

Restoring Electric System at Battery Gunnison/New Battery Peck *Ft. Hancock, New Jersey*

The reintroduction of electrical service to Battery Gunnison/New Battery Peck began in 2003 when the National Park Service introduced a 20 amp circuit with approximately nine modern interior lighting fixtures and two standard 15 amp outdoor standard receptacles. This very basic service was the starting point. Fifteen years later the system is essentially completed both interior and exterior lighting using predominantly restored and the correct historic fixtures and fittings.

This paper begins with the current status of the Electric Installation at Battery Gunnison/New Battery Peck as of May 2018. As of that date, the installation is over ninety five percent complete. The next part will give a brief chronology of the improvements beginning with NPS electrification in 2003 up to May 2018.

The primary focus is on historic lighting fixtures, junction boxes and cable hangers. These materials are the 1915 Corps of Engineers (COE) standard interior fortifications lighting and electrical system components in use at Fort Hancock from the 1917 time period through the 1940s and in some cases beyond.

In 2010, AGFA obtained a very significant collection of historic COE Standard fixtures. This acquisition is discussed in detail on page 26.

The materials installed in conjunction with the Chemical Warfare system are discussed in an associated document focused on the Chemical Warfare System.

AGFA has installed the following materials within Battery Gunnison/New Battery Peck as of May 2018:

- A) Fourteen 1915 Corps of Engineers (COE) Standard Ceiling Lights
- B) Fourteen 1915 COE Standard Wall Lights
- C) Nine 1915 COE Standard Junction Boxes with covers
- D) Four 1915 COE Standard junction boxes with modern receptacles
- E) Two 1915 COE Standard platform stanchion lights (Gun #1)
- F) One mixed COE vintage and modern component platform stanchion light (Gun #2)
- G) Eight modern (vintage look) ceiling lights in plotting room with metal conduit
- H) Four WWII vintage 15 amp single receptacle fixtures (in plotting room)
- I) Five modern (vintage look) wall lights (exterior)
- J) Four modern (vintage look) ceiling lights (exterior)
- K) Modern motion/light sensor switch for exterior lighting (near machine shop)
- L) Approximately 600 feet of PVC covered flexible metal conduit
- M) 428 COE Standard vintage (correct) cable hangers
- N) One eight line Corps of Engineers Standard Panel Box
- O) One eight "relay switch" box affixed to the Siemens panel box

The original armored cable is impractical to use. It is made of 18 gage conductors, insulated in either natural rubber or paper/jute, with lead and then steel wire. The conductors only carry 8 amps - too light for anything other than lighting. More significantly these cables are over 70 years old - in many cases 100 years old, and are subject to cracking and shorting when moved. In place of the vintage armored cable, AGFA used modern 12 gage wire contained inside flexible metal PVC covered (watertight) conduit. The conduit is then painted black to simulate the old armored cables.

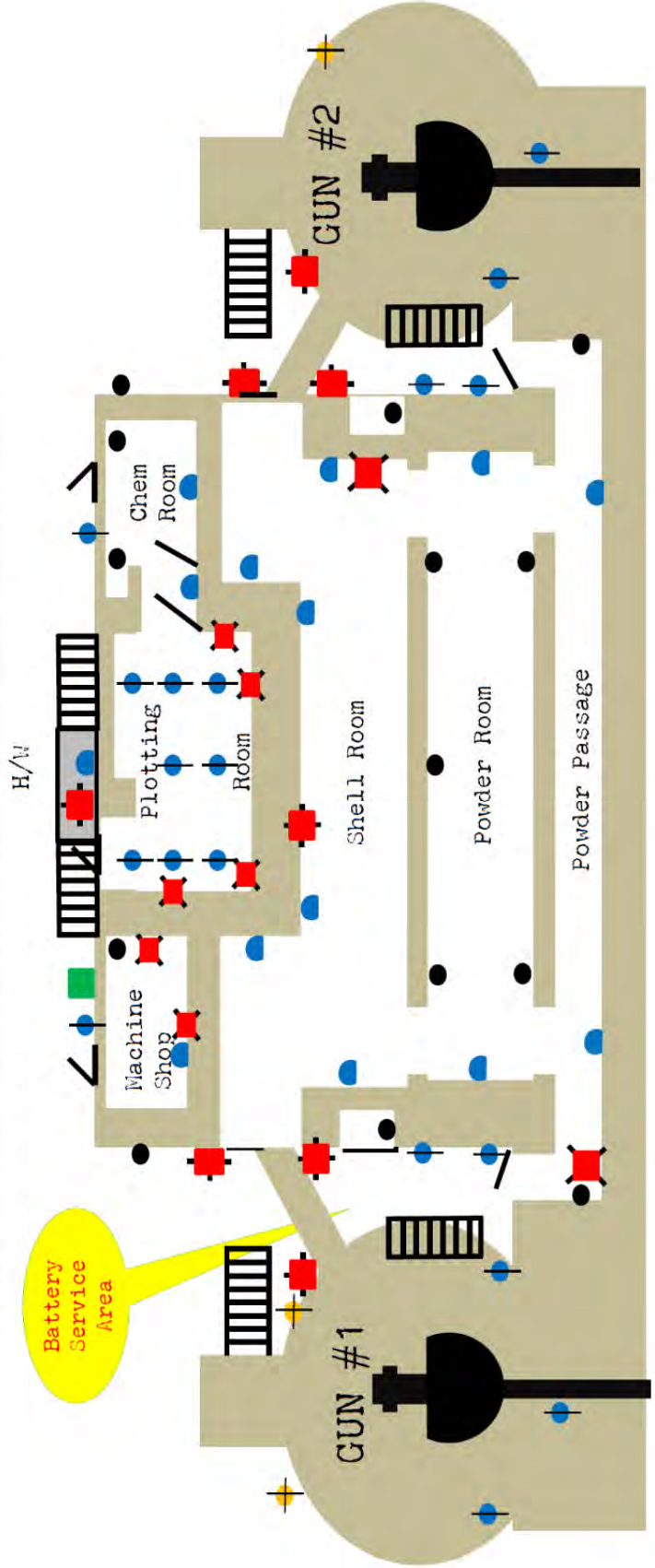
The materials outlined above were cleaned and restored for use in Battery Gunnison/New Battery Peck. The basic restoration process includes removing old paint and corrosion, tapping and cleaning threads for screws, in some cases replacing screws with new production, in other instances we run existing screws through a die to clean the threads, then we prime and paint the entire fixture.

The drawing on the next page outlines the entire system as currently installed in Battery Gunnison/New Battery Peck. The panel box is not show on this drawing.

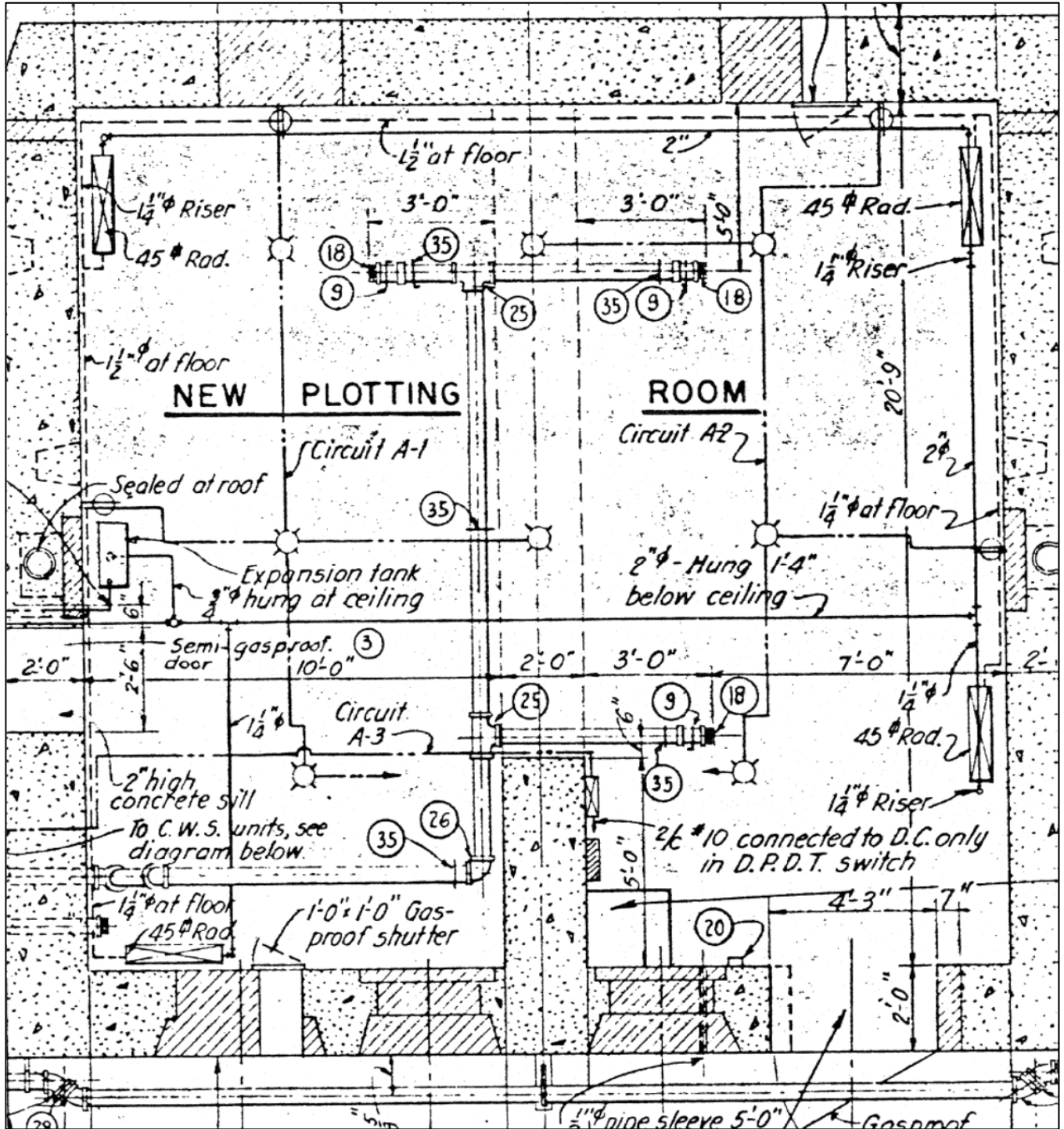
New Battery Peck Electric Service As of May 2018

