THE VILLAGE OF HOMEWOOD
EMERGENCY BACKUP GENERATORS
FOR VILLAGE FACILITIES

ASSESSMENT REPORT

FINAL REVIEW
February 11, 2025

INTERFACE ENGINEERING
100 SOUTH WACKER DRIVE - SUITE 1140
CHICAGO, ILLINOIS 60606 – 312 964 4450

TABLE OF CONTENTS

SECTION I - INTRODUCTION

The Village of Homewood has commissioned this study to assess critical facilities and to provide phased implementation and cost recommendations to develop enhanced backup power and enhanced resilience in facilities deemed “critical” under FEMA Guidelines. Critical facilities are defined to include emergency operation centers, healthcare facilities, police and fire stations, schools, and power stations. These facilities support critical community lifelines that enable the continuous operation of critical business and government functions and are essential to human health and safety or economic security.

The Village currently has five facilities that need to be assessed, including the Village Hall, Police Station, Fire Station, Municipal Service Center (Public Works Facility) and the Brian Carey Training Center (Emergency Operations Center–EOC). These facilities currently incorporate

This report will provide an assessment of these five facilities and options for cost effective and phased upgrades for backup power systems, internally (i.e. outlets and internal circuitry, emergency lighting, etc.) and externally (generator connectivity), with the goal of maintaining full operational during short or long term power outage conditions.

SECTION II - EXISTING CONDITIONS

In the Introduction, it was stated that there are a total of five facilities that fall within the focus of this study, including the Village Hall, Police Station, Fire Station, Municipal Service Center (Public Works Facility) and the Brian Carey Training Center (Emergency Operations Center - EOC). The configuration and conditions present with the existing electrical distribution systems in each of these facilities will be discussed in this section of the report.

Village Hall

The Village Hall includes two full stories and a Basement of occupied space and includes key administrative functions and offices for the Village of Homewood. The existing building electrical service includes a single incoming ComEd feeder originating at a pad-mounted exterior transformer located adjacent to the building on the West side. This feeder is routed to a 400 Ampere ComEd CT/Metering cabinet and Main Service Switch located in the Basement. This Main Service Switch assembly is quite old and is in need of replacement. See Figure 1 for an image of this main service switch.

Figure 1 – Village Hall Main Service Switch and Meter

This service switch supplies power to the building power distribution located in the Main Electrical Room on the Ground Floor. The Main Service Panel, located in this room, is rated at 400 Amperes, 208Y/120 Volts, 3 – Phase, 4 Wires, and provides normal power to branch circuit lighting, receptacles, appliances, equipment, rooftop heating/cooling units and an elevator. See Figure 2 below for an image of this Main Service Panel. All of the building's normal power electrical distribution equipment is located in this room. The Main Service Panel and remaining panels located in this room have been updated in recent years and appear to be in very good condition.

Figure 2 – Village Hall Main Service Panel

Emergency Service for the Village Hall originates at a generator distribution panel located in the adjacent Police station facility. A dedicated feeder from this generator panel runs through these buildings and terminates at Panel EM located adjacent to the Village Hall Main Service Panel.

This panel, rated at 100 Amperes, 208Y/120 Volts, 3 – Phase, 4 Wires, currently powers both emergency life safety loads, which includes emergency lights, exit signs, fire alarm panels, etc. and standby power loads such as access door controls, heaters, data processing loads, sump pumps, etc. See Figure 3 for an image of Panel EM. Panel EM is not equipped with a dedicated automatic transfer switch, so a power outage that impacts the Village Hall only will not initiate generator startup. Loss of power to the Police Station is required to initiate generator startup. This condition needs to be corrected through the installation of automatic transfer switches in each facility powered from a common generator. This will be further discussed in a later section of this report addressing remedial options.

Figure 3 Village Hall Panel EM

Based upon the field investigation performed, we have developed a full power system riser diagram that establishes the existing electrical equipment and feeder configuration in the Village Hall. This diagram is included as ESK-1 in the Appendix.

Auditorium

The Auditorium includes one story and a Basement of occupied space and includes a multi-purpose gymnasium/assembly venue with stage for the Village of Homewood. The existing building electrical service includes a single incoming ComEd feeder originating at a pad-mounted exterior transformer located adjacent to the building on the West side. This feeder is routed to a 400 Ampere ComEd CT/Metering cabinet and Main Service Panel DP-1 located in the Sub-Basement. This Main Service Panel looks to be of recent vintage and is in good condition. See Figure 4 for an image of this main service panel.

Figure 4 Auditorium Main Service Panel

This service panel supplies power to the building power distribution panels located in the Basement and Ground Floor levels. The Main Service Panel is rated at 400 Amperes, 208Y/120 Volts, 3 – Phase, 4 Wires, and provides normal power to four branch circuit panels which power circuit lighting, receptacles, appliances, equipment and rooftop heating/cooling unit RTU-1. The Main Service Panel and associated branch circuit have been updated in recent years and appear to be in very good condition.

Emergency Service for the Auditorium does not appear to exist. This condition will be addressed as part of the Village Hall Options.

Based upon the field investigation performed, we have developed a full power system riser diagram that establishes the existing electrical equipment and feeder configuration in the Village Hall. This diagram is included as ESK-1A in the Appendix.

Police Station

The Police Station includes one-story above grade and a Basement of occupied space and houses key administrative functions, offices, lockup capability, meeting/conference areas, firing range and ancillary spaces for the Homewood Police Department. The existing building electrical service includes a single incoming ComEd feeder originating at a pad-mounted exterior transformer located adjacent to the building on the West side. This feeder is routed to a 1200 Ampere ComEd CT/Metering cabinet and Main Service Switchboard located in a dedicated electrical/telecommunications room on the Ground Floor. See Figure 5 for images of this main service switchboard.

Figure 5 – Police Main Service Switchboard

This main service switchboard, rated at 1200 Amperes, 208Y/120 Volts, 3 – Phase, 4 Wires supplies normal power to the building power distribution, including branch circuit lighting, receptacles, appliances, and equipment in both the Police and adjacent Fire Station. A portion

of the normal power electrical distribution equipment is located in this Main Switchboard Room, with the remainder located at strategic locations on the Basement and Ground Floors of the building. The Main Service Switchboard and other panels located in the Police Station facility are very old and are good candidates for replacement. The exceptions are the two panelboards serving the geothermal heating/cooling system. These were installed in 2014 and are in very good condition. See Figure 6 for an image of a typical power panel located in a building corridor.

Figure 6 – Police Corridor Power Panel Installation

Emergency/Standby Power Services for the Police and Fire Stations and the Village Hall are connected to a common backup natural gas engine generator located on the Ground Level at the West side of the Police Station. The generator, rated at 100 KW/125 KVA, 208Y/120 Volts, 3 – Phase, 4 Wires, 60 HZ, is housed in a dedicated room which includes a 400 Ampere, 3-Pole automatic transfer switch and the Main Generator Distribution Panel. The generator is equipped with a unit mounted 400AF/350AT output circuit breaker. The Generator Distribution Panel,

rated at 400 Amperes, 208Y/120 Volts, 3 - Phase, 4 Wires, includes the overcurrent protection for a series of emergency life safety and standby power panels located in the three facilities mentioned above. These loads include emergency lights, exit signs, fire alarm panels, radio equipment, etc. and standby power loads such as access door controls, lockup area, the geothermal heating/cooling system (police/fire facilities only), data processing loads, sump pumps, etc. The Generator Distribution Panel and automatic transfer switch are in very good condition and can be considered for reuse as part of an upgraded installation. See Figures 8, 8 and 9 for images of the existing generator set, automatic transfer switch and generator distribution panel.

Figure 7 – Police/Fire/Village Hall Generator Set

Figure 8 - Generator Automatic Transfer Switch

Figure 9 - Generator Distribution Panel

The Police Station main electrical room includes a series of panelboards that supply power to standby and emergency/life safety power in both the Police and Fire Stations. These panels include Emergency Panel, Emergency Lighting Panel, Radio Room HVAC Panel, Radio equipment Panel, Lockout Panel and the Geothermal Panel. See Figure 10 for an image of Emergency Panel located in the Main Electrical Room.

Based upon the field investigation performed, we have developed a full power system riser diagram that establishes the existing electrical equipment and feeder configuration in the Police Station/Generator Room. This diagram is included as ESK-2 in the Appendix.

Figure 10 – Police Station Emergency Power Panel

Fire Station

The Fire Station includes two stories of occupied space, including key administrative functions, offices, garage, meeting/conference areas, sleeping, kitchen, common and ancillary spaces for the Homewood Fire Department. The existing building electrical service includes a single

incoming feeder originating in the Main Switchboard located in the adjacent Police Department facility. This feeder, rated at 400 Amperes, 208Y/120 Volts, 3 - Phase, 4 Wires is routed through these building, terminating at a Main Service Panel located on the Ground Level.

The Main Service Panel, rated at 400 Amperes, 208Y/120 Volts, 3 – Phase, 4 Wires supplies normal power to the building power distribution, including branch circuit lighting, receptacles, appliances, and equipment in the Fire Station. A portion of the normal power electrical distribution equipment is located in this Main Electrical Space, with the remainder located at strategic locations on the Ground and Second Floors of the building. The Main Service Panel and other panels located in the Fire Station facility are very old and should be replaced. The exception is the panelboards serving the Second Level sleeping/living spaces which are newer and are in good condition. See Figures 11 & 12 for images of the Fire Department Electrical Space and Main Service Switchboard.

