,300	$21,813			2,094	$1,458				
Franklin Welcome Center	524	$119								
Dauphin Engineering District Office 8	1,157,400	$86,550								
Dauphin County Office	93,592	$8,494								
Dauphin Maintenance District Office (Satellite)	91,960	$8,432								
Dauphin Fleet Management Division	403,600	$36,208								
Dauphin Server Farm	2,447,100	$169,245			3,370	$3,065				
Lancaster County Office	267,680	$21,909								
Lebanon County Office	28,728	$3,093								
Lebanon Eastern PA Training Facility	749	$332								
York Welcome Center	7,694	$925								
Total Annual Cost		$387,171								

ATTACHMENT 2 – ENERGY CALCULATIONS

McClure Company has provided a preliminary assessment for each energy conservation measure (ECM) opportunity, including a detailed estimate of implementation costs and energy cost savings. Detailed calculations for the energy cost savings can be found within this Attachment. The preliminary assessment of the energy efficiency opportunities available to Penn DOT are based upon the information provided in the RFQ, issued bulletins (1-7), and escorted tours of Penn DOT sites.

ATTACHMENT 3 – Supplemental ECM Information and Documentation

ECM-1: Site-Wide LED Lighting & Lighting Controls Upgrade

ECM-3: Building Envelope Upgrades