- = Light Ceiling
- = Light Wall
- ⊕ = Light Platform
- = Modern Light
- ⊕ = Modern 15 amp receptacle
- = Light/Motion Sensor
- ⊕ = 4 way Junction Box
- ⊕ = 3 way Junction Box
- ⊕ = 2 way Junction Box

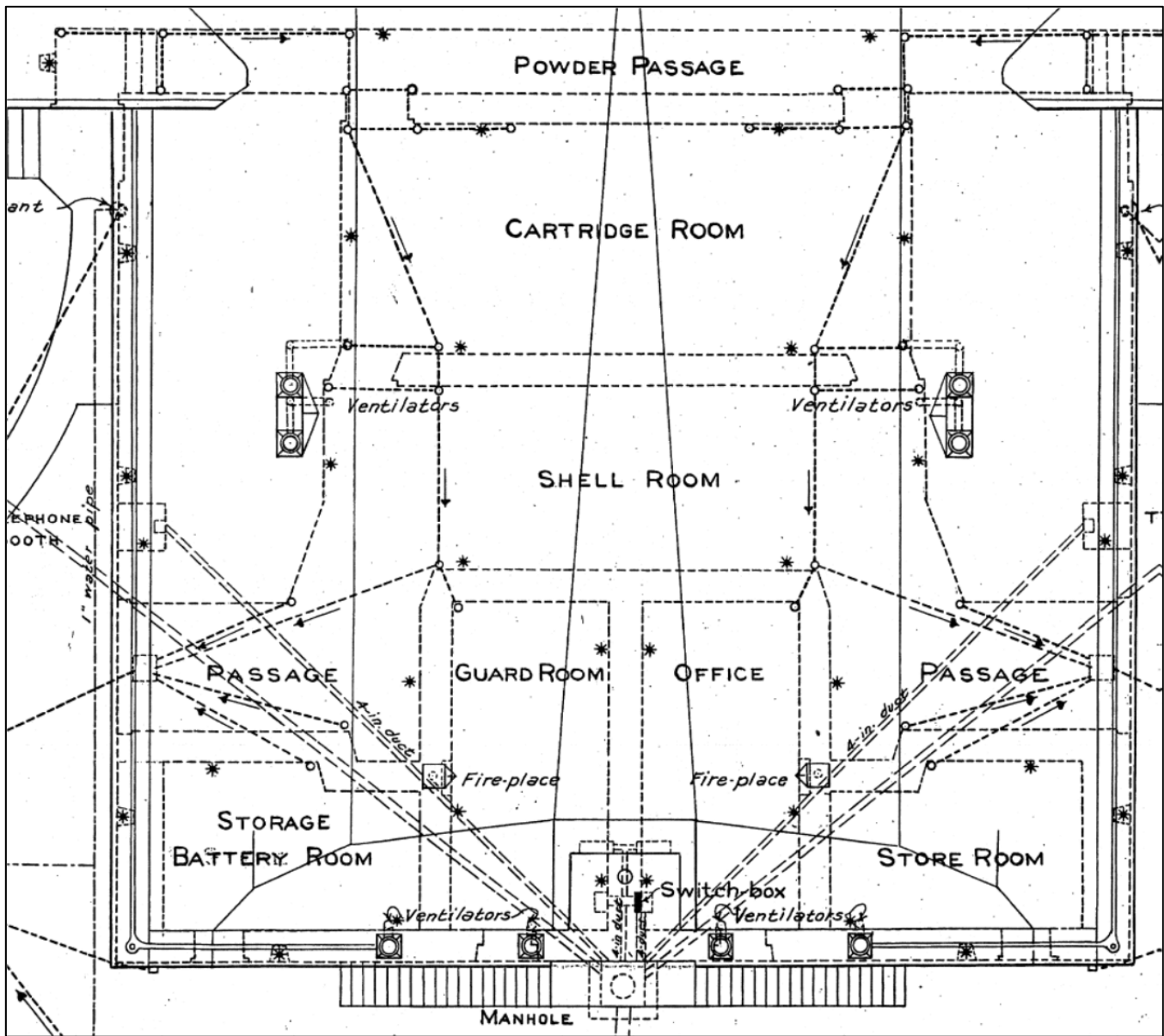
All fixtures historic unless otherwise indicated



In the process of determining the location for the components of the historic electrical fixtures and cabling, AGFA used essentially four sources. One source is the 1943 conversion drawings. Unfortunately, those drawings only show detail for the plotting room and the chemical warfare room. The plotting room drawing is shown below. The drawing provides locations for the lighting, electric controls (panel box) and the recepticals.



For the remainder of the structure we referenced the October 1905 electrical plan which showed the location for all lights, receptacle and panel box (switch box) locations. This lighting system used conduit that was embedded in the concrete.



Sometime between 1915 and 1920 the 1905 system was replaced by the Corps of Engineers Standard system which used armored cable and heavy cable hangers between fixtures. We were able to pull together a full document on the 1915 COE standard electrical installation to include drawings with dimensions. This third source has guided the restoration of the fixtures and provided much clarity on the entire system to include power generation and power (panel) management.

The final method for determining the location of electrical equipment was remaining evidence of mountings on the walls and ceilings. The wall and ceiling fixture boxes each have a specific "bolt pattern" and their locations can be determined by alignment with existing holes in the walls and ceilings. The same method was used for locating cable hangers (they use a very specific large screw).

The boxes for the electrical fixtures are quite different from modern equipment - the bolt patterns are larger and more spaced and in the case of the wall lights, completely different from modern wall lights. Modern industrial/explosion proof lighting uses one common box size and it is smaller than the historic fixtures.

The current system is 100 amps and is delivered to the plotting room through a Siemens modern breaker box. All power is controlled by the historic Corps of Engineers panel box that is located in the plotting room on the left hand wall as you enter the plotting room from the outside.

The Corps of Engineers panel box was standardized in 1915 from a commercial design. This particular box is an "eight circuit" box and was designed originally to operate on 60 amps of 110 volt Direct Current (DC) or Alternating Current (AC) power. The box currently operates on 12 volts DC power and the 110 volt AC power passes through the box without contacting any portion of the box circuits. The original panel box used at Battery Gunnison/New Peck was six circuits. Eight circuits is more appropriate for the current restoration.

All exposed circuits are 12 volt DC. The knife switches use 12 volts DC current to operate relay switches next to the modern Siemens breaker box. These relay switches "switch" the 110 volt AC power on and off. This ensures the 1915 era panel box is safe for modern use.

Each knife switch has a brass "name plate" under the switch that is engraved with the name of the room or location of which the switch controls the power.

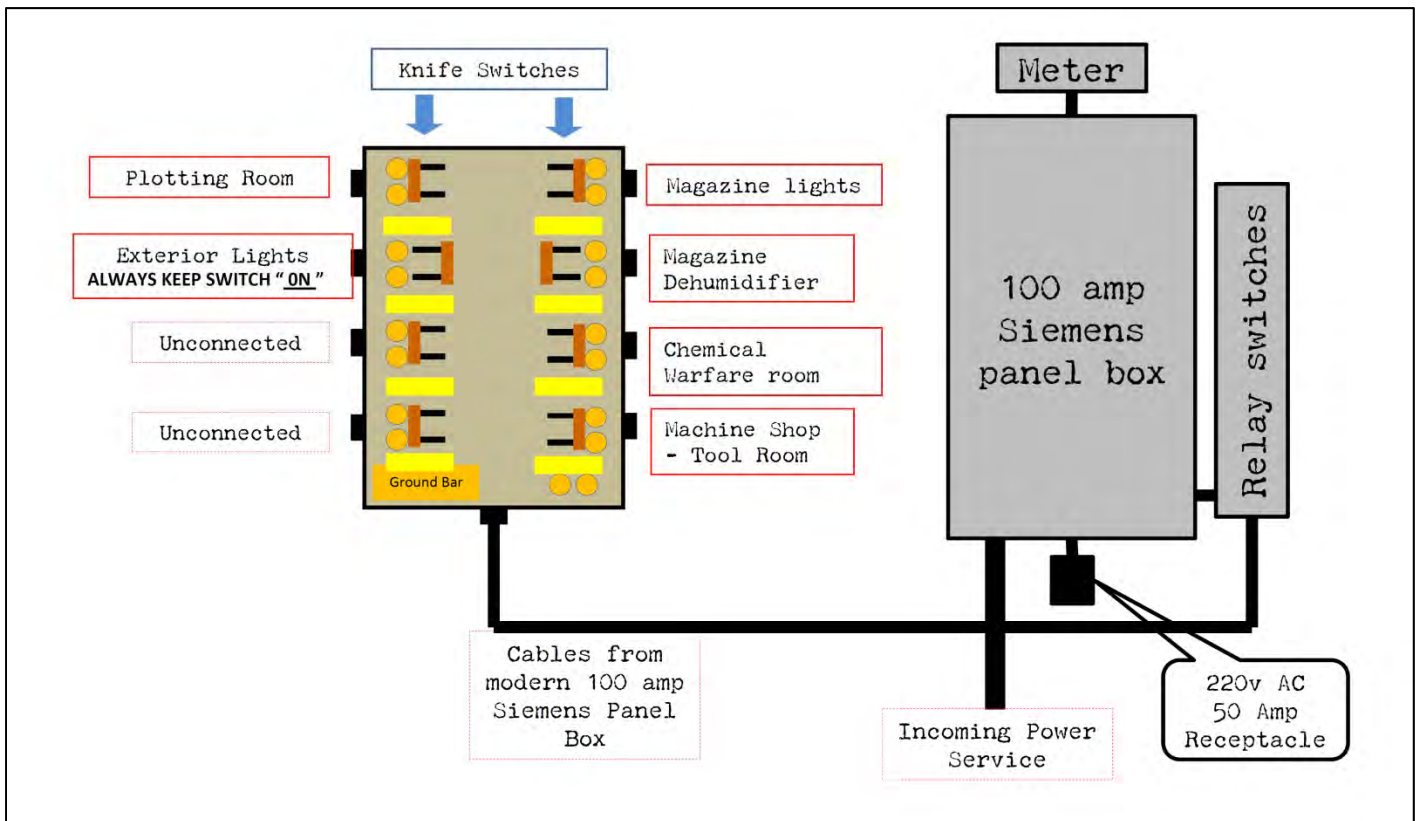
The power receptacle next to the modern breaker box operates the 12 volt DC power for the panel box and operates the plotting room dehumidifier. This line must remain powered at all times.

