Background

In January of 2019, the Springfield Township Board of Commissioners created a Renewable Energy Transition Plan (Plan) in which the Township committed to reaching 100% renewable electricity for all Township municipal operations by 2035 and 100% renewable energy for all Township municipal transportation and building heat by 2050. The plan also aims to meet 100% renewable electricity and energy use by the wider community, including Springfield residents and businesses, by 2035 and 2050, respectively. The Plan was written by the Springfield Township Environmental Advisory Commission (EAC), along with help from other Township members with relevant professional expertise, defining a focus on the goals for the Township, as well as monitoring and sharing the Township's progress.

Identified in the Plan is converting to 100% renewable electricity for the Township in which solar energy is specifically identified as a method to reach the stated goal. Springfield Township has already completed steps towards this goal including a feasibility analysis (Attachment 3) completed in 2024 by Celentano Energy Services (CES) detailing the opportunity for rooftop solar arrays at the Springfield Township Administration/Police Building, the Public Works Building, and the Public Works East Shed. The study concluded that the solar PV systems would have the capacity to meet the annual electricity needs for the Administration/Police Building, the Public Works buildings, and additionally, the Township Library, with excess energy generation after all the energy needs of all three facilities are satisfied. Furthermore, Architecture + Engineering Innovations performed an Evaluation of Roof Structure (see Attachment 4) in 2024 on the buildings listed above. The evaluation found that the roof structures can support the solar panel arrays in conformance with all applicable codes, without any further modifications. Utilizing the findings from the performed analyses, Springfield Township has decided to move forward with a Request for Proposal to install a rooftop solar array to progress sustainability goals.

Project Goals

Springfield Township is issuing this Request for Proposals to solicit proposals to design, engineer, and build a turn-key installation of a rooftop mounted solar array project on its Administration/Police Building located at 1510 Paper Mill Road and its Public Works Main Building and Public Works Equipment Building, both located at 1600 Paper Mill Road, and referred to as the Admin/Police Building, Public Works Building, and Public Works East Shed, respectively in the Feasibility Study, to achieve the following goals:

- Confirm the potential for a solar photovoltaic array to be installed on the rooftop inclusive of structural and electrical requirements.
- Design the solar arrays to allow for efficient use of rooftop area and maximize the cost benefit to the Township.
- Implement a rooftop solar array to maximize the currently underutilized area for electrical generation and provide a predictable long-term energy supply.
- Interconnection into PECO's electrical grid and decrease energy costs for Township buildings through net metering.
- Reduce the greenhouse gas emissions profile of Township-owned facilities.

Springfield Township intends to implement the rooftop array under a turnkey project scope that includes all design, procurement, construction, interconnection, and commissioning requirements.

Therefore, all aspects necessary to the successful completion of the project as described herein, even if not explicitly stated in this RFP, shall be included in any responses.

Response Elements

Respondents shall include the following elements in their RFP response and should use their professional judgement and expertise in preparing all elements to best meet the identified project goals. All proposals are due by 10:00 AM July 11, 2025 (see Bid Timeline below) and shall not expire for at least one hundred twenty (120) days. Respondents are encouraged to submit Requests for Information (RFIs) for more information and to answer any questions of the Respondent regarding the project that can influence the bid response. The deadline for RFIs and the anticipated date for answers are provided below. Submit RFIs to Michael Stahly, Wilson Engineering Services, mstahly@wilsonengineeringservices.com. All RFIs received and their responses shall be made available to all RFP Respondents prior to the bid submission deadline.

Proposals shall be submitted in a sealed envelope to Springfield Township Administration Building located at 1510 Paper Mill Road Wyndmoor, PA 19038 Attn: Michael Taylor, Township Manager, with items clearly labeled Proposal Submission for Solar Photovoltaic Project. Proposals will be opened by the Township on the same day, at the same location and at approximately the same time. No proposal may be withdrawn, altered or otherwise modified after the submittal deadline. Respondents may not assign or otherwise transfer their Proposals.

Bid Timeline

- Initial Release of RFP: June 1, 2025
- Advertisement Period: June 1, 2025– June 30, 2025
- Direct notice to potential bidders: Throughout Advertisement Period
- Mandatory Prebid meeting & On-site Visit: June 18, 2025, 10:00 AM
- Deadline for RFIs from bidders: June 20, 2025
- Anticipated RFI responses: June 30, 2025
- Bid submittal deadline: July 11, 2025, 10:00 AM
- Anticipated Award date: August 13, 2025

Technical Proposal

The technical proposal should evaluate an array at the Administration/Police Building located at 1510 Paper Mill Road and another located at its Public Works Main Building and Public Works Equipment Building, both located at 1600 Paper Mill Road, and confirm the feasibility of the implementation of a ballasted rooftop solar photovoltaic array.

Prior to submitting the response, the Respondent shall review the analysis reports attached to this RFP and perform a site visit to inspect existing infrastructure and provide an indication and scale of any items that can hinder the installation and/or performance of the proposed array. Springfield Township encourages Respondents to submit RFIs identifying opportunities to increase the project's benefit and/or for clarification. The performance specifications provided in Table 1 shall serve as the basis for responses with proposed equipment providing at **minimum** the metrics prescribed. Respondent shall provide actual specifications for each category of the proposed turnkey approach.

Table 1: PV Array Minimum Specifications

Parameter	Administration Building System	Public Works System
System Size	150 kWdc	200 kWdc
Racking (Fixed Tilt, Angle on ballasted system to maximize annual generation)	Ballasted, Direct Attached Slope: 3.5° - 5.5°	Ballasted, Direct Attached Slope: 4.5° - 6°
Warranty	Modules: 25-Year linear Power Output & 12 Year Product Inverter: 10-Year Product Warranty. Provide a price and/or plan for inverter replacement in year 11 and beyond, or pricing to extend the product warranty to 20 years. Workmanship: [5] Year Limited Warranty Roof: 1-Year Leak Warranty, Maintain existing vendor warranty	
Annual Degradation	<0.75%	
Minimum Panel Efficiency	19%	
Inverters	Performance certified to UL1741 and IEEE 1547-2018 be listed with an efficiency of 98% or higher	
Data Acquisition	Cloud-based storage and dashboard Separate revenue-grade meter(s) meeting ANSI C12.1-2024 or 52 Pa. Code § 57.20	

The scope of work is inclusive of all solar engineering, permitting, and equipment, including, without limitation, modules, racking, inverters, conductors, conduit/protection, tie-in to the electrical service of the facilities, integration of the new solar electric meter(s), any further onsite electrical infrastructure/upgrades and interconnection efforts that may be required.

The Respondent has the freedom to propose a racking system that provides a safe, secure, and efficient means of attachment to the existing structure e.g., direct attachment, ballasted, and the like, and can refer to the evaluation of roof structure performed by Architecture and Engineering Innovations and the Respondent's own professional judgment to determine the appropriateness of the selected equipment. To aide in the selection, the slope of each roof on each of the buildings in question has been measured and presented in Table 1. All pertinent electrical equipment shall be identified in the California Solar Equipment Lists Program[1] as a means to ensure tested and approved equipment is utilized for the project. To ensure the integrity of the roof is maintained, the Respondent shall include in their proposal a roof inspection for each of the buildings prior to the construction of the solar array and another inspection of each roof once the array has been completed. The Respondent will be responsible for maintaining the current roof warranties and providing an additional leak-free warranty of 1-year for each roof after the final completion of the array, with coverage limits and other policy terms and conditions acceptable to the Township. The Township

[1]California Energy Commission - Solar Equipment Lists Program
https://www.energy.ca.gov/programs-and-topics/programs/solar-equipment-lists

shall provide all relevant information in its possession regarding the roofs, installers, and warranty information to the Respondent as needed for coordination.

The Administration Building System infrastructure includes a 13 kV, 150 kVA PECO-supplied transformer that serves as the facility's tie point to the grid. It is expected that the available area on the roof for the solar array will not exceed the AC capacity of the transformer, but it is recommended that the Respondent investigate the ramifications, if any, the existing transformer will have on system sizing, tie in, or any other array parameter that may affect the design of the system. The Public Works System infrastructure also features a similar 150 kVA transformer serving as the facility tie point. In contrast to the Administration Building, it is expected the roof of the Public Works Building has the opportunity to install DC capacity in excess of that which can be accommodated by the transformer. The DC capacity figure presented in Table 1 is intended to account for this limitation and assuming a representative size ratio. In both cases, the Respondent shall perform a cost benefit analysis of the DC to AC capacity of the system and submit a response with a capacity correlating with the maximum cost benefit to the Township. For the purposes of this RFP, the rating depicted on the front of each transformer has been carried as the maximum AC capacity of the facility. It is expected that during interconnection agreement negotiations with PECO, a final acceptable AC capacity will be identified by PECO.

There are multiple points of interconnection available for Respondent to tie in the array. It is expected the Response will include a due diligence design considering all aspects of the current infrastructure and select the optimal tie in point. Refer to the attached single line diagrams for the electrical infrastructure in place attached to this RFP as Attachment 5 and all proposed designs shall be confirmed with the site visit. For the purposes of this RFP, the following are some preliminarily identified locations that may be apt for integrating each solar array. The Respondent shall determine the most appropriate tie in of all arrays and their ultimate integration into the electrical infrastructure that provides the most value to the project, confirm all necessary existing conditions, and carry all costs associated with an acceptable tie-in approach in their bid. PECO fees for items such as interconnection and utility upgrades, if applicable, are not to be included in the Response and are the Township's responsibility.

- **Administrative Building System:** This system will include the array on a single rooftop and will tie into the electrical infrastructure either on the load side of the PECO meter at the transformer, or on the line side of the building's main switchboard. EDP1 serves as the primary panel for electrical distribution and is rated at 1,200 amps at 208Y/120V. There is a spare 4" conduit from the electrical room to the transformer that the Respondent can utilize as appropriate.
- **Public Works System:** This system will encompass the arrays on both the main and equipment buildings. The electrical system includes a main switchboard located in the equipment building feeding both loads in the equipment building, as well as the feeder to the main building. It is expected that any tie in at these buildings will be required to occur on the line side of the building switchboard. There is a spare 4" conduit between the main electrical room in the equipment building and the electrical room in the main building which the Respondent is free to utilize, as appropriate. All conduits from the main electrical room in the equipment building to the transformer are currently fully utilized Alternately, the arrays may interconnect at the transformer near Paper Mill Rd.

For each array, the Respondent shall be responsible for designing and carrying the cost of a Code compliant connection that complies with all applicable codes, laws, rules, and regulations,

including all necessary equipment for such connection. The Township requires that all design choices that can affect the aesthetic of the buildings be submitted for approval with all responses to this RFP. The Township reserves the right to reject any items proposed during construction but not submitted with the RFP and require the Respondent to rectify at the Respondent's expense. All aesthetic items e.g., disconnects, new exterior conduit, and the like, must be screened and hidden to the greatest extent practicable to the satisfaction of the Township.

The successful respondent will have demonstrated experience designing, planning, scheduling, permitting, staging, constructing, interconnecting, and maintaining commercial scale solar PV systems. Respondents with NABCEP certified staff, or other relevant certifications, are preferred. However, the absence of a relevant certification does not preclude a Respondent from being selected, but relevant experience must be provided in its absence. It is expected that Respondents will have experience with successful completion of at least 5 projects of similar scope and successful integration and interconnection agreements with PECO to support the projects. The Respondent shall provide three (3) references that can corroborate this experience. Respondents shall complete and submit with their response the "Respondent's General Information" form attached to this RFP as Attachment 6. It is a condition of this RFP that the identity of subcontractors and other persons and organizations be submitted by the Respondent to the Township as part of his/her proposal. Such information shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification for each such subcontractor, person and organization.

All administrative requirements to interconnect the solar arrays shall be within the Respondent's scope. These are expected to include, but are not limited to: engineering, licensing, permitting, coordination with PECO, interconnection agreement(s). All specified equipment in Respondent's proposal should meet Build America Buy America (BABA) requirements pursuant to Inflation Reduction Act (IRA) guidelines if that provides the best value to the Township. Respondent shall include support as needed for application for Federal tax credit, system registration with PennAEPs as a Certified Alternative Energy Credit generator, applicable PECO rebate(s), and any other incentive/grant programs that are identified by the Township.

Respondent shall provide the qualifications of the entities performing the analyses and, utilizing the dictated array performance specifications, include the following information:

- Contractor to verify current Code adoption applicable to the project prior to construction commencing. Contractor is responsible for compliance with all applicable codes at the time of project permitting and construction.
- Concept level electrical design and tie in of the proposed array systems. This should include at minimum a single line diagram of the existing systems and the tie in for the new solar array, identification of tie in location, justification for choosing of the tie in location, and qualifications of the designer. If identified, necessary upgrades to electrical systems shall be identified, line-item costs for each specified upgrade presented, and a justification as to why they are necessary shall be included.
- Confirm existing structural infrastructure can support the proposed array. Mounting systems shall limit roof penetrations or be fully ballasted. Mounting system design needs to meet applicable local building code requirements with respect to snow and wind loading factors. Solar system installation must not void the roof warranty.
- Drawing of proposed array overlayed on an aerial of the existing roof including designated

areas for existing equipment, walkways and maintenance of rooftop equipment. System layout shall meet local fire department, code and ordinance requirements for roof access. Show plan view of expected conductor runs and locations of key electrical equipment. Conduit penetrations shall be minimized.

- Description of key solar array characteristics
    - Review of shading
    - Installed DC and AC system size
    - Technical specifications of key equipment including racking, inverters, and solar panels used
    - Annual generation profile
    - Annual panel degradation
    - Design basis for worst-case wind and snow loads on solar panels and racking
- All ground level equipment shall be screened from view to retain the aesthetic integrity of the site. The Respondent shall include a plan detailing how the visual impact of all required ground equipment will be mitigated.
- Provide all warranties and guarantees of the equipment to be installed.
- Include a prospective schedule of the project including key milestones such as:
    - Permitting
    - Interconnection agreement
    - Procurement
    - Installation
    - Commissioning

Cost Proposal

Springfield Township intends to implement the rooftop solar project described in a manner providing the most benefit to the Township, as solely determined by the Township. Respondents are encouraged to submit under two costs proposal structures described as Option 1 and Option 2 below, based on the Technical Proposal stated above. Option 1 represents the direct purchase of the solar array from the Respondent. Option 2 represents the Township entering a power purchase agreement with the Respondent.

Option 1: Direct Purchase and Ownership

The Respondent shall provide the total cost for a complete turnkey system as previously identified in this RFP that is a fully installed, commissioned, and warrantied grid tied solar PV system, inclusive of racking, panels, rapid shutdown devices, inverters, wiring, disconnects, and associated accessories, up through and including the electrical tie in. The overall cost shall be broken into the line items as presented in Table 2 in Attachment 2. For the 'Total' line item, also indicate the normalized cost on a dollar ($) per kWdc installed. The Respondent shall explicitly state whether their bid package will meet base 30% ITC requirements as well as the IRS Domestic Content Bonus Credit. If such requirements can be achieved, the successful Respondent will be contractually obligated to provide the necessary documentation to secure such Credit(s) for the Township. Respondent shall

include any IRA Bonus Credits that are relevant to this specific project given a construction start date no later than 12/1/2025, i.e. Domestic Content Bonus. Respondent shall state their experience regarding obtaining/redeeming the Domestic Content Bonus, and describe in their response how they will support the Township in realizing the value from the Domestic Credit Bonus. The Township is agnostic to domestic content requirements, except in terms of overall project cost after incentives.

The cost proposal for Option 1 includes all requirements listed above along with those listed in the Technical Proposal, with cost based on the entire solar array being directly purchased by Springfield Township. Springfield Township shall be responsible for payment of all fees to PECO for interconnection application and interconnection studies. Respondent's price shall not include any allowances for upgrades of Utility-owned infrastructure, such as might be determined during PECO's interconnection study, as these will ultimately be borne by the Township, if applicable. Respondent's proposal shall include the expected O&M requirements and their expected intervals e.g., monthly, annual, etc. and provide an amortized OPEX figure for the life of the array.

If it is identified during the due diligence period that the project can support a solar array in excess of the DC size specified in the performance specifications, Respondent shall provide the maximum DC size that can be implemented, the anticipated effect the increase will have on maximum and average AC output, and a unit cost($/kWdc) for the additional system capacity to provide the Township the opportunity to review and decide on the expansion of the project.

Option 2: Power Purchase Agreement (PPA)

The Respondent shall provide the terms of a Power Purchase Agreement ("PPA") for which, if selected, the Township can enter into for both arrays depicted in the Technical Proposal. The proposal shall include the arrays as identified in this RFP requiring no capital expenditure from the Township for a project term of 25 years. To provide the Township the opportunity to identify the value of the AECs (Alternative Energy Credits) generated and how they can benefit Springfield's goals, the Respondent shall propose a PPA in which the AECs minted through the generation of the renewable electricity are retained by the Township and retained by the Respondent. The cost proposal for Option 2 shall include a complete purchase agreement in conjunction with a completed Table 3 attached as Attachment 2 for each array. It is expected that the default end of term obligation will be for the Township to buyout the array for the total cost of $1.00. For PPAs in which escalation is based on a fixed percentage, the chosen percentage rate shall be explicitly stated.

Award Structure

The Township reserves the right to waive informalities in any response, to reject any or all responses with or without cause, to waive irregularities/technicalities, and waive technical and non-technical or non-material defects in the response documents or submittal of any Respondent. The Township reserves the right to make an award either in part or completely, and/or to accept the response that, in its judgment, will be in the best interest of the Township and provide the best value to the Township with price, technical, and other applicable factors considered. The Township reserves the right to

reject any and all Proposals and to re-advertise for all or any part of this RFP as deemed in its best interest.

The Township intends to make an award pursuant to this RFP on August 13, 2025 and will notify the successful Respondent within 48 hours of any such award.

The selected Respondent shall execute a written agreement with the Township (the "Agreement" or the "Contract"). The final terms of the Agreement will be determined by direct negotiation, and the Agreement is subject to the approval of the Township Board of Commissioners. As such, acceptance of any response pursuant to this RFP does not guarantee that the Township will enter into an Agreement with the selected Respondent.

Procurement Requirements

Bid Bond

A certified check or bank draft, payable to the order of the Township of Springfield, negotiable U.S. Government Bonds (at par value), or a satisfactory Bid Bond executed by the Respondent and an acceptable surety, in an amount equal to ten percent (10%) of the total bid amount shall be submitted with each Proposal.

Payment and Performance Bonds

The successful Respondent shall be required to furnish a performance bond for the faithful performance of the Contract in the sum of 100% of total Contract amount. In addition, the successful Respondent shall be required to furnish a payment bond in the sum of 100% of total Contract amount to ensure that all labor, materials and equipment supplied to the project will be paid in full. All bonds shall be filed with the office of the Township Manager between the time an award is made by the Township and the Agreement or Contract is fully-executed and approved between the Township and the successful Respondent. The terms and conditions of the bonds shall be reviewed and approved by the Township Solicitor. Said bonds shall be that of an approved surety company authorized to transact business within the Commonwealth of Pennsylvania, and proof of same shall be submitted to the satisfaction of the Township. Agents of bonding company shall furnish the necessary power of attorney, bearing the seal of the company and evidencing such agents authorized to execute the particular type of bond to be furnished, as well as the right of the surety company to conduct business in the Commonwealth of Pennsylvania.

Maintenance Bond

The Respondent shall provide a maintenance bond in the amount of 10% of the Contract sum for the maintenance of the work performed under the Contract for a period of eighteen (18) months from the date of completion and acceptance of the work performed under the Contract by the Township.

Insurance and Indemnification

The minimum required insurance and the indemnification obligations of the successful Respondent are attached hereto as Attachment 7. The references there in to "Contractor" shall be considered a reference to Respondent. The reference to "Owner" shall be deemed a reference to the Township. Similarly, the terms "Project" shall refer to the Respondent's proposal and "Premises" shall include the project sites described herein.

Affidavit of Non-Collusion

Each Respondent shall be required to submit an affidavit of non-collusion on the form included in and made a part of this RFP as Attachment 8.

Workers' Compensation Act

In addition to the obligation to provide workers' compensation insurance as set forth in this RFP, Respondents herein accept, insofar as the work required by this RFP is concerned, the provisions of the act of June 2, 1915 (P.L. 736, No. 338), known as the "Workers' Compensation Act," and any supplements or amendments thereto.