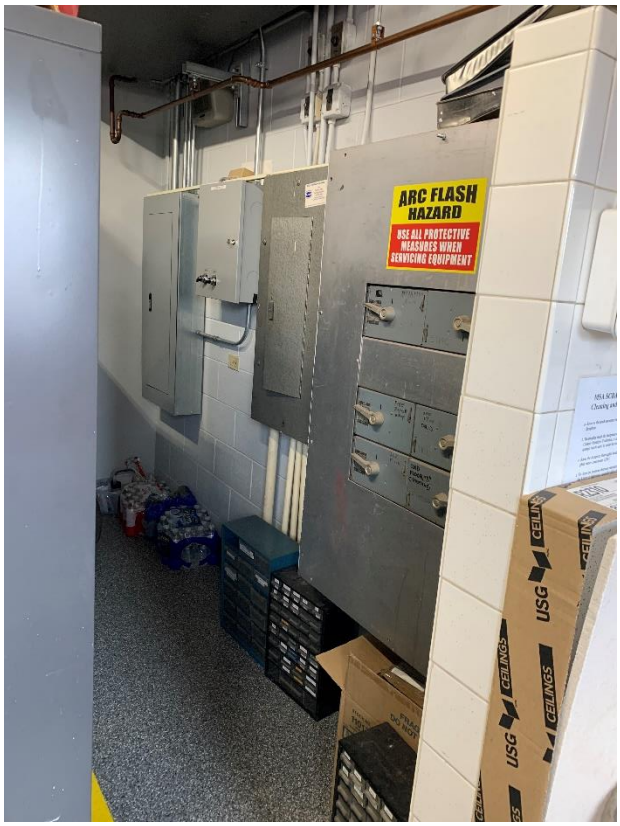


Figure 11 – Fire Dept. Electrical Space

Figure 12 – Fire Dept. Main Service Panel

Emergency/standby power serving the Fire Station is installed as part of the system serving the Police Station and was covered above. No further discussion is required at this juncture.

Based upon the field investigation performed, we have developed a full power system riser diagram that establishes the existing electrical equipment and feeder configuration in the Fire Station. This diagram is included as ESK-3 in the Appendix.

Municipal Service Center (Public Works Facility)

The Municipal Service Center (Public Works Facility) includes two stories of occupied space, including administrative offices, maintenance garage, vehicle storage garage, meeting/conference areas, common and ancillary spaces for the Homewood Public Works Department. The existing building electrical service includes a single incoming underground ComEd service feeder originating at an outdoor pad-mounted transformer. This feeder supplies power to a two-section, “sequence” service assembly, with individual sections rated at 800 Amperes and 400 Amperes, 208Y/120 Volts, 3 - Phase, 4 Wires. See Figure 13 for an image of this service assembly.

Figure 13 – Public Works Main Service Assembly

Service Section No. 1 consists of a ComEd CT compartment supplying an 800 Ampere, 3-Pole service switch. This service switch supplies power to Panel PP-2, located in the maintenance garage. This panel supplies power to lighting, receptacles, equipment, electric heat and ventilation loads in this area. See Figure 14 for images of Panel PP-2.

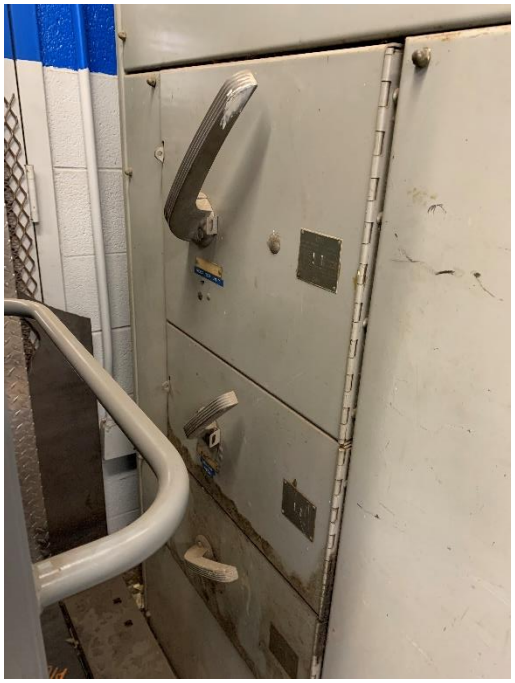


Figure 14 – Public Work Panel PP-2

Service Section No. 2 consists of a ComEd CT compartment supplying (2) two 100 Ampere, 3-Pole and (2) two 200 Ampere, 3-Pole “sequence” service main disconnecting means. Loads served include lighting, receptacles, equipment and HVAC located in the areas outside of the maintenance garage. The existing service switch assembly and remote distribution and branch panels located throughout this facility are largely older and in need of replacement. See Figure 15 for an image of this distribution section. This will be discussed later in this report.

Figure 15 – Main Service Distribution Section No. 2

Based upon the field investigation performed, we have developed a full power system riser diagram that establishes the existing electrical equipment and feeder configuration in the Municipal Service Center. This diagram is included as ESK-4 in the Appendix.

Pump Station No.1

The Municipal Service Center (Pump Station No.1) includes two stories of occupied space, including a Ground Floor pump room, an administrative office and generator room, and a Basement piping distribution and service area. The existing building electrical service includes a single incoming underground ComEd service feeder originating at an outdoor pad-mounted transformer. This feeder supplies power to a multi-section, Main Service Switchboard rated at 800 Amperes, 208Y/120 Volts, 3 - Phase, 3 Wires. See Figure 16 for an image of this service assembly. The ComEd service feeder enters this Main Switchboard in a CT/Metering section and supplies power to an 800 Ampere, 3-Pole Automatic Transfer switch and (5) five downstream distribution sections. Loads powered include (5) main water pumps, electric unit heaters, generator exhaust fan, vacuum pump, 45 KVA Lighting Transformer, dehumidifier, Municipal Services Building and Storm Water Pump Station standby power load, building lighting and receptacle panel. The main service switchboard is currently slated for replacement as part of a companion project.

Figure No. 16 – Pump Station No. 1 Main Switchboard

Pump Station No. 1 is equipped with a 300 KW/375 KVA Natural Gas generator set that supplies power to the entire Main Service Switchboard (via the 800 Ampere ATS). The generator is equipped with a 600 Ampere, 3-Pole output circuit breaker which is connected to supply power to the entire main switchboard. There is a load shedding function that limits the water pump operation on generator power to Pump No. 2. There are circuit breakers, housed in the Main Switchboard, that supply power to the Municipal Services Building and a remote Storm Water Pump Station. The generator is not new, and at the time of the visit, there was evidence of an anti-freeze leak in the room. This generator is housed in an adjacent room as shown in Figure No. 17.

Figure 17 – Pump Station No. 2 Natural Gas Generator

Based upon the field investigation performed, we have developed a full power system riser diagram that establishes the existing electrical equipment and feeder configuration in Pump Station No. 1. This diagram is included as ESK-5 in the Appendix.

Brian Carey Training Center/Fire Training Facility/Garage

The Brian Carey Training Center/Fire Training Facility is a three-building complex that includes the Carey Training Center, the Homewood Fire Training Facility and an adjacent maintenance garage facility.

The Carey Training Center includes two stories of occupied space, including administrative offices, meeting/conference areas, kitchenette, common and ancillary spaces for the Homewood Fire Department. The existing building electrical service includes a single incoming underground ComEd service feeder originating at an outdoor pad-mounted transformer. This feeder supplies power to a 400 Ampere, 240/120 Volt, 1-Phase, 3-Wire panel equipped with a 400 Ampere, 2-Pole Main Circuit Breaker. This panel and an adjacent Sub-Panel supplies power to the lighting, receptacle, equipment and HVAC loads in the Carey Training Center. The electrical panels and distribution equipment in this building are in very good condition and are

not considered candidates for replacement at this time. See Figure 18 for an image of the Main Service Panel and adjacent Sub-Panel.

Figure 18 – Brian Carey Center Main Service Panel/Sub-Panel

The Carey Training Center is equipped with a exterior 33 KW/33 KVA Natural Gas generator set that supplies power to an Automatic Transfer Switch and Generator Panel located in the Main Electrical Room. The generator powers numerous emergency standby loads in the building, including lighting, receptacles, HVAC equipment, communications equipment, sump pumps and other building electrical loads. The transfer switch is rated at 400 Amperes, 208/120 Volts, Single Phase, 3 wires. The main Generator Panel is rated at 225 Amperes, 208/120 Volts, Single Phase, 3 Wires with a 200 Ampere/ 2-Pole main circuit breaker.

Homewood Fire Training Building

The Homewood Fire Training Building includes one story of occupied space, which includes fore training facilities and vehicle parking for the Homewood Fire Department. The existing building

electrical service includes a single incoming underground ComEd service feeder originating at an outdoor pad-mounted transformer. This feeder supplies power to a 225 Ampere, 240/120 Volt, 1-Phase, 3-Wire panel equipped with a 200 Ampere, 2-Pole Main Circuit Breaker. This panel supplies power to the lighting, receptacle, fire equipment and HVAC loads in the Fire Training Building and a sub-panel located in the adjacent Garage Building. See Figures 19 and 20 for images of the Main Service Panel and the Garage Sub-Panel.

Figure 19 – Fire Training Building Main Service Panel

Figure 20 – Garage Sub-Panel

Based upon the field investigation performed, we have developed a full power system riser diagram that establishes the existing electrical equipment and feeder configuration in the Brian Carey Training Center, Homewood Fire Training Building and Garage. This diagram is included as ESK-6 in the Appendix.

ComEd Utility Peak Demand Load Summary

All of the existing buildings included in this study currently derive power from ComEd service lines and transformers typically located adjacent to each facility. Each facility is equipped with one or more ComEd meters that measure monthly energy draw and the peak power demand.

The peak power demand is useful in assessing the maximum power draw at each service, and can be used to evaluate the generator capacity required to power the entire facility. It should be noted that this reading averages this demand over a 15 or 30 minute “window”, so the instantaneous reading could actually be greater than this value. This factor will be included in

any assessment of the peak demand requirements of a given facility. The ComEd Peak Demand Table is included as ESK – 7 in the Appendix.

SECTION III – BACKUP POWER OPTIONS

In the previous section, we outlined the existing conditions in each of the five subject facilities. This section will build upon that discussion and establish options at each location for providing backup power that addresses the emergency/standby power requirements established by the operations team. The proposed solutions will focus on two basic approaches as follows:

1. Installation of backup generator, transfer switches and distribution to provide standby/emergency power to all required life safety loads and essential standby power loads that will enable operation during extended outages.
2. Installation of backup generator, transfer switches and distribution to provide standby/emergency power to 100% of the facility load, enabling full building operation during extended outages.