The drawing below shows the Corps of Engineers Box on the left and the circuits it operates as well as its relationship to the Siemens panel box and the relay switch box.

The 50 amp receptacle below the Siemens box is for high energy systems such as welding and heavy tools.

The drawing below shows the "knife switches" in the panel box in the "off" position, with the exception of the exterior light and magazine dehumidifier circuits.

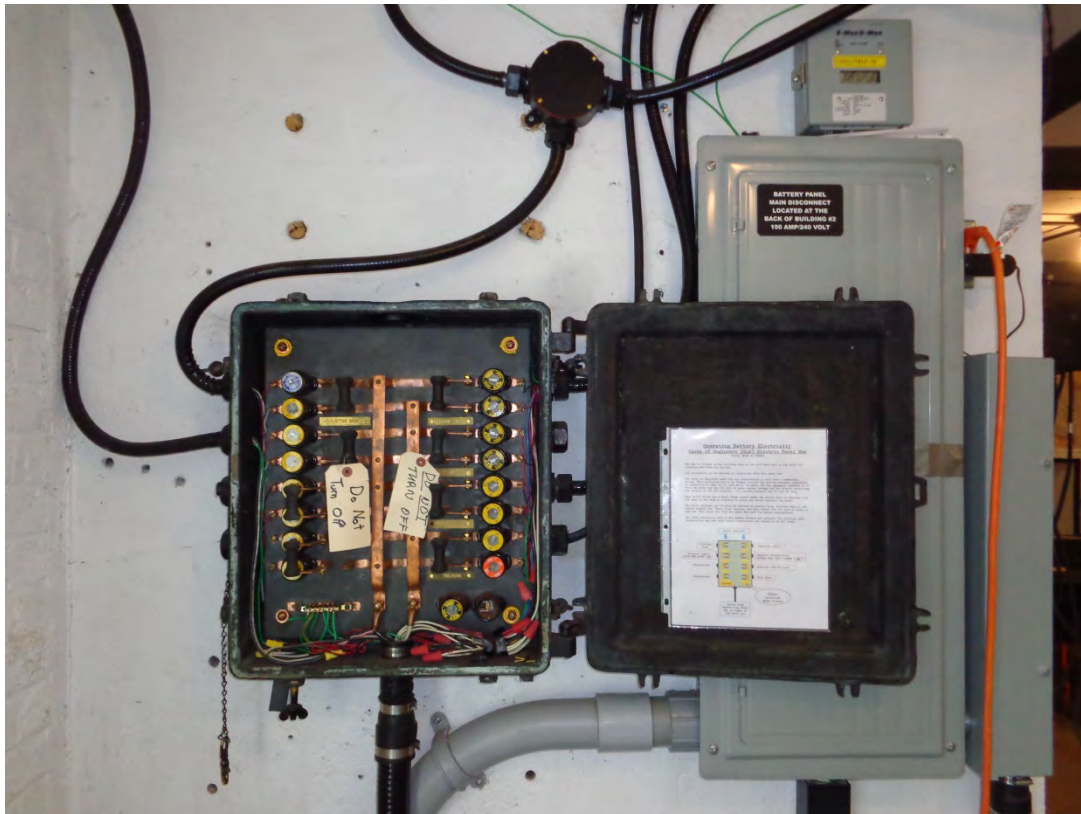
It is important to note that the exterior light circuit and the Magazine Dehumidifier circuit are kept on at all times.



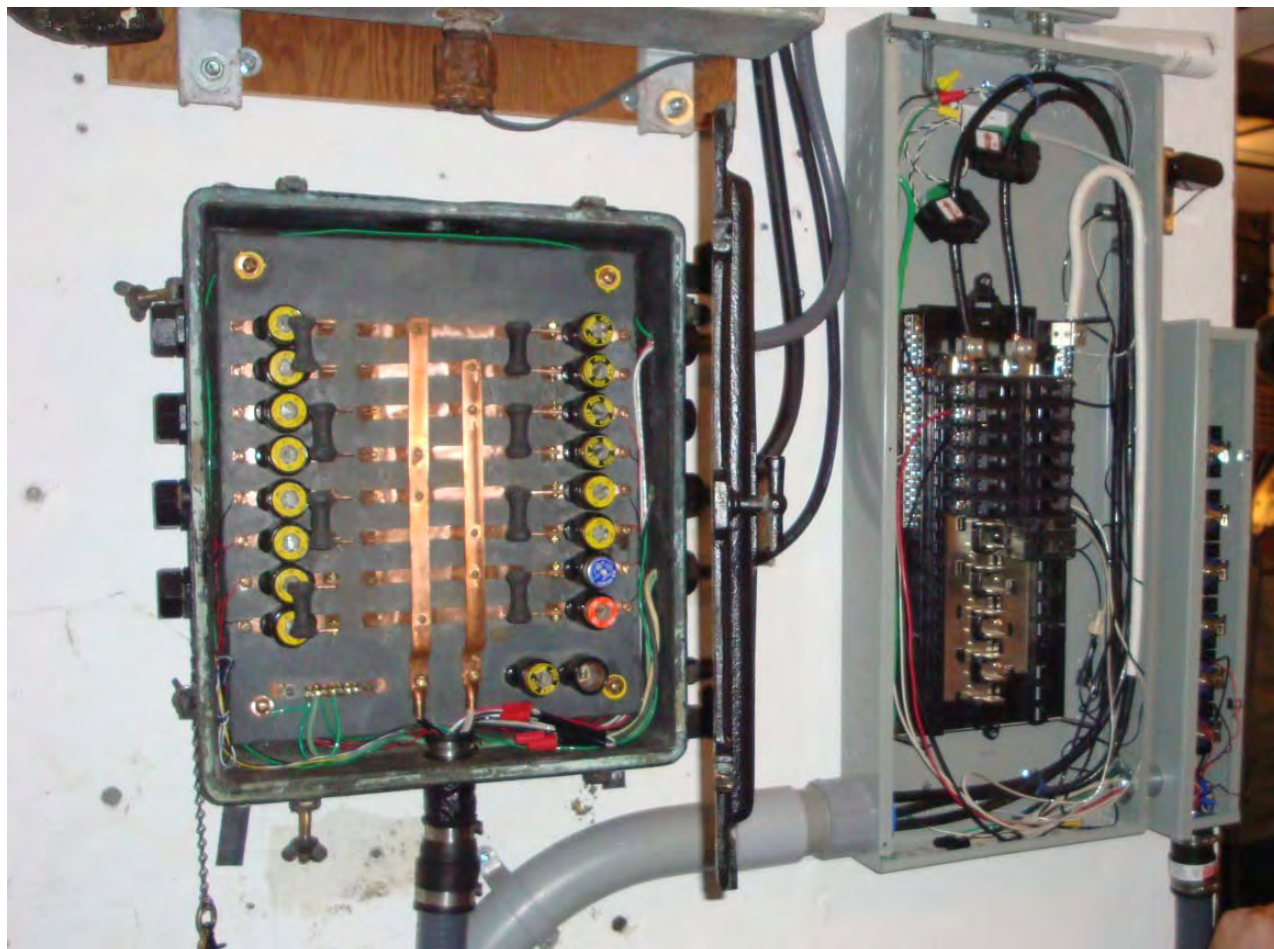
The two photos below from 2018 show the 1915 Corps of Engineers Standard eight circuit panel box and to its right the modern Siemens breaker panel box and the "electric relay switch box" where actual switching is done via a 12 volt DC system. The Siemens panel box, adjacent relay switch box and conduit have been painted white to blend into the background surroundings.



The photo below shows the COE Panel Box open. Notice the 1915 COE box has a paper inside the door explaining the box and the circuits it operates. The two paper tags indicate circuits that must remain "on" to support exterior lights & dehumidifiers.



The photo below from October 2011 shows all three boxes open as they are wired and connected. The fuses in the panel box are actually used to complete the 12 volt DC circuits. The green wires in the lower left hand corner of the box are the only other operational wiring in the box. These are the grounding circuits and they effectively ground the box as well. The Siemens panel box and conduit will likely be painted white in the future.



The photo below shows the manufacture's tag for the panel box. Notice that it was manufactured in Arlington, New Jersey.



The photo below from May 2018 shows the plotting room and four of its ceiling lights (modern with vintage look) and two of the vintage WWII Crouse and Hinds single plug receptacles on the walls. These modern RAB lights were chosen because they are very similar to WWII period Crouse & Hinds lights which were mounted in the plotting room in 1943, but, are generally unavailable.



This photo from May 2018 shows three modern (vintage look) ceiling lights.