Additional Contracting Requirements

Respondents, by submitting a response to this RFP, hereby acknowledge that their proposal and any Agreement or Contract entered into with the Township may be subject to additional and potentially different contractual obligations for Option 1 and Option 2 as described in this RFP, including requirements in the Pennsylvania Prevailing Wage Act, the Public Works Contractors' Bond Law of 1967, the Minimum Wage Act of 1968, the Public Contract Bid Withdrawal Law, the Steel Products Procurement Act, and the Contractor and Subcontractor Payment Act, all as may be amended from time to time, pursuant to both the Pennsylvania First Class Township Code and the Guaranteed Energy Savings Act.

Attachments

1. Bid Checklist (to be submitted by Respondent with Proposal)
2. Cost Proposal Form
3. Solar PV Feasibility Study, Celentano Energy Services
4. Evaluation of Roof Structure, Architecture & Engineering Innovations
5. Electrical Single Line Diagrams
6. Respondent's General Information
7. Insurance and Indemnification
8. Affidavit of Non-collusion

Attachment 1 – Bid Checklist

Required Proposal Components

Respondent shall furnish the following information, and shall sign and return this bid checklist as part of the proposal. Failure to complete the Bid Checklist may cause the response to be non-responsive and may cause its rejection.

- ☐ Completed Bid Checklist
- ☐ Cost Proposal Form
- ☐ Technical Proposal (including all components as required in this RFP)
- ☐ Respondent's General Information
- ☐ Affidavit of Non-Collusion
- ☐ Bid Bond (10% of total bid amount)

Respondent certifies that it has read and understood all components of this RFP, including any and all addendums issued prior to the bid due date, and that Respondent agrees to be bound by all requirements as outlined in these documents.

Name _____

Signature _____

Title _____

Company _____

Date _____

Attachment 2 – Cost Proposal Form

Option 1 Cost Proposal

Table 2: Capital Cost Breakout

Array	Cost	IRA Bonus Credits Applicable (12/1/2025 Construction Start)
Administration Building System	$	$
Public Works System (Main Building & Equipment Building)	$	$
Total $ ($/kWdc)	**$**	**$**

Option 2 Cost Proposal

Table 3: Amortized PPA Metrics

Year	All-In Electric Rate Township Retained AECs, $/kWh	All in Electric Rate Respondent Retained AECs $/kWh	Array Buyout Cost at Year End, $	Minimum Energy Purchase, kWh
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25			**$1**	

Celentano Energy Services

7821 Flourtown Avenue, Wyndmoor, PA 19038
CelentanoR@aol.com
Cell: (215) 740-0439
Office: (215) 836-9958

Summary Solar Assessment Prepared For:
Springfield Township Administration (MontCo)

Prepared By:
Celentano Energy Services (CES)

June 28, 2024 (Final-Rev)

Overview

This is a summary feasibility report regarding a solar photovoltaic (PV) assessment conducted by Celentano Energy Services (CES) for the Springfield Township (TWP) Administration, in Montgomery County, Pennsylvania. ***Note:*** Throughout this report, the *Public Works Equipment Shed* is referred to as the "PW East Shed", and the *Public Works Exterior Storage Shed* is referred to as the "PW West Shed". This is a revised solar assessment based on one that was initially carried out by CES in 2022. This final draft version consists of solar PV arrays installed on the rooftops of the TWP Administration/Police building and the TWP Public Works (PW) Main building, as well as the PW East Shed rooftop.

The annual solar generation from the solar PV systems would meet all the annual electricity usage for these two accounts, as well as the annual usage at the TWP Library, with more to spare. Pennsylvania's virtual meter aggregation net metering law would allow the annual excess solar generation to offset the TWP Library's electric usage, without needing physical wires to connect the buildings together.

Figure 1 shows the three building rooftops that would have solar PV arrays installed (one solar PV system for the Admin/Police building; a second solar PV system consisting of two rooftop arrays on the Public Works Main building and the PW East Shed), and the Library building.

The tasks for carrying out this solar assessment included reviewing the twelve months of electricity usage in 2023 all three accounts (i.e., Admin/Police, Public Works and the Library); prepare preliminary layouts of solar PV arrays on the Admin/Police and Public Works Main and East Shed building rooftops; simulate the solar generation and estimate the billing impacts; and carryout a 30 year cash flow analysis.

Update Note: CES, TWP officials, and others revisited the TWP sites on June 14, 2024, and verified the PECO service points for the Admin/Police and Public Works buildings, as shown in Figure 1. At the Public Works site, underground service runs between the PW West Shed location to the PW East Shed, then to the Public Works Main building (indicated by the straight dashed lines).

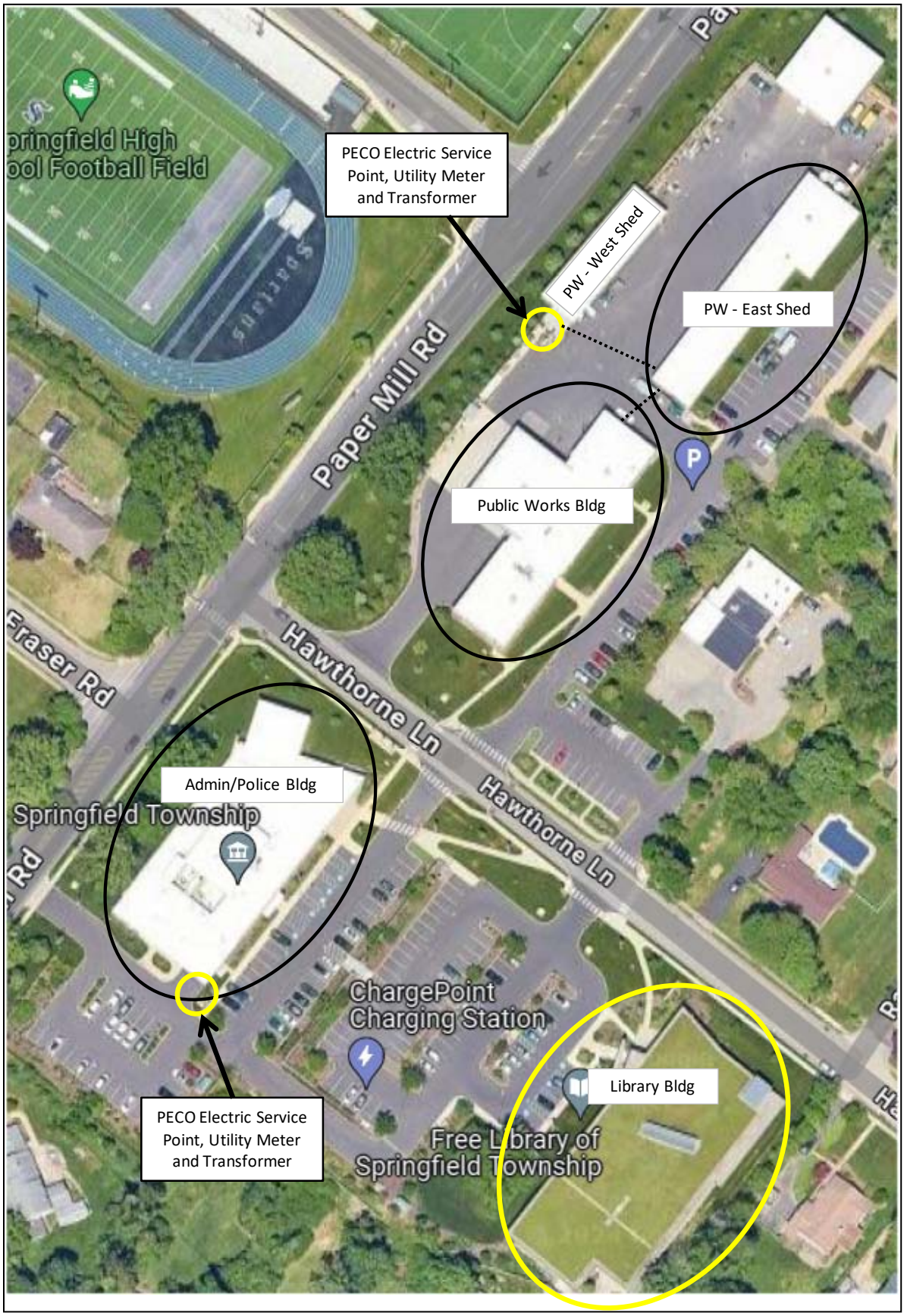


Figure 1. Springfield TWP Buildings – Proposed Location for Solar PV Arrays (Black) and Virtual Solar Designation (Yellow)

Summary of Results

Table 1 below shows the summary of results, aggregating across all the relative Springfield TWP building accounts.

Total Solar PV Capacity (kW)	453
Full Installation Cost	$1,041,348
Price per Watt Installed ($/watt)	2.30
IRA/ITC Elective Payment (30%)	$312,404
Act 129 Incentive ($0.10/kWh - Year 1)	$57,561
Adjusted Net Installation Cost	$671,383

Solar Generation (kWh) - Year One	575,605
Electricity Usage Offset	112%
Electricity Bill Savings - Year One	$45,832
SREC Revenue - Year One	$21,585
Estimated Total Revenue – 30 Years	$2,403,516
Estimated Total Expenses – 30 Years	$1,700,227

Positive Cashflow Payback (Years)	9.2
Net Present Value (NPV)	$217,902
Internal Rate of Return (IRR)	13.5%
TOTAL NET SAVINGS OVER 30 YEARS	$703,289
Total Levelized Cost of Electricity ($/kWh)	$0.07399
Value of Energy Generated ($/kWh)	$0.07005

Table 1. Summary of Results

Section 1. Methodology

Basis of Design

Using the SolarEdge Design software, the following considerations were taken into account with regard to the array layout of solar PV modules and the balance of system devices for preliminary engineering:

- Ballasted Racking (for mounting modules on flat roof surfaces and slightly pitched roofs, up to 7 degrees)
- DC Optimizer (connected to each module to optimize performance and execute rapid shutdown as a safety requirement when the system is turned off)

- Three Phase Inverters
- Integrated Inverter Manufacturer Monitoring System

Array Layout

The SolarEdge Design software was used to populate the modules throughout the rooftop areas based on Google Maps satellite views of the buildings. The software has a database of commercially available solar PV modules and a Q-Cell 420-watt bi-facial module (i.e., solar cells on both front and back of the module frame) was selected. Solar modules can be much larger than this, up to 600 watts and more, but the smaller modules allow for more of them to be placed within roof boundaries, thus providing more array capacity. The bi-facial modules were placed on all the open ballast racking, allowing indirect or reflective irradiance to collect on the backside of the module, resulting in a little more solar generation.

Two different types of ballasted racking systems were used. An East/West facing racking system was used on all the relatively flat rooftops on the Admin/Police building, including the upper or penthouse rooftop area, and on the Public Works Main building. On the roughly 5 degree pitched rooftops on the Admin/Police building and the Public Works East Shed building, a more conventional ballasted racking system was used. Note, this racking system can be installed on roof pitches up to 7 degrees, but they can also be strategically attached onto the roof for additional support. The installed unit weight (including the solar modules) of these ballasted racking systems range between 3 and 8 PSF, which can be assumed as inputs for conducting structural analysis for the building roofs.

The module layout was then edited by removing or aligning selected modules considering the following:

- Roof Pitch: Flat < 5 Degree - East/West Ballasted Racking System
- Roof Pitch: 5 – 6 Degree – Conventional Ballasted Racking System
- Shading from HVAC and other obstacles on the roofs
- Setbacks 3’
- Walkways / Access to equipment
- Roof Drains / Crickets – Typically racking is not installed in these areas, but for this analysis, these areas were also covered with ballasted racking

PVWatts

The National Renewable Energy Laboratory’s (NREL) PVWatts Calculator is an online software that simulates monthly and annual solar generation. After the array layout was completed, the total solar system DC capacity was known for each building, which was input to the PVWatts model. Other PVWatts inputs are location (with regard to weather data), array tilt and azimuth (orientation), various system losses (i.e., module mismatch characteristics, light-induced degradation, soiling, etc.), array racking type (i.e., open racking, flush mounted, single or dual tracking, etc.), inverter efficiency, and

other assumed inputs. The annual solar generation results from the PVWatts model were inputs to the financial pro forma analysis model.

Utility Bill Review

Springfield TWP procures electricity from PECO, the default supplier in PECO's territory. CES did not review the actual bills for the Admin/Police, Public Works and Library accounts, but rather collected monthly kWh usage data by each account recently processed by a volunteer of the Springfield TWP EAC. All three accounts are under PECO's Commercial General Service, 0 – 100 kW, and the weighted generation rate of $0.079632/kWh was used in this analysis (also accounting for price-to-compare for annual excess generation). Table 2 shows the annual electric usages by each of the accounts in 2023.

Admin/Police Building Account	177,840 kWh/yr
Public Works Account	89,120 kWh/yr
Library Account	247,477 kWh/yr
Total Usage	514,437 kWh/yr

Table 2. 2023 Electric Usage by Account

Pro forma

A pro forma is a financial model used to measure the potential future impacts of different business decisions. The pro forma used in this analysis was from the Solar Schools Toolkit, developed in 2023 by the Philadelphia Solar Energy Association and sponsored by the Pennsylvania Department of Environmental Protection (DEP). Several inputs for this model include the total PV capacity in kW_{DC}, unit installation cost, operating and maintenance costs, and other assumptions. Most of these are described below in ***Section 4. Financial Analysis*** section. The pro forma results include positive cash flow payback (years), net present value (NPV), internal rate of return (IRR), first year and 30 years of cost savings, etc., and a 30-year cash flow analysis.

Section 2. Proposed Solar Projects Design

The next step of this analysis was to provide a rough scope of potential solar photovoltaic projects at the three TWP buildings. Each of the solar PV array layouts were developed using the free online SolarEdge software program.

For the flat roof layout for both the Admin/Police and Public Works Main buildings, an East/West ballasted roof-mount racking system was assumed; this racking system orients the modules at a 8° tilt, facing opposite directions. The UniRAC RoofMount RMDT East/West ballasted racking system was assumed for this application (see ***Sample Equipment Spec Sheets*** in **Section 7. Addendum**). For the slightly tilted roofs, assumed to be 5° for the Admin/Police building and 6° for the Public Works East Shed building, a conventional ballasted roof-mount racking system was assumed, which orients the

modules at a 5° tilt in one direction. Therefore, when combining the tilted roofs and the rack tilted modules, the solar PV array tilts for these two applications were 10° and 11°, respectively. The UniRAC EcoFoot 5D ballasted racking system was assumed for this application (see ***Sample Equipment Spec Sheets*** in **Section 7. Addendum**).

For the ballasted modules, the SolarEdge software automatically determines the row spacing such that the modules do not cast inter-row shading on nearby rows of modules. The array azimuth was set parallel to the building roof edge closest to due South.

The selected solar PV module for all the ballasted roof-mounted racking arrays was the 420-watt Wp QPeak Duo L-G8.3, bifacial module (see ***Sample Equipment Spec Sheets*** in **Section 7. Addendum**). Once the layouts were completed, the SolarEdge software revealed the solar PV capacities for each building; these capacities, along with array tilt, azimuth, and other input assumptions, were entered into PVWatts to calculate the expected electrical output from these systems. The three rooftop solar PV systems combined has a total rated capacity of 452.76 kW_{DC}, resulting in an expected Year 1 production of 575,605 kWh. The SolarEdge software also sized up the inverters, along with specific optimizers. This included the following: Admin/Police building, one SE120K-US inverter (120 kW_{AC}); Public Works Main building, five SE30K-US inverters (total – 150 kW_{AC}); and Public Works East Shed building – one SE80K-US (80 kW_{AC}). (see ***Sample Equipment Spec Sheets*** in **Section 7. Addendum**).

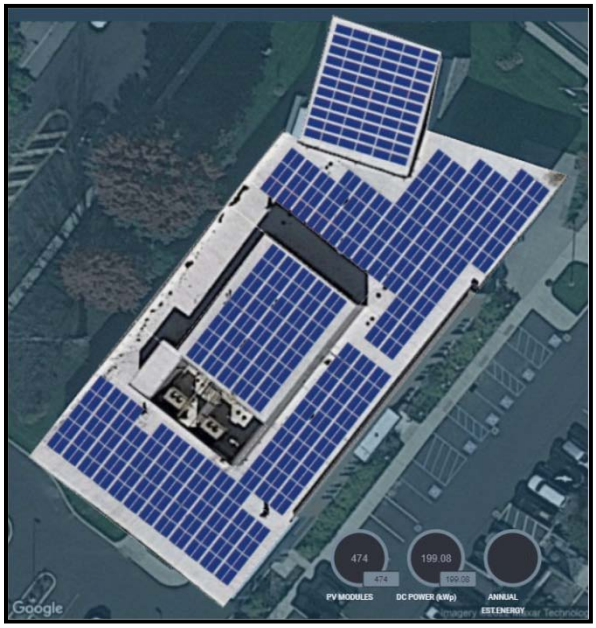
The following images show satellite views of the solar array layouts for the Site 1 - Admin/Police building, and Site 2 - Public Works Main building (Site 2.1) and East Shed building (Site 2.2). Based on the recent re-visit of both sites on June 14, 2024, the location for the inverters for the Admin/Police solar PV system would most likely be on the roof, on the inside of the Eastern wall of the partitioned Penthouse structure.

Regarding the Public Works site, the inverters would most likely be located on the Southern outside wall of the PW West Shed, close to the PECO Service Point for that site (see Figure 1 on page 2). Possibly solar arrays could also be installed on the PW West Shed rooftop, as well, because the inverters would be so close to those arrays, but this scenario was not considered in this feasibility analysis. The DC output conductors from the solar arrays on the rooftops from the PW main building and the PW East Shed would be routed down the sides of those buildings and under the pavement to the inverters on the PW West Shed wall. It is possible there are additional empty conduits running under the pavement preserved for future use wiring opportunities. If this is true, this could be used for routing the solar PV wiring without needing to trench through the payment.

Lastly, these inverters are typically three phase at 480 VAC, where 480/208 step down transformers would be needed to connect to the 208 VAC service - one for the Admin/Police building and one for the Public Works building. These transformers can be located close to the PECO transformers and interconnected at the PECO meters as line side or supply side connections, where additional PECO meter pans will also need to be installed. The required utility isolation switches can be located at these points, as well.

Site 1: Springfield TWP Admin/Police Building

Address 1510 Papermill Road
Wyndmoor, PA 19038



System Design/Performance Details

System Size (DC)	200 kW
Generation (1st year)	251,384 kWh
2023 Usage	177,840 kWh
Electricity Offset	95%
Excess to Library	82,758 kWh

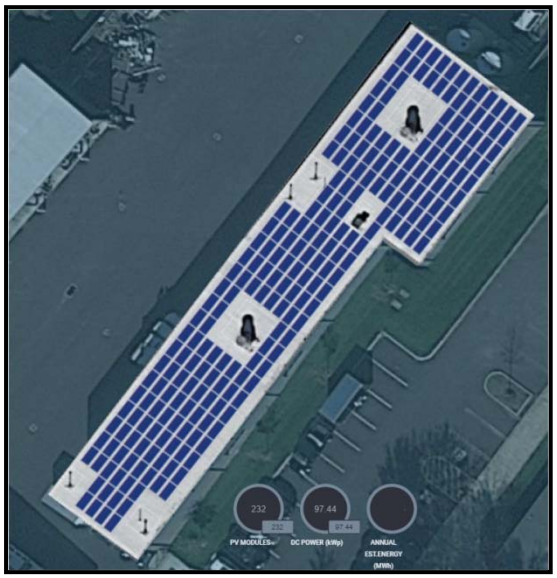
Site 2: Springfield TWP Public Works

Address 1600 Papermill Road
Wyndmoor, PA 19038

Site 2.1 - PW Main Building – 156.24 kW_{DC}

System Design/Performance Details

System Size (DC)	254 kW (combined)
Generation (1st year)	324,222 kWh
2023 Usage	177,840 kWh
Electricity Offset	100%
Excess to Library	235,102 kWh



Site 2.2 - PW East Shed Building – 97.44 kW_{DC}

Section 3. Summary of Solar Generation vs Electric Usage

As described earlier, the preliminary solar PV systems designed for the Admin/Police and Public Works buildings will collectively generate more than the electric usage for both of those accounts, with the excess generation offsetting the electric usage at the TWP Library, with more to spare. Table 3 shows on a monthly basis, how the excess generation carries over to the Library account.