There are a number of criteria that are included as part of each of the proposed options presented in this section. They include the following:

- The preferred location for generator equipment is outdoors, with sound attenuated enclosures.
- Generators shall be located to minimize any potential for exhaust fumes migrating into adjacent building ventilation systems.
- The Village of Homewood would like to install generators capable of “dual fuel” operation, preferably natural gas/propane.
- All locations will include a manual transfer switch to permit operation from a portable generator.
- Each option will include the replacement of electrical distribution equipment deemed beyond useful life as established in Section II.

The options available for each facility will be outlined in the remainder of this section.

Village Hall

The Village Hall currently derives it emergency power from the generator located in the adjacent Police Department Building. As outlined in Section II, the existing emergency power system powers both emergency life safety loads, which includes emergency lights, exit signs, fire alarm panels, etc. and standby power loads such as access door controls, heaters, data processing loads, sump pumps, etc. It does not power the building heating, cooling and ventilation systems. Full operation of offices is not possible during extended outages.

The Village Hall does not currently include automatic transfer switches, a situation with meaningful consequences. Automatic transfer switches serve two essential functions in electrical power distribution. Their initial function is to sense power loss when a utility source fails. Once a power failure is detected, the automatic transfer switch initiates generator start

and subsequent transfers power from the utility to the backup generator source. Upon restoration of the normal utility power source, it undertakes the retransfer from the generator to the utility and shuts down the generator unit upon completion of this cycle. The operation of the entire backup power system is dependent on the transfer switches for proper operation.

The generator currently located in the Police Station is triggered via one transfer switch located in that facility. If there is an isolated outage in the Village Hall or Fire Department that does not affect the Police Department service, will not activate that generator. There will be no generator power available to the Village Hall under those circumstances. Each of the options generated for the Village Hall proposes the installation of dedicated automatic transfer switches to remediate this condition.

Village Hall Option 1

Village Hall Option 1 includes the introduction of an automatic transfer switch for the existing Emergency Panel loads described above and a second transfer switch and associated distribution panel to power the rooftop unit HVAC units. Under this option, additional building loads would be evaluated and powered to enhance the load complement currently served from the Emergency Panel. This option would maintain the Police Department generator as the backup power source for the Village Hall emergency/standby power, with the added capability to sense power loss and initiate generator operation independently. Option 1 also addresses the obsolete utility main service switch with the installation of a replacement switch. The remaining electrical distribution equipment in this building is in excellent condition and would be retained. Refer to Drawing EOSK-1A for a diagram of the modifications proposed under Village Hall Option 1.

Advantages/disadvantages of this option can be summarized as follows:

Advantages

- Independent generator start/stop control via multiple transfer switches
- Reduced first cost option versus full building backup
- Continued reliance on Police Department generator reduces total site machine quantity and ongoing maintenance expense
- Reduced site impact from reduced machine quantity.
- Upgraded utility service switch.

Disadvantages

- Continued reliance on Police Department Generator increases impact on the entire site if that generator fails
- Extended feeder lengths from Police Department generator to the new Village Hall transfer switches.
- Less operational flexibility versus full building backup power - Option 2

Village Hall Option 2

Village Hall Option 2 includes full back up power for the entire Village Hall facility and includes the installation of a dedicated Village Hall generator set as part of this comprehensive solution. Under Option 2, a total of three automatic automatic transfer switches will be installed, one for the existing Emergency Panel loads described in Option 1 above, a second to power the elevator and a third switch to power the existing main service panel.

The full implementation of this option will require the installation of a new main service panel to replace the existing service switch currently located in the Basement. This panel will provide power to the normal side of the three new automatic transfer switches.

The installation of a dedicated generator set requires locating and installing a 75KW/93.75KVA dual fuel natural gas/propane generator, a 400 Ampere, 208Y/120 Volt, 3 Phase, 4 wire generator distribution panel, and a 400 Ampere, 208Y/120 Volt, 3 Phase, 4 wire manual transfer switch. The introduction of the manual transfer switch addresses a National Electrical Code requirement to provide the means to connect a portable generator for situations where the permanent machine is out of service for maintenance or other reasons.

This option could be further enhanced with an interconnection to Police/Fire, offering additional backup capability if the generator were to fail.

The remaining electrical distribution equipment in this building is in excellent condition and would be retained. Refer to Drawing EOSK-1B for a diagram of the modifications proposed under Village Hall Option 1.

Advantages/disadvantages of this option can be summarized as follows:

Advantages

- Full facility operation under outage conditions
- An independent generator to provide complete load isolation from Police/Fire
- Independent generator start/stop control via multiple transfer switches
- Upgraded utility service switch and distribution

Disadvantages

- Highest cost option
- Added maintenance expense from added generator v. Option 1
- Greater site impact with added generator

Auditorium Option 2A

Village Hall/Auditorium Option 2a incorporates the full Village Hall Option 2 and adds the Auditorium in its entirety. Under Option 2A, a dedicated automatic automatic transfer switch will be installed, to provide full backup power capability for the Auditorium. As has been mentioned previously, the Auditorium does not have an existing backup power system, and under this option, power would be installed for the entire facility.

The full implementation of this option will require the installation of a new main service switch to power to the normal side of a new automatic transfer switch. As the load for this facility is not great, coupled with close proximity to the Village Hall makes connecting to the enhanced Village Hall system a natural choice. The impact on the Village Hall generator sizing is minimal.

This option could be further enhanced with an interconnection to Police/Fire, offering additional backup capability if the generator were to fail.

The remaining electrical distribution equipment in this building is in excellent condition and would be retained. Refer to Drawing EOSK-1C for a diagram of the modifications proposed under Auditorium Option 2A.

Police Fire

The Police and Fire Departments currently derive backup power from the generator located in the Police Department Building. As outlined in Section II, the existing emergency power system powers both emergency life safety loads, which includes emergency lights, exit signs, fire alarm panels, etc. and standby power loads such as access door controls, radio equipment, geothermal heating/cooling equipment, data processing loads, lockup area, sump pumps, etc. Full operation of offices is not possible during extended outages.

As described in Section II, both building derive their normal power from a common service switchboard. Loss of power on this service will trigger generator operation for both buildings. There is currently only one automatic transfer switch for the entire facility. The presence of a single switch is problematic in that any malfunction with this switch renders the entire backup power system vulnerable. This condition will be addressed with the installation of multiple transfer switches under the proposed remedial options.

Police/Fire Option 1

Police/Fire Option 1 includes the introduction of an automatic transfer switch for the existing Emergency Lighting Panel loads in order to segregate the code required emergency load from the optional standby power. The existing generator would be replaced with a modern “dual-fuel” natural gas/propane machine located outdoors in a weatherproof, sound attenuated enclosure. This installation would include the addition of a code-mandated manual tnasfer switch as described in the Village Hall Option 2 narrative. Option 1 includes evaluation of current emergency and standby power loads, with additional loads added as required. The

existing 400 Ampere automatic transfer switch, which is in good condition, would be retained for continued use under Option 1.

Option 1 also addresses the obsolete electrical distribution equipment in each facility. The existing utility main service switchboard in the Police Department building and the Main Service Panel in the Fire Station would be replaced with modern equipment. The remaining electrical distribution equipment in this building is in excellent condition and would be retained. Refer to Drawing EOSK-2A and 2C for diagrams of the modifications proposed under Police/Fire Option 1.

Advantages/disadvantages of this option can be summarized as follows:

Advantages

- Addition of transfer switch to reduce full reliance on existing switch
- Reduced first cost option versus full building backup
- Service to Police/Fire from one generator provides efficient means to power both facilities
- Reduced site impact from reduced machine quantity.
- Upgraded electrical distribution in Police and Fire Departments through replacement with modern equipment

Disadvantages

- Less operational flexibility versus full building backup power - Option 2
- Greater site impact with relocation of generator to an outdoor location

Police/Fire Option 2

Police/Fire Option 2 includes full back up power for the entire Police/Fire Department facilities and includes the installation of a dedicated Police/Fire Department generator set as part of this comprehensive solution. Under Option 2, two new automatic automatic transfer switches will be installed to augment the existing 400 Ampere switch that will be retained. One of the new transfer switches will power the existing Emergency Panel loads described in Option 1 above, the second will provide power to all of the Police/Fire Department loads not currently equipped with generator backup power and the third (existing) switch will continue to serve the existing building standby power loads.

The full implementation of this option will include the installation of a new 1200 Ampere main service panel to replace the existing service switchboard currently in place. This new panel will provide power to the normal side of the two new and one existing automatic transfer switches. A new 400 Ampere, 208Y/120 Volt, 3 Phase, 4 wire distribution panel will be installed to connect existing normal service panels to one of the new standby power automatic transfer switches.

The installation of the replacement Police/Fire generator set requires locating (on-site) and installing a 200KW/250KVA dual fuel natural gas/propane generator, a 1200 Ampere, 208Y/120 Volt, 3 Phase, 4 wire generator distribution panel, and a 1200 Ampere, 208Y/120 Volt, 3 Phase, 4 wire manual transfer switch. The introduction of the manual transfer switch addresses a National Electrical Code requirement to provide the means to connect a portable generator for situations where the permanent machine is out of service for maintenance or other reasons.

Option 2, as with Option 1, also addresses the obsolete electrical distribution equipment in each facility. The existing utility main service switchboard in the Police Department building and the Main Service Panel in the Fire Station would be replaced with modern equipment. The remaining electrical distribution equipment in these buildings is in good condition and would be retained. Refer to Drawings EOSK-2B and 2C for diagrams of the modifications proposed under Police/Fire Option 2.

Advantages/disadvantages of this option can be summarized as follows:

Advantages

- Full facility operation under outage conditions
- An independent generator to provide complete load isolation from the Village Hall
- Independent generator start/stop control via multiple transfer switches
- Upgraded utility service switchboard and distribution equipment

Disadvantages

- Highest cost option
- Greater site impact with relocation of generator to an outdoor location

Municipal Service Center (Public Works) and Pump Station No. 1

The Public Works and Pump Station No. 1 facilities currently derive backup power from the generator located in the Pump Station No. 1 Building, as described in Section II above. This generator is equipped with a 600 Ampere, 3-Pole output circuit breaker which is connected to supply power to the entire Pump Station main switchboard. There is a load shedding function that limits the water pump operation on generator power to Pump No. 2. There are circuit breakers, housed in the Main Switchboard, that supply power to the Municipal Services Building and a remote Storm Water Pump Station. The existing generator is exhibiting signs of deterioration and should be replaced as part of this program. A number of upgrade options will be outlined in the balance of this section.