The photo below from May 2018 shows the plotting room from south to north.



The photo below shows the Chemical Warfare room's ceiling light (left) and wall light (right) along the northern wall.



The photo below taken in May 2018 shows the chemical decontamination air lock with its COE vintage wall light on the left.



The photo below from May 2018 shows the vintage COE ceiling light inside the mechanical section of the Chemical Warfare room. The electrical system for the blower motors is addressed in a separate document.



The photo below from May 2018 shows the Gun #1 main entrance to the shell magazine with three COE wall lights.



This photo from May 2018 shows the shell magazine looking towards the Gun #2 side with three COE wall lights and one COE four line junction box. The shell room dehumidifier is under the wall light on the right. The dedicated receptacle for the two magazine dehumidifiers is to the right of the wall light.



This view from May 2018 is from the entrance to the powder magazine looking towards the Gun #2 entrance. It shows three wall lights, and the dedicated dehumidifier receptacle on the right.



This photo from May 2018 shows the shell room dehumidifier, wall light and dedicated circuit receptacle for the dehumidifiers.



This view from May 2018 shows the shell room looking towards Gun #1 showing two COE wall lights.



This photo from May 2018 shows the three COE lights (two ceiling lights mounted on the wall and one wall light to the right).



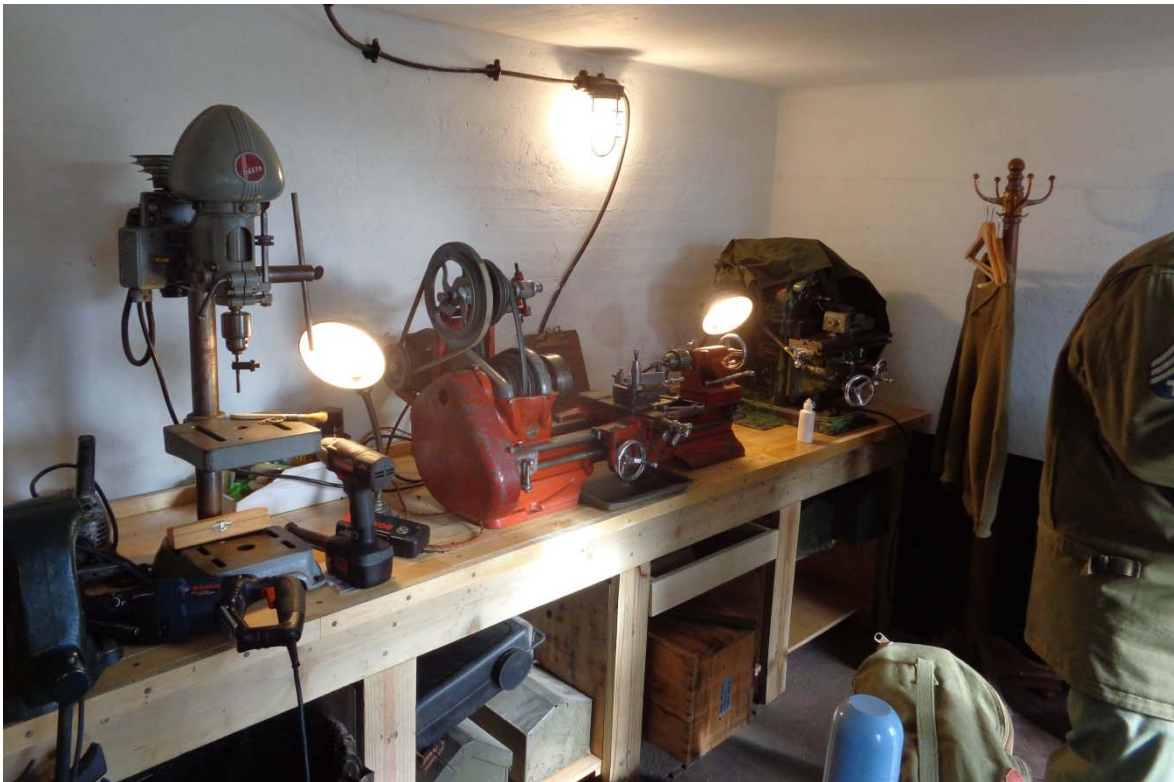
This view from May 2018 looking out the powder passage shows one COE wall light and one COE ceiling light in niche. Both lights are historically correct.



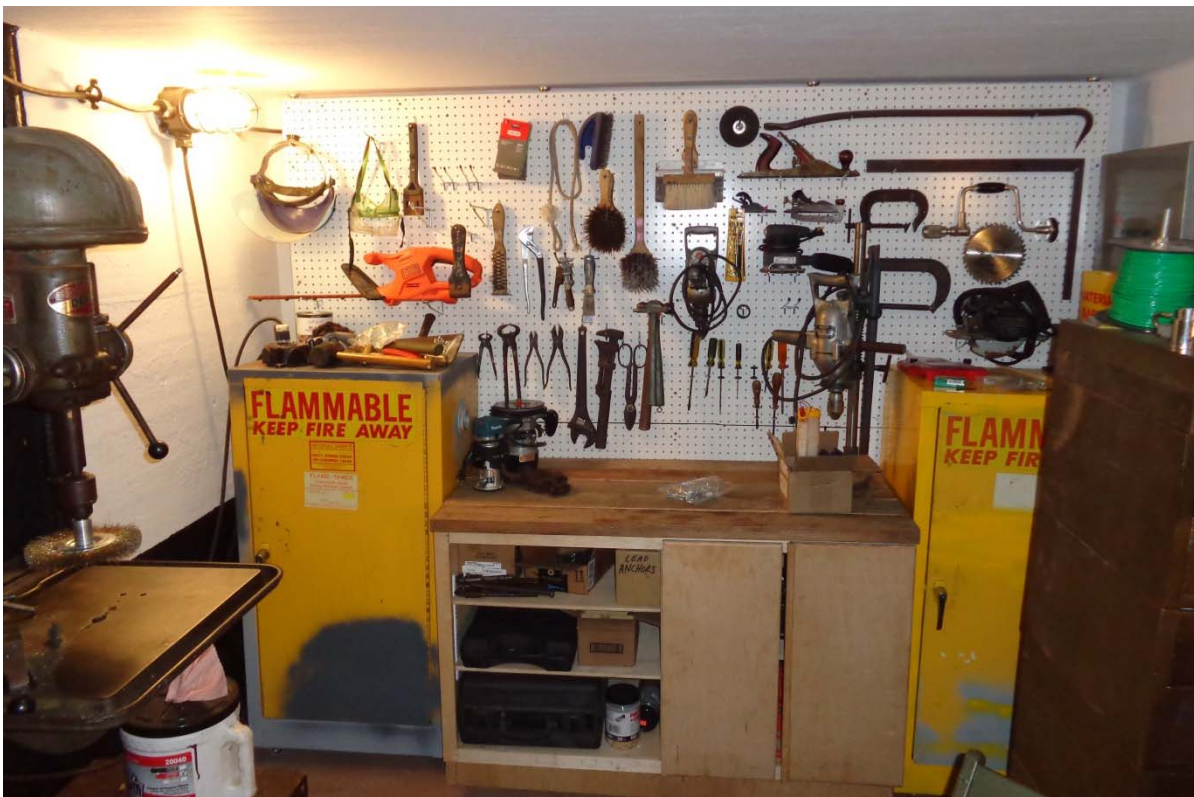
This view is looking down the Gun #2 powder passage showing one COE wall light and one COE ceiling light in niche.



This May 2018 photo of the machine shop shows one COE wall light (correctly mounted). The cable emanating from the right side of the fixture leads to a modernized COE junction box with a modern 15 amp double receptacle.



The photo below from May 2018 shows the northern wall of the machine shop with one COE vintage ceiling light mounted on the wall. All of the ceiling lights mounted in place of wall lights have a wooden disk as backing since the holes in the wall are for wall lights.



The photo below from April 2018 shows the Gun #2 telephone booth light installed and niche light both illuminated. The telephone booth light and the junction box are historic COE Standard fixtures.



The photo below from May 2018 shows the Gun #1 telephone booth light and wiring for telephones and Time Interval Bell.



The photo below shows Gun #1 with its full light installation (three wall lights and two stanchion lights) operating in May 2018. All three front lights and the two stanchion lights are in place.