	Admin/Police			Public Works			Library		
Month	Solar kWh	2023 Usage kWh	Net kWh	Solar kWh	2023 Usage kWh	Net kWh	VMA Solar kWh	2023 Usage kWh	Net kWh
Jan	11,809	14,640	2,831	15,535	8,160	-7,375	7,375	16,890	9,515
Feb	15,636	13,200	-2,436	20,348	6,560	-13,788	16,224	16,126	-98
Mar	23,248	14,240	-9,008	30,053	6,960	-23,093	32,102	17,371	-14,731
Apr	26,439	12,240	-14,199	33,969	6,240	-27,729	41,928	17,161	-24,767
May	28,592	13,760	-14,832	36,417	6,400	-30,017	44,849	18,869	-25,980
June	29,571	17,840	-11,731	37,759	8,080	-29,679	41,409	22,354	-19,055
July	30,812	18,960	-11,852	39,483	8,320	-31,163	43,015	25,385	-17,630
Aug	25,298	17,200	-8,098	32,536	8,320	-24,216	32,314	28,358	-3,956
Sept	21,603	14,960	-6,643	27,845	7,680	-20,165	26,808	23,101	-3,707
Oct	16,759	12,800	-3,959	21,816	6,960	-14,856	18,815	19,469	654
Nov	11,953	12,400	447	15,715	7,120	-8,595	8,595	18,888	10,293
Dec	9,663	15,600	5,937	12,746	8,320	-4,426	4,426	23,505	19,079
Annual	251,384	177,840	-73,544	324,222	89,120	-235,102	317,860	247,477	-70,383

Table 3. Monthly Solar Generation vs. Electric Usage and Carry-Over to the Library Account

For example, in January, the generation from the solar PV system at the Admin/Police building will not fully meet all of the electric usage at that building, whereby PECO will bill that account for 2,831 kWh of electricity, and no solar generation will carry over to the Library. This is also true for months November and December. However, the Public Works solar system will generate more than the electric usage for that building for every month. Any monthly excess of solar generation from either the Admin/Police or the Public Works systems will carry over to the Library, which shows up under the column heading, VMA Solar (i.e., virtual meter aggregation), and will offset some of or all of the electric usage for that month at the Library.

Therefore, the Library will only be charged for 9,515 kWh in January. The Library will also be charged for electric usage in October through December, as well. Note, however, the excess solar generation in February through September – will be credited back to the TWP at the price-to-compare (PTC) at the end of the reporting year (i.e., end of May), where the PTC is valued at PECO's generation rate and the transmission rate. For this analysis, it was estimated to be $0.079632/kWh. Although the solar generation doesn't always offset 100% of the monthly electric usage, the excess from most of the other months equates to about 112% over generation on an annual basis across all three accounts.

Section 4. Financial Analysis

The financial analysis conducted for this feasibility study was based on the inputs, computations, and results of the Solar School Toolkit pro forma model, specifically for direct ownership for nonprofit and tax-exempt entities. Some of these input assumptions and sections of the pro forma are described below.

Assumptions

The general input assumptions into the pro forma included many key data points about the Springfield TWP - the site, system installation, contract prices, the expanded federal Solar Investment Tax Credit, future electricity costs, etc. Some are default values, whereas others are input specific to the solar project metrics.

Installation Cost

Typically, the metric used for the cost of installing solar is dollars per watt of DC capacity, or $/watt, where the DC capacity is the sum of all the solar modules based on their nameplate value. This is typically the cost value that may be seen in a developer's proposal to install a solar project. The $/watt installation cost typically corresponds to economies of scale, so the larger the solar PV system, the lower the $/watt tends to be. For this feasibility study, $2.30/watt was assumed for the turnkey installation cost, including the equipment and labor for installing the project, permits, interconnection, and much of the design work and other soft costs.

Incentives

One of the incentives available for offsetting the installation costs is the Federal Investment Tax credit (ITC), which is 30% off the entire installation cost of the solar project. The recent Inflation Reduction Act (IRA) expanded the ITC to be available for nonprofit and tax-exempt entities, which is provided by way of a one time payment (a.k.a., elective payment) to the entity after the project is in operation. Another incentive is provided by PECO Energy for all the solar generation produced in the first year that offsets the on-site energy usage. This commercial solar program incentive of $0.10/kWh of solar generation is based on Pennsylvania's Act 129. However, PECO Energy can change this incentive rate at anytime at their discretion. Since these systems generated annual excess generation, this analysis may have slightly overstated the incentive payment; therefore, further review may be needed.

Electricity Price and Other Financial Assumptions

For this analysis, as mentioned above, PECO Energy is assumed to be the generation supplier, charging a weighted supply rate of $0.079632/kWh. This is also assumed as the electricity cost savings rate used for the net metering billing mechanism that produces the bill savings from generating on-site solar energy. Every kWh generated from the solar system directly offsets the kWh usage at the

site. Note that only electric distribution companies (i.e., PECO Energy), are required to provide net metering benefits based on the volumetric rate on a bill. Third-party suppliers, such as Constellation, and others are not obligated to provide this benefit. Fortunately Springfield TWP is already a PECO customer.

Financing

This analysis considered three types of financing likely to be part of a solar project. A construction loan is an interest-only, short-term loan to cover project construction costs during the construction period. Once the solar project is complete and placed in service, the construction loan is then converted into (1) a short-term bridge loan, an interest-only loan that provides capital that will later be reimbursed by the Elective Payment from the IRS under the Investment Tax Credit provisions and other grants that get paid some months after the solar system has been placed in service; and (2) a long-term permanent loan with fixed monthly payments of principal and interest. The interest rates for all three loans were assumed to be 6.5%, and the permanent loan term was assumed to be 20 years.

Please note that the 30% ITC decreases to 15% if tax-exempt financing is used. The current 10-year treasury rate is hovering around 4.5% and may be a better option for the TWP depending on when and if the TWP finances through a tax-exempt bond. The TWP may also bundle the financing with other capital upgrades such as other new construction projects, roof replacements, or major retrofits, including energy conservation measures.

Cash Contribution

It was assumed that a modest cash contribution of $75,000 for both the Admin/Police and Power Works projects was provided, especially for some of the up-front predevelopment expenses, before the project is firm enough to justify the work of securing financing.

Operation and Maintenance (O&M)

Although there aren't many O&M costs associated with solar PV systems, as there are no moving parts, there are some routine measures typically taken on an annual basis, such as visiting the site and looking for any significant red flags. The system could be operating properly, but perhaps there are accumulated dry leaves that got caught up under the ballast racking system, or some of the free-air wire between the solar modules dropped onto the roof surface from the wire management fixtures - these are not concerning issues, but they should be rectified. There may be other issues causing operation issues that may need periodic attention. However, the main O&M cost is the replacement of the inverter, as well as both labor and equipment. The inverters typically have a 10-year warranty, though some have longer ones, even when they might fail prematurely and the equipment is covered, but there are still labor costs to consider. Since this analysis looks out 30 years, it can be assumed that the inverter could be replaced two or three times. Based on National Renewable Energy Laboratories

survey findings on O&M costs and some reality check adjustments, it was assumed that the diversified average annual O&M cost was $8/kW$_{DC}$ of solar PV capacity over the 30 year period.

Other Costs

These could include increased insurance premiums, project management fees, and other costs. It was assumed these costs were $0 and were absorbed in the TWP's business-as-usual costs.

Summary of Results

Table 4 below shows the summary of results, aggregating across all the relative Springfield TWP building accounts (this is the same as Table 1, at the beginning of this report).

Total Solar PV Capacity (kW)	453
Full Installation Cost	$1,041,348
Price per Watt Installed ($/watt)	2.30
IRA/ITC Elective Payment (30%)	$312,404
Act 129 Incentive ($0.10/kWh - Year 1)	$57,561
Adjusted Net Installation Cost	$671,383

Solar Generation (kWh) - Year One	575,605
Electricity Usage Offset	112%
Electricity Bill Savings - Year One	$45,832
SREC Revenue - Year One	$21,585
Estimated Total Revenue – 30 Years	$2,403,516
Estimated Total Expenses – 30 Years	$1,700,227

Positive Cashflow Payback (Years)	9.2
Net Present Value (NPV)	$217,902
Internal Rate of Return (IRR)	13.5%
TOTAL NET SAVINGS OVER 30 YEARS	$703,289
Total Levelized Cost of Electricity ($/kWh)	$0.07399
Value of Energy Generated ($/kWh)	$0.07005

Table 4. Summary of Results

Table 5 shows the pro forma 30 year cash flow results.

TABLE 5

Springfield Township – Combined Solar Projects for Admin/Police, Public Works and Library Buildings

30-Year Pro Forma

			REVENUE					EXPENSES					CASH FLOW		
Year	Solar Generation (kWh)	Electricity Price ($/kWh)	Electricity Bill Savings ($)	SREC Revenue ($)	IRA/ITC Elective Payment ($)	Act 129 Incentive ($)	Total Revenue ($)	Cash Contributions & Construction Financing Interest ($)	Bridge & Permanent Financing P&I & Debt Srvcs ($)	Operating & Maintenance ($)	Contract Srvcs, Insurance & Other Fees ($)	Total Expenses ($)	Net Annual Cash Flow ($)	Net Annual Discounted Cash Flow ($)	Cumulative Cash Flow ($)
0	0	–	$0	$0	$0	$0	$0	$102,710	$0	$0	$0	$102,710	($102,710)	($102,696)	($102,710)
1	575,605	0.07962	$45,832	$21,585	$312,404	$57,561	$437,382	$0	$436,781	$3,622	$0	$440,403	($3,021)	($2,877)	($105,731)
2	572,727	0.08082	$46,286	$21,907	$0	$0	$68,193	$0	$53,358	$3,695	$0	$57,052	$11,141	$10,104	($94,590)
3	569,864	0.08203	$46,746	$22,233	$0	$0	$68,979	$0	$53,358	$3,768	$0	$57,126	$11,853	$10,238	($82,737)
4	567,014	0.08326	$47,210	$22,565	$0	$0	$69,774	$0	$53,358	$3,844	$0	$57,201	$12,573	$10,342	($70,164)
5	564,179	0.08451	$47,678	$22,901	$0	$0	$70,579	$0	$53,358	$3,921	$0	$57,278	$13,301	$10,420	($56,863)
6	561,359	0.08578	$48,152	$23,242	$0	$0	$71,394	$0	$53,358	$3,999	$0	$57,357	$14,037	$10,473	($42,827)
7	558,552	0.08706	$48,629	$23,588	$0	$0	$72,218	$0	$53,358	$4,079	$0	$57,437	$14,781	$10,503	($28,046)
8	555,759	0.08837	$49,112	$23,940	$0	$0	$73,052	$0	$53,358	$4,161	$0	$57,518	$15,534	$10,512	($12,512)
9	552,980	0.08970	$49,600	$24,296	$0	$0	$73,896	$0	$53,358	$4,244	$0	$57,602	$16,294	$10,502	$3,782
10	550,215	0.09104	$50,092	$24,658	$0	$0	$74,750	$0	$53,358	$4,329	$0	$57,686	$17,064	$10,474	$20,846
11	547,464	0.09195	$50,340	$25,026	$0	$0	$75,366	$0	$53,358	$4,415	$0	$57,773	$17,593	$10,285	$38,439
12	544,727	0.09287	$50,589	$25,399	$0	$0	$75,988	$0	$53,358	$4,504	$0	$57,861	$18,126	$10,092	$56,565
13	542,003	0.09380	$50,839	$25,777	$0	$0	$76,617	$0	$53,358	$4,594	$0	$57,951	$18,665	$9,897	$75,231
14	539,293	0.09474	$51,091	$26,161	$0	$0	$77,252	$0	$53,358	$4,686	$0	$58,043	$19,209	$9,701	$94,440
15	536,597	0.09568	$51,344	$26,551	$0	$0	$77,895	$0	$53,358	$4,779	$0	$58,137	$19,758	$9,503	$114,198
16	533,914	0.09664	$51,598	$26,947	$0	$0	$78,545	$0	$53,358	$4,875	$0	$58,233	$20,312	$9,304	$134,510
17	531,244	0.09761	$51,854	$27,348	$0	$0	$79,202	$0	$53,358	$4,972	$0	$58,330	$20,872	$9,105	$155,382
18	528,588	0.09858	$52,110	$27,756	$0	$0	$79,866	$0	$53,358	$5,072	$0	$58,429	$21,436	$8,906	$176,818
19	525,945	0.09957	$52,368	$28,169	$0	$0	$80,537	$0	$53,358	$5,173	$0	$58,531	$22,006	$8,708	$198,825
20	523,315	0.10057	$52,627	$28,589	$0	$0	$81,216	$0	$53,358	$5,277	$0	$58,634	$22,582	$8,510	$221,407
21	520,699	0.10157	$52,888	$0	$0	$0	$52,888	$0	$0	$5,382	$0	$5,382	$47,506	$17,049	$268,912
22	518,095	0.10259	$53,150	$0	$0	$0	$53,150	$0	$0	$5,490	$0	$5,490	$47,660	$16,290	$316,572
23	515,505	0.10361	$53,413	$0	$0	$0	$53,413	$0	$0	$5,600	$0	$5,600	$47,813	$15,564	$364,385
24	512,927	0.10465	$53,677	$0	$0	$0	$53,677	$0	$0	$5,712	$0	$5,712	$47,965	$14,871	$412,351
25	510,363	0.10570	$53,943	$0	$0	$0	$53,943	$0	$0	$5,826	$0	$5,826	$48,117	$14,207	$460,467
26	507,811	0.10675	$54,210	$0	$0	$0	$54,210	$0	$0	$5,942	$0	$5,942	$48,267	$13,573	$508,735
27	505,272	0.10782	$54,478	$0	$0	$0	$54,478	$0	$0	$6,061	$0	$6,061	$48,417	$12,967	$557,152
28	502,745	0.10890	$54,748	$0	$0	$0	$54,748	$0	$0	$6,182	$0	$6,182	$48,565	$12,387	$605,717
29	500,232	0.10999	$55,019	$0	$0	$0	$55,019	$0	$0	$6,306	$0	$6,306	$48,713	$11,833	$654,430
30	497,731	0.11109	$55,291	$0	$0	$0	$55,291	$0	$0	$6,432	$0	$6,432	$48,859	$11,303	$703,289
	16,072,725		$1,534,913	$498,638			$2,403,516		$1,450,576	$146,941	$0	$1,700,227	$703,289		

Section 5. Considerations

Solar Renewable Energy Credits (SRECs)

The solar project will also generate Solar Renewable Energy Certificates (SRECs), which equate to 1 MWh of solar generation and have market value. Pennsylvania SREC rates have ranged from $48/SREC in May 2023 to $29/SREC in November 2023, but they are currently valued at $35/SREC (May 2024). In the SREC Revenue line of the pro forma, $30 per SREC was assumed, and therefore the TWP could expect to earn approximately $21,585 in the first year, should it decide to sell the environmental attributes. Of course, the TWP may wish to retain the environmental attributes – the SRECs, or any future carbon credits – it may dedicate any SREC revenue to other TWP needs, making this SREC/carbon revenue unavailable for the project's financial pro forma.

It should be noted that CES extended this $30/SREC revenue assumption for 20 years of the analysis. While Pennsylvania's Alternative Energy Portfolio Act's mandated percentages for clean energy stop increasing in 2021, this analysis shows the revenue continuing through 2044 because it is reasonable to assume Pennsylvania and the U.S. will continue to recognize some monetization of the environmental attributes of the solar generation – cap-and-trade or carbon tax – will be in place. Whatever risk is contained in this assumption is likely offset by our decision to keep SRECs prices starting at $30/SREC with a 2% annual escalation over 20 years of the 30-year analysis period.

Net Metering

Net metering enables the TWP to be compensated for its solar electricity production that exceeds its current electricity demand. As the policy stands, the TWP would be eligible to receive the full retail rate of any volumetric electricity sent back to the grid. However, under Pennsylvania law and regulations, net metering is only required for default service customers of the local electric distribution company, not entities that purchase electricity through a third-party electricity supplier such as Constellation – but, this is not an issue for the TWP.

It is important to note that distribution and transmission demand charges ($/kW), are not volumetric charges ($/kWh), and are often not reduced that much. Although there would be some demand charge savings, it is extremely difficult to estimate how much that could be; therefore, to be conservative, it is best not to assume these bill savings.

Interconnection

CES reviewed the PECO Interconnection Viability Map, which seems to indicate that interconnecting solar PV on the distribution system where the Springfield TWP buildings are located is potentially viable (i.e., green bubble markers). See the map in Figure 2.

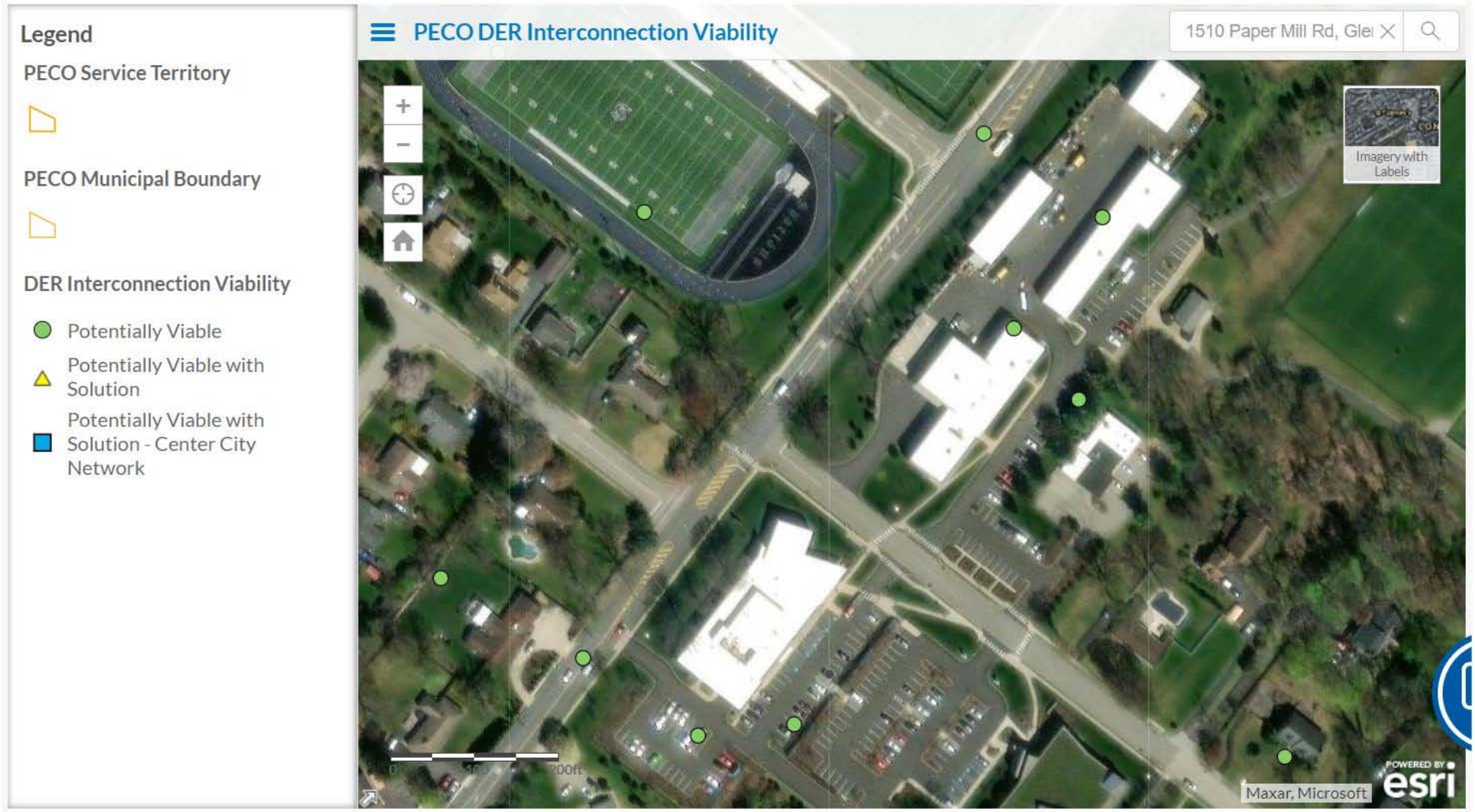


Figure 2. PECO Interconnection Viability Map over the Springfield TWP Buildings (note the green bubbles indicating Potentially Viable for interconnection

As mentioned in *Section 2. Proposed Solar Projects Design*, all the inverters are three phase at 480 VAC, where 480/208 step down transformers would be needed - one for the Admin/Police building and one for the Public Works building - before interconnecting onto the 208 VAC service at the corresponding buildings. The 480 VAC output conductors from the five 30 kW inverters for the Admin/Police system would be wired and combined in an accumulation panel on the roof of that building, then wired to the 480/208 transformer located on the ground near the PECO transformer and utility meter, then interconnected as a line-side tap on the feeder side of the 208 VAC service (including all the overcurrent protection devices and other devices necessary). A second utility meter pan will also need to be installed.