Municipal Service Center (Public Works)/Pump Station No. 1 Option 1

Option 1 for the Public Works/Pump Station No. 1 anticipates renovation of the current installation that utilizes a common generator to service the Public Works Facility and the Pump Station from a common backup generator. Under Option 1, the existing 300 KW/375KVA Natural Gas would be replaced with a machine of similar rating, equipped to run on both

natural gas and propane. The current installation powers the entire Pump Station, with load shedding function that limits backup power to Pump No. 2 only. The existing Pump Station Main Switchboard includes an 800 automatic transfer switch that initiates the generator operation. This switchboard and transfer switch is in the process of being replaced, so this work would be excluded from the work performed under Option 1. Option 1 also includes an upgrade to emergency/standby power loads in the Public Works facility. At this time, loads powered are limited to basic emergency lighting and selected telecommunications equipment. This load complement would be upgraded. There is no Public Works facility HVAC equipment currently powered from the generator. Option 1 would not alter this condition. Refer to Drawing EOSK-3A in the Appendix for a diagram of Option 1.

Advantages

- Independent generator start/stop control via multiple transfer switches
- Reduced first cost option versus full building backup
- Continued reliance on Pump Station generator reduces total site machine quantity and ongoing maintenance expense
- Reduced site impact from reduced machine quantity.
- Upgraded utility service switches and distribution panels in Public Works facility.

Disadvantages

- Continued reliance on Pump Station No. 1 increases impact on the entire site if that generator fails
- Extended feeder lengths from Pump Station generator to the new Public Works transfer switch.
- Less operational flexibility versus full building backup power - Option 2

Municipal Service Center (Public Works)/Pump Station No. 1 Option 2

Option 2 includes the scope of Option 1 in the Pump Station as described above, and expands coverage with the introduction of a dedicated generator to power the Public Works facility. The existing connection to the Pump Station would be severed.

The generator proposed for the Public Works facility would be rated at 150KW/187.5KVA and be configured to operate on natural gas and propane. This capacity would enable full facility operation, including HVAC. The existing Main Service equipment would be replaced with new panels and powered via newly installed automatic transfer switches. A generator distribution panel would be provided to distribute generator power to the emergency side of the new transfer switches. Option 2 includes the replacement of Panel PP-2 that services the maintenance garage portion of the facility. The existing telecom equipment would be reconnected from its existing generator feed from Pump Station No. 1 to the new standby power system in the Public Work facility. Refer to Drawing EOSK-3B in the Appendix for a diagram of Option 2.

Advantages

- Full facility operation under extended outage conditions
- An independent generator for the Public Works to provide complete load isolation from Pump Station No. 1
- Independent generator start/stop control via multiple transfer switches

Disadvantages

- Highest cost option
- Greater site impact with relocation of generator to an outdoor location

Brian Carey Training Center/Fire Training Facility/Garage

The Carey Training Center emergency/standby power is currently powered from an exterior 33 KW/33 KVA Natural Gas generator set. This generator supplies power to an Automatic Transfer Switch and Generator Panel located in the Main Electrical Room. The generator powers numerous emergency standby loads in the building, including lighting, receptacles, HVAC equipment, communications equipment, sump pumps and other building electrical loads. The transfer switch is rated at 400 Amperes, 208/120 Volts, Single Phase, 3 wires. The main Generator Panel is rated at 225 Amperes, 208/120 Volts, Single Phase, 3 Wires with a 200 Ampere/ 2-Pole main circuit breaker. The adjacent Fire Training Facility and Garage are independently powered from ComEd and do not currently include generator backup.

Brian Carey Training Center/Fire Training Facility/Garage Option 1

The existing outdoor generator set currently in place appears to have adequate capacity to power the entire Brian Carey Training Center and adjacent buildings. This machine is relatively new and is in very good condition and is anticipated to remain. The current backup power system provides power to an extensive variety of loads in the building, so the addition of the remaining load complement is not a major undertaking. To reconfigure the building loads to include the full building requires replacement of the existing “generator” panel with a new distribution panel. This panel would power existing standby power loads and include a circuit breaker to service the existing Main Service Panel. The existing 400 Ampere automatic transfer switch would remain in place.

The generator power will be configured to feed a new 400 Ampere Generator Distribution Panel that would provide generator power to the emergency side of the existing automatic transfer switch in the Carey Training Center and a second transfer switch located in the Fire Training Center. This second switch would provide the connection to the existing generator and facilitate full power backup to those buildings.

Advantages

- Full facility operation under extended outage conditions for all three buildings
- Independent generator start/stop control via multiple transfer switches
- Reuse of existing generator on site reduces first costs

Disadvantages

- None

SECTION IV – BUDGET ESTIMATE

Village Hall Option 1				Milestone:	Village of Homewood Generator Study	
Prepared by Interface Engineering				Date:	02/04/25	
For: Village of Homewood						
VILLAGE HALL COST ESTIMATE						
Qty	Unit	Component	Notes	$/Unit	$ Sub Total	$ Total
Option No. 1 - Electrical						
Main Service Switch						
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W CT/Switch	Main Service Switch Replacement	$ 9,500.00	$ 9,500.00	$ 9,500
				Sub-Total Generator		**$ 9,500**
Standby Power Loads (Rooftop Units)						
1	EA	ATS-STBY (225A/4P)	Automatic Tansfer Switch - Standby Loads	$ 9,000.00	$ 9,000.00	$ 9,000
20	LF	3#10 AWG, 1#10 Gnd.,3/4"C	Feeder to RTU - 3	$ 19.00	$ 380.00	$ 380
20	LF	3#10 AWG, 1#10 Gnd.,3/4"C	Feeder to RTU - 5	$ 19.00	$ 380.00	$ 380
20	LF	3#4 AWG, 1#8 Gnd.,1-1/4"C	Feeder to RTU - 1	$ 36.00	$ 720.00	$ 720
20	LF	3#4 AWG, 1#8 Gnd.,1-1/4"C	Feeder to RTU - 2	$ 56.00	$ 1,120.00	$ 1,120
20	LF	3#4 AWG, 1#8 Gnd.,1-1/4"C	Feeder to RTU - 4	$ 56.00	$ 1,120.00	$ 1,120
1	EA	Standby Panel - 225A	New Panel for Rooftop Unit Loads	$ 4,000.00	$ 4,000.00	$ 4,000
1	EA	200A/3P CB in Main Service Panel	CB to feed New ATS	$ 1,500.00	$ 1,500.00	$ 1,500
80	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Normal Feeder to New ATS-STBY	$ 71.00	$ 5,680.00	$ 5,680
20	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Normal Feeder from ATS to New Standby Panel	$ 71.00	$ 1,420.00	$ 1,420
250	LS	4#4/0 AWG, 1#4 Gnd., 2"C.	EM Feeder to New ATS-STBY	$ 81.00	$ 20,250.00	$ 20,250
				Sub-Total Standby Loads		**$ 45,570**
Emergency Lighting Loads						
1	EA	ATS-EM (100A/4P)	Automatic Transfer Switch - Emergency Lighting	$ 6,600.00	$ 6,600.00	$ 6,600
1	EA	100A/3P C.B. in Main Service Panel	CB to feed New ATS	$ 1,200.00	$ 600.00	$ 600
25	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	Normal Feeder to New ATS-EM	$ 56.00	$ 1,400.00	$ 1,400
25	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	Normal Feeder from ATS to Emergency Panel	$ 56.00	$ 1,400.00	$ 1,400
25	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	EM Feeder to New ATS-EM	$ 56.00	$ 1,400.00	$ 1,400
				Sub-Total EM Lighting Loads		**$ 11,400**
					SUBTOTAL	**$ 66,470**
			Contractor General Conditions			
			Overhead & Profit	10%	$ 6,647.00	
			Subtotal		$ 73,117.00	$ 73,117
			Design Contingency	10%	$ 6,647.00	$ 6,647
			Bid Contingency	5%	$ 3,323.50	$ 3,324
			Construction Contingency	10%	$ 6,647.00	$ 6,647
					Total	**$ 89,735**