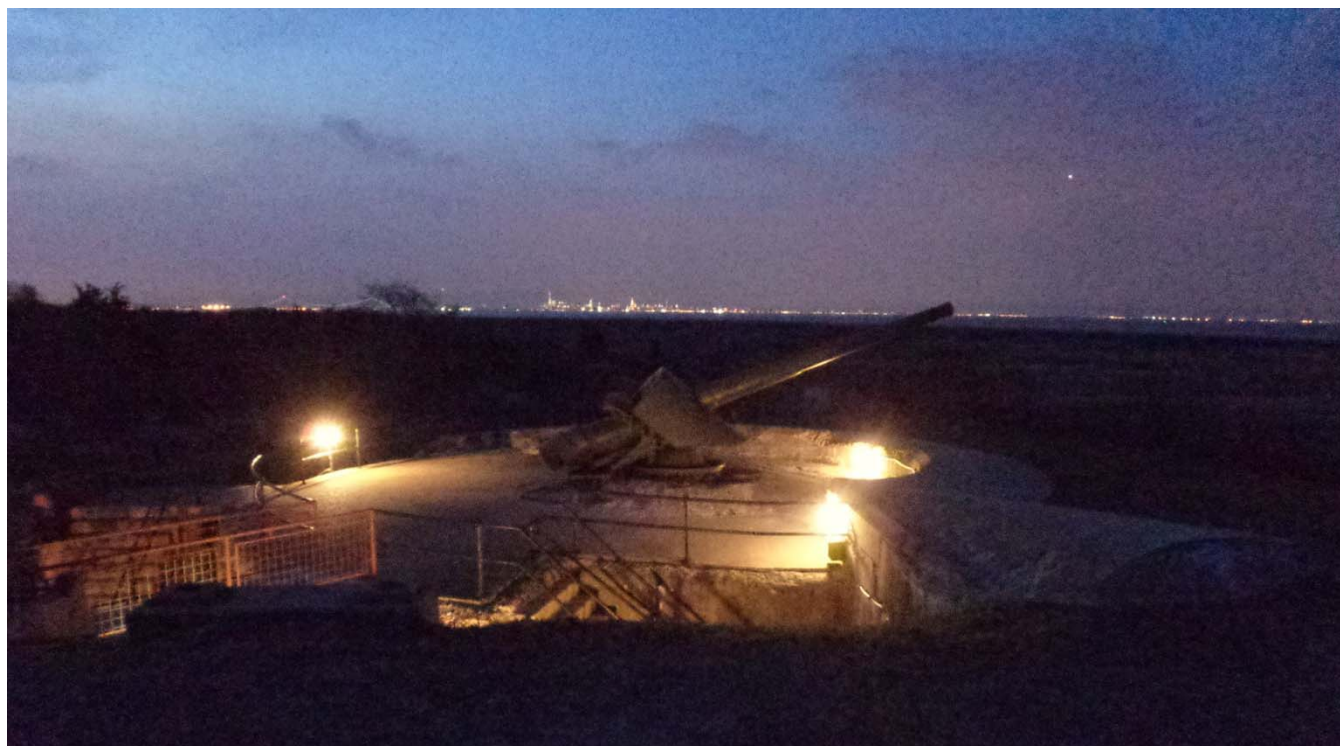
The photo below shows them in operation. These two lights are full restorations with original light fixtures cleaned and re-wired.



The photo below shows the platform light for Gun #2 in May 2018. This particular light uses a historic COE light stanchion from a New England fortification and modern light fixtures. There remain to be mounted about ten cable hangers.

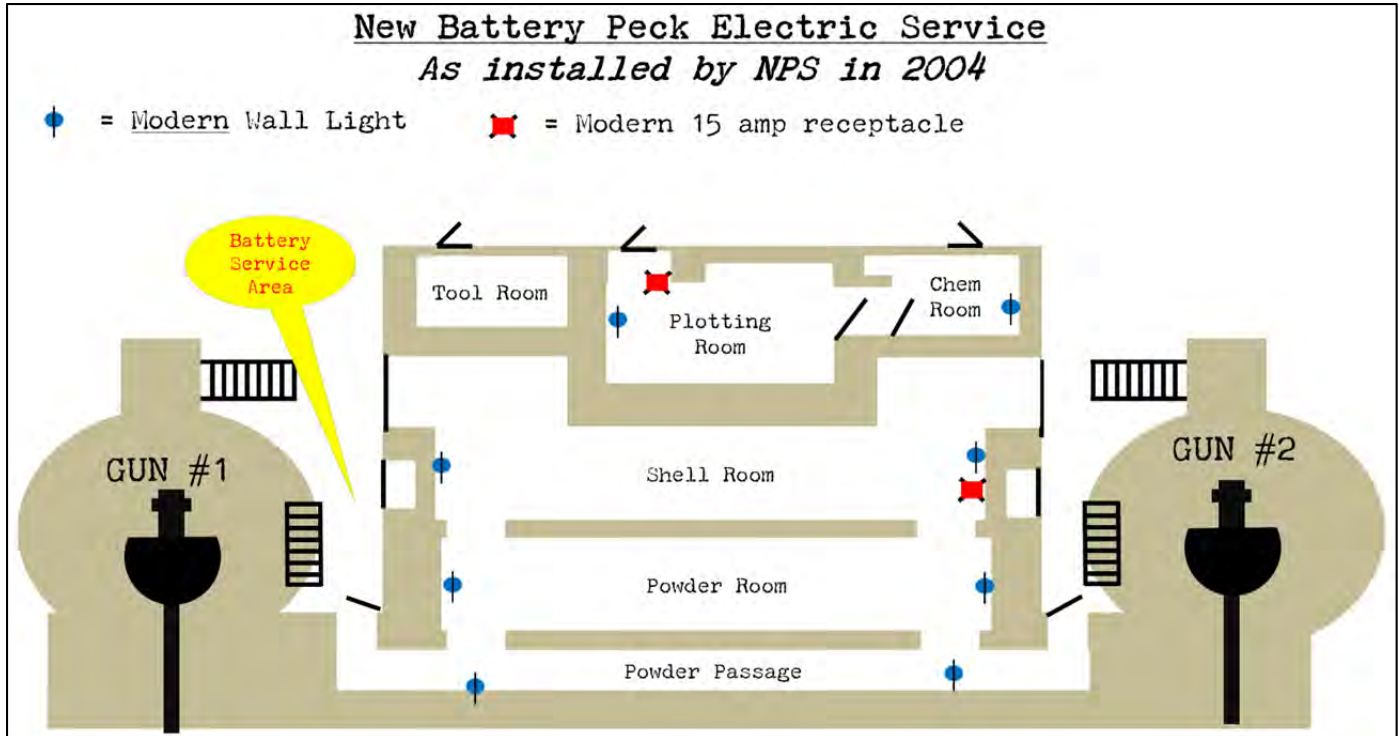


The photo below shows Gun #2 with two front lights and one stanchion platform light installed and operating in May 2018. The second platform light can be installed once restored. The third front light must await concrete stabilization actions prior to installation.



Evolution to the Current Electrical System

Between 1975, when the NPS took control of Fort Hancock, and approximately 2004, there was no electrical service within Battery Gunnison/New Battery Peck. In 2004, the National Park Service brought a 20 amp line to the Battery and installed eight lights and two standard 15 amp receptacles inside the structure. There were no exterior lights installed. The basic installation is shown in the drawing below.



This was a first step. Eight bulbs were barely adequate for lighting. Additionally, the battery electrical service shared the 20 amps with a soda vending. Power tools were problematic and the soda machine often was turned off to ensure a reliable circuit. The photo below shows one of two lights in the powder passage in May 2005.



The photo below of the powder magazine looking south was taken in May 2005. Notice the openness of the magazine. Two lights worked when the room was empty, however, displays and storage (approx. 290 powder cans and storage boxes) brought the shortfalls of two bulbs into sharp focus.



The photo below from 2004 shows the electric breaker box (two circuits) for the receptacle and lighting. The light switch was above the receptacle. This receptacle was the only receptacle inside the Battery from 2004 until 2011 when the 100 amp service was brought into the battery by the NPS.



The photo below from April 2004 shows the absence of lighting in the plotting room. AGFA installed the telephone system and the replica (PVC) cast iron pipe overpressure system just before this photo was taken.



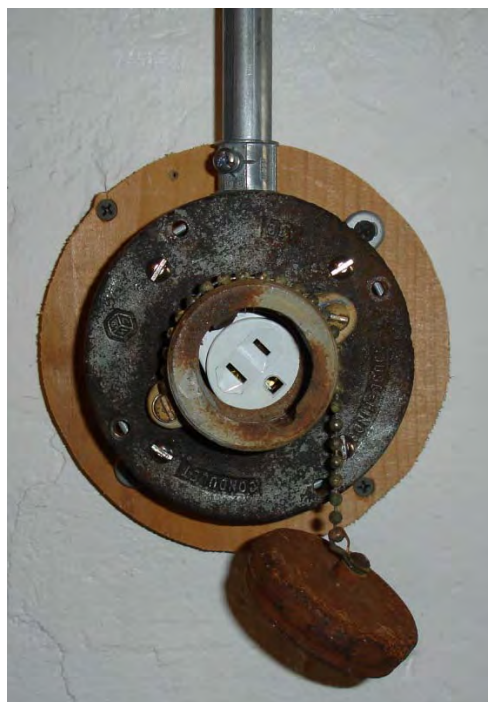
The first major electrical effort undertaken by AGFA was the installation of the plotting room lighting. The photo below from June 2007 shows the system as installed in 2006. The basic system had standard grounded household plug that used the single receptacle in the plotting room for power. This view shows five of the eight lights and one of the four single line receptacles installed. The fixtures are modern but are similar in appearance to the WWII period Crouse and Hinds fixtures.



The photo below shows two lights and one of the four single line receptacles.



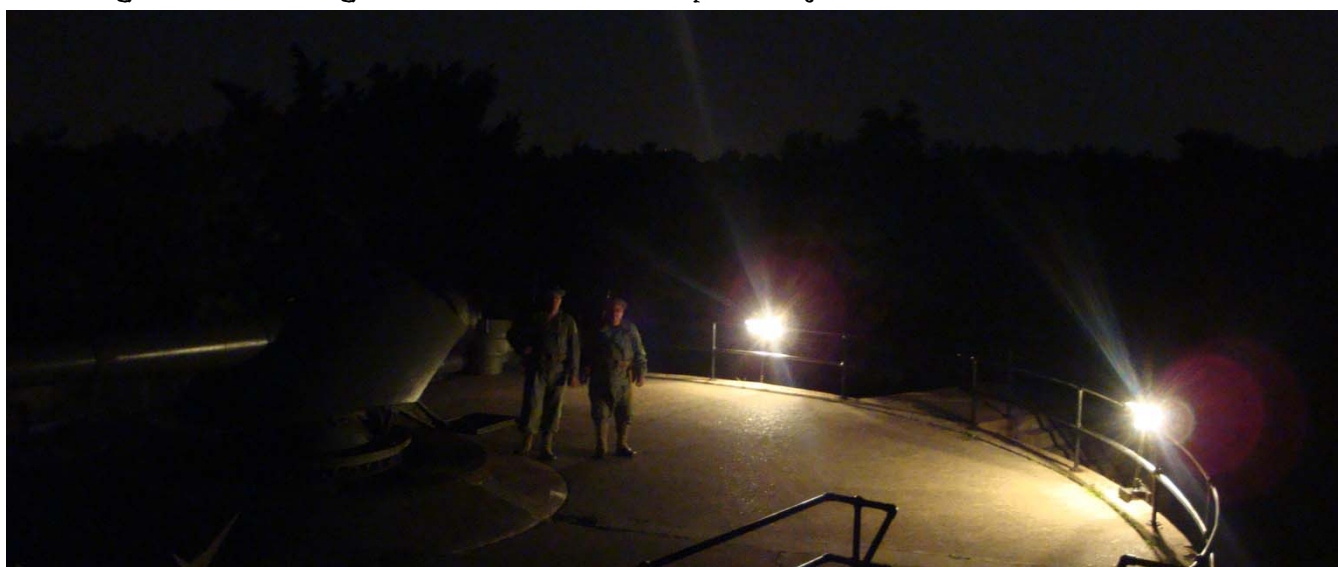
The single line receptacles are shown below. These are actually historic covers - the boxes are modern but accept the historic covers nicely. These covers are WWII vintage and were obtained from a WWII fortification in New England.



