September 3, 2024

United States Department of the Interior
National Park Service
Denver Service Center
12795 W. Alameda Parkway
P.O. Box 25287
Denver, CO 80225-0287

ATTENTION: Susan Lehmann

Dear Susan,

REFERENCE: NPS Arc Flash Evaluation – GAAR Trip Report

On 07/24/24 through 07/25/24 Trevor Doxsee with RSA Engineering travelled to Coldfoot & Marion Creek and on 04/17/24 Patrick Collins with RSA Engineering travelled Anaktuvuk Pass to investigate the electrical systems in the buildings specified below. The intent of the site visit was to gather enough information to determine a list of code deficiencies for future correction. See one-line diagrams for further information on site electrical systems. The following report will address any code issues we discovered as part of our investigation. All power distribution systems at GAAR are single phase only, and as such no arc-flash analysis was performed.

Coldfoot Transient Housing:

The Coldfoot Ranger Station consists of a 120/240V, 125A, 1Ø Cutler-Hammer type Combination Meterbase/Disconnect (CMD) with a 125A 2-Pole disconnect fed from a pad-mounted utility transformer. This disconnect feeds the normal power side of a Manual Transfer Switch (MTS) mounted nearby. The emergency side of the MTS is fed from a twist lock plug & cord, for connection to a portable generator, assumed to have integral over current protection based on onsite personnel information. The load side of the MTS feeds what is assumed to be a 120/240V, 125A, 1Ø Siemens panelboard with main lugs due to lack of markings on the inside of the panel and installed breaker types, designated panel 'A'. On panel 'A' a 50A 2-Pole breaker feeds a 120/240V, 125A, 1Ø Siemens Outdoor Load Center series A with main lugs, designated panel 'Lean to' which is mounted on the exterior of a conex adjacent to the Coldfoot Ranger Station.

Code Deficiencies

1. All outside receptacle covers are either broken or lacking approved cover. Install extra-duty in-use receptacle covers on all outside receptacles per NEC 406.9.
2. Receptacle by sink not GFCI protected. Replace receptacle with new GFCI type per NEC 210.8(A)(7).
3. No smoke detector located in bedroom hallway. Install smoke detector per NFPA 29.8.1.1.
4. FA breaker not locked out. Lock out FACP breaker with red lock out per NFPA 106.5.4.

Coldfoot Visitor Center:

The Coldfoot Visitor Center consists of utility service equipment fed from a pad-mounted utility transformer. There are no utility markings, we are assuming it is rated 112.5KVA, 120/208V, 3Ø and are designating it transformer 'VC'. Transformer 'VC' feeds a 120/208V, 800A, 3Ø Hoffman CT cabinet where the power usage of the building is metered remotely. The CT cabinet feeds to a splice cabinet where the incoming feed has (3) taps. (2) taps each feed a 120/208V, 225A, 3Ø Square D Circuit Breaker Enclosure with a 200A 3-Pole disconnect, designated disconnect 'A' and 'B'. The

third tap feeds a 200A 3-Pole Square D fused disconnect with 50A fuses, which in turn feeds a fire pump control panel, designated 'Fire Pump Disconnect'. Disconnect 'A' feeds (2) panels both of which are 120/208V, 225A, 3Ø Square D type NQOD panelboards with main lugs, designated panels 'A Sec. 1' and 'A Sec. 2'. Panel 'A Sec. 1' subfeeds a 120/208V, 60A, 3Ø Square D type QO load center with main lugs, designated panel 'Theater', with a 50A 3-Pole breaker. Disconnect 'B' feeds to the normal power side of a 200A 3-Pole MTS designated MTS 'STBY', and there is no connection to the emergency side of the transfer switch. According to onsite personnel, an emergency back-up generator will be installed and connected to the MTS 'STBY' in the near future. The load side of MTS 'STBY' feeds to a 120/208V, 225A, 3Ø Square D type NQOD panelboard with main lugs, designated Panel 'STBY'.

Code Deficiencies

1. Smoke detector in bathroom hallway had been removed at the time of inspection. Provide new or reinstall smoke detector per NFPA 10.3.2.
2. Receptacle next to mop sink in mechanical room not GFCI protected. Replace receptacle with new GFCI type per NEC 210.8(B)(5).
3. Laundry 208V receptacle by mop sink not GFCI protected. Install 30A/2P GFCI breaker per NEC 210.8(B)(5).
4. FIRE Alarm Control Panel breaker not locked out. Lock out FACP breaker per NFPA 106.5.4.
5. No fire alarm pull stations located by exits. Install pull stations per NFPA 17.15.9.4.
6. No smoke detector above fire panel. Install smoke detector above fire panel per NFPA 10.4.5.
7. Working clearance for outside fire pump disconnect does not meet code. Recommend moving panel per NEC 110.26.
8. Liquid tight strapping for outdoor condensing units is missing required supports in spots. Install proper support per NEC 356.30.

Electrical Recommendations

1. Fire Alarm Control Panel was reading (2) trouble alarms at the time of inspection. Recommended that a licensed technician trouble shoot and repair existing fire alarm to conform with NFPA 72.
2. Emergency lighting by main entrance appears to be inadequate. Recommend further sight investigation to determine if existing emergency lighting is provided per IBC 1008.3.5.
3. Panel 'Theatre' is labeled 120/240V, whereas actual voltage supplied to bus is 120/208V. Recommended removing panel voltage label and relabeling to indicate correct voltage supplied, 120/208V.
4. Working clearance for exterior fire pump disconnect is limited. Verify that disconnect can be opened while on. If not, recommend moving to allow proper maintenance of disconnect.

<u>Anaktuvuk Pass (AKP) - Ranger Station/Residence:</u>

The Ranger Station/Residence building in Anaktuvuk Pass consists of two services. One is for the North Slope Borough's Water/Sewer service and the main building service. The Water/Sewer service feeds overhead from the 25KVA, 120/240V, 1Ø pole-mounted transformer to a meter base. The meter base then feeds to a load center with a 100A main breaker, designated 'Water/Sewer', which is a 120/240V, 125A, 1Ø Square D type QO load center with a 100A, 2-Pole breaker. The main building service is feed from the same overhead laterals spliced to a separate weatherhead to a 120/240V, 125A, 1Ø Square D CMD with a 100A 2-Pole disconnect. The disconnect subfeeds a 120/240V, 125A, 1Ø Square D type QO load center with main lugs, designated panel 'Normal' which

is protected by a surge protection device. Panel 'Normal' feeds the normal side of a 100A 2-Pole MTS with a 60A 2-Pole breaker and a 60A 3-Pole Siemens type disconnect, designated 'Windmill' disconnect. The emergency side of the MTS is fed via a 50A plug assumed to be a Hubbell twist lock flanged inlet based off a lack of visible markings and previously documented buildings. The load side of the MTS feeds a 120/240V, 125A, 1Ø Square D type QO load center with main lugs, designated panel 'EM'. The 'Windmill' disconnect is metered upstream between panel 'Normal' and it and draws its power from an out of service windmill located just outside of the Ranger Station/Residence.