Village Hall Option 2				Milestone:	Village of Homewood Generator Study	
Prepared by Interface Engineering				Date:	02/04/25	
For: Village of Homewood						
VILLAGE HALL COST ESTIMATE						
Qty	Unit	Component	Notes	$/Unit	$ Sub Total	$ Total
			Option No. 2 - Electrical			
			Main Service Panel (MSP-1)			
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W Panel	Main Service Panel Replacement	$ 9,500.00	$ 9,500.00	$ 9,500
1	EA	400 Ampere, 208Y/120V, 3-PH, 4WCT/Meter Cabinet	Main Service Meter	$ 4,500.00	$ 4,500.00	$ 4,500
20	LF	4-500kcmil, 1#3 Gnd., 3-1/2"C.	Main Service Feeder Reconnection	$ 193.00	$ 3,860.00	$ 3,860
30	LF	4#4/0 AWG, 1#4 Gnd., 2"C.	MSP-1 to ATS-SB Normal Feeder	$ 81.00	$ 2,430.00	$ 2,430
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	MSP-1 to ATS-EM Normal Feeder	$ 41.00	$ 1,230.00	$ 1,230
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	MSP-1 to ATS-ELEV Normal Feeder	$ 41.00	$ 1,230.00	$ 1,230
				Sub-Total MSP-1		**$ 22,750**
			Standby Power Loads (Main Service Panel)			
1	EA	ATS-STBY (225A/4P)	Automatic Tansfer Switch - Standby Loads	$ 9,000.00	$ 9,000.00	$ 9,000
20	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Normal Feeder from ATS to New Standby Panel	$ 71.00	$ 1,420.00	$ 1,420
				Sub-Total Standby Loads		**$ 10,420**
			Emergency Lighting Loads			
1	EA	ATS-EM (100A/4P)	Automatic Transfer Switch - Emergency Lighting	$ 6,600.00	$ 6,600.00	$ 6,600
20	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	ATS-SB to Main Service Panel Feeder	$ 41.00	$ 820.00	$ 820
				Sub-Total EM Lighting Loads		**$ 7,420**
			Elevator Loads			
1	EA	ATS-ELEV (100A/3P)	Automatic Transfer Switch - Emergency Lighting	$ 6,600.00	$6,600	$ 6,600
20	LF	3#2 AWG, 1#8 Gnd.,1-1/4"C	ATS-ELEV to Elevator	$ 41.00	$820	$ 820
				Sub-Total Elevator Load		**$ 7,420**
			Generator			
1	EA	100 KW Dual Fuel Generator Set w/ Enclosure	Village Hall Generator	$ 95,000.00	$95,000	$ 95,000
1	EA	400A Load Break Transfer Switch	Code required portable connection	$ 25,000.00	$25,000	$ 25,000
150	LF	4-500kcmil, 1#3 Gnd., 3-1/2"C.	Load Break Transfer Switch to Panel GDP-1	$ 193.00	$28,950	$ 28,950
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W Panel	Panel GDP-1	$ 12,000.00	$12,000	$ 12,000
30	LF	4#4/0 AWG, 1#4 Gnd., 2"C.	MSP-1 to ATS-SB Emergency Feeder	$ 81.00	$2,430	$ 2,430
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	MSP-1 to ATS-EM Emergency Feeder	$ 41.00	$1,230	$ 1,230
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	MSP-1 to ATS-ELEV Emergency Feeder	$ 41.00	$1,230	$ 1,230
				Sub-Total Generator Load		**$ 165,840**
			Generator Enclosure			
400	SF	Concrete Pad	Generator Enclosure Slab	$ 27.50	$11,000	$ 11,000
80	LF	Prefabricated Enclosure Wall	Generator Enclosure Walls	$ 250.00	$20,000	$ 20,000
4	EA	Steel Bollards	Generator Enclosure Protection	$ 750.00	$3,000	$ 3,000
100	SF	Generator Pad	Generator pad	$ 15.00	$1,500	$ 1,500
18	EA	Fence Piers	Generator enclosure	$ 225.00	$4,050	$ 4,050
20	CY	Excavation	Pad	$ 75.00	$1,500	$ 1,500
15	CY	Granular Fill	Pad Support	$ 90.00	$1,350	$ 1,350
				Sub-Total Generator Enclosure		**$ 42,400**
				Sub-Total		**$ 256,250**
			Contractor General Conditions			
			Overhead & Profit	10%	$ 25,625.00	
			Subtotal		$ 281,875.00	$ 281,875
			Design Contingency	10%	$ 25,625.00	$ 25,625
			Bid Contingency	5%	$ 12,812.50	$ 12,813
			Construction Contingency	10%	$ 25,625.00	$ 25,625
					Total	**$ 345,938**

Police/Fire Option 1				Milestone:	Village of Homewood Generator Study	
Prepared by Interface Engineering				Date:	02/05/25	
For: Village of Homewood						
POLICE/FIRE COST ESTIMATE						
Qty	Unit	Component	Notes	$/Unit	$ Sub Total	$ Total
			Option No. 1 - Electrical			
			Main Service Panel			
1	EA	1200 Ampere, 208Y/120V, 3-PH, 4W Panel	Main Service Switchboard Replacement	$ 18,500.00	$ 18,500.00	$ 18,500
1	EA	1200 A. CT/Meter Cabinet	Main Service Meter	$ 18,500.00	$ 18,500.00	$ 18,500
30	LF	1200A Service Feeder	Service Feeder - CT Cabinet to New Service Panel	$ 600.00	$ 18,000.00	$ 18,000
1	EA	200 Ampere, 208Y/120V, 3-PH, 4W Panel	New Police Basement Panel	$ 8,000.00	$ 8,000.00	$ 8,000
150	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Police Basement Panel Feeder	$ 71.00	$ 10,650.00	$ 10,650
1	EA	200 Ampere, 208Y/120V, 3-PH, 4W Panel	New Police Office Hall Panel	$ 8,000.00	$ 8,000.00	$ 8,000
150	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Police Office Hall Feeder	$ 71.00	$ 10,650.00	$ 10,650
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Police Firing Range Panel	$ 193.00	$ 5,790.00	$ 5,790
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	ATS-EL - Normal Feeder	$ 41.00	$ 1,230.00	$ 1,230
1	EA	ATS-EL (100A/4P)	Automatic Transfer Switch - Emergency Lighting	$ 6,600.00	$ 6,600.00	$ 6,600
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	ATS-EL to Emergency Light Panel	$ 41.00	$ 1,230.00	$ 1,230
50	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Generator ATS - Normal Feeder	$ 193.00	$ 9,650.00	$ 9,650
200	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Fire Department - Normal Feeder	$ 193.00	$ 38,600.00	$ 38,600
				Sub-Total Generator		**$ 155,400**
			Generator			
1	EA	100 KW Dual Fuel Generator Set w/ Enclosure	Village Hall Generator	$ 95,000.00	$ 95,000.00	$ 95,000
1	EA	400A Load Break Transfer Switch	Code required portable connection	$ 25,000.00	$ 25,000.00	$ 25,000
20	LF	4-500kcmil, 1#3 Gnd., 3-1/2"C.	Load Break Transfer Switch to Panel GDP-1	$ 193.00	$ 3,860.00	$ 3,860
20	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	Generator Dist. Panel to ATS-EL Emergency Feeder	$ 41.00	$ 820.00	$ 820
				Sub-Total Standby Loads		**$ 124,680**
			Generator Enclosure			
400	SF	Concrete Pad	Generator Enclosure Slab	$ 27.50	$ 11,000.00	$ 11,000
80	LF	Prefabricated Enclosure Wall	Generator Enclosure Walls	$ 250.00	$ 6,600.00	$ 6,600
4	EA	Steel Bollards	Generator Enclosure Protectior	$ 750.00	$ 6,600.00	$ 6,600
100	SF	Generator Pad	Generator pad	$ 15.00	$ 6,600.00	$ 6,600
18	EA	Fence Piers	Generator enclosure	$ 225.00	$ 6,600.00	$ 600
20	CY	Excavation	Pad	$ 75.00	$ 600.00	$ 1,400
15	CY	Granular Fill	Pad Support	$ 90.00	$ 1,400.00	$ -
				Sub-Total Generator Enclosure		**$ 32,800**
					SUBTOTAL	**$ 312,880**
			Contractor General Conditions			
			Overhead & Profit	10%	$ 31,288.00	
			Subtotal		$ 344,168.00	$ 344,168
			Design Contingency	10%	$ 3,280.00	$ 31,288
			Bid Contingency	5%	$ 1,640.00	$ 15,644
			Construction Contingency	10%	$ 3,280.00	$ 31,288
					Total	**$ 422,388**

Police Fire Option 2				Milestone:	Village of Homewood Generator Study	
Prepared by Interface Engineering				Date:	02/05/25	
For: Village of Homewood						
POLICE FIRE COST ESTIMATE						
Qty	Unit	Component	Notes	$/Unit	$ Sub Total	$ Total
			Option No. 2 - Electrical			
			Main Service Panel (MSP-1)			
1	EA	1200 Ampere, 208Y/120V, 3-PH, 4W Panel	Main Service Switchboard Replacement	$ 18,500.00	$ 18,500.00	$ 18,500
1	EA	1200 A. CT/Meter Cabinet	Main Service Meter	$ 18,500.00	$ 18,500.00	$ 18,500
30	LF	1200A Service Feeder	Service Feeder - CT Cabinet to New Service Panel	$ 600.00	$ 18,000.00	$ 18,000
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	ATS-EL - Normal Feeder	$ 41.00	$ 1,230.00	$ 1,230
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	ATS-SB1 - Normal Feeder	$ 193.00	$ 5,790.00	$ 5,790
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	ATS-SB2 - Normal Feeder	$ 193.00	$ 5,790.00	$ 5,790
200	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Fire Department ATS - Normal Feeder	$ 193.00	$ 38,600.00	$ 38,600
					Sub-Total MSP-1	**$ 106,410**
			Standby Power Loads (Main Service Panel)			
1	EA	ATS-STBY (400A/4P)	Automatic Tansfer Switch - Standby Loads	$ 9,000.00	$ 9,000.00	$ 9,000
20	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Normal Feeder from ATS-SB to New Police Distribution Panel	$ 193.00	$ 3,860.00	$ 3,860
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W Panel	New Police Distribution Panel	$ 15,000.00	$ 15,000.00	$ 15,000
1	EA	200 Ampere, 208Y/120V, 3-PH, 4W Panel	New Police Basement Panel	$ 8,000.00	$ 8,000.00	$ 8,000
150	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Police Basement Panel Feeder	$ 71.00	$ 10,650.00	$ 10,650
1	EA	200 Ampere, 208Y/120V, 3-PH, 4W Panel	New Police Office Hall Panel	$ 8,000.00	$ 8,000.00	$ 8,000
150	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Police Office Hall Feeder	$ 71.00	$ 10,650.00	$ 10,650
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Police Firing Range Panel	$ 193.00	$ 5,790.00	$ 5,790
					Sub-Total Standby Loads	**$ 70,950**
			Emergency Lighting Loads			
1	EA	ATS-EL (100A/4P)	Automatic Transfer Switch - Emergency Lighting	$ 6,600.00	$ 6,600.00	$ 6,600
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	ATS-EL to Emergency Light Panel	$ 41.00	$ 1,230.00	$ 1,230
					Sub-Total EM Lighting Loads	**$ 7,830**
			Fire Department Loads			
1	EA	ATS-FIRE (400A/4P)	Automatic Transfer Switch - Fire Department	$ 9,000.00	$ 9,000.00	$ 9,000
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W Panel	New Fire Department Panel	$ 15,000.00	$ 15,000.00	$ 15,000
20	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	ATS-FIRE to EW Fire Department Panel	$ 193.00	$ 3,860.00	$ 3,860
					Sub-Total Fire Department	**$ 27,860**
			Generator			
1	EA	200 KW Dual Fuel Generator Set w/ Enclosure	Village Hall Generator	$ 200,000.00	$200,000	$ 200,000
50	LF	(3) 4-600kcmil, 1#3 Gnd., 3-1/2"C.	Generator to Load Break Transfer Switch	$ 600.00	$30,000	$ 30,000
1	EA	1200A Load Break Transfer Switch	Code required portable connection	$ 30,000.00	$30,000	$ 30,000
30	LF	(3) 4-600kcmil, 1#3 Gnd., 3-1/2"C.	Load Break Transfer Switch to New Generator Dist Panel	$ 600.00	$18,000	$ 18,000
1	EA	1200 Ampere, 208Y/120V, 3-PH, 4W Panel	Generator Dist. Panel	$ 24,000.00	$24,000	$ 24,000
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Generator Dist Panel to ATS-SB1 - Emergency Feeder	$ 193.00	$5,790	$ 5,790
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Generator Dist Panel to ATS-SB2 - Emergency Feeder	$ 193.00	$5,790	$ 5,790
30	LF	4#2 AWG, 1#8 Gnd.,1-1/4"C	Generator Dist Panel to ATS-EL - Emergency Feeder	$ 41.00	$1,230	$ 1,230
200	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Generator Dist Panel to Fire ATS - Emergency Feeder	$ 193.00	$38,600	$ 38,600
					Sub-Total Generator Load	**$ 353,410**
			Generator Enclosure			
600	SF	Concrete Pad	Generator Enclosure Slab	$ 27.50	$16,500	$ 16,500
120	LF	Prefabricated Enclosure Wall	Generator Enclosure Walls	$ 250.00	$30,000	$ 30,000
6	EA	Steel Bollards	Generator Enclosure Protection	$ 750.00	$4,500	$ 4,500
180	SF	Generator Pad	Generator pad	$ 15.00	$2,700	$ 2,700
24	EA	Fence Piers	Generator enclosure	$ 225.00	$5,400	$ 5,400
30	CY	Excavation	Pad	$ 75.00	$2,250	$ 2,250
20	CY	Granular Fill	Pad Support	$ 90.00	$1,800	$ 1,800
					Sub-Total Generator Enclosure	**$ 63,150**
					Sub-Total	**$ 629,610**
			Contractor General Conditions			
			Overhead & Profit	10%	$ 62,961.00	
			Subtotal		$ 692,571.00	$ 692,571
			Design Contingency	10%	$ 62,961.00	$ 62,961
			Bid Contingency	5%	$ 31,480.50	$ 31,481
			Construction Contingency	10%	$ 62,961.00	$ 62,961
					Total	**$ 849,974**