The next significant project was installing the WWII period Crouse and Hinds four switch explosion proof box in 2008. This photo is from March 2011. This box was found outside of Battery Kingman in the grass. AGFA restored it to usable condition by opening it up, replacing the switches with modern switches and a new seal. This box still required a household grounded plug to obtain power from the single receptacle shown below. This box was replaced in October 2011 by the 1915 Corps of Engineers Panel box. This box is in storage inside the magazine of Battery Gunnison/New Battery Peck awaiting a suitable reinstallation and reuse as appropriate at Fort Hancock.



The next electrical work undertaken was restoring two platform lights in early 2010. These two lights were obtained outside of Fort Hancock. One was fully restored and had a wooden base mounted on it to use as a work light. The second used modern light fixtures mounted to the historic stanchion. The two lights are shown below. Both lights were designed to be mounted temporarily and stored between events.



The next two platform lights were restored in conjunction with Dan Meharg, NPS. Two lights were obtained from 9-gun battery and summarily restored to operating condition. These two lights were obtained in early 2011 and restored by the summer of 2011. These were also designed to be mounted during events and otherwise stored.



Below is another view of these restored platform lights in 2010.



In 2010 AGFA was blessed with a very significant acquisition of over fifty 1915 Corps of Engineers (COE) standard light fixtures. Only four of these fixtures were wall lights. This was unfortunate as wall lights constituted the vast majority of what was mounted inside Battery Gunnison/New Battery Peck. Additionally, AGFA obtained four COE panel boxes (two each 10 and 8 circuit boxes) in varying states of disrepair that were manufactured between about 1915 to 1920; about 200 cable hangers, six COE receptacle boxes (no current application) and four broken double pole snap switches and their specially modified boxes completed the acquisition. We may be able to acquire the switches in the future. All of this material required restoration - a time consuming process.

At about the same time, Pete McCarthy (NPS Unit Coordinator) was able to adjust a contract to install a 100 amp independent electric service into the Battery. The service was fully installed by the summer of 2011.

This acquisition and the addition of 100 amp service changed the focus of AGFA's scope and approach to the reintroduction of historic lighting at Battery Gunnison/New Battery Peck.

The first major work that occurred as a result of this acquisition was installation of lighting in the tool room (now a machine shop) in March 2011. There was no lighting in that room and this created significant operational difficulties. Two lights were installed. The one below has since been replaced by a wall light.



The COE standard ceiling light (shown below) remains in place as of May 2018.



In April 2011, we began installing lighting into the Chemical Warfare room. Below the installation of a ceiling light in the mechanical niche.



The light as installed is shown below and it remains in place as of May 2018. Notice the three line COE Standard junction box. It would be replaced a year later with a four way COE standard box.



The photo below shows an AGFA member installing the COE ceiling light on the eastern wall of the Chemical Warfare room in May 2011.



The COE ceiling light as installed in 2011. This light has since been replaced by a COE wall light and the wiring enters the fixture on the opposite side as of May 2018. Two vintage COE lights and one WWII wall light were installed in the chemical warfare mechanical spaces.



The installation of lighting moved as fast as the restoration of light fixtures progressed. All of the fixtures that we obtained required significant cleaning and restoration. Most required re-wiring. Additionally we had to determine an effective way to integrate the historic fixtures with modern flexible metal PVC covered conduit. We discovered the modern connectors could be used with these 100 year old fixtures by inserting them inside the closure nut and applying large washers inside. The historic fixture connectors are concave inside and when the historic nut is tightened, the modern connector with the heavy washers effectively seals the fixture.

In the photo below an AGFA member begins the process of laying out the required equipment to install our first lighting in the magazine - the two lights on the Gun #1 side of the powder passage and one light inside the magazine proper. The light that is facing the member is one of the original NPS installed lights.



In the photo below two AGFA members begin installing cable hangers for the conduit.



In the photo below an AGFA member installs a COE ceiling light on the wall in the powder passage. The member is removing the large brass connecting nut to prepare for installation of the modern conduit. Since a wall light was originally mounted in this space, a large wooden disc was mounted using the wall light screw holes in the concrete. Then ceiling light was then affixed to the wooden disc. The disc is painted white to match the wall.



The photo below shows the two newly installed lights in the powder passage. The far light has a two plug receptacle installed using a historic COE junction box. This ceiling light has since been replaced by a COE wall light. The picture on the right shows the ceiling light in the niche and the flexible corded receptacle attached to it.



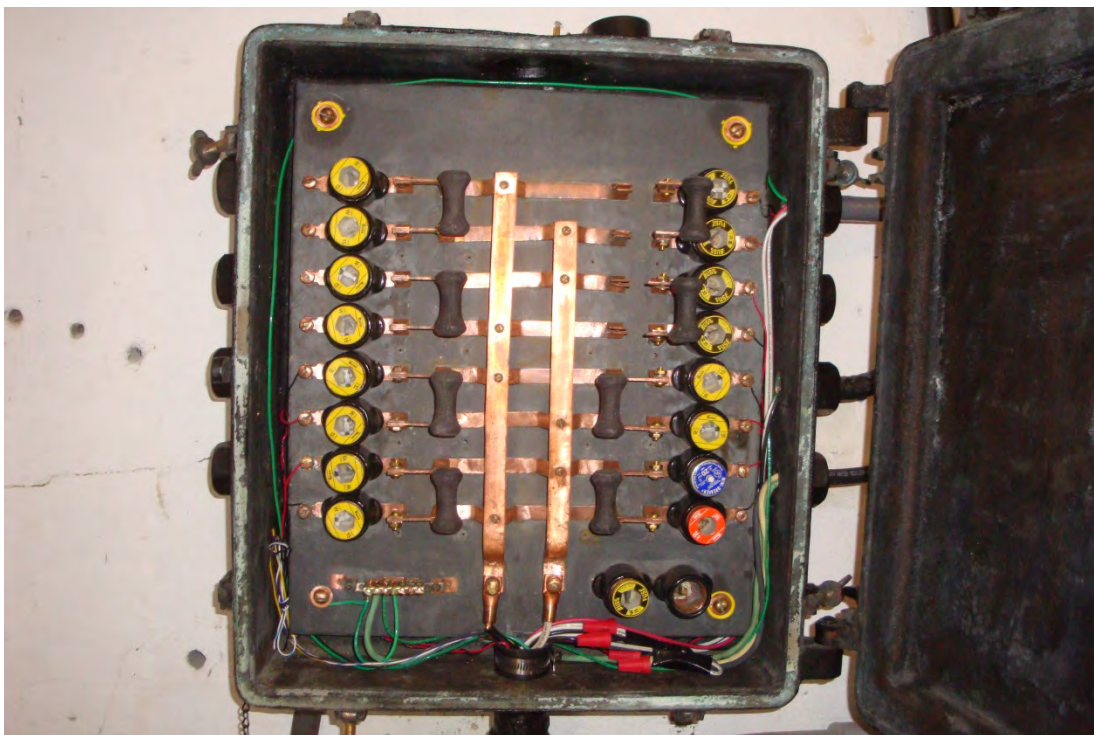
The photograph below from May 2011 shows the new 100 amp Siemens panel box installed and the deactivated 20 amp service being removed.



The photo below is later in the day showing the 1915 Corps of Engineers Standard panel box mounted. This box is made of bronze with a slate board and weighs over 150 pounds. The NPS 20 amp service is just below the panel box and will soon be removed. However, this box is totally open and not even close to safety code. Another four months of discussion and work with Pete McCarthy and other NPS experts was spent determining the safest way to integrate this box into the system.