Code Deficiencies

1. The refrigerator is not GFCI protection. Recommend using a GFCI breaker in place of a plug to allow for accessibility for testing.
2. Work bench installed in front of panels in the working clearance. Remove work bench.
3. Breakers for bedroom receptacles and lighting are not AFCI protected. This was not code required when originally installed.
4. 20A, 2-Pole breaker for heat tape in Panel 'EM' is not EPD type.

Electrical Recommendations

1. Smoke detectors where not installed. It appears that these are battery operated standalone type smoke detectors that are removed when the building is closed for the winter. Upgrading to a 120V interconnected system that could be turned off for the winter might make opening facility simpler.
2. Bathroom fans did not appear to be working. More investigation is required to determine exact issue.
3. Handful of lamps where out. Suggest replacement with LED replacement lamps.
4. Panel 'EM' had missing screws. Recommend providing extra screw for panel and deadfront.

AKPB – Bunk House:

The Bunk House building in Anaktuvuk Pass consists of a CMD, with no visible markings or designations, assumed to be a 120/240V, 100A, 1Ø Square D type CMD with a 100A 2-Pole disconnect, based off the interior disconnect breaker type and size, which is fed from a pole-mounted transformer nearby. This CMD feeds an interior recess-mounted panel with no visible marking or designations assumed to be a 120/240V, 100A, 1Ø Westinghouse panelboard with main lugs, designated panel 'Bunk', based off the interior breaker type and size.

Code Deficiencies

1. The refrigerator is not GFCI protection. Recommend using a GFCI breaker in place of a plug to allow for accessibility for testing.
2. Panel 'Bunk' has a bookshelf which is screwed to the wall directly in front of it, violating the working clearance of the panel. Recommend relocating bookshelf and all other objects/equipment to at least 3' away from the front of the panel.
3. Breakers for bedroom receptacles and lighting are not AFCI protected. This was not code required when originally installed.
4. No smoke detection in sleeping areas. However, it appears that these are battery operated stand alone units that haven't been installed yet for opening.

Electrical Recommendations

1. The surface-mounted exterior CMD has begun to rust and has no visible markings on the exterior or interior of panel. Recommend replacing with new similar CMD.

2. Panel 'Bunk' has no visible markings. Recommend providing visible marking to designate panel type and rating.

Marion Creek Generator Building:

The Marion Creek Generator building consists of 2 generators for redundant power. The primary standby generator is a 12 kW Stamford Generator with a 50A 2-Pole Square D type QO breaker, on standby to AutoStart when the voltage in the battery bank, see below, gets below a set voltage. The secondary standby generator is 16 kW with no manufacturer name or information, which must be manually started. The primary and secondary standby generators feed a 100A 2-Pole MTS and are terminated on the emergency and normal sides, respectively. The load side of the MTS is connected to a hybrid inverter/charger system by Schneider Electric type Xantrex XW PDP. This system consists of an inverter control panel and for redundancy, (2) inverters, which are connected to a battery bank. The inverters are then connected to a solar array through a series of disconnects and a charge controller, see the one-line 3/E1 for further details. The inverter control panel has sets of (2) 60A 2-Pole breakers used for overcurrent protection to allow for each of the following situations: The first is an option to bypass the solar array, the second to bypass the generator, and the third is to disconnect the inverter control panel from the grid of which it is feeding. Also located on the inverter control panel are (2) 250 ALM disconnects for inverters 1 & 2 from the DC system. From the hybrid inverter/charger system, power is distributed to a 120/240V, 125A, 1Ø GE PowerMark Load Center with main lugs, designated panel 'C'. Panel 'C' feeds buildings C1, (MACB – Ranger Residence (C1)), and C2, (MACH – Transient Housing (C2)), through surface-mounted splice cabinet mounted on the exterior of the generator building. Building C1 is fed off the main lugs of panel 'C' and building C2 is fed from a 60A 2-Pole breaker on the bus of panel 'C'.

Electrical Recommendations

1. Exterior receptacle has no power and no wires to energize it. Appears to be abandoned in place. Recommended to demolish receptacle and install blank weatherproof cover on junction box.
2. Generators are serviced by local maintenance per conversation with on-site personal. Recommend placing last service date on each generator.

Marion Creek Ranger Station (C1):

Building C1 consists of an exterior mounted splice cabinet fed from panel 'C', see MACB – Generator Building (Existing) above. The splice cabinet feeds a 120/240V, 125A, 1Ø Square D CMD with a 100A 2-Pole building disconnect. The building disconnect feeds a 120/240V, 125A, 1Ø Square D type QO load center with main lugs, designated panel 'Normal'. Panel 'Normal' feeds the normal side of a 60A 2-Pole Square D MTS located inside the building via a 60A 2-Pole breaker. Feeding the emergency side of the MTS is a 50A Hubbell twist lock flanged inlet located on the exterior of the building, for connection to a portable generator, assumed to have integral over current protection based on onsite personnel information. The MTS feeds a 120/240V, 125A, 1Ø Square D type QO load center with main lugs, designated panel 'EM'. Panel 'EM' feeds what appears to be, based off existing panel schedules and onsite personnel information, an old fire suppression switch and an old communications station receptacle switch. The fire suppression switch which is a 30A 2-Pole Square D safety switch is not in use any longer and is fed from a 25A 2-Pole breaker on panel 'EM'. The communications station receptacle switch is a 120/240V, 70A, 1Ø Square D type QO load center with main lugs, fed via a 20A 1-Pole breaker on panel 'EM'.

Code Deficiencies

1. All exterior receptacle covers are either broken or lacking approved weatherproof covers. Provide and install extra-duty in-use receptacle covers on all outside receptacles per NEC 406.9.

