

The construction photo inspection resource is used by NYSERDA's Independent Standards and Quality Assurance team to evaluate the quality of the solar electric installation. NY-Sun approved builders are encouraged to reference this document to understand what inspection items are reviewed during the construction photo inspection and view examples of how the photos should be taken.

1. Overview Photos: Home Address Verification

Guidance: Must show street number and be taken from a street view.

Inspection Items: Site address must match site address reported

Example Photos:



2. Overview Photos: South Facing Horizon

Guidance: View of Horizon facing South (or whatever direction an array is facing) taken from behind the array illustrating presence or lack of potential shading issues.

Inspection Items: Site shading must match what was reported

Example Photos:



3. General Array Photographs: Pull Back Image of Array

Guidance: Wide angle shot or multiple images with clear reference point of each array so module count can be verified.

Inspection Items: Module and array count and must match what was reported

Example Photos:



4. General Array Photographs: Module Label Documentation

Guidance: Close up module label with model label legible.

Inspection Items: Module model must match what was reported

Example Photos:



5. Array Racking Photographs: Module Racking System Documentation

Guidance: Multiple angles of racking being used. Must provide pictures of complete array and sub-arrays. Pictures should be taken just before panels are installed to show all grounding and wire management.

Inspection Items: Racking system mechanical connections must be installed to manufacturer specifications

Example Photos:



6. Array Racking Photographs: Racking Roof Mounting System Documentation

Guidance: Photos must illustrate adequate flashing and sealing of racking attachments, that no vents or pipes are obstructed, and that roof is free of damage. For flat roofs, photos must include example of how vertical posts are secured to roof.

Inspection Items:

- Roof penetrations must be sealed and flashed to prevent moisture problems

- PV module and/or racking system must not obstruct open vent pipe(s) on roof
- No visible roof damage must be present

Example Photos:



7. Array Racking Photographs: Racking End Clip Documentation

Guidance: Photos should demonstrate the end clips are properly installed.

Inspection Items: Modules must be properly secured to the end of the racking system with end clips and sufficient clearance

Example Photos:



8. Array Racking Photographs: Racking System Grounding

Guidance: Photos should show there is a continuous ground path from all rails, sub-arrays, conduits, etc. Provide documentation for any self bonding rail systems. Provide a close up shot of EGC for size verification.

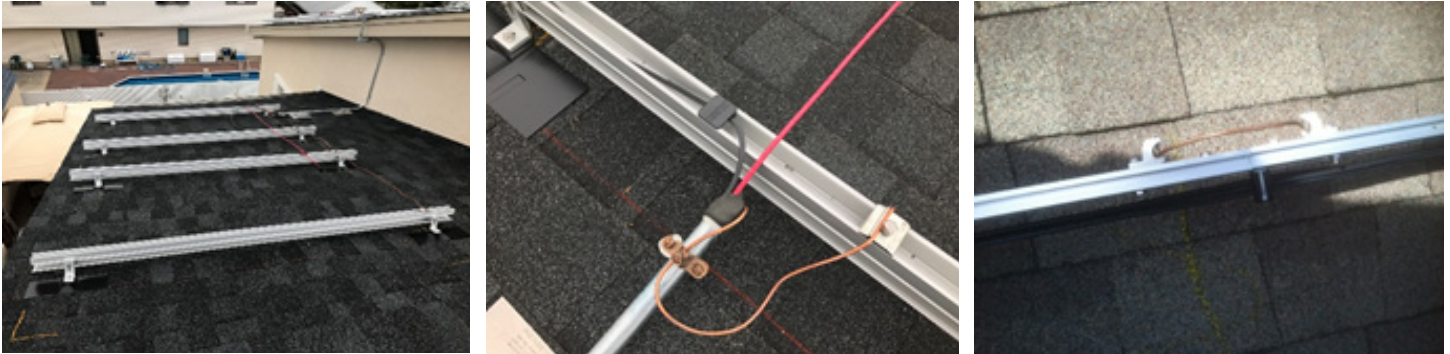
Inspection Items:

- Racking system and support structure must be grounded per manufacturer instructions

- Equipment grounding conductor must be larger than #6AWG or be protected from physical damage

- Electrical bonding means (e.g., bonding jumpers) must be present between rail sections

Example Photos:



9. Module Installation Photos: Module Grounding

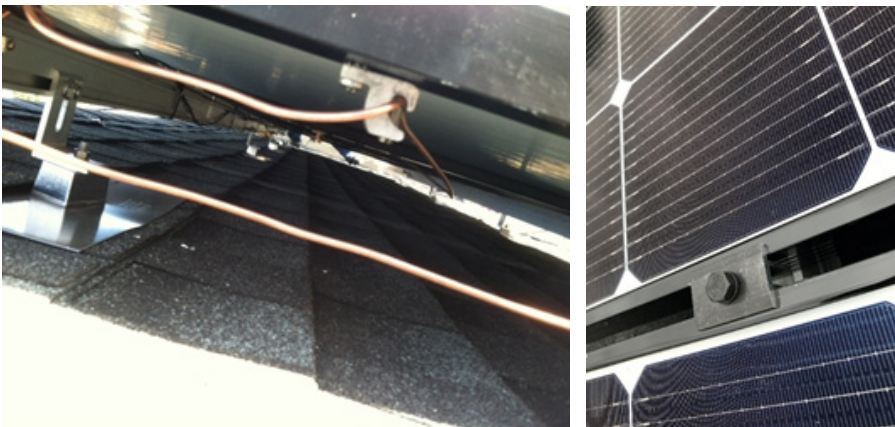
Guidance: Demonstrate the bond between the module and rails by means of approved rail components or appropriate grounding hardware at each array. Provide documentation if necessary.

Inspection Items:

- Module grounding hardware must be present

- Module grounding hardware must be properly installed to effectively ground module frames; including solid contact between grounding device and metal of the module frames, at designated grounding points

Example Photos:



10. Module Installation Photos: Wire Management of Modules (Under Array)

Guidance: Supply multiple pictures from all arrays showing proper wire management under arrays and entering conduit or junction boxes. Provide image of wire management device (clips, UV rated zip ties, etc.).

Inspection Items: • Circuit conductors cannot be in contact with the roof and supported and secured at least every 4.5' and within 12" of every termination

- Wire ties/clips must be UV and/or outdoor rated
- Conductors cannot be installed with a bend radius less than 5 times the conductor diameter

Example Photos:



11. Conductor Conduit Photos: Conductor Support and Management

Guidance: Take pictures showing all conduit is properly supported. Include photos to illustrate thermal expansion fittings and frost sleeves are used when required. Include close-ups of fittings and connectors.

Inspection Items: Thermal expansion fitting must be present on raceways to compensate for expansion and contraction

- PV circuit conduit or raceway must be properly supported and secured
- Conduit below grade must be installed with provisions for movement (e.g., frost sleeve)
- Conduit fittings and connectors must be designed and listed for use

Example Photos:



12. Conductor Conduit Photos: Conduit Roof Top Penetrations

Guidance: Include photos that illustrate any roof penetrations for conduit pass through or securing are adequately sealed.

Inspection Items: • Roof penetrations must be sealed and flashed to prevent moisture problems

- PVSC indoors in metal conduit

Example Photos:



13. Conductor Conduit Photos: Conduit Penetrations into Conditioned Space

Guidance: Include photos of conduit pass through into building to illustrate it is sealed.

Inspection Items: Conduit must have an approved internal sealant between conditioned and unconditioned spaces

Example Photos:



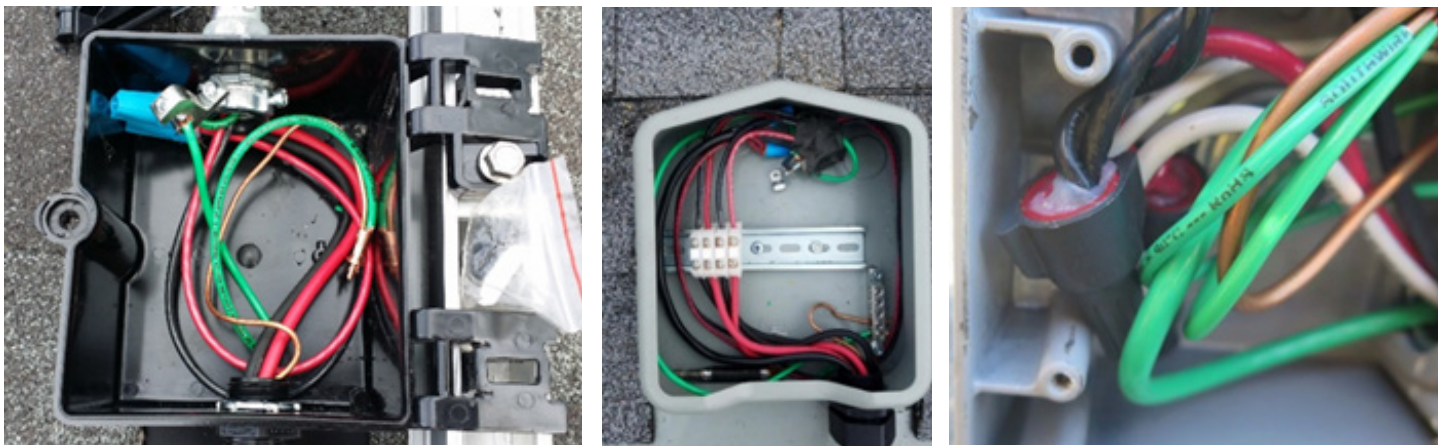
14. Junction/Combiner Box Photos: Internal Photo (cover off)

Guidance: Pictures should show proper grounding and components used for splices and transitions (i.e. terminal blocks, wire nuts etc.). Also show proper use of strain relief and submit pics of all Junction boxes on site

Inspection Items: • Electrochemically dissimilar metals cannot be in direct physical contact

- Ferrous conduit and enclosures containing the grounding electrode conductor (GEC) must be electrically continuous or appropriately bonded to GEC
- Junction Box circuit conductors must be properly sized for expected current load
- Conduit fittings and connectors must be designed and listed for their use
- Thermal expansion fittings must be installed on raceways and conduit
- Grounded conductor must be identified properly as white or gray
- Junction Box splices and connections must be secure and of high integrity
- Junction Box splice components must be rated for environment
- Grounded conductor(s) must be insulated from metal enclosure surfaces and the ground terminal
- Equipment grounding conductor must be properly identified
- Junction Box must be properly grounded

Example Photos:



15. Junction/Combiner Box Photos: External Photo (cover on)

Guidance: Pictures should show proper labels close enough to verify language, wires are secured no more than 12” from junction box and should show proper use of strain relief. Include images for all junction/combiner boxes onsite.

Inspection Items: • Junction Box must be properly guarded against accidental contact and/or physical damage and have proper working clearances

- Junction Box must be properly identified and listed
- Junction Box must be suitable for wet locations
- Junction Box must be properly secured in place

Example Photos:



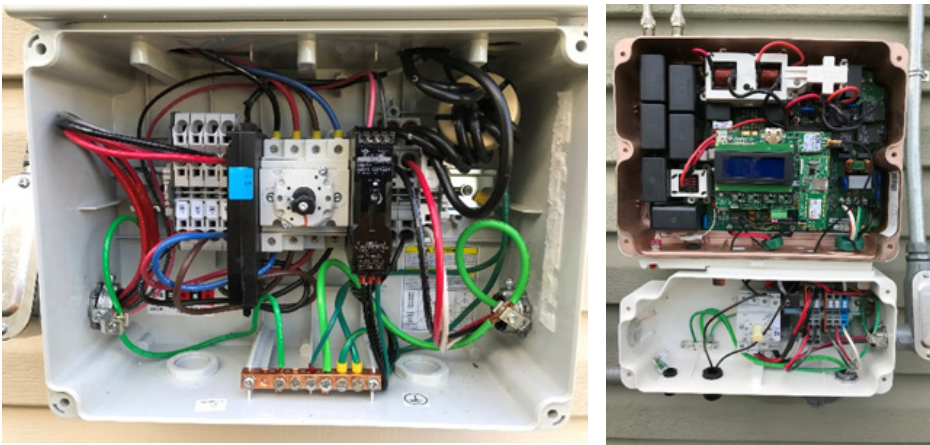
16. Inverter Photos: Internal Photo (inside view)

Guidance: Inverter showing correct wiring (AC and DC side) and grounding of inverter as well as conduits.

Inspection Items: • Electrochemically dissimilar metals cannot be in direct physical contact

- Ferrous conduit and enclosures containing the grounding electrode conductor (GEC) must be electrically continuous or appropriately bonded
- Inverter DC grounded conductors and AC grounded conductors (neutral wires) must be correctly identified
- Conduit fittings and connectors must be designed and listed for use
- Inverter PV source conductors' ampacity must meet or exceed expected current load
- Inverter PV system AC output conductors ampacity must meet or exceed expected current load
- Inverter string fuses must be 600 or 1000 VDC (if applicable)
- Inverter metal enclosure must be properly grounded
- Inverter grounding electrode conductor must be present and sufficiently sized
- Equipment grounding conductor must be properly identified

Example Photos:



17. Inverter Photos: External Photo (with lid on)

Guidance: Photos showing proper labels installed, and proper working and manufacturer clearances are provided.

Inspection Items: • Inverter detailed system information label must be present

- The completed installation appears to be neat and of good workmanship
- Inverter must be mounted in accordance with manufacturer instructions and its listing
- Inverter mounting location provides clearance required by the manufacturer
- Inverter Ground Fault warning label must be present

Example Photos:



18. Inverter Photos: Inverter Label Picture

Guidance: Close up photo clearly showing all data clearly legible

Inspection Items: • Inverter model number must match what must be submitted to Salesforce

• PV array maximum DC string voltage complies with inverter maximum input voltage rating

Example Photos:



19. Balance of System: Balance of System Wall Photos

Guidance: A pulled back shot showing all BOS equipment. Take multiple shots if necessary.

Inspection Items: • AC disconnect switch must be labeled with AC output information

• AC disconnect switch must be properly labeled as a photovoltaic system disconnect

• The completed installation appears to be neat and of good workmanship

• PV Service Disconnect must be installed in accordance with its listing and manufacturer instructions

• Installed with appropriate working clearances and guarding from accidental contact

• AC Disconnect must be in a readily accessible location

• Service Disconnects must be properly grouped

• Permanent plaque or directory must be properly installed

Example Photos:

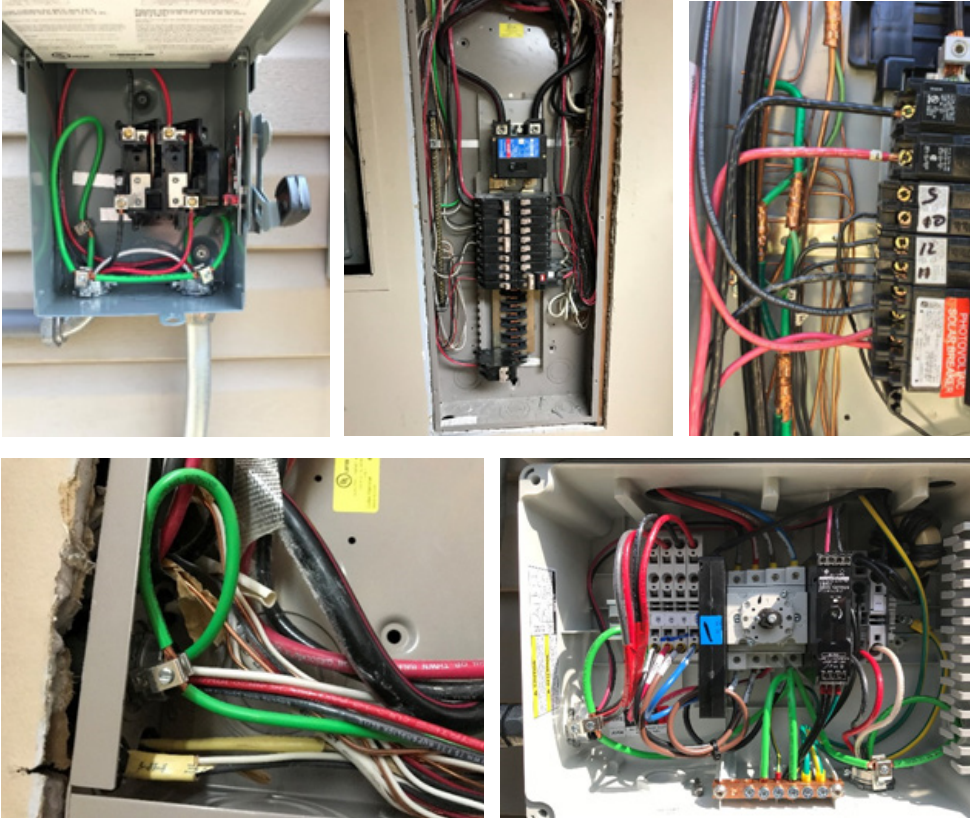


20. Balance of System: GEC Path Photos

Guidance: Sequence of photos showing the path of the GEC from the inverter(s) to the structure's GEC. Must show use of bond bushings and irreversible splices when used.

- Inspection Items:**
- Grounding electrode conductor must be present and sufficiently sized
 - Grounding electrode conductor must be properly bonded to the main premise grounding electrode system
 - Grounded conductor(s) must be bonded to the enclosure of the PV service disconnect through a listed grounding terminal or bus

Example Photos:



21. A/C Combiner: Internal Photos (cover off)

Guidance: Include photos to show correct wiring and grounding at all terminals. Include close ups of any breakers with rating visible.

Inspection Items: • Ferrous conduit and enclosures must be either electrically continuous or bonded to the grounding electrode conductor

- Enclosure must be properly grounded using a listed grounding method
- AC Combiner overcurrent protection must be sufficient
- Grounded conductor(s) must be insulated from metal enclosure surfaces and the ground terminal inside combiner box
- Grounded conductor must be properly identified
- Ungrounded conductor must be properly identified
- Equipment grounding conductor must be properly identified
- Conduit or raceway must have adequate support
- AC Combiner circuit conductors must be properly sized for expected current load
- PV backfeed breaker must be sufficiently sized to prevent nuisance tripping
- Electrochemically dissimilar metals must not be in direct physical contact, which may lead to a galvanic reaction

Example Photos:



22. A/C Combiner: External Photo

Guidance: Include photos to show all labeling and enclosure ratings, with photos provided to allow wording and value verification.

Inspection Items: • Integrated AC combiner/disconnect switch must be labeled with AC output information

- AC Combiner must be labeled to indicate presence of multiple sources
- The completed installation appears to be neat and of good workmanship
- AC Combiner must be suitable for wet locations
- AC Combiner must be properly secured in place
- AC Combiner must be installed with the appropriate clearances

Example Photos:



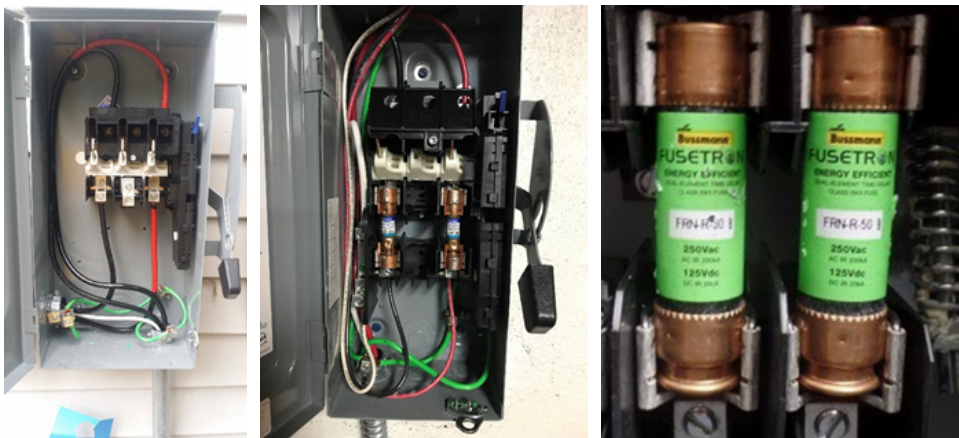
23. A/C Disconnect Photos: Interior Photo

Guidance: Show correct wiring and grounding. Make sure OCPD rating is clear and readable.

Inspection Items: • AC Disconnect must be properly rated for expected current load

- Electrochemically dissimilar metals must not be in direct physical contact
- Disconnect terminals must be properly wired
- Ferrous conduit and enclosures must be either electrically continuous or appropriately bonded to GEC
- AC Disconnect Switch must be breaking the ungrounded conductor and keep the grounded conductor properly grounded and unenergized
- Ungrounded conductor must be properly identified
- Outdoor conductor insulation type must be rated for 90C and wet conditions
- Grounded conductor(s) must be insulated from metal enclosure surface and ground terminal inside Disconnect enclosure
- Equipment grounding conductor must be properly identified
- Enclosure must be properly grounded by a listed means
- AC Disconnect must be grounded
- Equipment grounding conductor must be properly sized
- Equipment grounding conductor must be larger than #6AWG or else it must be protected from physical damage
- Grounding electrode conductor must be sufficiently sized
- Grounding electrode conductor must be continuous
- AC Disconnect must be present when required to isolate equipment for service

Example Photos:



24. A/C Disconnect Photos: Exterior Photo

Guidance: Photos should allow for factory installed listings, and field installed label wording and values to be assessed.

Inspection Items:

- AC Disconnect switch must be properly labeled as a photovoltaic system Disconnect

- AC Disconnect switch must be labeled with AC output information
- The completed installation appears to be neat and of good workmanship
- AC Disconnect must be installed with the appropriate clearances
- AC Disconnect enclosure must be suitable for wet locations

Example Photos:



25. Main Panel Tie-In Pictures: Interior of Main Service Panel

Guidance: Take both close up and pulled back shots to correct wiring, grounding, and overcurrent protection (solar and main). Include clear shots of all splices for load and line side taps. Include a back-up photo showing circuit run to illustrate interconnection point/method.

Inspection Items: • Main panel overcurrent protection must be sufficient

- PV system AC output conductors must be appropriately sized for expected current load
- Grounded conductor must be identified properly
- PV back feed breaker rating size must be properly sized to protect circuit conductors
- PV backfeed breaker must be sufficiently sized to prevent nuisance tripping
- Sum of back feed breaker(s) and main breaker must be less than or equal to 120% of busbar rating
- Inverter output connection must be properly located in main panel
- PV system AC output conductors must be appropriately sized for expected current load
- Enclosure must be properly grounded using a listed grounding method
- Equipment grounding conductor must be properly identified
- Grounding electrode conductor must be sufficiently sized
- Grounding electrode conductor must be properly bonded to the main premise's grounding electrode system
- GEC must be continuous/irreversibly spliced
- The completed installation appears to be neat and of good workmanship
- Grounded conductor(s) terminal lug must be properly installed in accordance with its listing

Example Photos:



26. Main Panel Tie-In Pictures: Busbar label

Guidance: Include a clear photo(s) of the busbar rating of the main service panel or other enclosure where PV is connected.

Inspection Items: Sum of backfeed breaker(s) and main breaker must be less than or equal to 120% of busbar rating

Example Photos:



27. Main Panel Tie-In Pictures: Exterior of Main Service Panel

Guidance: Include photos to show all labeling (manufacturer enclosure rating and field installed labels). Include photos with cover on, cover off, door open, and door closed.

Inspection Items: • PV system backfeed breaker must be properly labeled as a photovoltaic system Disconnect

- AC Disconnect switch must be labeled with AC output information
- Main panel busbar must be labeled to indicate presence of multiple sources
- PV backfeed breaker(s) must be correctly labeled
- Permanent plaque or directory must be properly installed
- The completed installation appears to be neat and of good workmanship
- Main Panel must be properly secured in place
- Main Panel must be installed with the appropriate clearances

Example Photos:



28. If Applicable Photos: Pole Mounted Systems Photo

Inspection Items: • All array conductors must be properly connected

- Thermal expansion fittings must be installed on raceways
 - Conduit below grade must be installed with provisions for movement
 - PV source and output circuits operating in readily accessible locations must be installed in a raceway
 - Racking system and support structure must be properly grounded per manufacturer instructions
 - The completed installation appears to be neat and of good workmanship
 - Ground/pole mount support structure, anchor system, and or footings must be installed and used according to manufacturer instructions
 - Outdoor wire ties/clips must be UV and outdoor rated
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30. If Applicable Photos: Metal Roof Grounding

Inspection Items: Metal roof beneath PV Array must be properly grounded

31. If Applicable Photos: Battery Back-Up Photos

Inspection Items: • Quantity of batteries present must match report quality to Salesforce

- Model of batteries must match model reported to Salesforce
 - Working clearance maintained above and around battery bank
 - Batteries must be properly ventilated
 - Battery backup system voltage must be limited to 50VDC nominal
 - Battery DC conductors must be protected from accidental contact
 - Battery DC conductors must be properly sized for expected current load
 - Battery DC conductor type complies code requirements
 - Electrical equipment in all adjacent circuits must be protected from battery bank short circuit current
 - Conduit fittings and connectors must be designed and listed for this use
 - DC Disconnect must be present for ungrounded conductors of battery banks over 30V
 - Batteries must be installed on non-conductive supports
 - Grounded conductor must be properly identified
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32. Overall Observation: Program

Inspection Items: Existing Panelboard does not meet Program Compliance