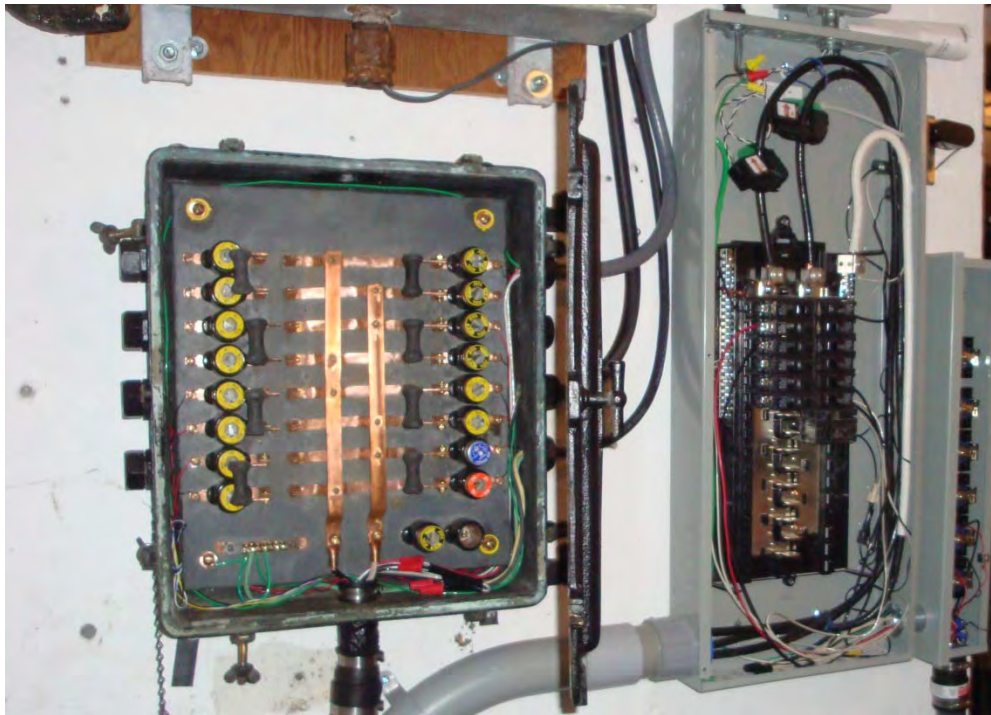
The solution developed involved using relay switches in a separate service box that was placed next to the main Siemens service panel. The 110 volt AC "hot" line would be connected to one of the relay switches. Both the hot and neutral lines pass "through" the 1915 COE panel box. The connections shown below in the panel box are actually a 12 volt DC system that actuates the relay switches when the knife switch is closed. The ground circuit is on the lower left side of the slate board. All grounding connects to this bar and then to the ground in the main Siemens box.



The photo below shows an AGFA member testing circuits in the box as each is connected. The main power was disconnected and all circuits tested prior to re-energizing the system.



The photo below shows the panel box wired as of May 2011. At that time there were four active circuits: (1) machine shop/tool room; (2) Chemical Warfare room; (3) Magazine including dehumidifier.



In July 2011 we installed two more lights on the Gun #1 side of the magazine. About this time we began to run out of cable hangers. In coordination with NPS we secured additional cable hangers from structures classified as "ruins" in the General Management Plan of Gateway National Recreation area (specifically Old Battery Peck).



In December 2011 AGFA began installing lights in the Gun #1 entrance and hoist area of the magazine. At the end of the work session two lights were mounted and one was working. Throughout this work we incrementally replaced the exiting NPS magazine lighting installation as more materials were restored from the original acquisition.



By March of 2012 all three light were installed. These are COE ceiling lights. As of 2018 these lights were replaced by COE wall lights. The COE ceiling light in the center was replaced in May 2012 by a COE wall light.



In May 2012 we installed two of four COE wall lights in the magazine. We had four wall lights on hand from our original acquisition and had been using them as lights for the front of a gun emplacement for events in a temporary manner. We decided to install these lights permanently inside the magazine as they are the correct lights for use inside the magazine. The magazine calls for fourteen wall lights. As of May 2018 there are ten COE wall lights mounted. The one below is installed in the entrance to the magazine next to Gun #1 hoist area.



The other was in the Gun #1 powder passage. Both lights remain in place as of May 2018.



In July of 2012, AGFA replaced the remaining NPS lighting in the magazine with historic COE ceiling lights. In the photo below an AGFA member installs a COE Standard wall light in the Gun #2 powder passage using a ratcheting "Yankee Screwdriver".



In the photo below an AGFA member works on installing a light and receptacle in the Gun #2 side of the shell room.



Below an AGFA member installs a vintage COE four way junction box to connect all the lines inside the magazine to the main line from the plotting room.



The photo below shows four newly installed lights on the Gun #2 side of the powder magazine. The light in the center has since been replaced by a wall light.



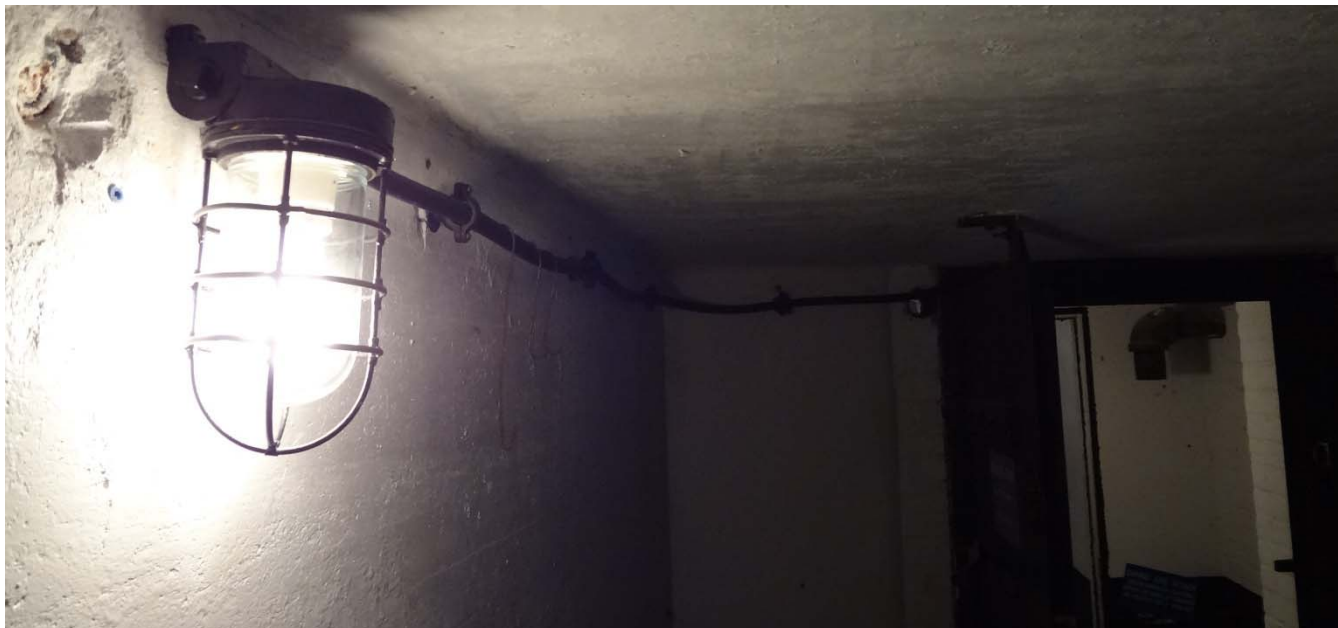
Below shows the installation of two COE Ceiling lights and one COE Wall light on the Gun #2 side of the shell magazine.



The photo below shows the COE Wall light from the entrance to the Gun #2 side of the magazine. AGFA installed four wall lights inside the magazine in July 2012. This substantially completed the interior of the magazine.



In 2012, working with Pete McCarthy, we recovered two COE Standard wall lights from Battery Kingman. These lights were installed in the Chemical warfare room and decontamination air lock. This wall light replaced a ceiling light installed in April 2011. Notice the “missing” decontamination stand pipe inside the decontamination chamber (right side of photograph). It would be 2017 before that would be fully restored.



Below the COE Standard Wall light is being installed in the Chemical Decontamination chamber.



The decontamination light required another line that the existing three line COE junction box would not support. A four line COE standard junction box replaced the three line box which was then available for use in another Fort Hancock location.



Below is a restored COE standard wall light from Battery Kingman. This provides a total of six COE standard wall lights inside Battery Gunnison/New Peck out of a required eighteen COE standard wall lights.



In August 2014, AGFA installed a COE Standard Ceiling light in each telephone booth. The light below is in the Gun #1 booth where it remains as of May 2018.



The photo below shows the light installed in Gun #2 telephone booth.



As the installation of electrical components progressed, the shortage of cable hangers became acute. As of 2014 there were not enough cable hangers on hand to initiate new installations. During the spring and early summer of 2015, AGFA coordinated with the NPS to remove and restore about 200 cable hangers from Old Battery Peck (a ruins designated battery in the GMP). In the photo below an AGFA member removes a cable hanger from the ceiling of Old Battery Peck.



In the photo below, an AGFA member cleans and counts cable hangers and prepares them for restoration.



Restored cable hangers are shown below. Cable hangers were cleaned and de-rusted using various non-corrosive processes typical to automotive restoration (bead blasting or carburetor cleaning). They are then primed and painted. All screw threads are cleaned and the cable hangers are re-tapped. These cable hangers (approximately 250) enabled completion of both the interior and 90% of the exterior electrical installation for Battery Gunnison/New Battery Peck.



Beginning in July 2015, AGFA began installing exterior lighting. This was in conjunction with the contracting action on the Battery Commander's Station stairs and ammunition bridge reconstruction contact. In the photo below an AGFA member installs cable hangers to hold the conduit



Additional cable hangers are installed on the Gun #1 side of the battery service area. In July of 2014 a total of four modern wall lights, one COE standard three line junction box with cover and one modern light/motion sensor switch were installed.



In the photo below the sensor box is being installed.