2. Receptacles in garage not GFCI protected. Replace receptacles with new GFCI type per NEC 210.8(A)(2).
3. Receptacle in bedroom has broken cover plate. Replace cover plate per NEC 406.6.
4. Receptacles in kitchen above counter not GFCI protected. Replace receptacles with new GFCI type per NEC 210.8(A)(6)
5. Fire Alarm Control Panel not labeled with branch circuit feeding it. Label FACP with correct circuit per NFPA 72 10.6.5.2.1.
6. No smoke detector above fire panel. Install smoke detector above fire panel per NFPA 10.4.5.
7. Laundry/Mechanical Room has receptacles that are not GFCI protected. Replace receptacles with new GFCI type per NEC 210.8(A)(10)

Electrical Recommendations

1. Coax in garage hanging out of J-box. Recommended to tuck coax into J-box and install blank cover.

Marion Creek Transient Housing (C2):

Building C2 consists of a surface mounted 120/240V, 125A, 1Ø Square D CMD with a 100A 2-Pole building disconnect fed from panel 'C', see MACB – Generator Building (Existing) above. From the building disconnect there are (2) subfeeds. One feed goes to a 120/240V, 70A, 1Ø Square D type QO load center with a 20A 2-Pole breaker. This Breaker is used to disconnect power to a receptacle in the Well House and was designated 'Well House Disconnect'. The other feed goes to a 120/240V, 125A, 1Ø Square D type QO load center with main lugs, designated panel 'Normal'. Panel 'Normal' feeds the utility side of a 60A 2-Pole Square D MTS located inside the building, via a 60A 2-Pole breaker. Feeding the emergency side of the MTS is a 50A Hubbell twist lock flanged inlet located on the exterior of the building, for connection to a portable generator, assumed to have integral over current protection based on onsite personnel information. The MTS feeds a 120/240V, 125A, 1Ø Square D type QO load center with main lugs, designated panel 'EM'.

Code Deficiencies

1. Well house 20A disconnect is located exterior in a NEMA 1 enclosure. Replace disconnect with NEMA 3R disconnect per NEC 110.28.
2. Flexible Metal Conduit feeding to and leaving well house disconnect is not rated for wet location use. Replace FMC with Liquid Tight per NEC 348.12.
3. Metal-Clad Cable in boiler room is not properly secured. Provide and install MC straps per NEC 330.30.
4. Laundry/Mechanical Room has receptacles that are not GFCI protected. Replace receptacles with new GFCI type per NEC 210.8(A)(10)
5. Receptacles in kitchen above counter not GFCI protected. Replace receptacles with new GFCI type per NEC 210.8(A)(6)
6. Receptacle in bedroom missing cover plate. Install cover plate per NEC 406.6.
7. No smoke detector above fire panel. Install smoke detector above fire panel per NFPA 10.4.5.
8. All outside receptacle covers are either broken or lacking approved cover. Install extra-duty in-use receptacle covers on all outside receptacles per NEC 406.9.
9. FACP no labeled with circuit feeding it. Label FACP with correct circuit per NFPA 72 10.6.5.2.1.

BTTB - 113 Visitor Center/Office:

The Bettles Visitor Center consists of a 120/240V, 200A, 1Ø Square D type Meter Main with a 100A 2-Pole disconnect and a 200A 2-Pole disconnect which takes up to (4) spaces, fed from a pad-mounted 15kVA, 120/240V, 1Ø utility transformer. The 200A disconnect feeds a fire pump control panel located in the crawl space beneath the Visitor Center. The 100A disconnect feeds the utility side of an exterior surface-mounted 120/240V, 100A, 1Ø Square D double throw enclosed switch. The emergency side of the MTS is fed by from an adjacent surface-mounted enclosure with a cord and NEMA 14-50P plug used to connect to a portable generator, assumed to have integral overcurrent protection, based on site personnel information. The MTS feeds a recess-mounted 120/240V, 400A, 1Ø Square D type NQOD panelboard with main lugs, designated panel 'A' which is remotely metered inside its enclosure. Panel 'A' in turn is connected to (2) panels, designated panels, 'Inverter Sub' and 'M'. Panel 'Inverter Sub', a surface-mounted 120/240V, 40A, 1Ø Square D type NQOD panelboard with a 40A 2-Pole MCB, is fed via a 40A 2-Pole breaker on panel 'A', and is connected via a 30A, 3-Pole Siemens type Enclosed Switch, via (3) 15A 2-Pole breakers, for disconnecting (3) solar panel Inverters, 'A', 'B', and 'C' which, in turn, are connected to solar panels mounted on the exterior of the building which provide an alternative power source for panel 'A'. Panel 'M', a surface-mounted 120/240V, 100A, 1Ø Square D type NQOD panelboard with main lugs, is fed from an 80A 2-Pole breaker on panel 'A'.

The following are issues we noted with the distribution system:

1. Conductors feeding the emergency side of the MTS are short and lie directly on top of the terminals for the utility side feed. Recommend stripping more of the cable insulation for the emergency side cable to allow for more slack in the MTS enclosure.
2. Panel 'Inverter Sub' is providing an alternative source of power to the bus of panel 'A'. Per NEC 705.10, markings on the plaque or directory of panel 'A' are required with wording as follows: "CAUTION: MULTIPLE SOURCES OF POWER." And shall be marked in accordance with 110.21 (B).

Code Deficiencies (2024)

1. Kitchennet: (1) receptacle above shelf, (1) receptacle below counter, and (1) receptacle providing power for the instant water heater 'WH-1' are within 6ft of the sink and not provided with Class A ground fault protection as required by NEC 210.8(B)(5). Provide either new 5mA GFCI type branch circuit breakers in panel or replace receptacles with new GFCI type.
2. Copy/Print Area: (2) receptacles are within 6ft of the kitchenette sink and are not provided with Class A ground fault protection as required by NEC 210.8(B)(5). Provide either new 5mA GFCI type branch circuit breakers in panel or replace receptacles with new GFCI type.
3. Battery for exit sign at front entry/exhibit door to exterior has failed. Internally illuminated exit signs shall be illuminated at all times per IBC 1013.5. Provide new battery or replace exit sign with like in kind.
4. Battery for exit sign at staff door into exhibit area has failed. Internally illuminated exit signs shall be illuminated at all times per IBC 1013.5. Provide new battery or replace exit sign with like in kind.
5. Battery for exit sign at back door to exterior area has failed. Internally illuminated exit signs shall be illuminated at all times per IBC 1013.5. Provide new battery or replace exit sign with like in kind.
6. (1) pendant fixture in exhibit area has an open outlet box. Fixture canopy needs to be reattached out outlet box per NEC 314.25.
7. A coax cable is run across the floor and tapped down before connecting to a radio on a shelf. The installation method may be in violation of OSHA 1910.22. Recommend altering installation such that the cable is not ran along walking-working surfaces.
8. Communication room and crawl space have abandoned/unterminated communication cabling. NEC 800.25 requires abandoned cables to either have accessible portions of the

cable demolished or labeled for future use. Recommend labeling all unterminated cabling as future use where sufficient slack is available for reuse, otherwise demolish cabling.

9. Building grounding electrode rod protrudes out of the ground with electrode conductor attachment exposed. NEC 250.53(G) requires that electrode rod be flush with grade or below unless the electrode conductor attachment is protected against physical damage. Either drive down rod and burry attachment or provide protective cover.
10. (1) flood light down low near the boiler room entrance is not fully secured to the outlet box as required by NEC 410.30. Secure fixture to box.