Same with the Public Works building, the 480 VAC output conductors from the 120 kW inverter and the 80 kW inverter would be wired and combined in an accumulation panel, all mounted on the South side of the outside PW West Shed wall, then wired to the 480/208 transformer close to the PECO transformer and utility meter, then interconnected as a line-side tap on the feeder side of the 208 VAC service (including all the overcurrent protection devices and other devices necessary), along with a second utility meter pan.

These solar PV systems are too large to interconnect on the load-side or onto a breaker in any of the electric panels. Line-side connections are very common for applications like this. More details about interconnecting the solar systems onto the service are beyond the scope of this feasibility assessment, but the overall cost of the solar project always includes the interconnection costs.

Section 6. Next Steps

1. Structural Analysis

   Assuming Springfield TWP wants to further explore installing solar PV arrays on the Admin/Police and the Public Works Main and East Shed buildings, and possibly on the PW West Shed roof, then it would make sense to have a structural analysis conducted for these roofs. As mentioned above, the range of the installed weight for solar modules on a ballasted racking system is about 3 PSF to 8 PSF.

2. Request for Proposal Guidance

   After structural analysis is completed and there are no load issues with installing ballasted solar on the given building rooftops, and the TWP is still interested in going forward with a solar project, then CES can help the TWP consider a couple of options, such as – 1) traditional pathway – hire an engineering firm to design-bid-build the whole project, then separately bid out and hire the solar contractor to install the engineered system; or, 2) hire an engineering firm or alternative to oversee the bidding, and contract oversight of a design/build contract.

3. Tax-exempt Financing

   Should the TWP decide to finance the solar project, the TWP's lender should perform a cash flow analysis with tax-exempt and conventional financing. The federal incentive for conventional financing is 30% of the total project cost, while the incentive will decrease to 15% if the project is financed with tax-exempt bonds.

Section 7. Addendum (Solar Array Layouts and Sample Equipment Spec Sheets)

Figure 3

Springfield TWP Admin / Police Building

Array Layout

Figure 4

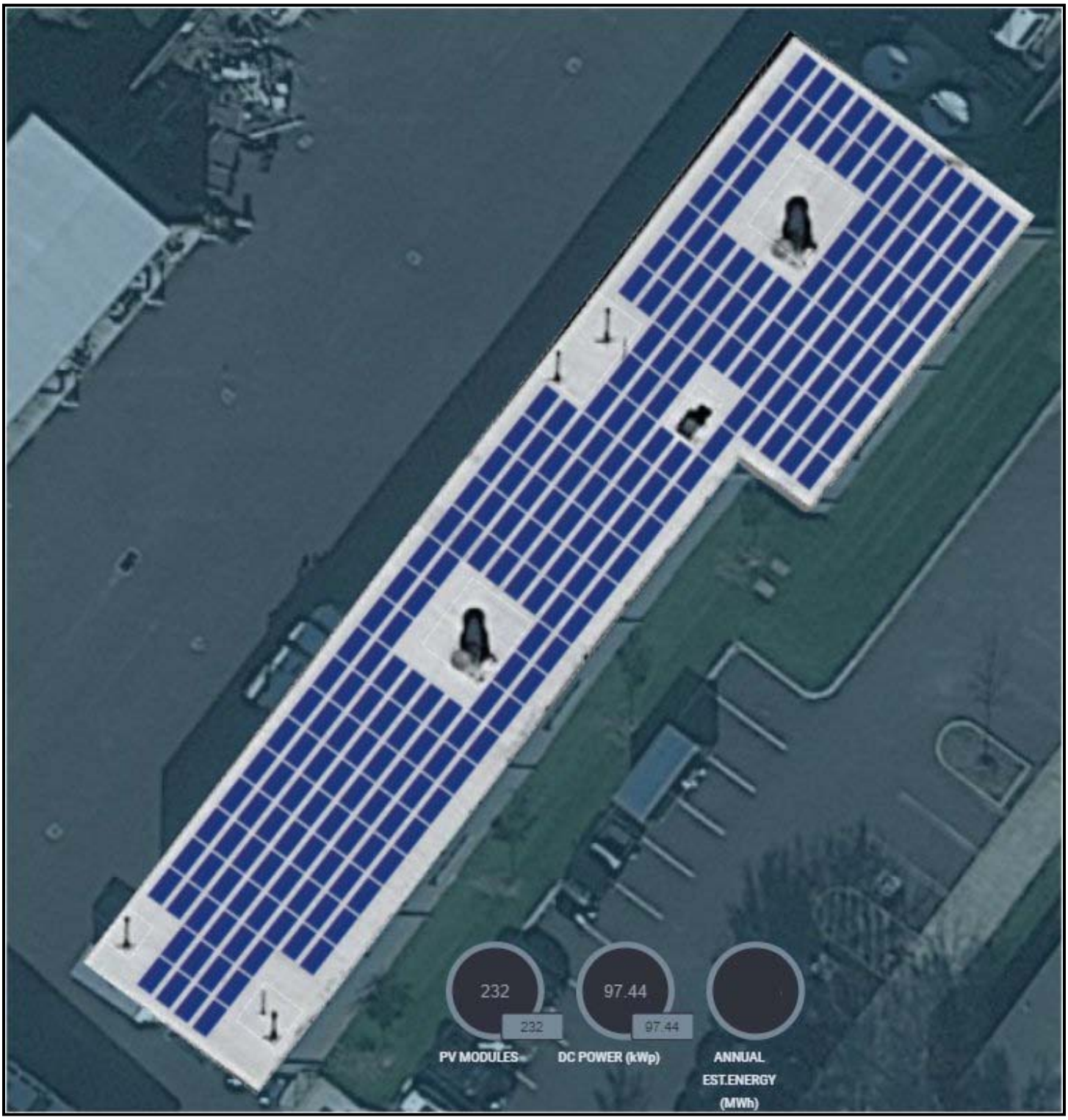
Springfield TWP Public Works Main Building

Array Layout

Figure 5

Springfield TWP Public Works – East Shed Building

Array Layout



ROOFMOUNT | RMDT

UNIRAC
BETTER SOLAR STARTS HERE

MAXIMUM ENERGY DENSITY

- Up to 33% more modules on the roof.
- 8 Degree Dual Tilt.
- G235 steel, double the corrosion protection of other racking products.

FASTER INSTALLATION

- Place panel, then clamp for single person module installation .
- Integrated bonding with single tool, hassle-free installation.
- Elimination of wind deflectors and fire skirts streamlines system installation.
- Ship up to 1 MW per truck with compact packaging.

WHY ROOFMOUNT RMDT?

Maximize energy density and minimize cost with RMDT, UNIRAC's ballasted dual tilt flat roof mounting system. Fewer components, single tool installation, snap-in hardware, and integrated bonding ensure high speed installation, while optional roof attachment, MLPE mount, and wire management provide a complete solution. UNIRAC's unmatched commercial project support makes construction easy, from permitting through installation, and RMDT is supported by North America's largest distribution network. Plus, enjoy peace of mind with UNIRAC's industry-leading 25-year warranty.

FOR QUESTIONS OR CUSTOMER SERVICE CONTACT:
505-242-6411 | SALES@UNIRAC.COM | WWW.UNIRAC.COM
PUB2024JAN01-V1

CONFORMS TO UL2703

ISO 9001:2015 14001:2015 CERTIFIED

EcoFoot5D™

The New High Density 5° Racking System

Small Footprint. Big Power.

Now you can build more powerful rooftop solar systems faster and easier than ever before with the new high density EcoFoot5D™ Racking System.

Built on the Industry-Preferred EcoFoot® Platform, with More than 200MW Installed.

18.4% More Power

Small 7"x16.7" roof-friendly modular Base and dense 9.9" inter-row spacing enables a tightly packed solar array that delivers 18.4% more power than 10° systems. Whether your roof is small or large, EcoFoot5D provides more power, lowering cost-per-watt.

Elegantly Simple Installation

EcoFoot5D delivers preassembled parts and an out-of-the-box, ready-to-go installation that is unlike any other flat-roof racking. The result is a seamless installation process from start to finish, saving on time and minimizing job-site impact.

Cost-Saving Logistics & Support

Stackable bases enable a huge per-pallet shipping capacity. Fewer pallets are required, minimizing shipping, storage and onsite crane use. Dedicated engineering support prevents issues before they happen and provides quick solutions if obstacles arise.

EcolibriumSolar

Contact: 740.249.1877 | sales@ecolibriumsolar.com | www.ecolibriumsolar.com

Q.PEAK DUO L-G8.3 / BFG
410-425

BIFACIAL DOUBLE GLASS MODULE WITH EXCELLENT RELIABILITY AND ADDITIONAL YIELD

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2020

Q CELLS Yield Security

BIFACIAL ENERGY YIELD GAIN OF UP TO 20 %
Bifacial Q.ANTUM solar cells make efficient use of light shining on the module rear-side for radically improved LCOE.

LOW ELECTRICITY GENERATION COSTS
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology for higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 20.1%.

INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behavior.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID and Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

FRAME FOR VERSATILE MOUNTING OPTIONS
High-tech aluminum alloy frame protects from damage, enables use of a wide range of mounting structures and is certified regarding IEC for high snow (5400 Pa) and wind loads (3000 Pa).

A RELIABLE INVESTMENT
Double glass module design enables extended lifetime with 12-year product warranty and improved 30-year performance warranty[2].

[1] APT test conditions according to IEC/TS 62804-1:2015 method B (−1500V, 168h) including post treatment according to IEC 61215-1-1 Ed. 2.0 (CD)
[2] See data sheet on rear for further information

THE IDEAL SOLUTION FOR:

Rooftop arrays on commercial / industrial buildings

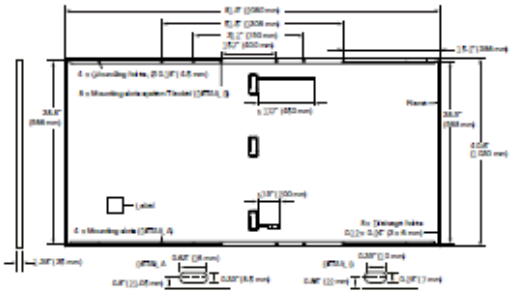
Ground-mounted solar power plants

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	81.9 in × 40.5 in × 1.37 in (including frame) (2080 mm × 1030 mm × 35 mm)
Weight	62.8 lbs (28.5 kg)
Front Cover	0.07 in (2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	0.07 in (2 mm) semi-tempered glass
Frame	Anodized aluminum
Cell	6 × 24 monocrystalline Q.ANTUM solar half cells
Junction Box	3.42-3.94 in × 1.26-1.51 in × 0.73 in (87-100.3 mm × 32-38.5 mm × 18.7 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 17.7 in (450 mm), (−) ≥ 7.87 in (200 mm)
Connector	Stäubli MC4-Evo2, Hanwha Q CELLS HQC4, Amphenol UTX, Renhe 05-8, JMTHY JM601A, Tongling Cable01S-F; IP68 or Friends PV2a; IP67



ELECTRICAL CHARACTERISTICS

POWER CLASS				410		415		420		425	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC¹ AND BSTC² (POWER TOLERANCE +5 W / −0 W)					BSTC²		BSTC²		BSTC²		BSTC²
Minimum	Power at MPP³	P_{MPP}	[W]	410	448.5	415	453.9	420	459.4	425	464.9
	Short Circuit Current³	I_{SC}	[A]	10.65	11.65	10.69	11.7	10.74	11.75	10.78	11.80
	Open Circuit Voltage³	V_{OC}	[V]	48.34	48.52	48.59	48.76	48.84	49.01	49.09	49.26
	Current at MPP	I_{MPP}	[A]	10.13	11.09	10.18	11.14	10.22	11.18	10.27	11.23
	Voltage at MPP	V_{MPP}	[V]	40.46	40.45	40.77	40.76	41.08	41.07	41.39	41.38
	Efficiency³	η	[%]	≥19.1	≥20.9	≥19.4	≥21.2	≥19.6	≥21.4	≥19.8	≥21.6

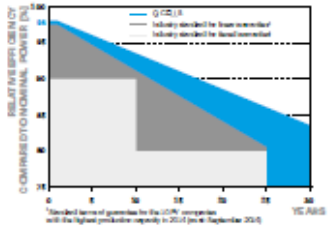
Bifaciality of P_{MPP} and I_{SC}: 70% ± 5% • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2

¹Measurement tolerances P_{MPP} ± 3%; I_{SC}, V_{OC} ± 5% at STC: 1000 W/m²; ²at BSTC: 1000 W/m² + Φ × 135 W/m², Φ = 70% ± 5%, 25 ± 2 °C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT²							
Minimum	Power at MPP	P_{MPP}	[W]	307.1	310.8	314.5	318.3
	Short Circuit Current	I_{SC}	[A]	8.58	8.61	8.65	8.69
	Open Circuit Voltage	V_{OC}	[V]	45.58	45.82	46.05	46.29
	Current at MPP	I_{MPP}	[A]	7.98	8.01	8.05	8.08
	Voltage at MPP	V_{MPP}	[V]	38.49	38.79	39.09	39.38

²800 W/m², NMOT, spectrum AM 1.5

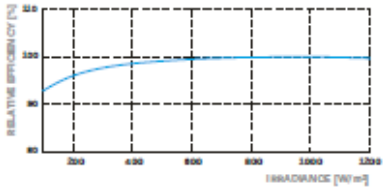
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 83.5% of nominal power up to 30 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.35	Nominal Module Operating Temperature	NMOT	[°F]	108 ± 5.4 (42 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1500 (IEC) / 1500 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 19⁴
Max. Design Load, Push / Pull³	[lbs / ft²]	75 (3600 Pa) / 42 (2000 Pa)	Permitted Module Temperature on Continuous Duty	−40 °F up to +185 °F (−40 °C up to +85 °C)
Max. Test Load, Push / Pull³	[lbs / ft²]	113 (5400 Pa) / 63 (3000 Pa)		

³See Installation Manual

⁴New Type is similar to Type 3 but with metallic frame

QUALIFICATIONS AND CERTIFICATES

UL 1703, CE-compliant,
IEC 61215:2016,
IEC 61730:2016,
U.S. Patent No. 9,893,215
(solar cells)

PACKAGING AND TRANSPORT INFORMATION

Horizontal packaging	83.8 in 2130 mm	42.5 in 1080 mm	47.1 in 1196 mm	1912 lbs 867.4 kg	22 pallets	22 pallets	29 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

Three Phase Inverter with Synergy Technology

INVERTER

For the 277/480V Grid for North America

SE80KUS / SE100KUS / SE110KUS / SE120KUS

Powered by unique pre-commissioning process for rapid system installation

- Pre-commissioning feature for automated validation of system components and wiring during the site installation process and prior to grid connection
- Easy 2-person installation with lightweight, modular design (each inverter consists of 2 or 3 Synergy units and 1 Synergy Manager)
- Independent operation of each Synergy unit enables higher uptime and easy serviceability
- Built-in thermal sensors detect faulty wiring, ensuring enhanced protection and safety
- Built-in arc fault protection and rapid shutdown
- Built-in PID mitigation for maximized system performance
- Monitored* and field-replaceable surge protection devices, to better withstand surges caused by lightning or other events
- Built-in module-level monitoring with Ethernet or cellular communication for full system visibility

*Applicable only for DC and AC SPDs

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Three Phase Inverter with Synergy Technology

For the 277/480V Grid for North America

SE80KUS / SE100KUS / SE110KUS / SE120KUS

MODEL NUMBER	SE80KUS	SE100KUS	SE110KUS	SE120KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER	SExxK-USx8Ixxxx				UNITS
OUTPUT					
Rated AC Active Output Power	80000	100000	110000	120000	W
Maximum AC Apparent Output Power	80000	100000	120000	120000	VA
AC Output Line Connections	3W + PE, 4W + PE				
Supported Grids	WYE: TN-C, TN-S, TN-C-S, TT, IT; Delta: IT				
AC Output Voltage Minimum-Nominal-Maximum[1] (L-N)	244 – 277 – 305				Vac
AC Output Voltage Minimum-Nominal-Maximum[1] (L-L)	422.5 – 480 – 529				Vac
AC Frequency Min-Nom-Max[1]	59.5 – 60 – 60.5				Hz
Maximum Continuous Output Current (per Phase, PF=1)	96.5	120	144.3		Aac
GFDI Threshold	1				A
Utility Monitoring, Islanding Protection, Configurable Power Factor, Country Configurable Thresholds	Yes				
Total Harmonic Distortion	≤ 3				%
Power Factor Range	±0.85 to 1				
INPUT					
Maximum DC Power (Module STC) Inverter / Synergy Unit	140000 / 70000	175000 / 58300	210000 / 70000		W
Transformer-less, Ungrounded	Yes				
Maximum Input Voltage DC+ to DC-	1000				Vdc
Operating Voltage Range	850 – 1000				Vdc
Maximum Input Current	2 x 48.25	3 x 40	3 x 48.25		Adc
Reverse-Polarity Protection	Yes				
Ground-Fault Isolation Detection	167kΩ sensitivity per Synergy Unit[2]				
CEC Weighted Efficiency	98.5				%
Nighttime Power Consumption	< 8	< 12			W
ADDITIONAL FEATURES					
Supported Communication Interfaces[3]	2 x RS485, Ethernet, Wi-Fi (optional), Cellular (optional)				
Smart Energy Management	Export Limitation				
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi access point for local connection				
Arc Fault Protection	Built-in, User Configurable (According to UL1699B)				
Photovoltaic Rapid Shutdown System	EC 2014, 2017 and 2020, Built-in				
PID Rectifier	Nighttime, built-in				
RS485 Surge Protection (ports 1+2)	Type II, field replaceable, integrated				
AC, DC Surge Protection	Type II, field replaceable, integrated				
DC Fuses (Single Pole)	25A, integrated				
DC SAFETY SWITCH					
DC Disconnect	Built-in				
STANDARD COMPLIANCE					
Safety	UL1699B, UL1741, UL1741 SA, UL1741 SB, UL1998, CSA C22.2#107.1, Canadian AFCI according to T.I.L. M-07				
Grid Connection Standards	IEEE 1547-2018, Rule 21, Rule 14 (HI)				
Emissions	FCC part 15 class A				

(1) For other regional settings please contact SolarEdge support.
(2) Where permitted by local regulations.
(3) For specifications of the optional communication options, visit the Communication product page or the Knowledge Center to download the relevant product datasheet.

Three Phase Inverters for the 277/480V Grid

for North America

SE30KUS / SE40KUS

INVERTERS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Quick and easy inverter commissioning directly from a smartphone using SolarEdge SetApp
- Fixed voltage inverter for superior efficiency (98.5%) and longer strings
- Built-in type 2 DC and AC Surge Protection, to better withstand lightning events
- Small, lightest in its class, and easy to install outdoors or indoors on provided bracket
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per articles 690.11 and 690.12
- Built-in module level monitoring with Ethernet, wireless, or cellular communication for full system visibility
- Integrated safety switch
- UL1741 SA and SB certified, for CPUC Rule 21 grid compliance

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Three Phase Inverters for the 277/480V Grid[1]

for North America

SE30KUS / SE40KUS

MODEL NUMBER	SE30KUS	SE40KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXK-USX8IXXXX		UNITS
OUTPUT			
Rated AC Power Output	30000	40000	W
Maximum Apparent AC Output Power	30000	40000	VA
AC Output Line Connections	3W + PE, 4W + PE		
AC Output Voltage Minimum-Nominal-Maximum[2] (L-N)	244 – 277 – 305		Vac
AC Output Voltage Minimum-Nominal-Maximum[2] (L-L)	422.5 – 480 – 529		Vac
AC Frequency Min-Nom-Max[2]	59.3 – 60 – 60.5		Hz
Maximum Continuous Output Current (per Phase)	36.25	48.25	Aac
GFDI Threshold	1		A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes		
Total Harmonic Distortion	≤ 3		%
Power Factor Range	+/- 0.85 to 1		
INPUT			
Maximum DC Power (Module STC)	52500	70000	W
Transformer-less, Ungrounded	Yes		
Maximum Input Voltage DC+ to DC-	1000		Vdc
Operating Voltage Range	840 – 1000		Vdc
Maximum Input Current	36.25	48.25	Adc
Maximum Input Short Circuit Current	55		Adc
Reverse-Polarity Protection	Yes		
Ground-Fault Isolation Detection	167kΩ Sensitivity[3]		
CEC Weighted Efficiency	98.5		%
Night-time Power Consumption	<4		W
ADDITIONAL FEATURES			
Supported Communication Interfaces	2 x RS485, Ethernet, Cellular (optional)		
Inverter Commissioning	With the SetApp mobile application using built-in access point for local connection		
Arc Fault Protection	Integrated, User Configurable (According to UL1699B)		
Rapid Shutdown	NEC2014, NEC2017 and NEC2020 compliant/certified		
RS485 Surge Protection Plug-in	Supplied with the inverter, Built-in		
DC Surge Protection	Type II, field replaceable, Built-in		
AC Surge Protection	Type II, field replaceable, Built-in		
DC Fuses (Single Pole)	25A, Built-in		
Smart Energy Management	Export Limitation		
DC SAFETY SWITCH			
DC Disconnect	Integrated		
STANDARD COMPLIANCE			
Safety	UL1741, UL1741 SA, UL1741 SB, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07		
Grid Connection Standards	IEEE1547-2018, Rule 21, Rule 14 (HI)		
Emissions	FCC Part 15 class A		
INSTALLATION SPECIFICATIONS			
AC Output Conduit Size / AWG Range	¾" or 1" / 6 – 10 AWG		
DC Input Conduit Size / AWG Range	¾" or 1" / 6 – 12 AWG		
Number of DC Inputs Pairs	4		
Dimensions with Safety Switch (H x W x D)	31.8 x 12.5 x 11.8 / 808 x 317 x 300		in / mm
Weight with Safety Switch	78.2 / 35.5		lb / kg
Cooling	Fans (user replaceable)		
Noise	< 62		dBA
Operating Temperature Range	-40 to +140 / -40 to +60(4)		°F / °C
Protection Rating	NEMA 3R		
Mounting	Bracket provided		

(1) For 120/208V inverters refer to the Three Phase Inverters for the 120/208V Grid for North America datasheet.
(2) For other regional settings please contact SolarEdge support.
(3) Where permitted by local regulations.
(4) For power de-rating information refer to the Temperature De-rating - Technical Note (North America).