Pump Station Option 1				Milestone:	Village of Homewood Generator Study	
Prepared by Interface Engineering				Date:	02/04/25	
For: Village of Homewood						
PUMP STATION COST ESTIMATE						
Qty	Unit	Component	Notes	$/Unit	$ Sub Total	$ Total
Option No. 1 - Electrical						
Generator						
1	EA	300 KW Dual Fuel Generator Set w/ Enclosure	Village Hall Generator	$ 200,000.00	$200,000	$ 200,000
1	EA	600A Load Bank Transfer Switch	Code required portable connection	$ 30,000.00	$30,000	$ 30,000
40	LF	(2) 4-350kcmil, 1#4 Gnd., 2-1/2"C.	Load Break Transfer Switch to Panel ATS	$ 262.00	$10,480	$ 10,480
				Sub-Total Generator Load		**$ 240,480**
				Sub-Total		**$ 240,480**
			Contractor General Conditions			
			Overhead & Profit	10%	$ 24,048.00	
			Subtotal		$ 264,528.00	$ 264,528
			Design Contingency	10%	$ 24,048.00	$ 24,048
			Bid Contingency	5%	$ 12,024.00	$ 12,024
			Construction Contingency	10%	$ 24,048.00	$ 24,048
					Total	**$ 324,648**

Public Works Option 2				Milestone:	Village of Homewood Generator Study	
Prepared by Interface Engineering				Date:	02/04/25	
For: Village of Homewood						
PUBLIC WORKS COST ESTIMATE						
Qty	Unit	Component	Notes	$/Unit	$ Sub Total	$ Total
Option No. 2 - Electrical						
Main Service Panel						
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W CT/Switch Cubic	New ComEd CT and Main Switch	$ 9,500.00	$ 9,500.00	$ 9,500
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W Panel	New Main Distribution Panel	$ 12,000.00	$ 12,000.00	$ 12,000
20	LF	4-500kcmil, 1#3 Gnd., 3-1/2"C.	Main Service Feeder Reconnection	$ 193.00	$ 3,860.00	$ 3,860
20	LF	4-500kcmil, 1#3 Gnd., 3-1/2"C.	Main Service Switch to New ATS	$ 193.00	$ 3,860.00	$ 3,860
1	EA	New ATS (400A/4P)	Automatic Tansfer Switch - Standby Loads	$ 9,000.00	$ 9,000.00	$ 9,000
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	New ATS to Main Distribution Panel Normal Feeder	$ 193.00	$ 5,790.00	$ 5,790
50	LF	4#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Main Distribution Panel to Telecom Room	$ 71.00	$ 3,550.00	$ 3,550
				Sub-Total MSP-1		**$ 47,560**
Standby Power Loads (Main Service Panel)						
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W CT/Switch Cubic	New ComEd CT and Main Switch	$ 9,500.00	$ 9,500.00	$ 9,500
20	LF	4-500kcmil, 1#3 Gnd., 3-1/2"C.	Main Service Feeder Reconnectior	$ 193.00	$ 3,860.00	$ 3,860
20	LF	4-500kcmil, 1#3 Gnd., 3-1/2"C.	Main Service Switch to New ATS	$ 193.00	$ 3,860.00	$ 3,860
1	EA	New ATS (400A/4P)	Automatic Tansfer Switch - Standby Loads	$ 9,000.00	$ 9,000.00	$ 9,000
80	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	New ATS to PP-2	$ 193.00	$ 15,440.00	$ 15,440
				Sub-Total Standby Loads		**$ 41,660**
Generator						
1	EA	150 KW Dual Fuel Generator Set w/ Enclosure	Public Works Generator	$ 125,000.00	$125,000	$ 125,000
1	EA	600A Load Break Transfer Switch	Code required portable connection	$ 30,000.00	$30,000	$ 30,000
50	LF	(2) 4-350kcmil, 1#4 Gnd., 2-1/2"C.	Load Break Transfer Switch to Generator Distribution Pane	$ 193.00	$9,650	$ 9,650
1	EA	600 Ampere, 208Y/120V, 3-PH, 4W Panel	New Generator Distribution Panel	$ 12,000.00	$12,000	$ 12,000
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Generator Distribution Panel to ATS-1 Emergency Feede	$ 193.00	$5,790	$ 5,790
30	LF	4-500 kcmil, 1#3 Gnd., 3-1/2"C.	Generator Distribution Panel to ATS-2 Emergency Feede	$ 193.00	$5,790	$ 5,790
				Sub-Total Generator Load		**$ 188,230**
Generator Enclosure						
400	SF	Concrete Pad	Generator Enclosure Slab	$ 27.50	$11,000	$ 11,000
80	LF	Prefabricated Enclosure Wall	Generator Enclosure Walls	$ 250.00	$20,000	$ 20,000
4	EA	Steel Bollards	Generator Enclosure Protectior	$ 750.00	$3,000	$ 3,000
100	SF	Generator Pad	Generator pad	$ 15.00	$1,500	$ 1,500
18	EA	Fence Piers	Generator enclosure	$ 225.00	$4,050	$ 4,050
20	CY	Excavation	Pad	$ 75.00	$1,500	$ 1,500
15	CY	Granular Fill	Pad Support	$ 90.00	$1,350	$ 1,350
				Sub-Total Generator		**$ 42,400**
				Sub-Total		**$ 319,850**
			Contractor General Conditions			
			Overhead & Profit	10%	$ 31,985.00	
			Subtotal		$ 351,835.00	$ 351,835
			Design Contingency	10%	$ 31,985.00	$ 31,985
			Bid Contingency	5%	$ 15,992.50	$ 15,993
			Construction Contingency	10%	$ 31,985.00	$ 31,985
					Total	**$ 431,798**

Carey Fire Training Option 1				Milestone:	Village of Homewood Generator Study	
Prepared by Interface Engineering				Date:	02/04/25	
For: Village of Homewood						
CAREY FIRE TRAINING COST ESTIMATE						
Qty	Unit	Component	Notes	$/Unit	$ Sub Total	$ Total
Option No. 1 - Electrical						
Generator Distribution Panel						
1	EA	400 Ampere, 208Y/120V, 3-PH, 4W Panel	New Generator Distribution Panel	$ 9,500.00	$ 9,500.00	$ 9,500
20	LF	3#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Generator to New Generator Distribution Panel	$ 71.00	$ 1,420.00	$ 1,420
30	LF	3#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Generator Distribution Panel to ATS-1 Emergency Feeder	$ 71.00	$ 2,130.00	$ 2,130
200	LF	3#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Generator Distribution Panel to ATS-2 Emergency Feeder	$ 71.00	$ 14,200.00	$ 14,200
				Sub-Total Gen Dist Pnl		**$ 27,250**
Normal Power Loads						
1	EA	ATS-STBY (200A/4P)	Automatic Tansfer Switch - Standby Loads	$ 9,000.00	$ 9,000.00	$ 9,000
2	EA	200A, 208/120V, 3-PH, 4W Disconnect Switches	Service Switches for Carey and Fire Training Buildings	$ 3,000.00	$ 6,000.00	$ 6,000
10	LF	3#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Normal Feeder from ATS to New Standby Panel	$ 71.00	$ 710.00	$ 710
20	LF	3#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Normal Feeder from ComEd Meter to new 200A Disconnect Switch	$ 71.00	$ 1,420.00	$ 1,420
10	LF	3#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Normal Feeder from New 200A Disconnect Switch to New ATS	$ 71.00	$ 710.00	$ 710
20	LF	3#3/0 AWG, 1#6 Gnd., 1-1/2"C.	Normal Feeder from New ATS to Main Service Panel	$ 71.00	$ 1,420.00	$ 1,420
				Sub-Total Standby Loads		**$ 19,260**
				Sub-Total		**$ 46,510**
			Contractor General Conditions			
			Overhead & Profit	10%	$ 4,651.00	
			Subtotal		$ 51,161.00	$ 51,161
			Design Contingency	10%	$ 4,651.00	$ 4,651
			Bid Contingency	5%	$ 2,325.50	$ 2,326
			Construction Contingency	10%	$ 4,651.00	$ 4,651
					Total	**$ 62,789**

SECTION VI – SOLAR ENERGY FEASIBILTY

We have been requested to assess the feasibility and impact of installing solar photovoltaic panels on the roof structures of the Village Hall, Police and Fire Stations. This section includes the study and highlights the opportunity for incorporating solar energy production into this multi-building complex.

