

SUBMITTAL CHECKLIST AND STANDARDS

### Submittal Checklist

Applicant	Description
	PV Array Configuration
	Grounding
	Wire Management
	Conductors
	Rapid Shutdown of PV Systems on Buildings
	Charge Controllers
	Disconnects
	Inverters
	Batteries

### Submittal Standards

- ◆ All plans must be submitted in PDF format.
- ◆ All plans must be submitted in a landscape orientation (horizontal position).
- ◆ All plans must have a space reserved in the upper left corner for City Approval stamps.
- ◆ Resubmittals must use the EXACT same file name as the original.
- ◆ All plans must be drawn to scale and each sheet should state the scale.
- ◆ Plans must be submitted individually using separate file names.
- ◆ Calculations, reports and other supporting documents (non-drawing files) must be submitted as searchable PDF files.

### Submittal File Naming Requirements

File Naming Standards allow for easy identification of drawings by naming convention.

- ◆ Files must be print ready, i.e. setup properly for printing with title block, no data outside the print page area, etc.
- ◆ Drawing file name must include the first characters of the discipline name, followed by the sheet number and name.
- ◆ The sheet name must clearly indicate the information found on the page.

## File Naming Examples for Solar Projects

Discipline	Sheet ID	Sheet #	Example File Names
Site Plan/Cover	NA	NA	Cover Sheet
Elevations	NA	NA	Elevations
Bracing Details	NA	NA	Bracing Details

## City of Meridian Solar Photovoltaic Installation Checklist

The City of Meridian requires an electrical plan review for all photovoltaic installations. Once the plan review process is complete, installation can be commenced and necessary inspections conducted. All work shall be in accordance with the current adopted version of the National Electrical Code.

### Section 1: PV Array Configuration

- Module manufacturer specification sheets and installation manuals provided.
- PV modules are listed. *110.3 (B); 690.4 (B)*
- AC modules are listed to UL 1703 and UL 1741.
- Residential one- and two-family dwellings limited to maximum PV system voltage of 600 volts. *690.7 (C)*
- One-line diagram depicting location of equipment, voltage and current ratings, wire size, disconnect ratings, overcurrent protection ratings. Other information required in sections 2-

### Section 2: Grounding

- A complete grounding electrode system is installed. *690.47 (A) and (B)*
- Modules are grounded in accordance with manufacture's installation instructions using the supplies hardware of listed equipment specified in the instructions and identified for the environment, and using the grounding point identified on the module and in the manufacture's instructions. *690.43*
- Properly sized equipment grounding conductor is routed with the circuit conductors. *690.45; 250.134 (B); 300.0 (B)*
- AC and DC grounding electrode conductors are properly connected. Separate electrodes, if used, are bonded together. *690.47; 250.50; 250.58*
- Bonding fittings are used on concentric/eccentric knockouts with metal conduits for circuits over 250 volts. *250.97 see exceptions 1-4*
- Bonding fittings are used for ferrous metal conduits enclosing grounding electrode conductors. *250.64*

### Section 3: Wire Management

- Wires are secured by staples, cable ties, straps, hangers or similar fittings in accordance with NEC.
- Wires are secured within 12" of each box, cabinet, conduit body or other termination. *334.30; 338.12 (A)(3)*
- Cable or flexible wiring methods closely follow the building surface or be protected from physical damage. *690.31 (G)*

### Section 4: Conductors

- Conductors are listed and labeled for the location. *690.31*
- Conductor insulation is rated at 90C to allow for operation at 70C+ near modules. *310.15*
- Grounded conductor is identified white or grey. *200.6*
- Open conductors are secured and protected *334.30*
- Conductors are not in contact with the roof surface. *334.30*
- DC conductor inside a building are in a metal raceway or MC cable that complies with *250.118 (10)*, or metal enclosures. *690.31 (G)*
- Where conductors of different systems are installed in the same raceway they must be identified by system. *200.6(D); 210.5 (C)*
- Underground conductors' must be buried in accordance with table *300.5*.
- DC source circuit conductors are rated  $1.25 \times 1.25 = 156\%$  short-circuit current from modules. **(NOTE: The module ISC x number of combined strings, if strings are combined. When DC source circuits (strings) are connected in parallel the short circuit current multiplies and PV output conductors from combined strings need to be sized appropriately.)** *690.8 (A)(1) and (B)(1)*

#### Section 4: Conductors continued...

- When PV system conductors are more than 5' in length inside a building, or more than 10' from an array a listed Rapid shutdown system shall be installed. 690.12

#### Section 5: Overcurrent Protection

- Overcurrent devices in the DC circuits are listed for DC operation. 690.9 (C)
- DC source circuit overcurrent protective devices are rated  $1.25 \times 1.25 = 156\%$  short-circuit current from modules. NOTE: The module ISC x number of combined strings, if strings are combined. When DC source circuits (strings) are connected in parallel the short circuit current multiplies and DC overcurrent protective devices need to be sized appropriately. 690.8 (A)(1) and (B)(1)
- Inverter output circuit overcurrent protection shall be sized in accordance with article 240. 690 (A) and (B)
- The source interconnection of one or more inverters installed in one system shall be made at a dedicated circuit breaker or fusible disconnect. 705.12 (D) (1) (NOTE: **No Twins are connection to "twin breakers" allowed**)
- The sum of 125% of the inverter output circuit and the rating of the overcurrent protective device protecting the busbar shall not exceed 120% of the ampacity of the busbar. 705.12 (D)(2)(3)(b)

#### Section 6: Rapid Shutdown of PV Systems on Buildings

- Rapid shutdown provided in accordance with 690.12.

#### Section 7: Charge Controllers

- Charge controllers intended for use in PV power systems shall be listed for the PV application. 690.4 (B)
- Diversion charge controllers that are used as the sole means of regulating the charging of batteries shall be equipped with a second independent means to prevent overcharging of the batteries. 690.72 (B)(1)

#### Section 8: Disconnects

- Disconnects used in DC circuits are listed for DC operation. 110.3
- Disconnects are installed for the PV equipment. (NOTE: For inverters and other equipment that are energized from more than one source, the disconnecting means must be grouped and identified.)
- Rapid shutdown of PV systems on building. AC microinverters, DC-DC converters and other equipment must be listed 690.12 compliant.

#### Section 9: Inverters

- Grid-Tied system inverters need to be identified for use in interactive power systems. 690.4 (B)
- Point of connection is at a dedicated breaker or disconnect. 705.12 (D)(1)
- No multi-wire branch circuits are installed where single 120-volt inverters are connected to 120/240-volt load centers. 690.10 (C)

#### Section 10: Batteries

- Storage batteries for dwellings shall have the cells connected so as to operate at a voltage of 50 volts nominal, or less. 690.71 (B)(1)
- Live parts of battery systems for dwellings are guarded to prevent accidental contact by persons or objects. 690.70 (B)(1)
- Flexible cables, as identified in article 400, in sizes 2/0 AWG and larger shall be permitted for battery cell connection. 690.74 (A)
- Flexible, fine-stranded cables shall be terminated only with terminals, lugs, devices, or connectors in accordance with 110.14; 690.74 (A)
- Listed current-limiting Overcurrent protective devices are used adjacent to batteries to protect against available short circuit current. 690.71 (C); 690.16

### Section 10 Batteries continued.....

- All cables to inverters, DC load centers, and or charge controllers are in conduit. 690.31 (A) and (G)
- To **prevent avoid the ventilation** of gases into electrical conduit, conduit shall enter the battery enclosure below the tops of the battery. 480.9 (A); 480.10
- A disconnection means shall be provided for all ungrounded derived from a stationary battery system over 50 volt. Disconnecting means shall be readily accessible and located within sight of the battery system. 480.6 (A); 690.15
- Batteries connected in series shall have disconnects limiting them to 48 volts nominal. 690.71€
- Area shall be will ventilated and batteries not installed in living area. 480.9
- Battery rooms shall have egress doors that open out and shall be equipped with listed panic hardware. 480.9 €
- Gas piping shall not be permitted in dedicated battery rooms. 480.9 (F)

### Section 11: Marking and Labeling requirement

The following wiring methods and enclosure that contain PV power source conductors shall be marked with the wording:

**“WARNING: PHOTOVOLTAIC POWER SOURCE”**

- Exposed raceways, cable trays, and other wiring methods. 690.31 (G)(3)
- Covers or enclosures of pull boxes and junction boxes.
- Conduit bodies in which any of the available conduit openings are unused.
- The labels shall be reflective and all letters shall be capitalized with a minimum height of 3/8” in white on red background.
- Labels shall appear on every section of the wiring system that is separated by enclosures, walls, partitions, ceilings, or floors spacing between labels shall not be more that 10’ and suitable for the environment. 690.31 (G)(4)