CE

Power Optimizer

For North America

P1100

POWER OPTIMIZER

PV power optimization at the module level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- High efficiency with module-level MPPT, for maximized system energy production and revenue, and fast project ROI
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses, and combiner boxes; over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Use with parallel PV modules connected in series

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Power Optimizer

For North America

P1100

Power Optimizer Model (Typical Module Compatibility)	P1100 (for up to 2 x high power or bi-facial modules)	Units
INPUT		
Rated Input DC Power(1)	1100	W
Connection Method	Single input for series connected modules	
Absolute Maximum Input Voltage (Voc at lowest temperature)	125	Vdc
MPPT Operating Range	12.5 – 105	Vdc
Maximum Short Circuit Current per input (Isc)	14.1	Adc
Maximum Efficiency	99.5	%
Weighted Efficiency	98.6	%
Overvoltage Category	II	
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)		
Maximum Output Current	18	Adc
Maximum Output Voltage	80	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)		
Safety Output Voltage per Power Optimizer	1 ± 0.1	Vdc
STANDARD COMPLIANCE		
Photovoltaic Rapid Shutdown System	NEC 2014	
EMC	FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3	
Safety	IEC62109-1 (class II safety), UL1741, CSA C22.2#107.1	
Material	UL94 V-0, UV Resistant	
RoHS	Yes	
INSTALLATION SPECIFICATIONS		
Compatible SolarEdge Inverters	All commercial three phase inverters	
Maximum Allowed System Voltage	1000	Vdc
Dimensions (W x L x H)	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight	1064 / 2.34	gr / lb
Input Connector	MC4(2)	
Input Wire Length	1.6 / 5.24	m / ft
Output Wire Length	2.4 / 7.8	m / ft
Output Wire Type / Connector	Double Insulated / MC4	
Operating Temperature Range(3)	-40 to +85 / -40 to +185	°C / °F
Protection Rating	IP68 / NEMA6P	
Relative Humidity	0 – 100	%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.
(2) For other connector types please refer to: Power Optimizer Input Connector Compatibility Technical Note.
(3) For ambient temperatures above +70°C / +158°F power de-rating is applied. Refer to the Temperature De-rating Technical Note for more details.

PV System Design Using a SolarEdge Inverter(4)(5)		208V Grid SE10K	208V Grid SE17.3K*	277/480V Grid SE30K	277/480V Grid SE40K*	
Compatible Power Optimizers		P1100				
Minimum String Length	Power Optimizers	8	10	14	14	
	PV Modules	15	19	27	27	
Maximum String Length	Power Optimizers	30	30	30	30	
	PV Modules	60	60	60	60	
Maximum Continuous Power per String		7200	8820	15300	15300	W
Maximum Allowed Connected Power per String(6)		1 string – 8400	1 string – 10020	1 string – 17550	2 strings or less – 17550	W
		2 strings or more – 9800	2 strings or more – 12020	2 strings or more – 20300	3 strings or more – 20300	
Parallel Strings of Different Lengths or Orientations		Yes				
Maximum Difference in Number of Power Optimizers Allowed Between the Shortest and Longest String Connected to the Same Inverter Unit		5 Power Optimizers				

* The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter.
(4) For each string, a Power Optimizer may be connected to a single PV module if 1) each Power Optimizer is connected to a single PV module or 2) it is the only Power Optimizer connected to a single PV module in the string.
(5) Design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification.
(6) To connect more STC power per string, design your project using SolarEdge Designer.

RoHS

a+ei

architecture + engineering innovations
Robert J. Illo, AIA, PE: Principal
971 Corvair Road, Lancaster, PA 17601
717-575-1741 email: Rillo@aeiArchitect.com

August 5, 2024

Michael Taylor, Township Manager
Springfield Township
1510 Paper Mill Road
Wyndmoor, PA 19038

RE: Evaluation of Roof Structure of Four (4) Township Buildings to Support Solar Panels at 1510 Paper Mill Road, Springfield Township, Montgomery County, Pennsylvania
a+ei file # 24.021

Dear Mr. Taylor:

On 7/30/24 I visited the municipal building complex located at 1510 Paper Mill Road in Springfield Township, Montgomery County, Pennsylvania to examine the physical condition and configuration of the roofs of the four buildings shown in Figure 2. to determine the structural capacity of the roof framing under normal live loads, dead loads and the super-imposed load of the solar collection system which you intend to install on these roofs. This evaluation is limited to roof framing and does not include the compatibility of the electrical system with the solar collection system, the capability of the collection system to supply operational power needs, the structural capability of the framework that supports the panels above the roof or any other aspect of the proposed solar collection system.

The buildings are situated on the eastern side of Paper Mill Road, as seen in Figures 1 and 2. Directions referenced in this report are based on Paper Mill being oriented north to south and Hawthorne Lane being oriented east to west.

Building A: Police and Administration: The police and administration building is seen in Figures 2, 3, 4, 5, 6, 7, 8, 9 and 10. The roof of this building is framed with wide-flange steel roof beams and open-web steel roof joists, supported on steel framing and masonry bearing walls, as seen in Figure 5.

The open-web steel roof joists range in depth from ten (10) inches to twenty-two (22) inches. The joists are fabricated with two and one-half (2-1/2)-inch deep seats and are fabricated with steel angle chords and steel web members. The spans of the open-web steel roof joists range from approximately eight (8) feet to thirty-one (31) feet, six (6) inches.

The wide-flange steel roof beams range in depth from ten (10) inches to twenty-one (21) inches. The spans of the wide-flange steel roof beams range from approximately four (4) feet to thirty-four (34) feet.

The roof joists and beams described above support 22-gauge, structural steel decking. Most areas of the roof are constructed with type B steel roof decking. Type B steel roof decking is formed with ribs that are one and one-half (1-1/2) inches deep and spaced six (6) inches on center. The type B steel roof decking spans no more than eighty-four (84) inches between joists or beams. The roof decking of the board room and the remaining areas of the roof are constructed with type N, 22-gauge structural steel roof decking. The type N steel roof decking is formed with ribs that are three (3) inches deep and spaced eight (8) inches on center. The type N steel roof decking spans no more than one-hundred and eight (108) inches between joists or beams. Both types of decking support foam insulation board and a single-ply membrane roofing.

Building B: Public Works Maintenance: The public works maintenance building is seen in Figures 11, 12, 13, 14, 15, 16 and 17. The roof of this building is framed with wide-flange steel roof beams and open-web steel roof joists supported on steel framing and masonry bearing walls, as seen in Figure 12.

The open-web steel roof joists are located in the central section of this building. The open-web steel roof joists range in depth from eight (8) inches to fourteen (14) inches. The joists are fabricated with two and one-half (2-1/2)-inch deep seats and are fabricated with steel angle chords and steel web members. The spans of the open-web steel roof joists range from approximately nine (9) feet to twenty-one (21) feet.

The wide-flange steel roof beams are located in the north, south and west wings of the building. The wide-flange steel roof beams range in depth from ten (10) inches to twenty-one (21) inches. The spans of the wide-flange steel roof beams range from approximately eight (8) feet to fifty-two (52) feet, eight (8) inches.

The roof joists and beams described above support structural steel decking. The roof of the central portion the building is constructed with type B, 22-gauge, steel roof decking. Type B steel roof decking is formed with ribs that are one and one-half (1-1/2) inches deep and spaced six (6) inches on center. The type B steel roof decking spans no more than seventy-two (72) inches between joists or beams. The roof decking of the north, south and west wings are constructed with type N, 20-gauge structural steel roof decking. The type N steel roof decking is formed with ribs that are three (3) inches deep and spaced eight (8) inches on center. The type N steel roof decking spans no more than one-hundred and twelve (112) inches between joists or beams. Both types of decking support foam insulation board and a single-ply membrane roofing.

Building C: Public Works, Exterior Storage: The public works exterior storage building is seen in Figures 22, 23 and 24. The roof of this building is framed with glue-laminated roof beams supported on steel framing and masonry bearing walls, as seen in Figure 24.

The main roof of the exterior storage building is framed with glue-laminated lumber beams, oriented east to west (front to back of the building). The glue-laminated lumber roof beams are nominally five (5) inches wide by eighteen (18) inches deep. The glue-laminated roof beams are spaced no greater than thirty-two (32) inches on center or twenty-two (22) inches clear between beams.

The glue-laminated lumber beams are supported on their west ends by the western exterior masonry bearing wall of the building and on their east ends by steel beams. The steel roof beams on the east (open, front) of the building are fourteen (14) inches deep and span twenty-five (25) feet.

The roof of the southern portion of the exterior storage building is framed with nominal 2x10 structural grade dimensional lumber rafters. These 2x10 rafters are spaced sixteen (16) inches on center and span approximately twelve (12) feet, six (6) inches between masonry bearing walls.
The roof framing members described above support three-quarter (3/4)-inch-thick plywood roof decking. The plywood decking supports single-ply membrane roofing on the main roof and standing-seam metal roofing on the southern portion.

Building D: Public Works, Equipment: The public works equipment building is seen in Figures 18, 19, 20 and 21. The roof of this building is framed with wide-flange steel roof beams supported on steel framing and masonry bearing walls, as seen in Figure 19.

The wide-flange steel roof beams range in depth from ten (10) inches to sixteen (16) inches. The spans of the wide-flange steel roof beams range from approximately fifteen (15) feet to thirty-five (35) feet.

The roof beams described above support type N, 20-gauge structural steel roof decking. The type N steel roof decking is formed with ribs that are three (3) inches deep and spaced eight (8) inches on center. The type N steel roof decking spans no more than one-hundred and twenty (120) inches between joists or beams. Both types of decking support foam insulation board and a single-ply membrane roofing.

Understanding of Conditions: I have reviewed the materials which you have sent to me, describing the materials and details of the roof framing systems of the four buildings that were examined on site. I understand that the following conditions apply to the installation of the solar collection system:

1. The solar panels will be mounted on the main roof areas and on the sloping, southern portion of the Exterior Storage building.
2. The panels may be mounted an angle of up to 10 degrees to the plane of the roof.
3. The installer of the solar panels will provide and install fasteners, and all mounting components above the roof structure to comply with all code-required structural loads.
4. The installer of the solar panels will seal all penetrations in the roofing material to ensure a weather-tight installation.

Metal Roofing Area at South of Exterior Storage:

5. The panels will be supported on the southern roof of the Exterior Storage building by rails fastened to the standing-seam roof with S-5 clamps or equivalent.
6. The S-5 clamps will be spaced forty-two (42) inches on center within eight (8) feet of the edge of the array and eighty-four (84) inches on center in the center of the array.
7. Two (2) rails will support each row of panels.

Membrane Roofing Areas:

8. The panels will be mounted to the remaining roof areas on a framework that is held to the roof with ballast blocks.
9. The panels, combined with ballast and frame mounting system, will impose approximately eight (8) pounds per square foot onto the portion of the roof directly under the panels.
10. The installer of the solar panels will provide and install fasteners, and all mounting components above the roof structure to comply with all code-required structural loads.
11. The installer of the solar panels will seal all penetrations in the roofing material to ensure a weather-tight installation.

12. If any components on the roof that require service or any part of a pathway to those components are located within ten (10) feet of an edge of the roof, a guard will be required in accordance with Chapter 10 of the International Building Code (IBC). It is understood that the solar panels do not require service, as they produce power throughout their lifetime without routine maintenance or service.

Conclusions: Based on my review of the materials which you have sent to me, and the understanding of conditions listed above in conjunction with my field inspection and analysis of the roof structures, I can conclude, with a reasonable degree of structural engineering certainty, that the roof structure as constructed and in its current condition is capable of supporting the solar collection panels in conformance to all applicable codes as described above without further modifications.

Thank you for allowing me the opportunity to provide you with my services.