The study begins with the available roof area and establishes a solar panel layout based upon commercially available products. The available roof area is divided into four "segments" as follows:

- Segment 1 – Auditorium Roof
- Segment 2 – Village Hall Roof
- Segment 3 - Police Department Roof
- Segment 4 – Fire Department Roof

One key issue governing the power/energy output of solar installations is the potential for shading. Shading can have a dramatic impact on the power output/energy production, and is taken into account in the numbers shown below. Rooftop mechanical equipment, trees, adjacent buildings/structures are examples that are typically factored into this analysis. For this study, it was assumed that the water tower will be relocated and therefore was therefore not considered. In the final tally, the only significant shading impact on this site was the shading effect on Segment 3, the Police Station from the Village Hall/Auditorium.

The panel count, power and energy production for each segment can be summarized in the following table:

Segment Number	Solar Panel Quantity	Maximum Power (KW)	Annual Energy Production (MWH)
1	249	92.1	113.6
2	6	2.2	2.58
3	153	56.6	67.3
4	115	41.8	51.0

The potential solar installation has been modeled on industry leading software with all of the criteria and output information included on the following pages. A number of comments are offered:

- The site is relatively shade free, and offers a relatively unobstructed opportunity for energy production.
- The total annual energy production totals 231.7 MWH.

- The total annual value of energy produced is approximately $18,500, based upon electricity cost of $.08 per KWH.
- The total installed budget cost for the complete installation is in the range of $380,000, based on an installation budget of $2.00 per kilowatt.
- It should be noted that these costs do not include energy credits or other cost subsidies that may be available.

There are many issues to be evaluated in order to determine the technical and economic viability of a particular solar energy installation. The level of information presented within the scope of this project serves to inform, at a high level, the potential available on this site to pursue this in greater depth.

Design 1 (copy) Homewood, 2020 Chestnut Rd, Homewood IL

Report

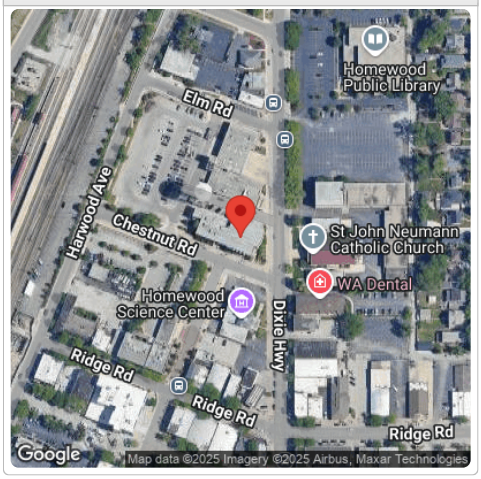
Project Name	Homewood
Project Address	2020 Chestnut Rd, Homewood IL
Prepared By	Joe Schmid joes@interfaceeng.com

INTERFACE ENGINEERING

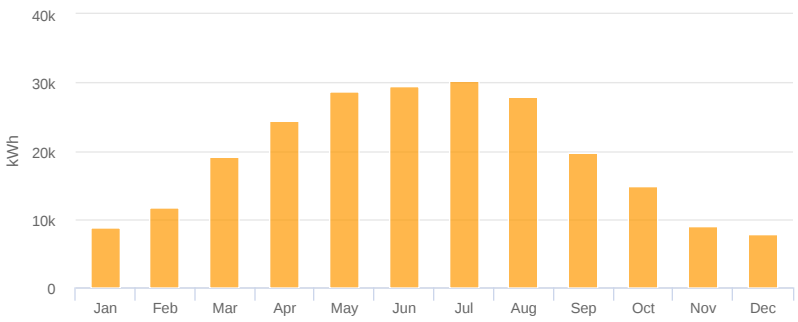
System Metrics

Design	Design 1 (copy)
Module DC Nameplate	190.6 kW
Inverter AC Nameplate	168.4 kW Load Ratio: 1.13
Annual Production	231.7 MWh
Performance Ratio	83.5%
kWh/kWp	1,216.1
Weather Dataset	TMY, 10km grid (41.55,-87.65), NREL (prospector)
Simulator Version	1ebd520c57-db3780a9a6-22fbeaa821-c44d35a0f2

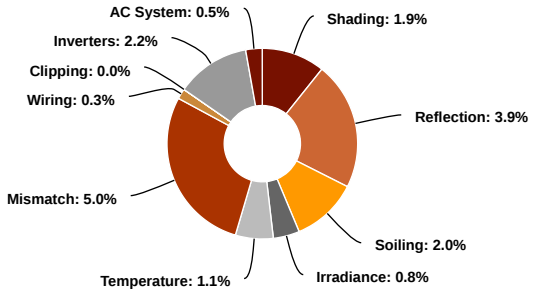
Project Location



Monthly Production



Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,445.3	
	POA Irradiance	1,456.7	0.8%
	Shaded Irradiance	1,428.9	-1.9%
	Irradiance after Reflection	1,373.8	-3.9%
	Irradiance after Soiling	1,346.3	-2.0%
	Total Collector Irradiance	**1,346.3**	**0.0%**
Energy (kWh)	Nameplate	256,550.9	
	Output at Irradiance Levels	254,519.8	-0.8%
	Output at Cell Temperature Derate	251,617.4	-1.1%
	Output After Mismatch	238,956.2	-5.0%
	Optimal DC Output	238,212.6	-0.3%
	Constrained DC Output	238,212.4	0.0%
	Inverter Output	232,901.1	-2.2%
	Energy to Grid	**231,736.6**	**-0.5%**
Temperature Metrics			
	Avg. Operating Ambient Temp		12.6 °C
	Avg. Operating Cell Temp		19.2 °C
Simulation Metrics			
	Operating Hours		4692
	Solved Hours		4692

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, 10km grid (41.55,-87.65), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Uploaded By	Characterization									
	Q.PEAK DUO BLK-G10+ 370 (Hanwha Q-cells)	HelioScope	Spec Sheet Characterization, PAN									
Component Characterizations	Device	Uploaded By	Characterization									
	Sunny Tripower 24000TL-US (SMA)	HelioScope	Modified CEC									

Components

Component	Name	Count
Inverters	Sunny Tripower 24000TL-US (SMA)	7 (168.4 kW)
Strings	10 AWG (Copper)	31 (3,458.4 ft)
Module	Hanwha Q-cells, Q.PEAK DUO BLK-G10+ 370 (370W)	515 (190.6 kW)

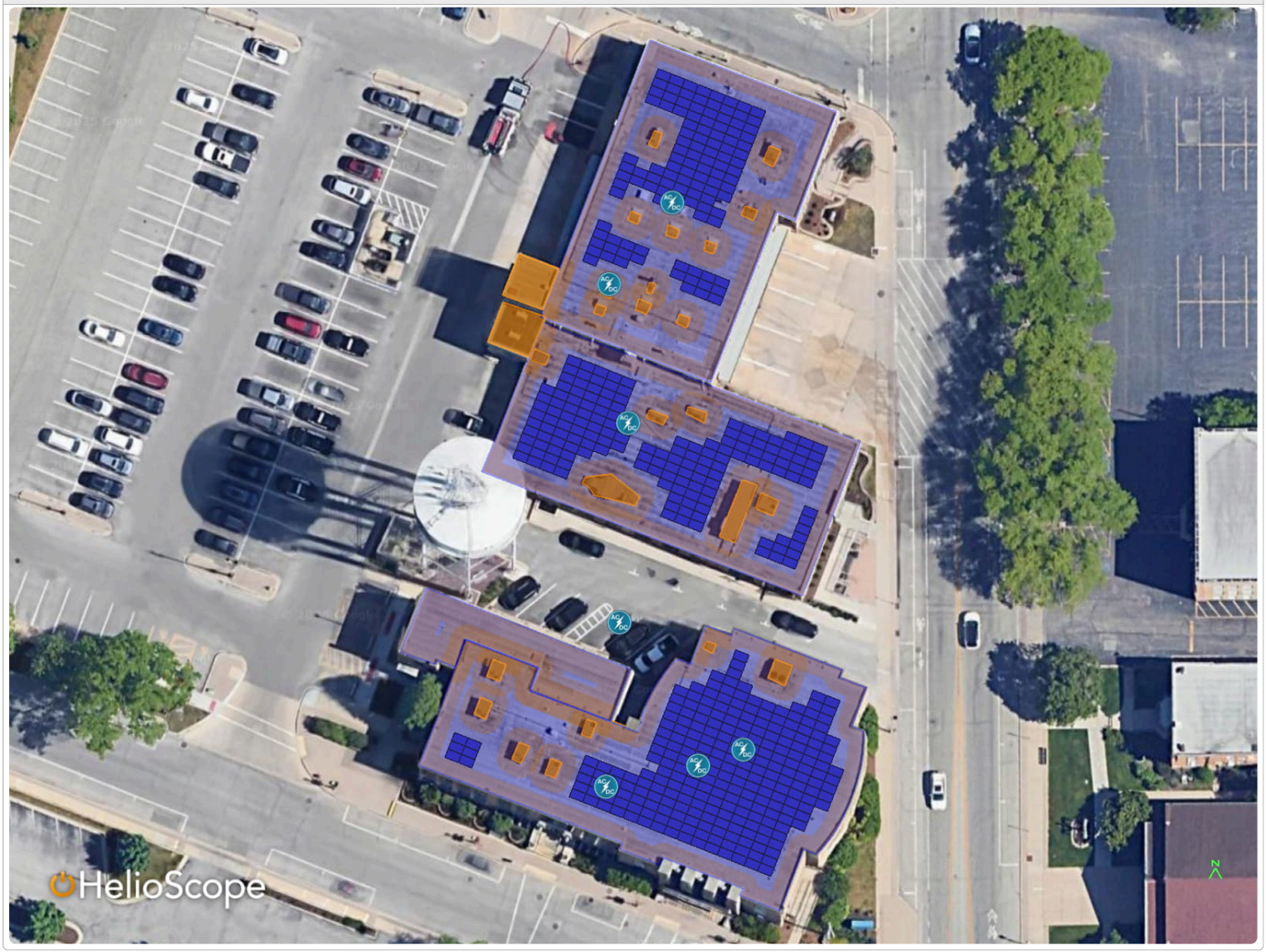
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-21	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Landscape (Horizontal)	Module: 1°	Module: 201.5°	0.1 ft	1x1	249	249	92.1 kW
Field Segment 2	Fixed Tilt	Landscape (Horizontal)	Module: 10°	Module: 201.5°	0.0 ft	1x1			0
Field Segment 3	Fixed Tilt	Landscape (Horizontal)	Module: 1°	Module: 201.5°	0.1 ft	1x1	153	153	56.6 kW
Field Segment 4	Fixed Tilt	Landscape (Horizontal)	Module: 1°	Module: 201.5°	0.1 ft	1x1	113	113	41.8 kW

Detailed Layout2



Design 1 (copy) Homewood, 2020 Chestnut Rd, Homewood IL

Shading Heatmap

Shading by Field Segment

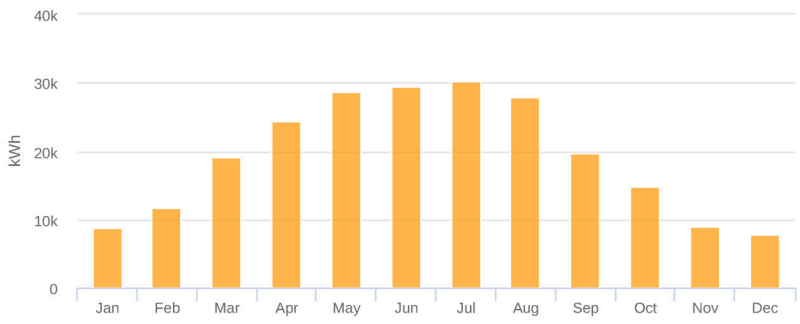
Description	Tilt	Azimuth	Modules	Nameplate	Shaded Irradiance	AC Energy	TOF[2]	Solar Access	Avg TSRF [2]
Field Segment 1	Module: 1.0°	Module: 201.5°	249	92.1 kWp	1,450.1kWh/m^2	113.4 MWh[1]	86.2%	99.5%	85.8%
Field Segment 3	Module: 1.0°	Module: 201.5°	153	56.6 kWp	1,391.1kWh/m^2	67.3 MWh[1]	86.2%	95.5%	82.3%
Field Segment 4	Module: 1.0°	Module: 201.5°	113	41.8 kWp	1,433.2kWh/m^2	51.0 MWh[1]	86.2%	98.4%	84.8%
Totals, weighted by kWp			**515**	**190.6 kWp**	**1,428.9kWh/m^2**	**231.7 MWh**	**86.2%**	**98.1%**	**84.5%**

[1] approximate, varies based on inverter performance
[2] based on location Optimal POA Irradiance of 1,690.5kWh/m^2 at 36.1° tilt and 183.6° azimuth

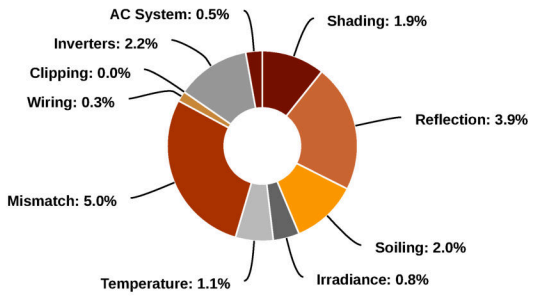
Solar Access by Month

Description	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Field Segment 1	98%	99%	100%	100%	100%	100%	100%	100%	100%	99%	99%	98%
Field Segment 3	87%	94%	96%	97%	97%	97%	97%	97%	97%	95%	90%	84%
Field Segment 4	96%	97%	98%	99%	99%	99%	99%	99%	98%	98%	97%	94%
Solar Access, weighted by kWp	**94.5%**	**97.0%**	**98.2%**	**98.7%**	**98.8%**	**98.8%**	**98.9%**	**98.9%**	**98.6%**	**97.7%**	**95.7%**	**92.9%**
AC Power (kWh)	**8,742.5**	**11,792.0**	**19,131.4**	**24,310.9**	**28,712.5**	**29,433.5**	**30,335.3**	**27,807.6**	**19,774.2**	**14,890.9**	**9,066.6**	**7,739.1**

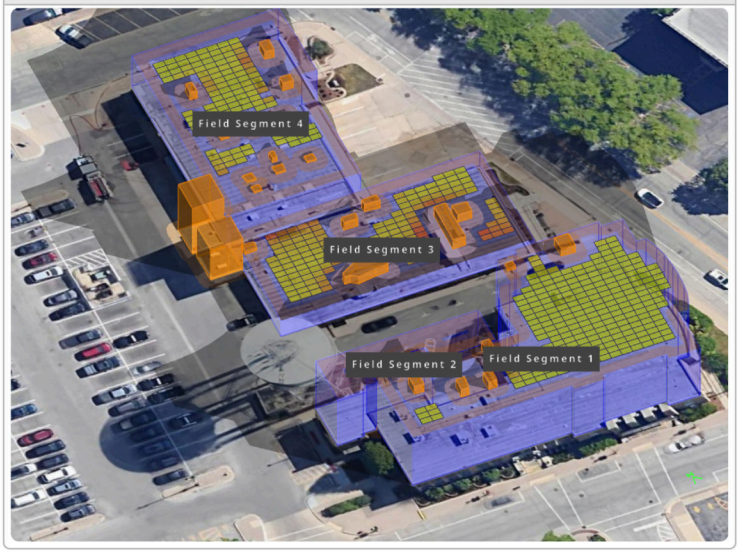
Monthly Production



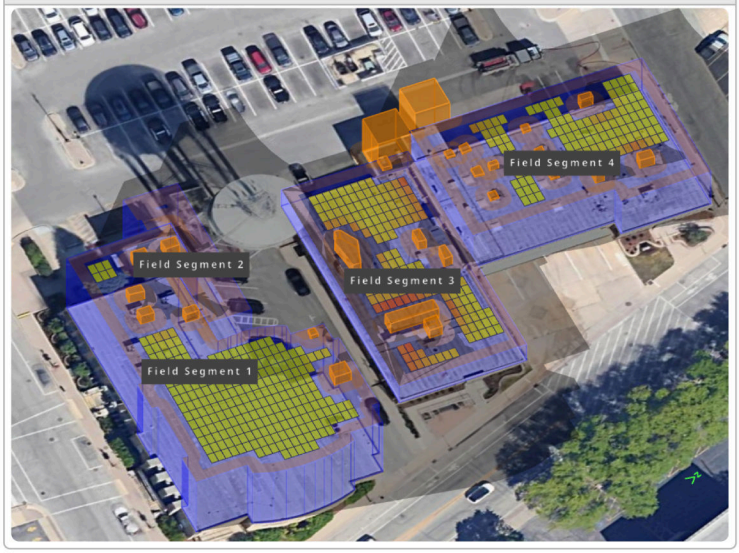
Sources of System Loss



Southwestern Angle



Southeastern Angle



SECTION V – CONCLUSIONS

This study has provided a review of the five existing “critical needs” facilities outlined in the RFP documents, including the Village Hall, Police Station, Fire Station, Municipal Service Center (Public Works Facility) and the Brian Carey Training Center (Emergency Operations Center–EOC).

For each of these facilities, this report provides a review of existing conditions, development and discussion of backup power upgrade options, including high level “advantages and disadvantages” and a budget estimate designed to facilitate the allocation of dollars for phased implementation over an extended timeframe.

The options developed fall into two broad categories, namely, a base option to improve performance and reliability within the current system framework, and a second option to provide 100% backup power at each site, facilitating full facility operation over extended timeframes. It should be noted that these options are not dependent upon an “all or nothing” mentality, but, in fact, can be configured as hybrid solutions.

One general comment is germane and applicable to all of the options presented. Backup generators are typically available utilizing either diesel fuel or natural gas as the fuel source. It should be noted that the overwhelming choice is diesel fuel, however, where an extended outage solution is desired, that avoids refueling issues, natural gas is frequently the preferred route. Natural gas is recognized by industry standards as having exceptional survivability in the face of natural disasters, making it a strong contender to provide backup power for Police, Fire and other agencies tasked with public safety under all conditions. In discussing this issue with Village staff, it was determined that natural gas was the chosen path. The team preference is a dual fuel machine that permits operation on either fuel. This can be facilitated subject to machine availability.

In assessing the wide spectrum of possible options, the design team evaluated the viability of internal electrical load reconfigurations to incrementally add to the current emergency/standby load complement. While this approach will enhance the level of internal load protection, it is very tedious and expensive. Without complete backup power protection, many of the current operational deficiencies would remain. Further, the incremental path would require construction in occupied work spaces and would be disruptive to building occupants and finishes.

In assessing the options outlined herein, it is the preference of the Design team to pursue full facility backup as funding permits. The flexibility to operate without restriction is a major benefit and maximizes the performance of these essential functions under all conditions. Implementation of the full backup options can be achieved in electrical rooms and other areas accessed by authorized personnel only. Proper sequencing of work performed will facilitate construction without interruption of daily operations.