

3.3 Structural Analysis

Yes/No	Structural Analysis
	Structural analysis prepared and stamped by a New York State licensed professional engineer or registered architect, who incorporated the following into their review.
	<ul style="list-style-type: none"> • Weight of the existing roofing (composition shingle, metal, masonry, etc.). • Number of layers of roof covering. • Method of waterproofing penetrations (flashing is required by the 2015 International Residential Code and International Building Code). • Type of racking system (engineered product) and height of solar PV modules from surface of roof. • Location-specific wind load and snow load. • Type, dimensions, and spacing of roof structural framing. • Calculations must be provided if any of the following apply: <ul style="list-style-type: none"> - Roofing is not lightweight, or roof has multiple layers of covering. - Racking system is not engineered for mounting of solar PV modules. - Modules will be mounted more than 18 inches above roof surface. - Modifications must be made to framing to strengthen roof structure. - Solar electric system and racking will add more than 5 pounds per square foot to dead load, or more than 45 pounds per attachment point, calculated as follows: <ul style="list-style-type: none"> • Total weight of solar PV modules, racking, and mounting hardware _____pounds. • Total number of attachment points to roof _____. • Weight per attachment point (A ÷ B) _____pounds. • Total area of solar PV array _____square feet. • Distributed weight of solar PV array on roof (A ÷ D) _____pounds/square foot.

4 Field Inspection Checklist

The Field Inspection Checklist in this chapter can be used directly by the AHJ or provided to a third-party inspection agency, where applicable. The checklist is intended to highlight key system characteristics and common installation errors. Completing the checklist should take approximately 20 minutes per field inspection. Not all sections may apply to a given installation.

A “rough inspection” (which occurs when all boxes and wires are installed to the point when walls or trenches are ready to be closed) is **not** necessary on most small residential installations with existing construction.

When a field inspection is necessary, inspectors should consider bringing the following items:

- Ladder with non-conductive sides.
- Binoculars for surveying inaccessible roof-mounted equipment.
- Screwdriver for opening enclosures.
- A copy of the contractor’s submitted design.

Code enforcement officers should consider asking solar PV contractors for a set of construction photos. Contractors typically document their installation progress with photos, which are sometimes required by their internal quality assurance team or financing partners. NY-Sun also requires construction photos from participating contractors. Code enforcement officers can use such photos to review hard-to-access parts of the installation (such as roof-mounted racking).

References to construction and equipment photos in Chapter 5 are included in the following checklist, where applicable.

4.1 Array (All photos are located in Appendix C)

1. Circuit conductors are properly supported and are not touching the roof surface [NEC 338.10(B)(4) and NEC 334.30] (Photo 10)	N	Y	N/A
2. Circuit conductors are same conductor type/size as on plan set	N	Y	N/A
3. Module count matches plan set. If no, investigate stringing configuration (Photo 3)	N	Y	N/A
4. Module manufacturer/model matches plan set (Photo 4)	N	Y	N/A
5. Modules are effectively grounded using lugs, WEEBs, or a racking integrated grounding method [NEC 690.43] (Photo 9)	N	Y	N/A
6. Modules and racking are properly secured (Photos 5, 6, 7)	N	Y	N/A
7. DC optimizers are properly grounded [NEC 690.43 and NEC 110.3(B)]	N	Y	N/A
8. Wire ties are UV-rated (generally black) (Photo 10)	N	Y	N/A
9. All electrical connections are secured to ensure no arcing	N	Y	N/A
10. Racking system is properly grounded (EGC bonding the rails, [NEC 690.43]) (Photo 8)	N	Y	N/A
11. Conductors are properly identified (ungrounded, grounded, grounding) [NEC 200.7, NEC 200.6, NEC 250.119] (Photo 13)	N	Y	N/A
12. Outdoor components are UL-listed for the environment [NEC 110.3(B)]	N	Y	N/A
13. Roof vents are not covered by the modules (2015 IRC/2015IBC) (Photo 3)	N	Y	N/A
14. DC conduit is labeled "WARNING: PHOTOVOLTAIC POWER SOURCE" every 10 feet, and is reflective, and meets color and size requirements [NEC 690.31(G)(3) and (4)]	N	Y	N/A

4.2 DC Optimizer (All photos are located in Appendix C)

1. DC Optimizer chassis is properly grounded per manufacturer's instructions [NEC 690.43, NEC 250 NEC 110.3(B)]	N	Y	N/A
2. EGC is protected if smaller than #6AWG [NEC 690.46 and NEC 250.120] (Photo 9)	N	Y	N/A
3. DC Optimizer GEC is sufficiently sized per manufacturer instructions [NEC 690.47(C), NEC 250.66, NEC 250.122, NEC 250.166]	N	Y	N/A
4. Rapid Shutdown label is present and meets the requirements of NEC 690.56(C).	N	Y	N/A
5. DC Output circuit conductor insulation type is rated for environment (Shall not be type: USE-2, THWN-2, RHW-2) [NEC 310.10]	N	Y	N/A

Note 1: Many violations from the "Array" section also apply to the "DC Optimizer" section.

Note 2: DC optimizer can have an integrated ground, or not. Bring the specifications sheet to the inspection for quick reference.

4.3 Structural (Roof-Mounted Only) (All photos are located in Appendix C)

1. All roof penetrations are properly flashed and sealed 2015 IRC/ 2015 IBC (Photos 6, 12)	N	Y	N/A
2. Rafter spacing/material matches construction documents	N	Y	N/A
3. Roof appears to be in good condition, with no signs of leaking or damage; Roof is free of debris (Photo 3)	N	Y	N/A
4. All racking splices are properly supported per manufacturer requirements (generally splices must be supported on both sides of the joint by a structural attachment)	N	Y	N/A
5. Modules cannot be moved by pushing or pulling with one hand (Photo 7)	N	Y	N/A

4.4 Junction Box (All photos are located in Appendix C)

1. Wire nuts and splices are suitable for the environment [NEC 110.3(B), NEC 110.14, NEC 110.28] (Photo 13)	N	Y	N/A
2. Junction box is UL listed for the environment [NEC 110.3(B)] (Photo 14)	N	Y	N/A
3. Junction box is properly grounded [NEC 690.43(A), NEC 250.4, NEC 110.3(B)]	N	Y	N/A
4. Grounding equipment is properly installed (NEC 690.43, NEC 250.8, NEC 250.12) (Photo 13)	N	Y	N/A

4.5 Inverter (All photos are located in Appendix C)

1. The number of strings match the plan set (Photo 18)	N	Y	N/A
2. The conductors have sufficient ampacity for each string	N	Y	N/A
3. DC conductors in metal when on or inside a building [NEC 690.31(G)] (Photos 11, 12)	N	Y	N/A
5. Conduit penetrations are properly sealed between conditioned and unconditioned space [NEC 300.7(A)]	N	Y	N/A
6. Conduit is properly supported e.g., [LFMC NEC 350.30, EMT NEC 358.30, PVC NEC 352.30] (Photo 15)	N	Y	N/A
7. Conduit is not being used as conductor support [NEC 300.11(B)] (Photo 15)	N	Y	N/A
8. The enclosure is properly grounded [NEC 690.43, NEC 250.8, NEC 250.12] (Photo 16)	N	Y	N/A
9. Grounding equipment is properly installed [NEC 690.43, NEC 250.8, NEC 250.12] (Photos 16, 19)	N	Y	N/A
10. Enclosure is labeled as a PV disconnect [NEC 690.13(B)]	N	Y	N/A
11. DC characteristics label is present [NEC 690.53]	N	Y	N/A
12. The ungrounded DC conductors are properly identified (shall not be white, gray, or white striped) [NEC 200.7(A)] (Photo 16)	N	Y	N/A
13. Max string voltage below inverter max [NEC 110.3(B) and NEC 690.7]	N	Y	N/A
14. Inverter string fuses are rated for use in application [NEC 690.9]	N	Y	N/A
15. DC and AC disconnecting means are located within sight of or in each inverter [NEC 690.15 (A)] (Photos 15, 18)	N	Y	N/A
16. AFCI protection is present and enabled [NEC 690.11]	N	Y	N/A
17. System is equipped with Rapid Shutdown [NEC 690. 12]	N	Y	N/A
18. System is marked with a permanent label with the following wording: "PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN" [NEC 690.56(C)]	N	Y	N/A

4.6 Microinverter (All photos are located in Appendix C)

1. Microinverter chassis is properly grounded per manufacturer's instructions [NEC 690.43(A), 250.4, 110.3(B)]	N	Y	N/A
2. EGC is protected if smaller than #6 AWG [NEC 690.46 and 250.120(C)] (Photo 5)	N	Y	N/A
3. Microinverter GEC is sufficiently sized per manufacturer instructions [NEC 690.47(C), NEC 250.66, NEC 250.122, NEC 250.166]	N	Y	N/A
4. Rapid Shutdown label is present and meets the requirements of [NEC 690.56(C)]	N	Y	N/A

Note 1: Many items from the "Array" section also apply to the "Microinverter" section.

Note 2: Microinverters can have an integrated ground, or not. This information is found on the specification sheet.

Note 3: As long as the microinverters are listed, they are inherently equipped with rapid shutdown, which is required by NEC Article 690.12. This does not negate the label requirement in 690.56(C).

4.7 AC Combiner (All photos are located in Appendix C)

1. The number of branch circuits match the plan set. (Photo 20)	N	Y	N/A
2. The conductors have sufficient ampacity for each branch circuit.	N	Y	N/A
3. The Overcurrent Protective Device (OCPD) for the conductors have a rating sufficient to protect them [NEC 240.4] (Photo 20)	N	Y	N/A
5. Conduit penetrations are properly sealed between conditioned and unconditioned space [NEC 300.7(A)]	N	Y	N/A
6. Conduit is properly supported e.g., [LFMC NEC 350.30, EMT NEC 358.30, PVC NEC 352.30] (Photo 15)	N	Y	N/A
7. Conduit is not being used as conductor support [NEC 300.11(B)] (Photo 15)	N	Y	N/A
8. The enclosure is properly grounded [NEC 690.43, NEC 250.8, NEC 250.12] (Photo 20)	N	Y	N/A
9. Grounding equipment is properly installed [NEC 690.43, NEC 250.8, NEC 250.12] (Photo 20)	N	Y	N/A
10. Enclosure is labeled as a disconnect [NEC 690.13]	N	Y	N/A
11. AC characteristics label is present (voltage and amperage), [NEC 690.54]	N	Y	N/A
12. "Multiple Sources" indication label is present [NEC 705.12(D)(3)]	N	Y	N/A
13. The sum of all overcurrent devices (excluding main) do not exceed the rating of the buss bar [NEC 705.12(D)(2)(3)(c)]	N	Y	N/A
14. The enclosure is labeled "Do Not Add Loads" [NEC 705.12(D)(2)(3)(c)]	N	Y	N/A
15. The main breaker is fastened in place [NEC 408.36(D)]	N	Y	N/A
16. Grounded conductors are isolated from enclosure [NEC 250.24(A)(5)] (Photo 20)	N	Y	N/A

4.8 Load-Side Connection (All photos are located in Appendix C)

1. Circuit conductors have sufficient ampacity [NEC 690.8, 310.15]	N	Y	N/A
2. The OCPD is sufficient to protect the circuit conductors [NEC 240.4]	N	Y	N/A
3. Grounded conductors properly identified [NEC 200.6(A)&(B)]	N	Y	N/A
4. The GEC is present and sufficiently sized [NEC 690.47(C), NEC 250.66, NEC 250.122, NEC 250.166]	N	Y	N/A
5. The GEC is continuous (or irreversibly spliced) [NEC 250.64(C), 690.47(C)]	N	Y	N/A
6. Ferrous conduit and the enclosure are appropriately bonded to the GEC [NEC 250.64(E), NEC 250.4(A)(5)]	N	Y	N/A
7. PV breakers are properly identified [NEC 408.4(A)] (Photo 23)	N	Y	N/A
8. AC characteristics label is present and suitable for the environment (voltage and amperage) [NEC 690.54, NEC 110.21]	N	Y	N/A
9. Dissimilar metals are separated and will not cause a galvanic reaction [(NEC 110.14, RMC NEC 344.14, EMT NEC 358.12(6))]	N	Y	N/A
10. Inverter directory present [NEC 690.15(A) and NEC 705.10]	N	Y	N/A
11. Backfed breaker sized to protect circuits [NEC 690.8(B)(1) and/or NEC 310.15]	N	Y	N/A
12. Source breakers follow 120% rule [NEC 705.12(D)(2)(3)(b)]	N	Y	N/A
13. Backfed breaker properly located in panel [NEC 705.12(D)(2)(3)(b)] (Photo 23)	N	Y	N/A
14. Clearances maintained/live parts secured [NEC 110.27(A) and NEC 110.26] (Photo 18)	N	Y	N/A

4.9 Supply Side Connection (All photos are located in Appendix C)

1. Disconnect is service-rated and has a current rating of at least 60 Amp [NEC 230.79(D)] (Photo 22)	N	Y	N/A
2. Circuit conductors have sufficient ampacity [NEC 690.8, NEC 310.15]	N	Y	N/A
3. New service entrance conductors are less than 10 feet [NEC 705.31] (Photo 18)	N	Y	N/A
4. The OCPD is sufficient to protect the circuit conductors [NEC 240.4] (Photo 21)	N	Y	N/A
5. The disconnect utility conductors are on LINE terminals [NEC 110.3(B), NEC 240.40(if fusible)]	N	Y	N/A
6. There is no OCPD in the grounded conductor [NEC 230.90(B)] (Photo 21)	N	Y	N/A
7. The AIC rating on the OCPD meets, or exceeds the rating of other main OCPD on the premises [NEC 110.9, NEC 110.10]	N	Y	N/A
8. The neutral is bonded to the PV disconnect enclosure/GEC [NEC 250.24(C)]	N	Y	N/A
9. The GEC is present and sufficiently sized [NEC 690.47(C), NEC 250.66, NEC 250.122, NEC 250.166] (Photo 24)	N	Y	N/A
10. The GEC is continuous (or irreversibly spliced) [NEC 250.64(C), NEC 690.47(C)]	N	Y	N/A
11. Ferrous conduit and the enclosure are appropriately bonded to the GEC [NEC 250.64(E), NEC 250.4(A)(5)] (Photo 24)	N	Y	N/A
12. AC characteristics label is present and suitable for the environment (voltage and amperage) [NEC 690.54, NEC 110.21]	N	Y	N/A
13. Power source directory is present, denoting all locations of power sources and disconnects on premises, at each service equipment location [NEC 110.21, NEC 690.56, NEC 705.10]	N	Y	N/A
14. AC disconnect label is present and suitable for the environment (NEC 690.13(B), NEC 110.21]	N	Y	N/A
15. Dissimilar metals are separated and will not cause a galvanic reaction [NEC 110.14, RMC NEC 344.14, EMT NEC 358.12(6)]	N	Y	N/A

4.10 General

1. Work is done in a neat and workmanlike manner [NEC 110.12] (Photos 5, 10, 13, 28)	N	Y	N/A
2. Working clearances are observed per NEC 110.26 (Photo 18)	N	Y	N/A