Sincerely,
architecture + engineering innovations

Robert J. Illo, AIA, PE
Principal

cc: File

Figure 1

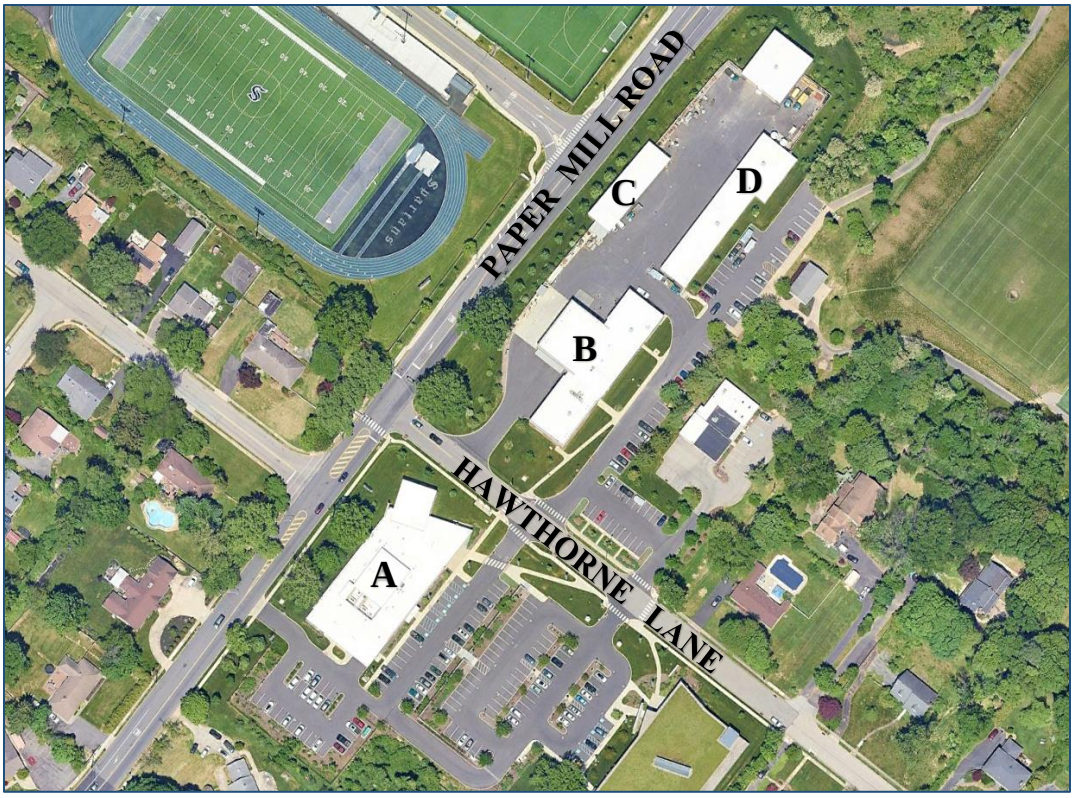


Figure 2

Figure 3

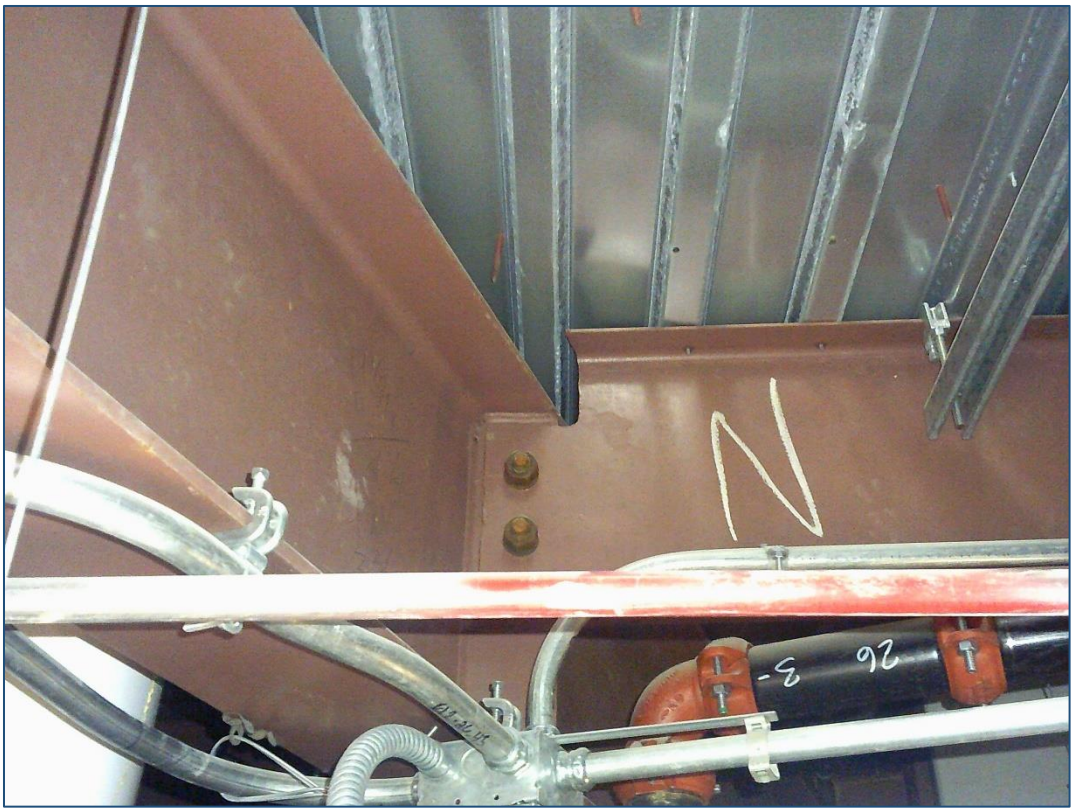


Figure 4

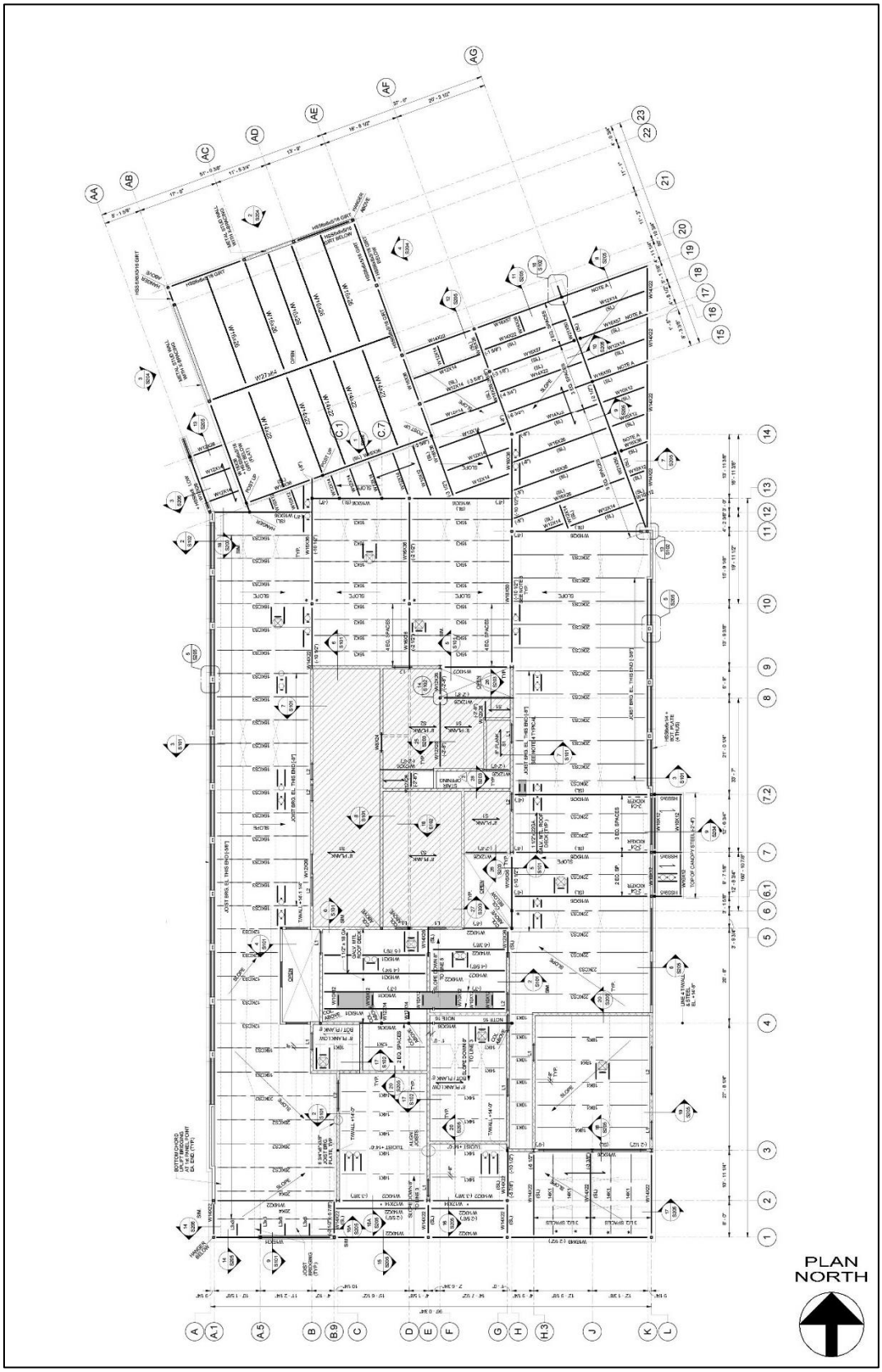


Figure 5

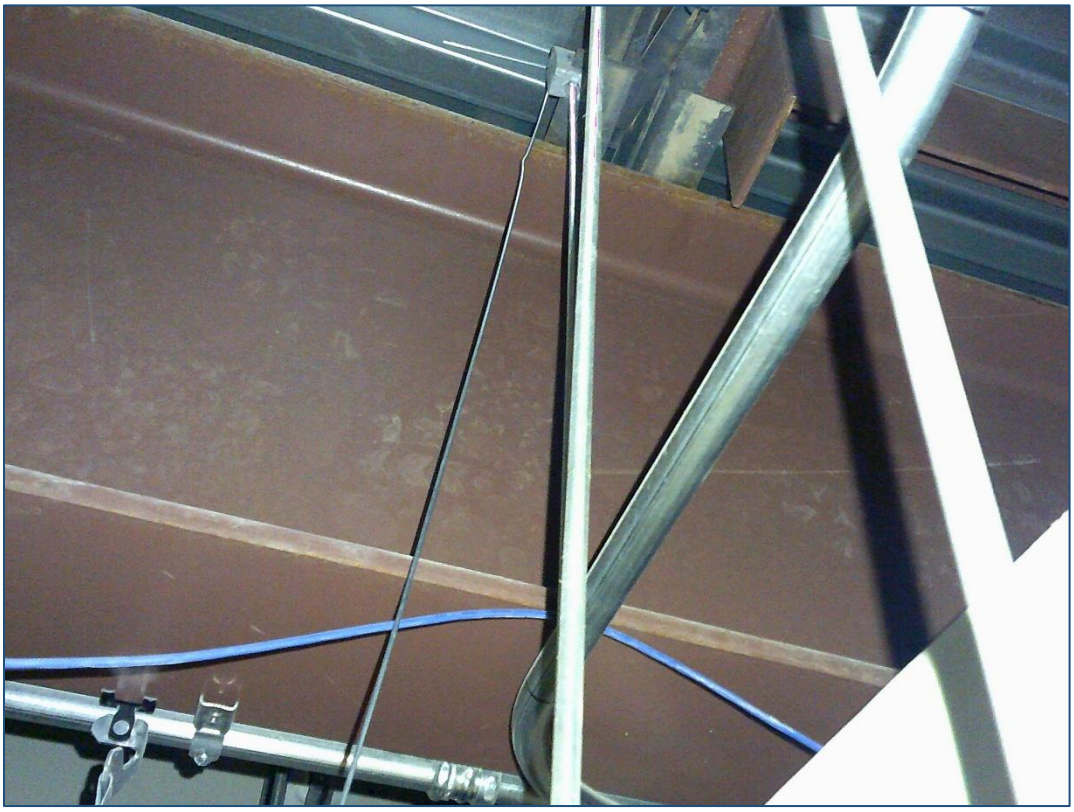


Figure 6

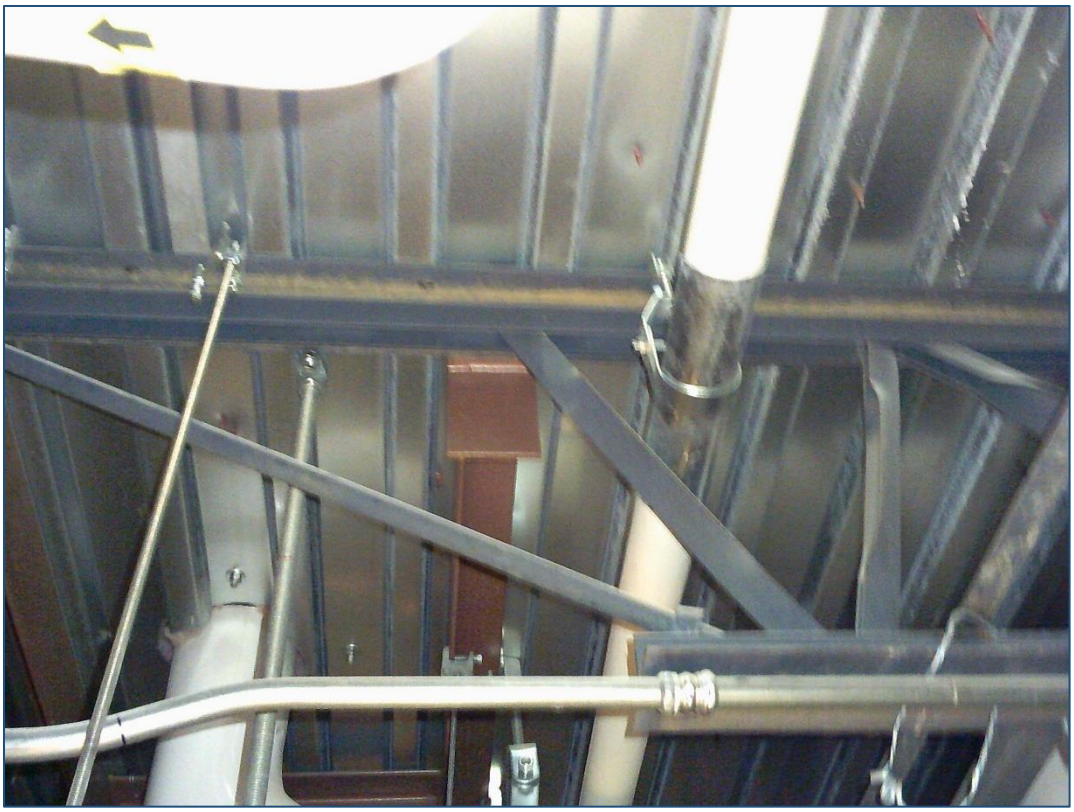


Figure 7

Figure 8

Figure 9

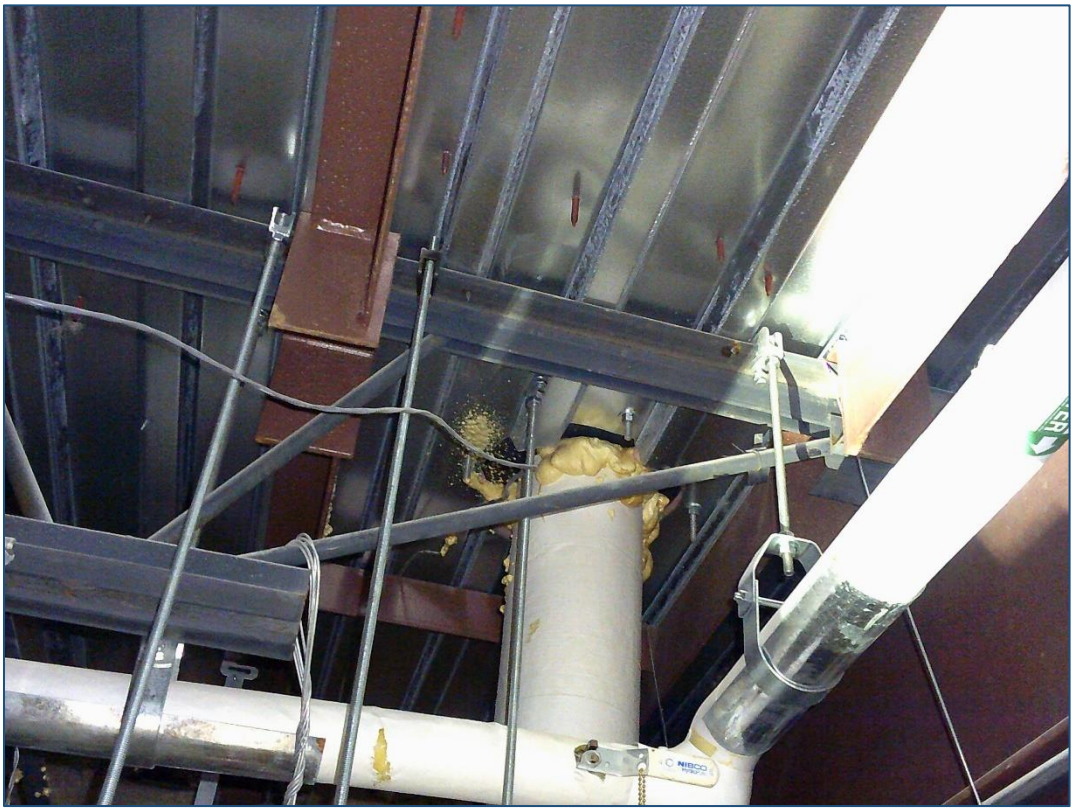


Figure 10

Figure 11

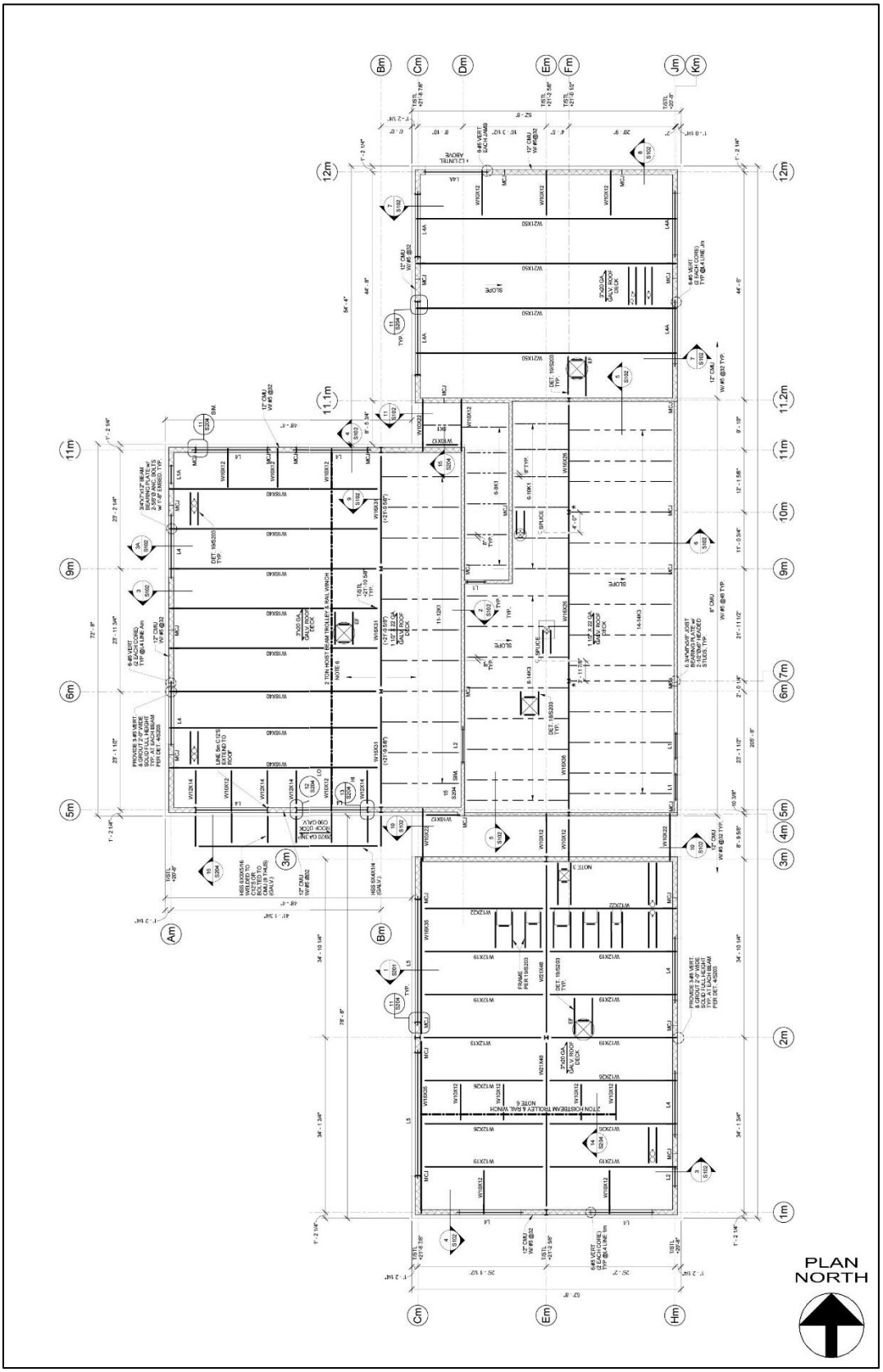


Figure 12

Figure 13

Figure 14

Figure 15

Figure 16

Figure 17

Figure 18

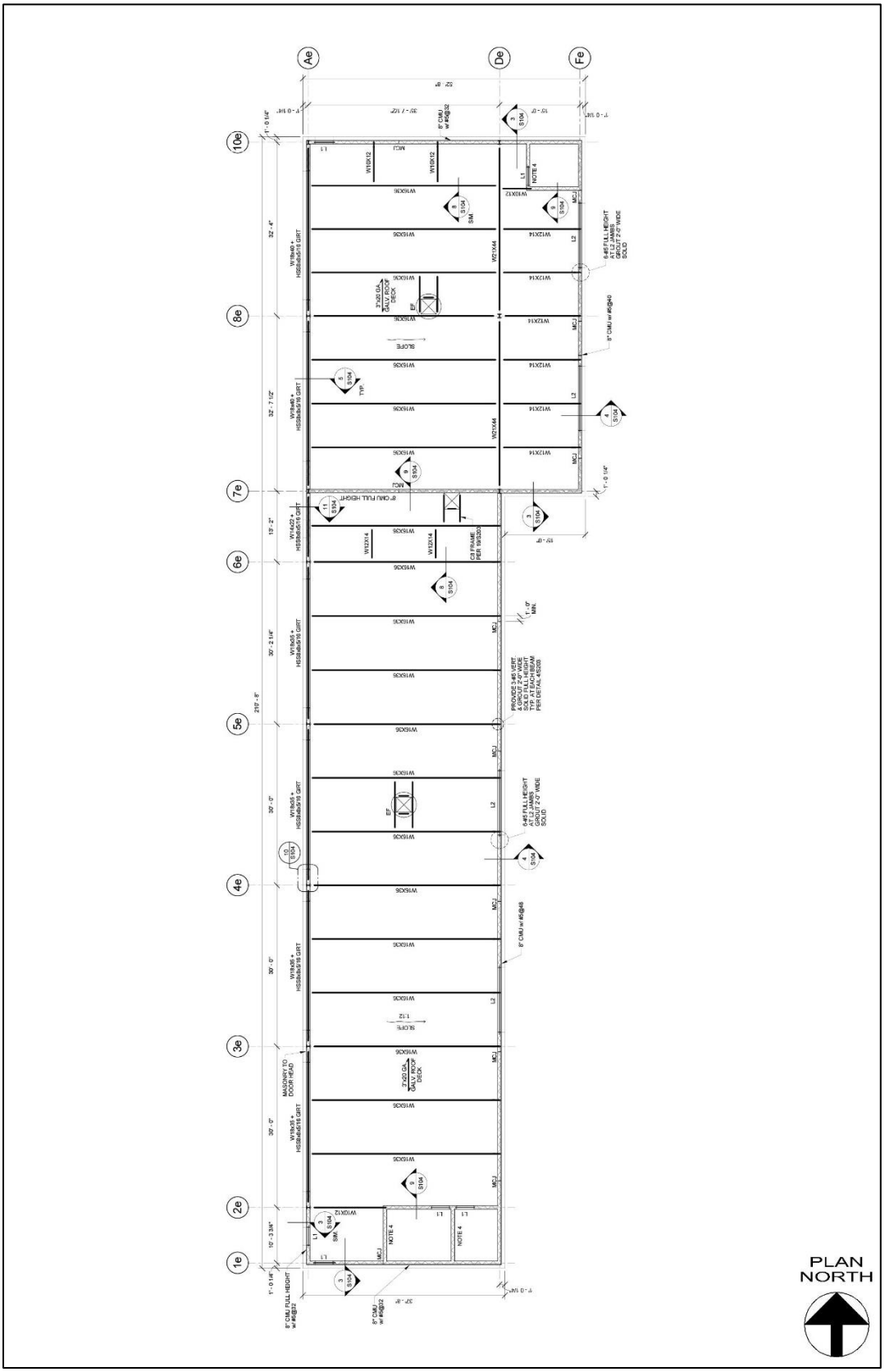


Figure 19

Figure 20

Figure 21

Figure 22

Figure 23

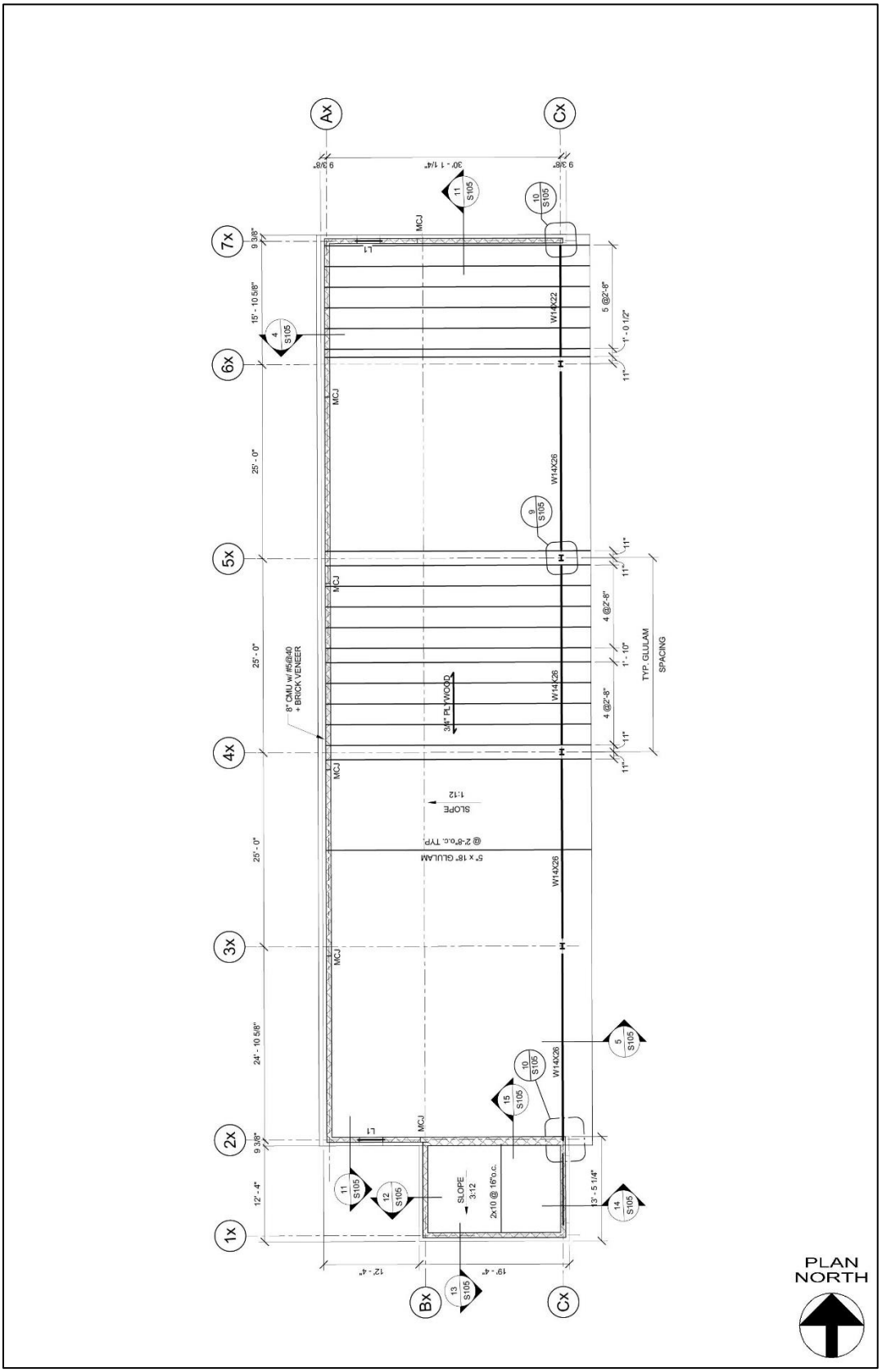
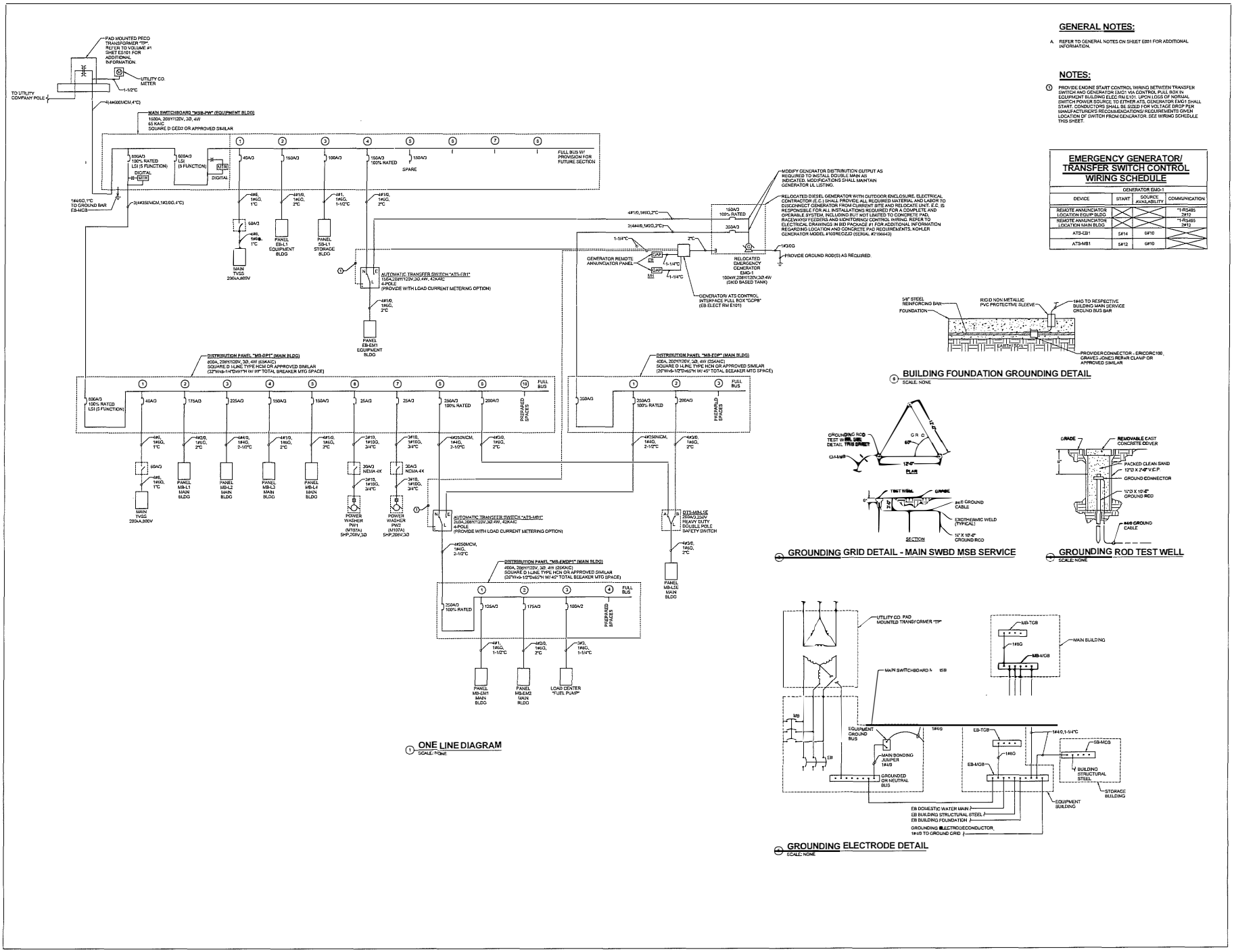

Ax
Cx
7x
6x
5x
4x
3x
2x
1x
Bx
MCJ
W14X22
W14X26
5 @2'-8"
4 @2'-8"
1' - 10"
TYP. GLULAM SPACING
3/4" PLYWOOD
8" CMU w/ REBAR + BRICK VENEER
SLOPE 1:12
5" x 18" GLULAM @ 2'-8" o.c. TYP.
SLOPE 3:12
2x10 @ 16" o.c.
25' - 0"
24' - 10 5/8"
12' - 4"
13' - 5 1/4"
PLAN NORTH

Figure 24

Attachment 5 – Electrical Single Line Diagrams



① ONE LINE DIAGRAM
SCALE: NONE

GENERAL NOTES:

A. REFER TO GENERAL NOTES ON SHEET E001 FOR ADDITIONAL INFORMATION.

NOTES:

① PROVIDE ENGINE START CONTROL WIRING BETWEEN TRANSFER SWITCH AND GENERATOR DMCH VIA CONTROL PULL BOX IN EQUIPMENT BUILDING ELEC RM E101. UPON LOSS OF NORMAL SWITCH POWER SOURCE TO EITHER ATS, GENERATOR EMG1 SHALL START. CONDUCTORS SHALL BE SIZED FOR VOLTAGE DROP PER MANUFACTURERS RECOMMENDATIONS/ REQUIREMENTS GIVEN LOCATION OF SWITCH FROM GENERATOR. SEE WIRING SCHEDULE THIS SHEET.

EMERGENCY GENERATOR/ TRANSFER SWITCH CONTROL WIRING SCHEDULE

DEVICE	START	SOURCE AVAILABILITY	COMMUNICATION
	GENERATOR EMG-1		
REMOTE ANNUNCIATOR LOCATION EQUIP BLDG			*1-RS485 2#12
REMOTE ANNUNCIATOR LOCATION MAIN BLDG			*1-RS485 2#12
ATS-EB1	5#14	6#10	
ATS-MB1	5#12	6#10	

⑥ BUILDING FOUNDATION GROUNDING DETAIL
SCALE: NONE

⑥ GROUNDING GRID DETAIL - MAIN SWBD MSB SERVICE

⑥ GROUNDING ROD TEST WELL
SCALE: NONE

⑥ GROUNDING ELECTRODE DETAIL
SCALE: NONE

VOLUME 2

SEAL

LANDSCAPE ARCHITECT
LRSLA STUDIO, INC
DUFFIELD ASSOCIATES
STRUCTURAL ENGINEER
A.M. LOCKUP CORPORATION
MECHANICAL ENGINEER
CORE STATES GROUP
ELECTRICAL ENGINEER
CORE STATES GROUP

DALEY-JALBOOT Architects Inc
232 Market Street
Philadelphia, PA 19106
215 564 4222 (fax)

NEW PUBLIC WORKS FACILITY
SPRINGFIELD TOWNSHIP
MUNICIPAL CAMPUS IMPROVEMENTS
1510 PAPER MILL ROAD, WYNDMOOR, PA 19038

DATE: 10 JANUARY 2018
ISSUED FOR: CONSTRUCTION

REVISIONS:

SHEET: ONE LINE DIAGRAM & GROUNDING DETAILS

SHEET: E400

PROJECT NO. 1316

Branch Panel: EL1

Location:
Supply From: EDP1
Mounting: Surface
Enclosure:

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 10KAIC
Mains Type: Main Lugs Only
Mains Rating: 225 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLE SQUAD ROOM A120	20 A	1	600	1200					1	20 A	RECEPTACLE RM A103G, A103E	2
3	RECEPTACLE SQUAD ROOM A120	20 A	1			1400	600			1	20 A	RECEPTACLE PATROL CORRIDOR A103E	4
5	RECEPTACLE SQUAD ROOM A120	20 A	1					1600	1440	1	20 A	COPIER PATROL CORRIDOR A103E	6
7	RECEPTACLE SHIFT SUPERVISOR A121	20 A	1	1400	1200					1	20 A	RECEPTACLE ROLL CALL / TRAINING ROOM...	8
9	RECEPTACLE SHIFT SUPERVISOR A121	20 A	1			1000	1000			1	20 A	RECEPTACLE ROLL CALL / TRAINING ROOM...	10
11	RECEPTACLE SAFETY OFFICER A122	20 A	1					1000	800	1	20 A	RECEPTACLE ROOM A118, A116	12
13	RECEPTACLE DEPUTY CHIEF A123	20 A	1	1000	1000					1	20 A	RECEPTACLE ROOM A105A, A113, A119A	14
15	RECEPTACLE CHIEF CLERK A124	20 A	1			1000	1200			1	20 A	RECEPTACLE ROOM A107, A107A, A105	16
17	RECEPTACLE POLICE CHIEF A125	20 A	1					1000	1200	1	20 A	RECEPTACLE PROCESSING ROOM A106	18
19	RECEPTACLE STAFF MEETING ROOM	20 A	1	1400	1200					1	20 A	RECEPTACLE DETECTIVES OFFICE A102B	20
21	RECEPTACLE RECORDS ROOM A117	20 A	1			1200	1000			1	20 A	RECEPTACLE ROOM A103, A108, A109	22
23	RECEPTACLE CORRIDOR A103G	20 A	1					1200	1000	1	20 A	RECEPTACLE DETECTIVE OFFICE A102C	24
25	LCP-P1 A103C	20 A	1	200	800					1	20 A	RECEPTACLE INTERVIEW A102D	26
27	RECEPTACLE ROOM A128, A128A	20 A	1			1000	1200			1	20 A	RECEPTACLE ROOM A100A, A100, A102	28
29	RECEPTACLE ROOM A127A, A127	20 A	1					600	1200	1	20 A	RECEPTACLE ROOM A102A, A102	30
31	RECEPTACLE EMERGENCY OPERATIONS...	20 A	1	1200	800					1	20 A	RECEPTACLE ROOM A104, A101	32
33	RECEPTACLE EMERGENCY OPERATIONS...	20 A	1			1000	400			1	20 A	RECEPTACLE SERVER / TELECOM ROOM A112	34
35	RECEPTACLE EVIDENCE LOCKER A114A	20 A	1					600	400	1	20 A	RECEPTACLE SERVER / TELECOM ROOM A112	36
37	RECEPTACLE ROOM A114B, A114	20 A	1	1000	400					1	20 A	RECEPTACLE SERVER / TELECOM ROOM A112	38
39	RECEPT & DISHWASHER BREAK ROOM A103A	20 A	1			1000	1200			1	20 A	RECEPTACLE SERVER / TELECOM ROOM A112	40