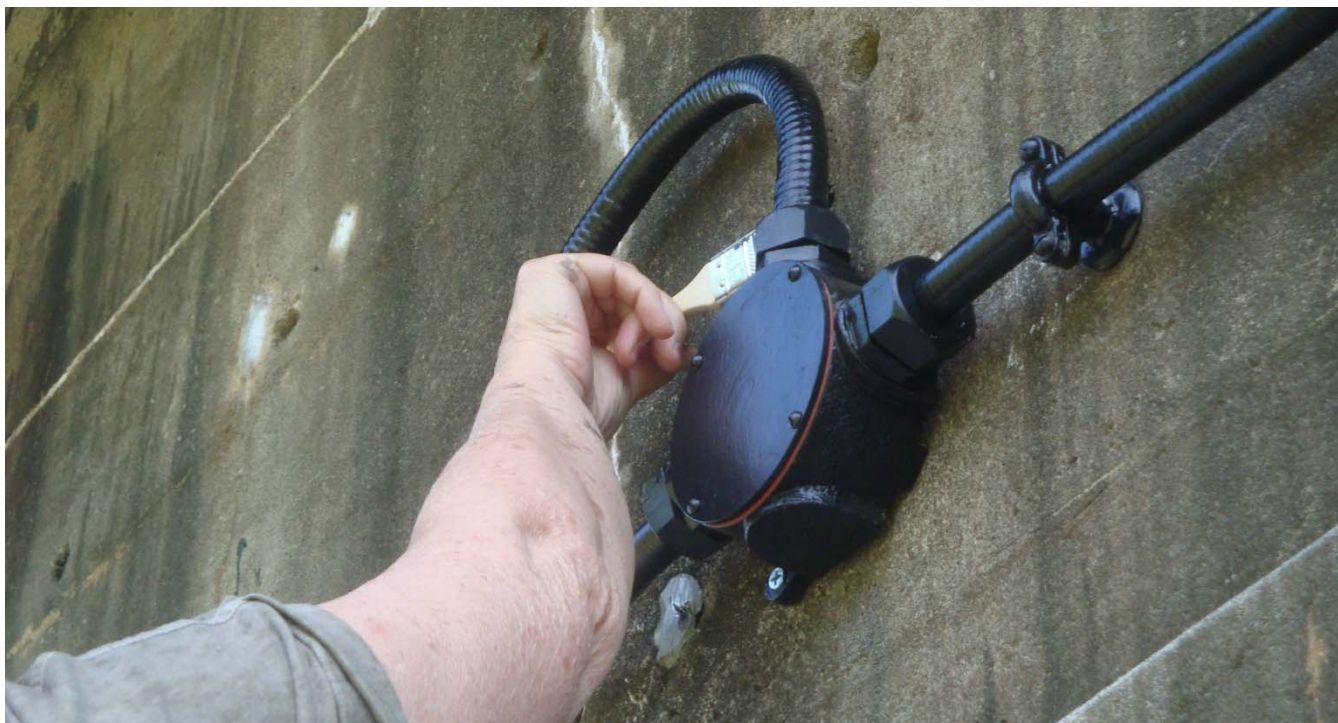
In the photo below the COE standard 3 way junction box is being wired for the sensor line. Notice the heavy cover and the large nut that is in place. These fixtures are a bronze/brass alloy and unfortunately valuable for theft. We ensure these valuable and rare fixtures are placed in areas where the public does not have easy access. This first phase of exterior lighting used approximately 50 cable hangers.



The two photos below show completion of a modern wall light on Gun #1 side (left) and the final installation of the sensor switch (right).



The photo below shows the the final painting of the 3 way junction box.



The photo below shows the July 2015 exterior lighting installation with the conduit and fixtures painted black.



In March 2017 the Chemical Warfare room was rewired in preparation for the Chemical Warfare system reinstallation. This consisted of adding an additional COE standard wall light to the northern corner near the outside entrance and reversing the wiring on the wall light on the eastern wall of the room. The photo below shows the reversal of the wall light.



The photo below shows the full relocation of the northern COE standard lights. This required the addition of the one ceiling light on the left.



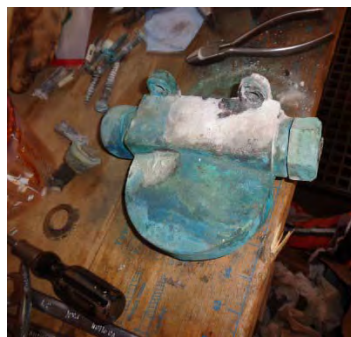
In the spring of 2017, seven wall lights were recovered from Battery Morris (a "ruins" designated battery) and restored to operating condition. Below are photographs of the Wall Lights recovered from Battery Morris and installed in Battery Gunnison/New Battery Peck. The first photo shows two wall lights inside Battery Morris. One light is missing the ceramic light component and the ceramic light mounting fixture.



The Photos below show wall lights in various stages of restoration. The first two photos show the lights as originally recovered.



The next three photos show the lights being disassembled.



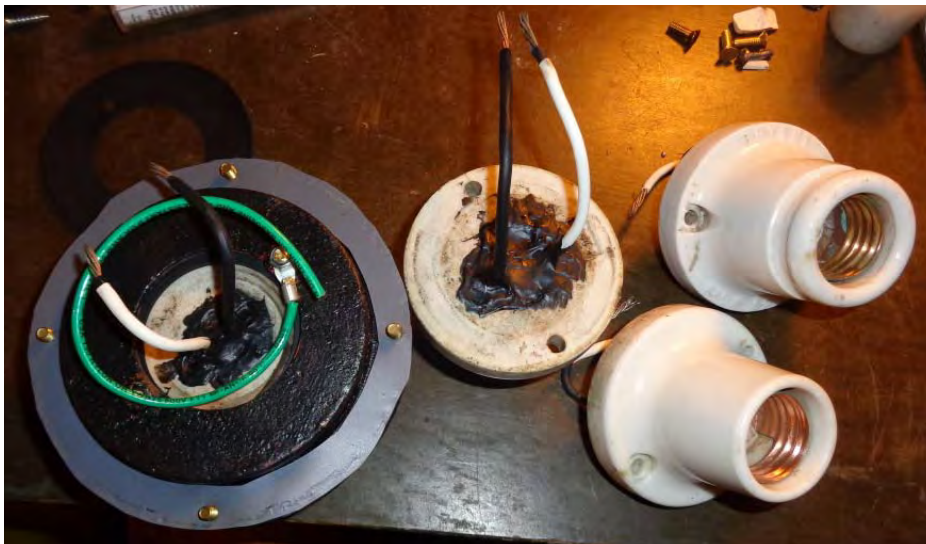
The photos below show the wall light housings being cleaned and primed.



Below are a number of corroded and broken ceramic light fixtures. No modern fixtures are manufactured to these sizes. In order to reuse the historic fixtures, those that are able to be restored, must be restored.



The restored ceramic fixtures are shown below rewired, polished and installed in the light housing for the junction box. Notice the fixture has a ground wire attached.



In the photo below, the right and left wall lights from Battery Morris are installed in Battery Gunnison/New Battery Peck Gun #1 side of the magazine in the summer of 2017. Two more were installed on the Gun #2 side (mirror image) and then two more were installed on opposing walls inside the powder magazine for a total of six in the magazine and the seventh was installed in the Machine Shop facing the door. This returned seven COE standard ceiling lights to storage for future use.



The photo below from May 2017 shows the replacement of ceiling lights with wall lights.



The COE standard wall light is shown on the Gun #2 side of the shell room with the dehumidifier receptacle to its right.



In September 2017, AGFA added a 220 volt 50 amp AC receptacle to the Siemens panel box. The left photo shows the Siemens box and the receptacle at the bottom. The right photo is a close-up of the receptacle.



The next major focus was the exterior lighting and that effort started in earnest in December 2017 and was completed in early May 2018. This work started once the ammunition bridges and Battery Commander's Station stairs were in and the projects were accepted by the NPS. The photo below was taken on 7 December 2017 showing a COE standard ceiling light having just replaced a modern RAB ceiling light on the Gun #1 side service area. The RAB light was used in a niche that is more accessible to the public. The same action occurred on the Gun #2 side.



The photo below take on 14 December 2017 shows an AGFA member running conduit on the Gun #1 service area. The two niches have modern wall lights that were replaced earlier by vintage COE ceiling lights. Notice the conduit is being connected.



The photo below shows the exterior lights and two COE Standard junction boxes (left is three line and right is four line). The left junction box provides the connection for the stanchion platform lights.



The photo below shows the three new RAB (modern) lights (two ceiling, one wall) installed on Gun #1.



On 27 December 2017 the Gun #2 side received its three new lights. These lights have since been primed and painted black.



On 11 January 2018 we continued installation of exterior lights by installing the two on the front of Gun #1 platform. Below an AGFA member installs one light box.



Below another AGFA member installs the center wall light box and connects the wiring. AGFA members have made many supporting tools to assist in our work. The wire basket on the gun apron is just one and has proven a massive help when pulling wire through conduit.



In order to connect the stanchion platform lights, we had to consult with the NPS on how best to drill the cable hanger holes in the new ammunition bridges. Once the method was settled upon, we drilled the holes on 22 February 2018 (photo below).



In addition to drilling the holes, we installed cable hangers on 22 February 2018.



Additionally, a COE Standard Wall light was installed under the BC Station stairs. We had noticed that the area was very dark at night even when the light system was on. The photo below shows the light being installed.



The photo below shows the installed light in operation.



On 7 April 2018 we completed all the cable hanger installation on Gun #1 side for the stanchion lights and installed the lights on 12 April 2018. In the photo below AGFA members install the southern light.



The northern light was installed after the southern light. Below an AGFA member connects the wires to the stanchion light.



On 19 April 2018 the northern platform light for Gun #2 was installed. The photo below shows two AGFA members mounting the light on the gun platform.



This light installation was completed on 3 May 2018. In the photo below the wiring is being installed.



In the photo below an AGFA member is completing the wiring for the Gun #2 stanchion platform light. He is feeding the wires into the flexible metal PVC covered conduit.



With the installation of the three stanchion platform lights, the exterior electrical installation for Battery Gunnison/New Battery Peck is essentially complete. Only two lights remain to be installed, one wall light on the northern front side of Gun #2 emplacement and one stanchion platform light. The wall light location is completely void of an attachment surface. This light will be installed once concrete rehabilitation has been completed. The same issue impacts installation of the second platform stanchion light. All grey conduit runs will be painted black before the end September 2018.

The Battery Commander's station will be electrified once the station is enclosed in a manner where the public does not have access outside of events and demonstrations.