Electrical Recommendations (2024)

1. Kitchennet: Receptacle under sink for instant water heater WH-1 is installed face up. 2020 NEC has added 406.5(G)(2) to not allow receptacles under sinks to be installed face up. Recommend reorienting receptacle at earliest convenience.
2. Crawl Space: 2017 NEC added 210.8(B)(9) to include crawl spaces of non-dwelling units to require gfci protection. (1) receptacle in this space was not gfci protection. Recommend replacing receptacle with one with integral gfci protection at earliest convenience.
3. Exterior GFCI receptacle on the backside of the building has been tripped and would not reset. Recommend replacing at earliest convenience.

BTTB – Bettles Visitor Center - Adjacent:

The Bettles Visitor Center – adjacent building was not listed among building required for this survey. During site investigation the building's power systems were investigated and determined to consist of a 120/240V, 125A, 1Ø Challenger Electrical Equipment Corp. type CMD with a 125A 2-Pole building disconnect fed from a nearby pad-mounted 15kVA 120/240V, 1Ø utility transformer, see AKPB – Bettles Visitor Center above. The CMD feeds a 120/240V, 225A, 1Ø Square D type NQ panelboard with main lugs, designated panel 'Shop'.

The following are issues we noted with the distribution system:

1. If any upgrades are to be performed to the distribution system, recommend replacing the Challenger Electrical Equipment Corp. type CMD with similar CMD that has more available replacement parts.

BTTB – Employee Recreation Hall & Cache:

The Bettles Employee Rec Hall building consists of an exterior surface-mounted 120/240V, 125A, 1Ø Cuttler Hammer Series B CMD with (2) 100A 2-Pole disconnects, assumed to be fed from a nearby pad-mounted 15kVA 120/240V, 1Ø utility transformer. One of the 100A disconnects feeds a surface-mounted 120/240V, 125A, 1Ø Cuttler-Hammer type panelboard with a 30A 2-Pole MCB, designated panel 'Cache' located inside of the Cache building nearby. The other 100A disconnect feeds a surface-mounted 120/240V, 125A, 1Ø Cuttler Hammer type panelboard with main lugs, designated panel 'Rec' located directly inside the Recreation Hall building.

The following are issues we noted with the distribution system:

1. The surface-mounted exterior CMD located on the Employee Recreation Hall is mounted 7' AFG to the highest breaker position, which is above the acceptable mounting height. Recommend relocating the CMD to a height of no greater than 6'-7" AFG to the highest breaker position.
2. Panel 'Rec' has a neutral designated wire feeding the line side of its busway, and an unmarked conductor bonded to the neutral bar in the panel. Recommend using phase tape to reflect installation of conductors.
3. Panel 'Cache' has tape covering circuits 10 with a note labeled "DO NOT TURN OFF". Recommend providing lockouts for above circuit in question.

4. If the Cache is considered a garage or shop, then all receptacles are required to be GFCI protected per NEC 210.8(B) and NEC 511.12. Review building classification and alter receptacles as required.
5. Exterior receptacle at the front entry of recreation hall is missing weather proof cover required per NEC 406.9. Replace missing cover.
6. Cache has two grounding electrode rod which protrude out of the ground with electrode conductor attachment exposed. NEC 250.53(G) requires that electrode rod be flush with grade or below unless the electrode conductor attachment is protected against physical damage. Either drive down rods and burry attachments or provide protective covers.
7. Panel 'Cache' is using a solid wire to tie breakers 12 and 14 together for common trip. This is not a listed or approved method per NEC 110.3. Replace with listed handle tie.

BTTB – 108 Well House:

The Bettles 108 Well House consists of an exterior surface-mounted 120/240V, 125A, 1Ø Cuttler Hammer type CMD with a 100A 2-Pole disconnect, assumed to be fed from a nearby pad-mounted 15kVA 120/240V, 1Ø utility transformer. The CMD feeds a surface-mounted 120/240V, 125A, 1Ø Eaton type panelboard, designated panel 'Well House' with main lugs, located in the basement of the Well House.

The following are issues we noted with the distribution system:

1. Panel 'Well House' is fed from a 100A 2-Pole breaker on the CMD using wire not rated for 100A. Recommend replacing 100A 2-Pole breaker with breaker rated to protect conductors, or refeeding panel with (3) #2 AWG Cu.
2. Panel 'Well House' has a tank within 3' in front of the panel violating its working clearance space. Recommend relocating tank and all other objects/equipment to at least 3' away from the front of the panel or relocating panel to a space with 3' of clearance in front of it.

Code Deficiencies (2024)

1. Junction box for thermostat is missing cover plate required per NEC 314.28(C). Provide missing cover plate.

BTTH – House 106, 107, 109, & 110:

The Bettles houses 106, 107, 109, and 110 are all the same in construction and consist of an exterior surface-mounted 120/240V, 125A, 1Ø Cuttler-Hammer type CMD with a 100A 2-Pole disconnect, fed from a nearby pad-mounted 15kVA 120/240V, 1Ø utility transformer. The CMD feeds a recess-mounted 120/240V, 180A, 1Ø I-T-E type panelboard with main lugs, located in the boiler room of each house.

The following are issues we noted with the distribution system:

1. The surface-mounted CMD on the exterior of House 106 has been heaved off the building. Replace service lateral conduit and wire, resecure CMD to the exterior of the house and coordinate with AP&T for final connection.
2. The surface-mounted CMD on the exterior of House 107 has missing bolts for the dead-front. Recommend providing new bolts to secure dead-front to enclosure.
3. Panel 'A' in House 109 has a broken handle to the enclosure. Recommend replacing enclosure door.
4. Panel 'A' in House 109 has no ground bar and has the exterior ground bonding wire and EGCs tied to the neutral bar inside of the panel. Recommend providing new ground bar for panel and moving ground rod connection point, EGCs off the neutral bar to the new ground bar in the panel.

5. Panel ‘A” in House 110 has its EGCs landed on the neutral bar in the panel. Recommend moving EGCs to existing ground bar in panel.

Code Deficiencies (2024)

1. Typical of all houses, not all receptacles in the kitchen are GFCI protect as required per 210.8(A). Replace non-GFCI receptacles in the kitchen with integral GFCI type.
2. Typical of all houses, heat traced pipes in crawlspace are required to have caution signs or markings attached to the pipe on intervals not exceeding 20ft, NEC 427.13. Provide labeling.
3. Typical of all houses, receptacles installed in crawlspace are not GFCI protected as required per NEC 210.8(A). Replace non-GFCI receptacles in the crawlspace with integral GFCI type.
4. Typical of all houses, receptacles have become sunken into outlet box and are no longer flush with the faceplate as required by NEC 406.5(D). Install outlet spacers as required.
5. House 106 grounding electrode rod protrudes out of the ground with electrode conductor attachment exposed. NEC 250.53(G) requires that electrode rod be flush with grade or below unless the electrode conductor attachment is protected against physical damage. Either drive down rod and burry attachment or provide protective cover.
6. Smoke alarm located in the living room/dining area of House 106 has been removed, most likely due to nuisance tripping from cooking. Locations is required to have smoke alarm per IFC 907.2.10.1. Re-install smoke alarm.
7. Type NM cable is ran exposed on exterior of House 109 under canopy which is not allowed per NEC 334.10. Remove and replace with either wire in conduit or MC cable as permitted by NEC 330.
8. (1) fixture in House 109 living room was removed with the junction box left open. Either replace fixture or provide outlet cover as required per NEC 314.28(C).
9. Back door doorbell at House 109 has been removed and left with wires loose and exposed. Class 2 wiring is required to be installed per NEC article 300 which requires the wires to be protected. Either reinstall doorbell or demolish wiring completely.
10. Exterior receptacle at House 109 has a damaged weatherproof cover. Replace cover to comply with NEC 406.9.

<u>BTTH – House 105:</u>

The Bettles house 105 consists of an exterior surface-mounted 120/240V, 125A, 1Ø Square D type CMD with a 100A 2-Pole disconnect, assumed to be fed from a nearby pad-mounted 15kVA 120/240V, 1Ø utility transformer. The CMD feeds an interior recess-mounted 120/240V, 125A, 1Ø Square D type Load Center with main lugs, designated panel ‘Normal’. Panel ‘Normal’ feeds the Normal side of a 100A 2-Pole MTS via a 60A 2-Pole breaker on panel ‘Normal’. Feeding the emergency side of the MTS is a 50A Hubbell twist lock flanged inlet located on the exterior of the building, for connection to a portable generator, assumed to have integral over current protection based on onsite personnel information. The MTS feeds a recess-mounted 120/240V, 125A, 1Ø Square D type Load Center with main lugs, designated panel ‘E’. According to the Arc Flash site notes provided by NPS, there is supposed to be a 7,500W generator used to provide emergency power to BTTH – House 105, but during site investigation, no generator was found on, or near the premises.

There are no issues we noted with the distribution system.

Code Deficiencies (2024)

1. Per discussions with park personnel on site, this building is scheduled for demolition due to foundation issues. Code deficiencies are therefore not required to be corrected.

BTTH – House 104:

The Bettles house 104 consists of an exterior surface-mounted, assumed to be, 120/240V, 200A, 1Ø Square D type CMD with a 200A 2-Pole disconnect, base on disconnect size. The CMD is assumed to be fed from a nearby pad-mounted 15kVA 120/240V, 1Ø utility transformer. The CMD feeds a recess-mounted, assumed to be, 120/240V, 225A, 1Ø Square D type QO Load Center with main lugs, located inside of the house, based on size of disconnect size.

There are no issues we noted with the distribution system.

Code Deficiencies (2024)

1. Not all receptacles in the kitchen are GFCI protect as required per 210.8(A). Replace non-GFCI receptacles in the kitchen with integral GFCI type.
2. Heat traced pipes in crawlspace are required to have caution signs or markings attached to the pipe on intervals not exceeding 20ft, NEC 427.13. Provide labeling.
3. Receptacle installed in crawlspace are not GFCI protected as required per NEC 210.8(A). Replace non-GFCI receptacles in the crawlspace with integral GFCI type.
4. Receptacles are becoming sunken into outlet box and are no longer flush with the faceplate as required by NEC 406.5(D). Install outlet spacers as required.

Electrical Recommendations (2024)

1. Light fixture in boiler room is missing cover lens. Recommend replacing fixture or lens.

Image #1 – Coldfoot Ranger Station CMD

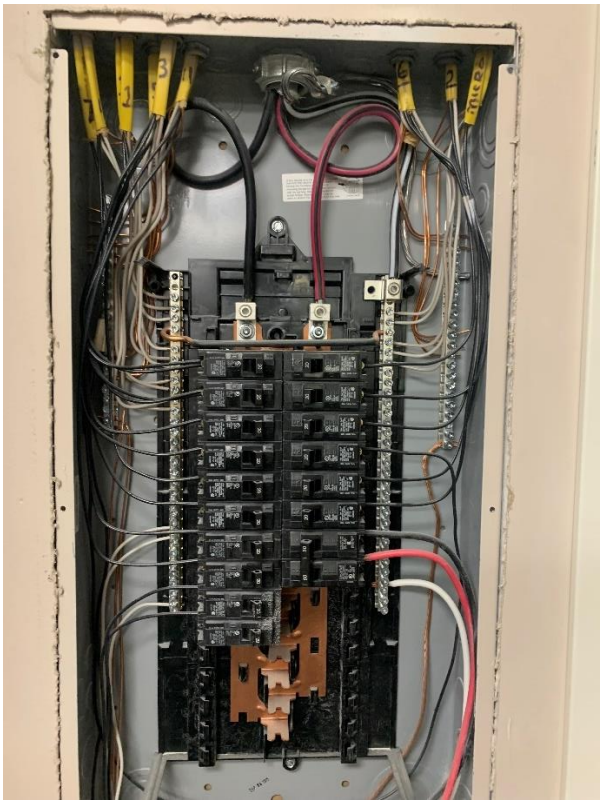

Image #2 – Coldfoot Ranger Station Panel 'A'

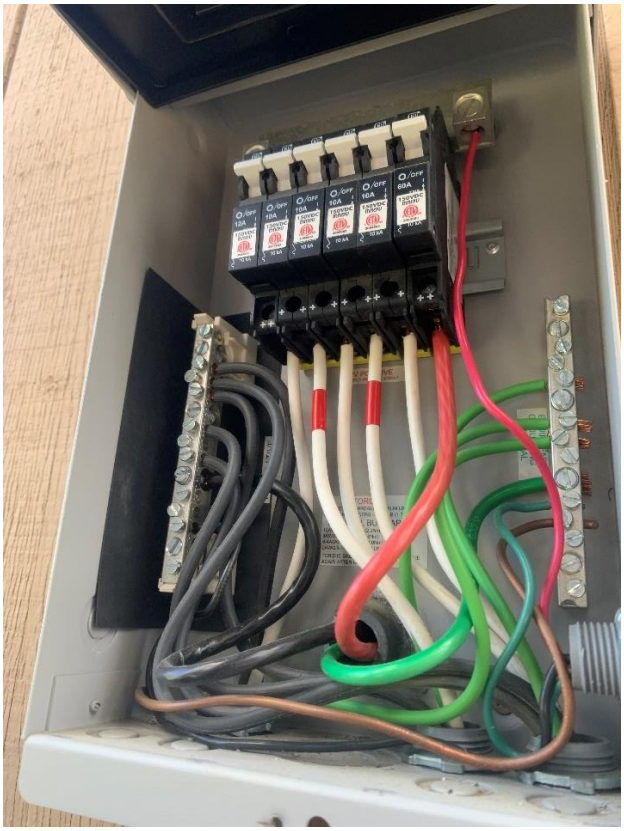

Image #3 – MACB-Gen Bldg Solar Disconnect

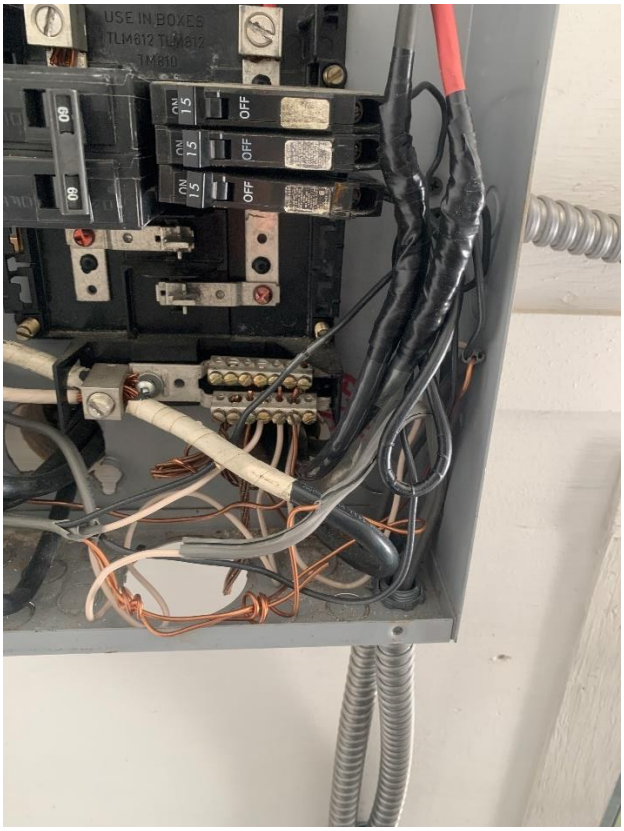

Image #4 – MACB-Gen Bldg Panel 'C'

Image #5 – MACB-Gen Bldg MTS

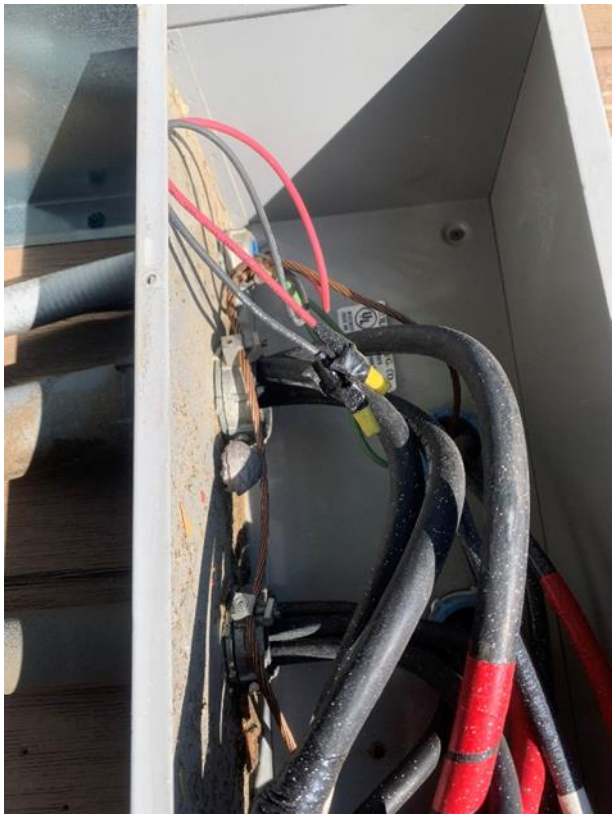

Image #6 – MACB-Gen Bldg Gutter

Image #7 – MACB-Gen Bldg Gutter Raceway

Image #8 – MACB-(C1) CMD

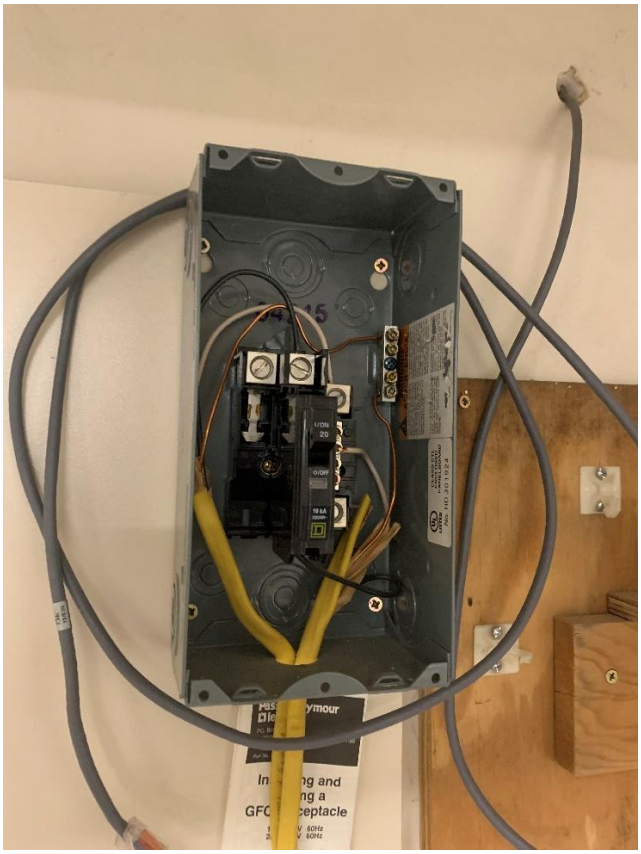

Image #9 – MACB-(C1) Com. Recp. Switch

Image #10 – MACB-(C2) Wellhouse Disc.

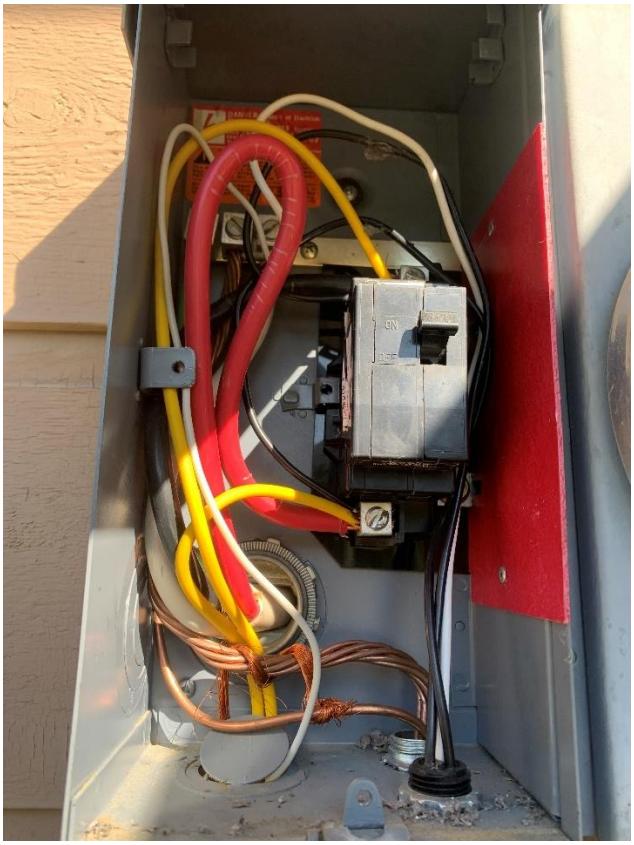

Image #11 – MACB-(C2) CMD

Image #12 – AKPB-Bunkhouse CMD

Image #13 – AKPB-Bunkhouse Panel 'Bunk'

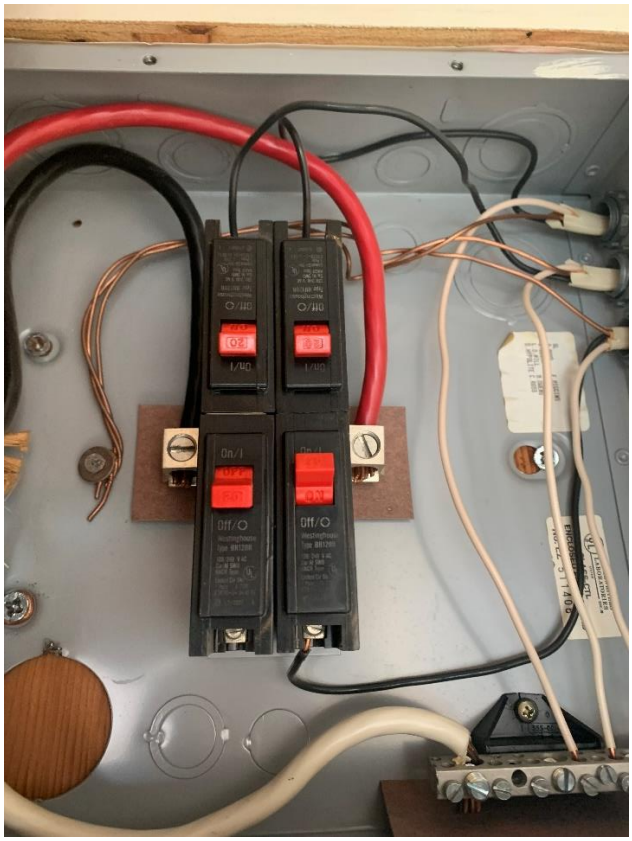

Image #14 – AKPB-Bunkhouse Panel 'Bunk' GND

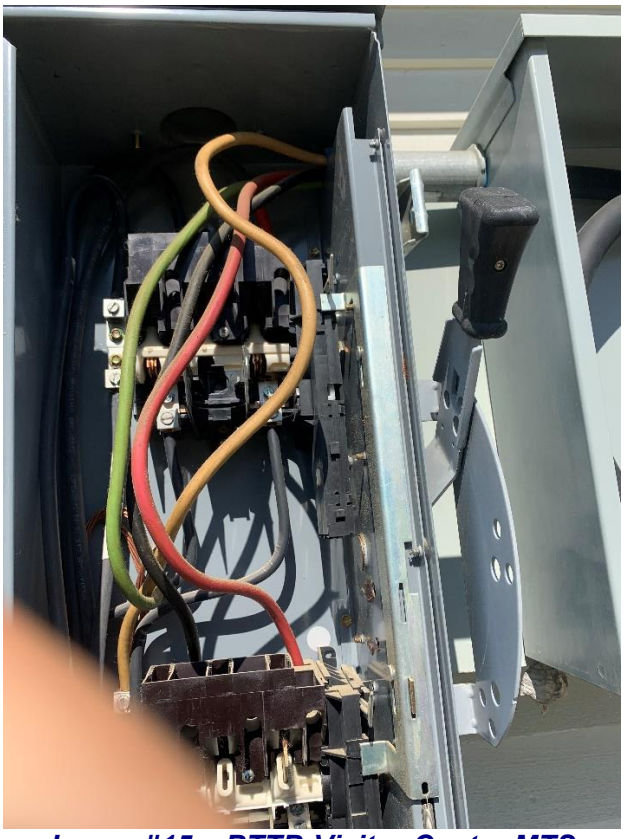

Image #15 – BTTB-Visitor Center MTS

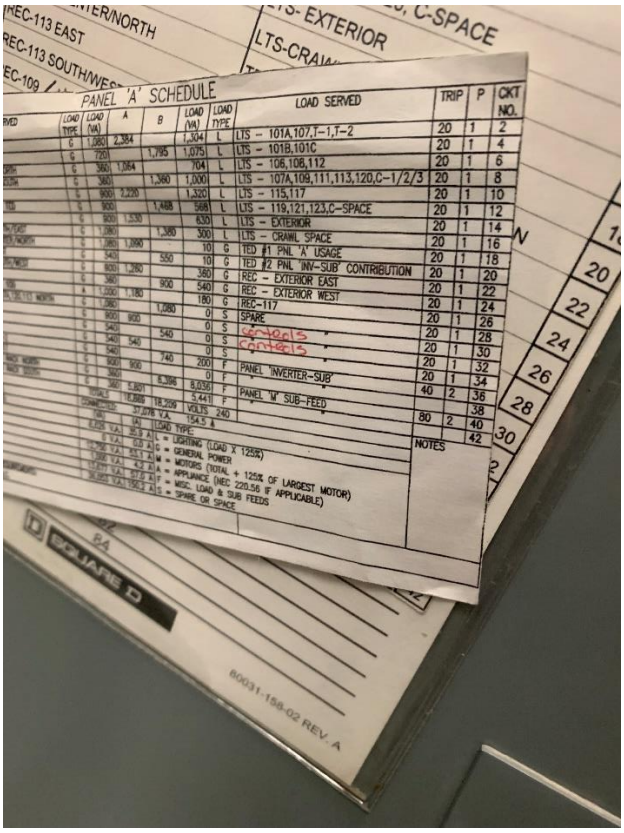

Image #16 – BTTB-Visitor Center Panel 'A'

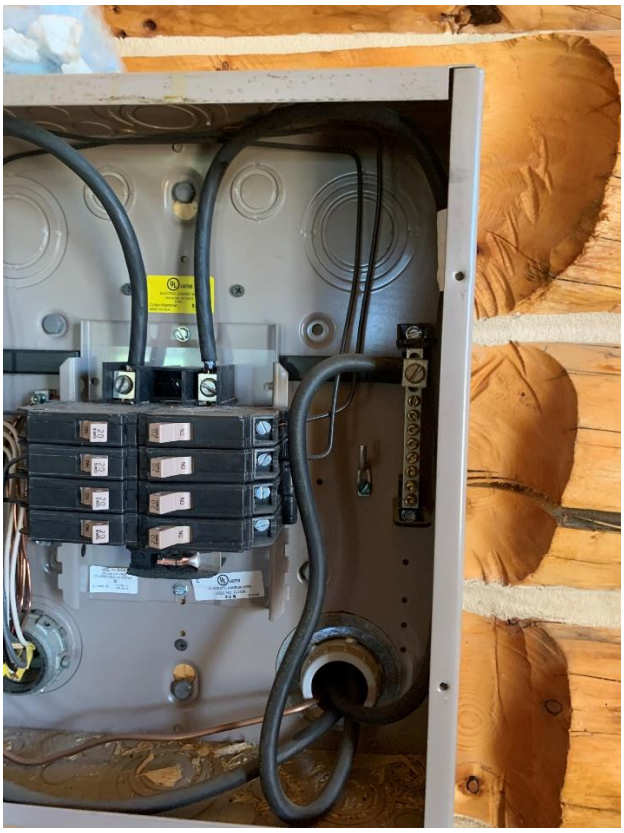

Image #17 – BTTB-Panel 'Rec'

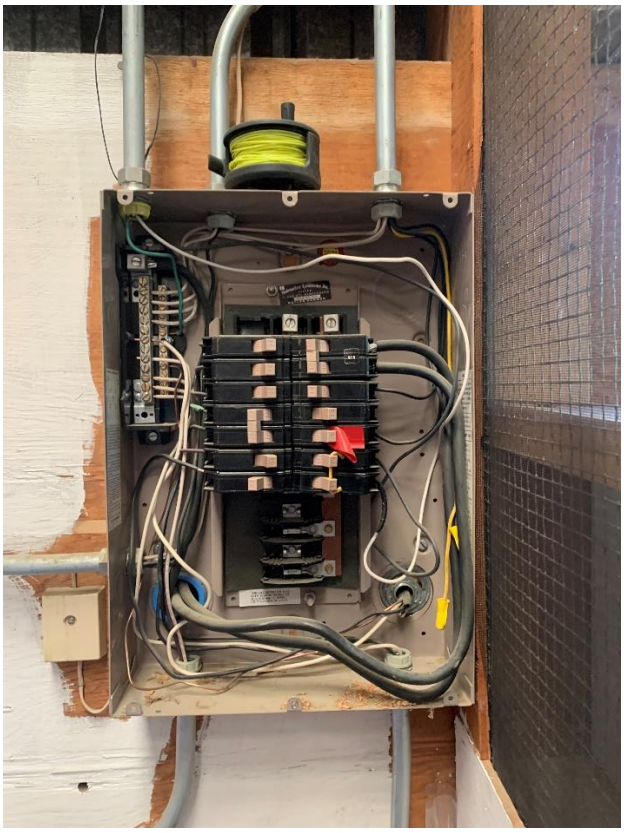

Image #18 – BTTB-Panel 'Cache'

Image #19 – BTTB-Well House CMD

Image #20 – BTTB-Panel 'Well House'

Image #21 – BTTH-House 106 CMD

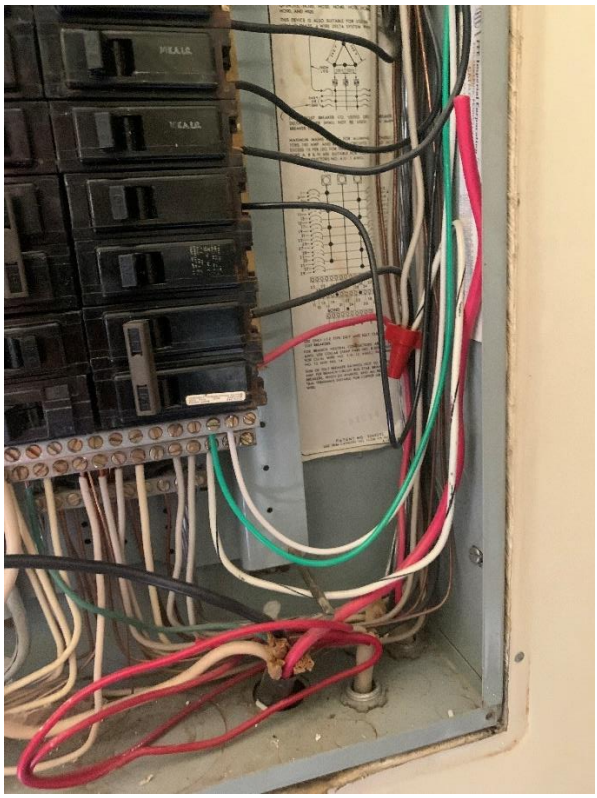

Image #22 – BTTH-House 109 Panel 'A'

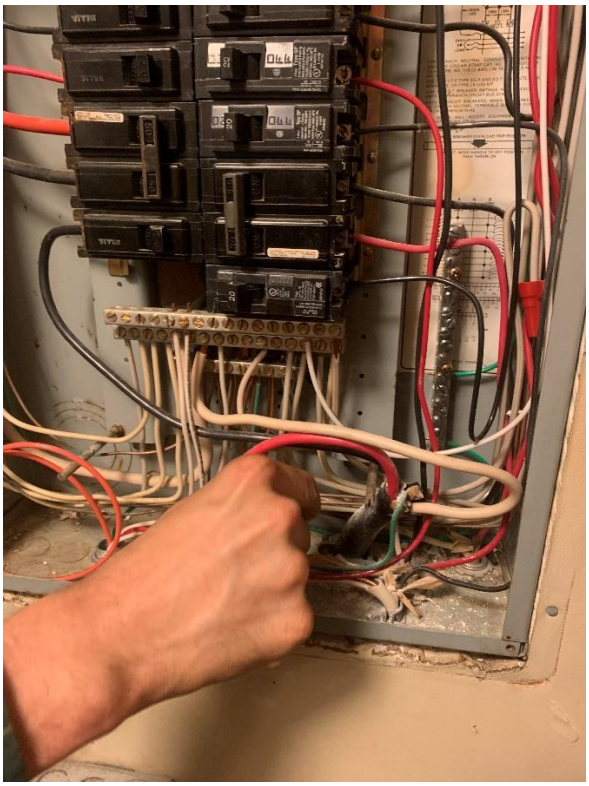

Image #23 – BTTH-House 110 Panel 'A'

If you have any questions concerning the above, please do not hesitate to call me.

Sincerely,

Patrick Collins

Patrick Collins, P.E.
Electrical Project Engineer

pcc/csz/fws/td/hhm
24-0353/M3144