41	RECEPTACLE BREAK ROOM A103A	20 A	1					200	1100	1	20 A	FIRE ALARM PANEL SERVER / TELECOM ROO...	42
43	RECEPT & REF BREAK ROOM A103A	20 A	1	1160	0					1	20 A	SPARE	44
45	LIGHTING ROOM A100, A100A, A102,...	20 A	1			736	665			1	20 A	LIGHTING ROOM A103E,A103F,A103G	46
47	LIGHTING ROOM A101,A104,A112,A115, A127,...	20 A	1					1130	1551	1	20 A	LIGHTING ROOM A118, A116, A117, A103C,...	48
49	GARAGE DOOR A107	20 A	1	400	1040					1	20 A	LIGHTING ROOM A102C,A102D,A105, A105A,...	50
51	GARAGE DOOR A107	20 A	1			400	1000			1	20 A	TC PANEL A103C	52
53	EXTERIOR LIGHTING	20 A	1					1131	200	1	20 A	DWH1, CP1 A110A	54
55	EXTERIOR LIGHTING	20 A	1	450	810					1	20 A	LIGHTING ROOM...	56
57	SPARE	20 A	1			0	0			1	20 A	SPARE	58
59	SITE LIGHTING	20 A	2					1392	0	1	20 A	SPARE	60
61	–	–	–	1392	1167					3	20 A	EUH-2	62
63	SPARE	20 A	1			0	1167			–	–	–	64
65	SOUND SYSTEM P131C	20 A	1					400	1167	–	–	–	66
67	SPARE	20 A	1	0	1500					1	20 A	ECH-1	68
69	SPARE	20 A	1			0	400			1	20 A	RECEPTACLE SERVER / TELECOM ROOM A112	70
71	SPARE	20 A	1					0	1200	1	20 A	ACCESS CONTROLS	72
73	SPARE	20 A	1	0	1600					1	20 A	ACCESS CONTROLS	74
75	SPARE	20 A	1			0	1000			1	20 A	ACCESS CONTROLS	76
77	SPARE	20 A	1					0	1500	1	20 A	AUTODOORS A100A	78
79	SPARE	20 A	1	0	500					1	20 A	EVIDENCE LOCKER A114A	80
81	SPARE	20 A	1			0	0			1	0 A	SPARE	82
83	SPARE	20 A	1					0	0	1	0 A	SPARE	84
			Total Load:	23628 VA		19568 VA		23101 VA					
			Total Amps:	201 A		163 A		197 A					

Notes:

Branch Panel: EL2

Location: ELEC A130A
Supply From: EDP1
Mounting: Surface
Enclosure:

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 10KAIC
Mains Type: Main Lugs Only
Mains Rating: 225 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLE TOWNSHIP MANAGER OFFICE...	20 A	1	1000	1200					1	20 A	RECEPTACLE	2
3	RECEPTACLE OFFICE MNGR A145	20 A	1			1000	800			1	20 A	RECEPTACLE LOBBY A130C	4
5	RECEPTACLE ASSIST TOWNSHIP MANAGER...	20 A	1					1000	1000	1	20 A	RECEPTACLE P/R OFFICE A131	6
7	RECEPTACLE MEETING / FUTURE OFFICE A147	20 A	1	1200	1000					1	20 A	RECEPTACLE P/R DIRECTOR OFFICE A131A	8
9	RECEPTACLE FINANCE OFFICE A148	20 A	1			800	400			1	20 A	RECEPTACLE ROOM A131B	10
11	RECEPTACLE ROOM A142, A143, A140, A141	20 A	1					1000	600	1	20 A	RECEPTACLE CONFERENCE A132	12
13	RECEPTACLE ROOM A130C, A139, A139E,...	20 A	1	1000	600					1	20 A	RECEPTACLE CONFERENCE A132	14
15	RECEPTACLE ELEC A130A	20 A	1			200	1400			1	20 A	RECEPTACLE ROOM A133A, A133	16
17	RECEPTACLE BREAK ROOM A136B	20 A	1					900	500	1	20 A	RECEPTACLE BOARD ROOM A133	18
19	RECEPTACLE BREAK ROOM A136B	20 A	1	800	2000					1	20 A	RECEPTACLE BOARD ROOM A133	20
21	RECEPTACLE ROOM A138B, A136B	20 A	1			400	792			1	20 A	LIGHTING ROOM A148, A147, A146, A145, A144...	22
23	RECEPTACLE ROOM A130E, A137, A136C	20 A	1					800	1452	1	20 A	LIGHTING ROOM A130, A138A, A146A, A136,...	24
25	RECEPTACLE SPACE 76	20 A	1	1440	1474					1	20 A	ROOM A130D, A130	26
27	RECEPTACLE RECEPTION A140A	20 A	1			1000	642			1	20 A	LIGHTING ROOM A131A, A131B, A131	28
29	RECEPTACLE TAX COLLECTOR OFFICE A138	20 A	1					1000	982	1	20 A	ROOM A133	30
31	RECEPTACLE ROOM A138, A138A	20 A	1	1000	500					1	20 A	TC PANEL A130A	32
33	RECEPTACLE BUILDING/ZONING OFFICE A135	20 A	1			1400	600			1	20 A	ACCESS CONTROL	34
35	RECEPTACLE BUILDING/ZONING OFFICE A135	20 A	1					1200	1500	1	20 A	ADMIN AUTODOORS	36
37	RECEPTACLE BUILDING/ZONING OFFICE A135	20 A	1	1400	1800					2	20 A	GENERATOR JACKET WATER HEATER	38
39	RECEPTACLE CE OFFICER A135A	20 A	1			1000	1800			–	–	–	40
41	RECEPTACLE BUILDING/ZONING OFFICE A135	20 A	1					800	1200	1	20 A	GENERATOR BATTERY CHARGER	42
43	RECEPTACLE CONFERENCE A134	20 A	1	1000	500					1	20 A	GENERATOR LTS, REC, ALTERNATOR HTR	44
45	RECEPTACLE ROOM A130A, A130, A130D	20 A	1			1200	400			1	20 A	SOUND SYSTEM A133A	46
47	PROJ SCREEN BOARD ROOM A133	20 A	1					200	1200	1	20 A	MOTORIZED SHADES A133	48
49	SPARE	0 A	1	0	1000					1	20 A	LIGHTING ROOM A133	50
51	SPARE	0 A	1			0	1500			1	20 A	LIGHTING ROOM A133	52
53	SPARE	0 A	1					0	1500	1	20 A	LIGHTING ROOM A133	54
55	SPARE	0 A	1	0	530					1	20 A	LIGHTING CORRIDOR...	56
57	SPARE	0 A	1			0	361			1	20 A	LIGHTING STAIR A115B, CORR A204	58
59	SPARE	0 A	1					0	200	1	20 A	LCP-A1 A130A	60
61	SPARE	0 A	1	0	0					1	20 A	SPARE	62
63	SPARE	0 A	1			0	0			1	20 A	SPARE	64
65	SPARE	0 A	1					0	0	1	20 A	SPARE	66
67	SPARE	0 A	1	0	0					1	20 A	SPARE	68
69	SPARE	0 A	1			0	0			1	20 A	SPARE	70
71	SPARE	0 A	1					0	0	1	20 A	SPARE	72
73	SPARE	0 A	1	0	0					1	20 A	SPARE	74
75	SPARE	0 A	1			0	0			1	20 A	SPARE	76
77	SPARE	0 A	1					0	0	1	20 A	SPARE	78
79	SPARE	0 A	1	0	0					1	20 A	SPARE	80
81	SPARE	0 A	1			0	0			1	20 A	SPARE	82
83	SPARE	0 A	1					0	0	1	20 A	SPARE	84
			Total Load:	19450 VA		15685 VA		17384 VA					
			Total Amps:	164 A		131 A		147 A					

Notes:

Branch Panel: EL3

Location: MECHANICAL A203
Supply From: EDP1
Mounting: Surface
Enclosure:

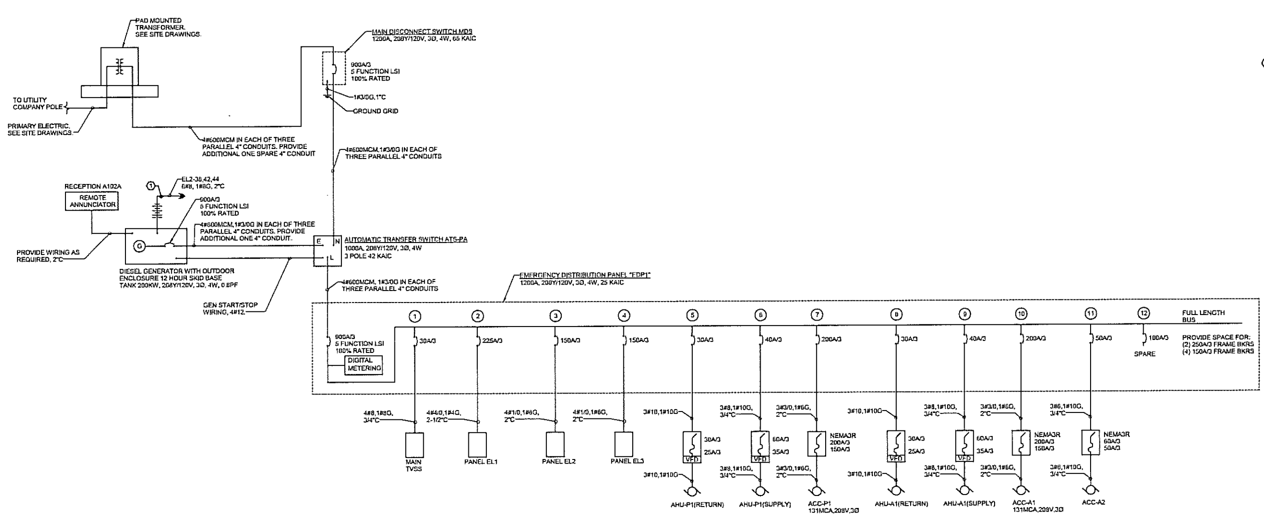
Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 10KAIC
Mains Type: Main Circuit Breakers
Mains Rating: 225 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPTACLE POLICE STORAGE A202	20 A	1	600	400					1	20 A	RECEPTACLE EXTERIOR UNITS	2
3	RECEPTACLE ADMIN STORAGE A201	20 A	1			600	1000			1	20 A	RECEPTACLE MECHANICAL A203	4
5	LIGHTING ROOM A202, A201	20 A	1					420	360	1	20 A	LIGHTING MECHANICAL A203	6
7	SPARE	20 A	1	0	696					1	20 A	EF-5	8
9	EF-4	20 A	1			696	696			1	20 A	EF-6	10
11	EF-2	20 A	1					696	696	1	20 A	EF-1	12
13	EUH-202	20 A	3	1100	1100					3	20 A	EUH-201	14
15	–	–	–			1100	1100			–	–	–	16
17	–	–	–					1100	1100	–	–	–	18
19	AHU-A2	20 A	3	900	500					1	20 A	TC PANEL A203	20
21	–	–	–			900	1176			1	20 A	P-AHUP1	22
23	–	–	–					900	1176	1	20 A	P-AHUA1	24
25	P-HWS1	20 A	3	1275	1176					1	20 A	P-B1	26
27	–	–	–			1275	1176			1	20 A	P-B2	28
29	–	–	–					1275	500	1	20 A	B-1	30
31	P-HWS2	20 A	3	1275	0					–	–	(SHUNT TRIP FOR B-1)	32
33	–	–	–			1275	600			1	20 A	B-2	34
35	–	–	–					1275	0	–	–	(SHUNT TRIP FOR B-2)	36
37	EF-7	20 A	3	555	1250					2	20 A	ACC-1	38
39	–	–	–			555	1250			–	–	–	40
41	–	–	–					555	696	1	20 A	EF-3	42
43	SPARE	20 A	1	0	696					1	20 A	EF-8	44
45	SPARE	20 A	1			0	600			1	20 A	RECEPTACLE - ROOF	46
47	SPARE	20 A	1					0	622	1	20 A	EF-201, EF-202	48
49	SPARE	20 A	1	0	500					1	20 A	OTHER MECHANICAL A203	50
51	SPARE	20 A	1			0	1500			1	20 A	EWH1	52
53	SPARE	20 A	1					0	0	1	20 A	SPARE	54
55	SPARE	20 A	1	0	0					1	20 A	SPARE	56
57	SPARE	20 A	1			0	0			1	20 A	SPARE	58
59	SPARE	20 A	1					0	0	1	20 A	SPARE	60
61	SPARE	20 A	1	0	0					1	20 A	SPARE	62
63	SPARE	20 A	1			0	0			1	20 A	SPARE	64
65	SPARE	20 A	1					0	0	1	20 A	SPARE	66
67	SPARE	20 A	1	0	0					1	20 A	SPARE	68
69	SPARE	20 A	1			0	0			1	20 A	SPARE	70
71	SPARE	20 A	1					0	0	1	20 A	SPARE	72
73	SPARE	20 A	1	0	0					1	20 A	SPARE	74
75	SPARE	20 A	1			0	0			1	20 A	SPARE	76
77	SPARE	20 A	1					0	0	1	20 A	SPARE	78
79	SPARE	20 A	1	0	0					1	20 A	SPARE	80
81	SPARE	20 A	1			0	0			1	20 A	SPARE	82
83	SPARE	20 A	1					0	0	1	20 A	SPARE	84
			Total Load:	12223 VA		15398 VA		11371 VA					
			Total Amps:	103 A		129 A		95 A					

Notes:



(1) **ONE-LINE DIAGRAM**
SCALE: NONE

GENERAL NOTES:

A. REFER TO SHEET E001 FOR ADDITIONAL INFORMATION.

NOTES:

(1) PROVIDE BRANCH CIRCUITS FOR BATTERY CHARGER, WATER JACKET HEATER, ENCLOSURE LIGHTING AND RECEPTACLE; AND ALTERNATOR HEATER. WATER JACKET HEATER: 3000W, 208V,1Ø. ALTERNATOR HEATER: 300W, 120V. VERIFY HEATER SIZES WITH MANUFACTURER. PROVIDE ELECTRIC AS REQUIRED.

VOLUME
4

SEAL

LANDSCAPE ARCHITECT
LRSLA STUDIO, INC
233 S BROAD STREET, PHILADELPHIA, PA 19102

CIVIL ENGINEER
DUFFIELD ASSOCIATES
211 N 13TH ST, SUITE 704, PHILADELPHIA, PA 19107

STRUCTURAL ENGINEER
A.W. LOOKUP CORPORATION
103 EAST 6TH AVENUE, CONSHOHOCKEN, PA 19428

M.E.P. ENGINEERS
BCCLT
1133 EAST CHESTNUT AVE, SUITE 7A, VINELAND, NJ 08360

DALEY+JALBOOT Architects Inc
2314 Market Street
Philadelphia, PA 19103
215 564 5222
215 564 0595 (fax)

NEW POLICE AND TOWNSHIP ADMIN. BLDG
SPRINGFIELD TOWNSHIP
MUNICIPAL CAMPUS IMPROVEMENTS
1510 PAPER MILL ROAD, WYNDMOOR, PA 19038

DATE: 15 JANUARY 2015
ISSUED FOR: CONSTRUCTION

REVISIONS:

SHEET
PANEL SCHEDULES AND ONE LINE DIAGRAM

SHEET
E401

PROJECT NO. 1390

Attachment 6

Respondent's General Information

Respondent shall furnish the following information. Additional sheets shall be attached as required. Failure to complete the Respondent's General Information may cause the response to be non-responsive and may cause its rejection.

1. RESPONDENT/CONTRACTOR'S name and street address:

_____

_____

_____

2. RESPONDENT/CONTRACTOR'S telephone number:_____

3. RESPONDENT/CONTRACTOR'S license number: _____

4. When organized: _____

5. If a corporation, where incorporated: _____

6. How many years have you been engaged in the contracting business under your present firm?

_____

Or

Trade name: _____

7. General character of work performed by your company: _____

_____

8. Have you ever failed to complete any work awarded to you? _____

If so, where and why?

9. Have you ever defaulted on a contract? _____

If so, where and why? _____

10. Name of person who inspected the site of proposed work for the Respondent:

Name: _____ Date of Inspection: _____

11. Surety Company and Agent who will provide any required bonds on this contract to be executed for this project:

Name of Surety: _____

Address: _____

Surety Company Agent: _____

12. ATTACH TO THE RESPONSE a financial statement, references, or other information, sufficiently comprehensive to permit the appraisal of Resondent/Contractor's current financial condition.

13: ATTACH TO THE RESPONSE a list of the 5 most recent projects completed involving work of similar type and complexity, listing the following data for each project:

1) Project name: _____

Contract price: _____

Name, address, and telephone number of owner's representative

_____

_____

_____

2) Project name: _____

Contract price: _____

Name, address, and telephone number of owner's representative

_____

_____

_____

3) Project name: _____

Contract price: _____

Name, address, and telephone number of owner's representative

_____

_____

4) Project name: _____

Contract price: _____

Name, address, and telephone number of owner's representative

_____

_____

_____

5) Project name: _____

Contract price: _____

Name, address, and telephone number of owner's representative:

_____

_____

_____

Attachment 7

1 - General Insurance Requirements

1.1 - The Contractor shall not commence Work until the Contractor has obtained at the Contractor's own expense all of the insurance as required hereunder and such insurance has been approved by the Owner; nor shall the Contractor allow any Subcontractor to commence work on any subcontract until all insurance required of the Subcontractor has been so obtained and approved by the Contractor. Approval of insurance required of the Contractor will be granted only after submission to the Owner of original certificates of insurance signed by authorized representatives of the insurers or, at the Owner's request, certified copies of the required insurance policies.

1.2 - Insurance as required hereunder shall be in force throughout the term of the Contract and for two years after final acceptance of the Project by Owner in accordance with 3.1.1.iv. Original certificates signed by authorized representatives of the insurers or, at the Owner's request, certified copies of insurance policies, evidencing that the required insurance is in effect, shall be maintained with the Owner throughout the term of the Contract and for two years after final acceptance of the Project by Owner.

1.3 - The Contractor shall require all Subcontractors to maintain during the term of the Contract commercial general liability insurance, business auto liability insurance, and workers compensation and employers liability insurance to the same extent required of the Contractor in 3.1.1, 3.1.2 and 3.1.3 (and 3.1.4) unless any such requirement is expressly waived or amended by the Owner in writing. The Contractor shall furnish Subcontractors' certificates of insurance to the Owner immediately upon request.

1.4 - All insurance policies required hereunder shall be endorsed to provide that the policy is not subject to cancellation or non-renewal until sixty (60) days prior written notice has been given to the Owner.

1.5 - No acceptance and/or approval of any insurance by the Owner shall be construed as relieving or excusing the Contractor or the Contractor's Surety from any liability or obligation imposed upon either or both of them by the provisions of this Contract.

1.6 - If the Contractor does not meet the insurance requirements of this Contract, the Contractor shall forward a written request to the Owner for a waiver in writing of the insurance requirement(s) not met or approval in writing of alternate insurance coverage, self-insurance, or group self-insurance arrangements. If the Owner denies the request, the Contractor must comply with the insurance requirements as specified in this Contract.

1.7 - All required insurance coverages must be underwritten by insurers allowed to do business in the Commonwealth of Pennsylvania and acceptable to the Owner. The insurers must also have a

policyholders' rating of "A-" or better, and a financial size of "Class VII" or better in the latest evaluation by A. M. Best Company, unless Owner grants specific approval for an exception. The Owner hereby grants specific approval for the acquisition of workers compensation and employers liability insurance from the State Workers' Insurance Fund (SWIF) of Pennsylvania.

1.8 - Any deductibles or retentions in excess of $10,000 shall be disclosed by the Contractor, and are subject to Owner's written approval. Any deductible or retention amounts elected by the Contractor or imposed by the Contractor's insurer(s) shall be the sole responsibility of the Contractor.

1.9 - Any and all return premiums and/or dividends for insurance or coverage directly charged to the Owner by the Contractor in connection with this Contract shall belong to and be payable to the Owner.

1.10 - If the Owner is damaged by the failure or neglect of the Contractor to purchase and maintain insurance as described and required herein, without so notifying the Owner, then the Contractor shall bear all reasonable costs properly attributable thereto.

2 – Owner's Liability Insurance

2.1 - The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance, or solely at the Owner's option, the Owner may self-insure the Owner's liability exposures.

3 - Contractor's Liability Insurance

3.1 - The Contractor shall purchase and maintain the following insurance coverages which will insure against claims which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. Insurance shall be written for not less than the limits specified below or required by law, whichever is greater.

3.1.1 - Commercial general liability insurance or its equivalent for bodily injury, personal injury and property damage including loss of use, with minimum limits of:

$1,000,000 each occurrence;

$1,000,000 personal and advertising injury;

$2,000,000 general aggregate; and

$2,000,000 products/completed operations aggregate.

This insurance shall include coverage for all of the following:

i. General aggregate limit applying on a per project basis;

ii. Liability arising from premises and operations;

iii. Liability arising from the actions of independent contractors;

iv. Liability arising from products and completed operations with such coverage to be maintained for two years after completion of the Work;

v. Contractual liability including protection for the Contractor from bodily injury and property damage claims arising out of liability assumed under this Contract; and

vi. Liability arising from the explosion, collapse, or underground (XCU) hazards.

3.1.2 - Business auto liability insurance or its equivalent with a minimum limit of $1,000,000 per accident and including coverage for all of the following:

i. Liability arising out of the ownership, maintenance or use of any auto; and

ii. Automobile contractual liability.

3.1.3 - Workers compensation insurance or its equivalent with statutory benefits as required by any state or Federal law, including standard "other states" coverage; employers liability insurance or its equivalent with minimum limits of:

$1,000,000 each accident for bodily injury by accident;

$1,000,000 each employee for bodily injury by disease; and

$1,000,000 policy limit for bodily injury by disease.

3.1.4 - Umbrella excess liability or excess liability insurance or its equivalent with minimum limits of:

$ 5,000,000 per occurrence;

$ 5,000,000 aggregate for other than products/completed operations and auto liability; and

$ 5,000,000 products/completed operations aggregate

and including all of the following coverages on the applicable schedule of underlying insurance:

i. Commercial general liability;

ii. Business auto liability; and

iii. Employers liability.

3.1.5 Contractor's Pollution Liability Insurance: Contractor's pollution liability insurance or its equivalent for bodily injury, property damage, including loss of use, and clean-up costs on and off the Project site, with minimum limits of:

$1,000,000 each pollution incident; and

$2,000,000 annual aggregate.

3.1.6 - Owner and Owner's elected and appointed officials, officers, consultants, employees and authorized volunteers shall be named as additional insureds on the Contractor's commercial general liability insurance and umbrella excess or excess liability insurance policies with respect to liability arising out of the Contractor's work under this Contract. Such coverage shall extend to cover the additional insured(s) for liability arising out of the following:

i. On-going operations; and

ii. Completed operations.

The commercial general liability policy and the umbrella excess liability or excess liability policies, if required herein, must include additional insured language, which shall afford liability coverage for the exposures listed above in i. and ii.

Special Note: Policies endorsed with the following combinations of ISO forms shall be acceptable:

• CG 2010 entitled "Additional Insured - Owners, Lessees or Contractors – Scheduled Person or Organization" and CG 2037 entitled "Additional Insured - Owners, Lessees or Contractors – Completed Operations";

OR

• CG 2033 entitled “Additional Insured - Owners, Lessees or Contractors - Automatic Status When Required in Construction Agreement With You” and CG 2037 entitled “Additional Insured - Owners, Lessees or Contractors – Completed Operations”.

Both endorsements are required to afford coverage to the additional insured for both on-going operations and completed operations. Additionally, the schedules on these endorsements must properly reference the Owner and Owner's elected and appointed officials, officers, consultants, agents and employees.

3.1.7 - Insurance or self-insurance provided to the Owner and Owner's elected and appointed officials, officers, consultants, employees, and authorized volunteers under any Contractor's liability insurance or self-insurance required herein, including, but not limited to, umbrella and excess liability or excess liability policies, shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of insurance or self-insurance. (Any cross suits or cross liability exclusion shall be deleted from Contractor's liability insurance policies required herein.)

3.1.8 - Insurance or self-insurance provided to the Owner and Owner's elected and appointed officials, officers, consultants, employees, and authorized volunteers as specified herein shall be primary, and any other insurance, self-insurance, coverage or indemnity available to the Owner and Owner's elected and appointed officials, officers, consultants, employees, and authorized volunteers shall be excess of and non-contributory with insurance or self-insurance provided to the Owner and Owner's elected and appointed officials, officers, consultants, employees, and authorized volunteers as specified herein.

3.2 - If any liability insurance purchased by the Contractor has been issued on a "claims made" basis, the Contractor must comply with the following additional conditions:

i. The Contractor shall agree to provide certificates of insurance evidencing the above coverages for a period of two years after final payment for the Contract. Such certificates shall evidence a retroactive date no later than the beginning of the Work under this Contract; or

ii. The Contractor shall purchase an extended (minimum two years) reporting period endorsement for each such "claims made" policy in force as of the date of final acceptance and evidence the purchase of this extended reporting period endorsement by means of a certificate of insurance or a copy of the endorsement itself. Such certificate or copy of the endorsement shall evidence a retroactive date no later than the beginning of the Work under this Contract.

4 – Indemnification and Other

4.1 - Indemnification: To the fullest extent permitted by law, the Contractor shall protect, hold free and harmless, defend and indemnify the Owner (including its elected or appointed officials, officers, employees and authorized volunteers) from all liability, penalties, costs, losses, damages, expenses, causes of action, claims or judgments (including attorney's fees) resulting from injury to or death of any person or damage to property of any kind, which injury, death of any person or damage arises out of, or is in any way connected with the performance of the work under this Contract. This agreement shall apply to any acts or omissions, willful misconduct or negligent conduct, whether active or passive, including acts or omissions of Contractor's agents or employees, except that this agreement shall not be applicable to injury, death or damage to property arising from the sole negligence or sole willful misconduct of the Owner (including its elected or appointed officials, officers and employees). Accordingly, the Owner shall notify the Contractor promptly, in writing, of any claim or action brought against the Owner in connection with the work under this Contract. Upon such notification, the Contractor shall promptly take over and defend any such claim or action. The Owner shall have the right and option to be represented in any such claim or action at its own expense. The Contractor's obligation to defend and indemnify the Owner and its elected or appointed officials, officers and employees shall survive the termination of this Contract or completion of the Work.

4.2 - To the fullest extent permitted by law, the Contractor shall be solely responsible for any loss or damage to property of the Contractor or its subcontractors, invitees, employees, officials, volunteers, agents and representatives while such property is on, at or adjacent to the Premises of the Project.

4.3 - Acknowledgment of Contractor's Independent Contractor Status and No Coverage for Contractor under Owner's Workers Compensation Insurance: The Contractor hereby acknowledges its status as an independent contractor while performing services on behalf on the Owner and that the Owner's workers compensation insurance is not intended to and will not respond to cover any medical or indemnity loss arising out of injury to the Contractor or its employees during the Contractor's performance of services for the Owner.

Attachment 8

Instruction for Non-Collusion Affidavit

1. This Non-Collusion Affidavit is material to any contract awarded pursuant to this RFP and Proposal. According to the Pennsylvania Anti-Bid-Rigging Act, 73 P.S. Section 1611 et seq., governmental agencies may require Non-Collusion Affidavits to be submitted together with bids or proposals.

2. This Non-Collusion Affidavit must be executed by the member, officer or employee of the Respondent who makes the final decision on prices and the amount quoted in the response/proposal.

3. Bid rigging and other efforts to restrain competition and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all responsibilities for the preparation, approval or submission of the proposal/response.

4. In the case of a proposal/response submitted by a joint venture, each party to the venture must be identified in the proposal/response documents, and an Affidavit must be submitted separately on behalf of each party.

5. Failure to file an Affidavit, in compliance with these instructions, will result in disqualification of the response/proposal.

AFFIDAVIT OF NON-COLLUSION

State of Pennsylvania:

SS

County of Montgomery:

_____

(NAME)

being first duly sworn, deposes and says that he is _____

_____

(TITLE)

of_____

(FIRM)

The party making the foregoing Proposal or Bid; that such Proposal or Bid is genuine and not collusive or a sham; that said Respondent/Bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any Respondent/Bidder or person to put in a sham Proposal or Bid, or that such other person refrained from bidding, and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference with any person, to fix the Proposal or Bid price of any other Respondent/Bidder, or to fix overhead, profit or cost element of said Proposal or Bid price, or that of any other Respondent/Bidder, or to secure any advantage against Springfield Township or any person interested in the proposed Contract; and that all statements contained in the Proposal or Bid are true; and further that such Respondent/Bidder has not, directly or indirectly, submitted this bid, or the contents hereof, or divulged information or data relative thereto, to any association or to any member or agent thereof, or to any other Respondent/Bidder.

_____

(AFFIANT)

Sworn to and subscribed

before me this _____ day

of, _____, 20_____.

_____

NOTARY PUBLIC

MY COMMISSION EXPIRES: