



Electrical Plan Requirements

Department of Planning & Development Review, Bureau of Permits and Inspections

Policy

for public distribution

November

City of Richmond SOLAR PANEL ELECTRICAL PLAN CHECKLIST

All electrical projects require plans except for single family or duplexes. Two sets of bound plans shall be submitted. Where permitted by this handout a master electrician may prepare the plans provided the plans are of the same quality and detail as normally provided by an engineer. This checklist is to be used by the design professional to ensure his/her plans will meet the minimum standards required.

General

- Drawings and copies shall be neat and legible and all of the same size.
- Drawing shall be either 22" x 34" (D size) or 34" x 44" (E size)
- Drawings shall be at least 1/8" scale or larger. Standard architectural scales are required and all lettering shall be at least 1/8" in height. All electrical/mechanical rooms etc. shall be a minimum of 1/2" scale or larger.
- Each sheet shall be numbered
- Each plan shall have a complete title block. (see example below).
- Site work requires plans
- Show all the engineering details required in this checklist on the plans; providing this information in the specifications only is not sufficient.
- A legend shall be provided for all symbols.
- All spaces and rooms shall be labeled as to their use.
- Indicate occupancy load, use group, (if a change of use so indicate) and building construction type on plans.
- New work shall be differentiated from that which exists
- Engineer shall **seal, sign and date** each sheet **OR**
- Master tradesman shall **sign and date** each sheet, where permitted (see page 6). (master electrician for electrical plans, master plumber for plumbing plans, master gas fitter for gas plans)
- Provide seismic design details by a RDP for all class IV structures

Title Block

Show title block on each plan.

Sample Title Block

Project Name:	Project Address:	
Designer's Name:	Designer's License No. or Master No.:	
Telephone No:	Fax No:	
Email:	Scale:	
Title:	Sheet No:	

Project Information- Must appear on front sheet of plans

Building Code Year:	Electrical Code Year:	Construction Type:
Use Group	Change of Use? Yes No	Occupancy Load:
Is project in flood plain?	BFE per NGVD1929:	DFE:
Square footage of project	Total square footage of building	

Codes

The design shall comply fully with the following codes. Specify on plans which edition the plans have been designed under.

Virginia Uniform Statewide Building Code- 2009

International Building Code IBC- IBC-2009

International Mechanical Code – 2009

International Plumbing Code – 2009

International Fuel Gas Code – 2009

ICC/ANSI A117.1 accessibility standards – 2009

International Energy Conservation Code - 2009

National Electrical Code 2008

ASME A17.1-2007 Elevator Code.

Floor Plans / Fire Assemblies

Label all fire rated assemblies, firewalls, fire separation walls as to their rating in hours on all electrical plans. No exceptions!

Provide UL listed fire-stopping detail as found in the latest edition of the UL Fire Resistance Directory for the type of through penetration used – see www.ul.com if help is needed.

If no rated assemblies are on the project put a note on the plans to that effect

If no rated assemblies will be penetrated state that on the plans

Make the indications of rated assemblies easy to pick out from the rest of the plans using darkened lines or hatched lines that show up well

Flood Plain

Show Design Flood Elevation on title sheet **OR** state “ **Not in flood plain**” on plans

Design Flood Elevation is the NGVD29 Base Flood Elevation plus 12 inches

Show floor elevations and flood elevations on each floor plan

Revised Plans

Revised plans are required to be the same size as original plans

Provide clouds around new areas of change with numbered revision triangles and remove clouds from previously issued revision(s).

Provide revision triangles with number, description and date

Provide a complete list of all electrical drawings include all revisions and dates

Do not skip revisions, submit all revisions for review that affect the permit when they are issued; do not wait until 2 or 3 revisions have been made to submit for review.

Plan Review Procedure

Plans will be reviewed in the order they are received.

Plans that require additional information or that have code deficiencies will have a plan review comments sheet emailed if an email address is available or the comment will be faxed to the applicant and designer.

It is the applicant's responsibility to get the revised plans submitted within 30 days.

Failure to get revised plans back within 30 days will result in the permit being denied.

Approved plans and permit will be at the front counter for pickup by the applicant

One Line Diagram

Do not submit a Riser Diagram for power and lighting in lieu of a one line diagram.

Show all service equipment, distribution equipment, transformers, panelboards, and major equipment and disconnect switches that are part of this project.

Show all Feeders larger than 40 amps

Differentiate between existing and new work

Show all fuse and/or circuit breaker sizes, conduit and wire sizes, wireway and trough sizes - do not say size per NEC.

Show grounding electrodes and types.

Size the grounding electrode conductors - **do not** say size per NEC.

Grounding Details for Services and Separately Derived Systems

Show grounding electrodes and types.

Size the grounding electrode conductors - **do not** say size per NEC.

Panelboards

Provide panelboard schedule with loads in amps or KVA (indicate which) fuse or circuit breaker sizes and wire sizes - see samples.

Show panelboard and transformer locations on floor plans.

Indicate main lugs only, or main fuse, or main circuit breaker size.

Indicate panelboard, voltage, phase, size in amps and AIC rating.

Feeder Details

Show conduit size and type on one-line diagrams.

Show wire size and type on one-line diagrams.

Show feeder loads and overcurrent device size and type on one-line diagram.

Size all wireways - do not say size per NEC.

Show wire sizes on panel schedules

Branch Circuit Details

Show major equipment on floor plan.

Indicate limits of all wet or hazardous locations on plans and elevations.

Show wire sizes on panel schedules

Disconnects and Starters

Show location of disconnects on the floor plan - in sight of equipment.

Show size and type; indicate if fused or non fused, NEMA type

Show fuse size and AIC rating of device

Maintain required clearances per **NEC SECT 110.26 (A)**

Equipment

Show equipment location on floor plan

Show equipment disconnect switches

Information Required for Photovoltaic Plan Review Submittal

** Supplement to Plan Review Submission Guidelines*

ADMINISTRATIVE

- The following clearances or approvals maybe required before a building permit can be issued:

- Zoning Department
Building & Electrical Plan Review

SITE PLAN

- Provide full dimensioned site plan. Show lot size, street, alley, easements, parking spaces, location, size and use of all structures on the lot, and property line. Identify property lines, lot dimensions, and distance to property line.
- Show size and location of the service meter, and location of all solar photovoltaic systems and components.

LINE DIAGRAMS

- Provide a minimum of a single line diagram showing:
- Array configuration
- Array wiring identified
- Combiner/junction box identified
- Conduit/wiring from array to inverter identified
- DC grounding system specified
- Disconnecting means specified
- Inverter specified
- Conduit/wiring from inverter to Utility point of connection identified
- AC grounding and system grounding specified
- Point of connection attachment method identified

INVERTER INFORMATION

- Provide inverter manufacturer specification sheet(s)

PV MODULE INFORMATION

- Provide module manufacturer specification sheet(s)

ARRAY INFORMATION

- Show the following on the plan:
- Number of module in series
- Number of parallel source circuits
- Total number of modules
- Operating voltage
- Operating current
- Maximum system voltage
- Short-circuit current

WIRING AND OVERCURRENT PROTECTION

- Show the following on plan:
- Wire type shall be 90° C wet and continuous rated
- Overcurrent protection on inverter output circuit is sufficient

ROOF INFORMATION (ROOF TOP SYSTEM)

- Show the following information on plan:
- Weight of the arrays (pounds per square foot including mounting hardware)
- Describe and show the roof structural elements
- Identify roof type
- Provide detail of photovoltaic panel mounting hardware attachment to the roof framing members
- Provide mounting hardware manufacturer specification
- Provide engineering calculations and details demonstrating adequacy of supporting members, including wind uplift effects and where required, seismic effects

REQUIRED PHOTOVOLTAIC SIGNS (To be shown on equipment)

DC COMBINER/ JUNCTION BOX:

- “Warning. Electrical shock hazard. The direct current circuit conductors of this photovoltaic power system are ungrounded but may be energized with respect to ground due to leakage paths and/or ground faults.”
 - “CAUTION: SOLAR CIRCUIT” marking on all interior and exterior DC conduits, raceways, enclosures, cable assemblies, every 10 feet, at turns and above and below penetrations and all DC combiner and junction boxes
 - Red background
 - White lettering
 - Minimum 3/8” letter height
 - All capital letters
 - Arial or similar font, non-bold
- Reflective, weather resistant material suitable for the environment

DC DISCONNECT: (Required information to be shown on local DC Disconnect)

- Warning. Electrical shock hazard. The direct current circuit conductors of this photovoltaic power system are ungrounded but may be energized with respect to ground due to leakage paths and/or ground faults.”
- PV system- DC disconnect
- At accessible location*Operating current
- Operating voltage
- Maximum system voltage
- Short-circuit current

INVERTER: (Required information to be shown on local inverter)

- “If a ground fault is indicated, the normally grounded conductors may be energized and ungrounded.”
- “Warning. Electrical shock hazard. Do not touch terminals. Terminals on both the line and load sides may be energized in the open position.”
- “The maximum AC output operating current _____”
- “The operating AC voltage _____”
- PV power source (DC)
- Operating current
- Operating voltage
- Maximum system voltage
- Short-circuit current

AC DISCONNECT: (Required information to be shown at AC Disconnect)

“PV system- AC disconnect” PV Signage

METER:

- The maximum AC output operating current _____
- The operating AC voltage _____
- Dual sources: Second source is Photovoltaic
- CAUTION: SOLAR ELECTRIC SYSTEM
- Red background
- White lettering
- Minimum 3/8” letter height
- All capital letters
- Arial or similar font, non-bold

Reflective, weather resistant material suitable for the environment

Permanent directory or plaque providing location of service disconnecting means and photovoltaic system disconnecting means, if not located at the same location.

Use Group	Description	1 To 3 Stories	Over Three Stories	0 to 800 Amp Service	Over 800 Amp Service	0 to 600 Volts	Over 600 Volts
A1A	Theater With Stage	Seal	Seal	Seal	Seal	Seal	Seal
A1B	Theater - No Stage	Seal	Seal	Seal	Seal	Seal	Seal
A2A	Night Club	Seal	Seal	Seal	Seal	Seal	Seal
A2B	Restaurant	Seal	Seal	Seal	Seal	Seal	Seal
A3B	Museum/Art Gallery	Seal	Seal	Seal	Seal	Seal	Seal
A3C	Library, Exhibits	Seal	Seal	Seal	Seal	Seal	Seal
A3D	Passenger Terminal	Seal	Seal	Seal	Seal	Seal	Seal
A3E	Recreation Center	Seal	Seal	Seal	Seal	Seal	Seal
A3F	Lecture Hall	Seal	Seal	Seal	Seal	Seal	Seal
A3G	Restaurant Fast Food	Seal	Seal	Seal	Seal	Seal	Seal
A3H	Church	Seal	Seal	Seal	Seal	Seal	Seal
A3M	Misc Assembly	Seal	Seal	Seal	Seal	Seal	Seal
A4A	Recreation Center	Seal	Seal	Seal	Seal	Seal	Seal
B1	Business: Auto Dealership	(1)	(2)	(1)	Seal	(1)	Seal
B2	Business: Doctor's Office	(1)	(2)	(1)	Seal	(1)	Seal
B3	Business: Bank	(1)	(2)	(1)	Seal	(1)	Seal
B4	Business: Car Wash	(1)	(2)	(1)	Seal	(1)	Seal
B5	Business: Fire Station	(1)	(2)	(1)	Seal	(1)	Seal
B6	Business: Funeral home	(1)	(2)	(1)	Seal	(1)	Seal
B7	Business: Laundry	(1)	(2)	(1)	Seal	(1)	Seal
B8	Business: Medical offices	(1)	(2)	(1)	Seal	(1)	Seal
B9	Business: Offices	(1)	(2)	(1)	Seal	(1)	Seal
B10	Business: Miscellaneous	(1)	(2)	(1)	Seal	(1)	Seal
E1	Education: School 1 to 12	Seal	Seal	Seal	Seal	Seal	Seal
EE2	Daycare over 2 ½ years	Seal	Seal	Seal	Seal	Seal	Seal
F1	Factory Moderate Hazard	Seal	Seal	Seal	Seal	Seal	Seal
F2	Factory Low Hazard	Seal	Seal	Seal	Seal	Seal	Seal
H1-5	High hazard	Seal	Seal	Seal	Seal	Seal	Seal
I1	Group Home 6 or More	Seal	Seal	Seal	Seal	Seal	Seal
I2A	Institutional Incapacitated	Seal	Seal	Seal	Seal	Seal	Seal
I2B	Day Nursery	Seal	Seal	Seal	Seal	Seal	Seal
I3	Institutional Restrained	Seal	Seal	Seal	Seal	Seal	Seal
I4B	Child care 5 or more under 2.5 years	Seal	Seal	Seal	Seal	Seal	Seal
M1	Retail: Convenience Store	(1)	(2)	(1)	Seal	(1)	Seal
M2	Retail: Department Store	(1)	(2)	(1)	Seal	(1)	Seal
M3	Retail: Supermarket	(1)	(2)	(1)	Seal	(1)	Seal
M4	Retail: Store	(1)	(2)	(1)	Seal	(1)	Seal
M5	Retail: Service Station	(1)	(2)	(1)	Seal	(1)	Seal
R1H	Hotel	(1)	(2)	(1)	Seal	(1)	Seal
R1M	Motel	(1)	(2)	(1)	Seal	(1)	Seal
R2A	Dormitories	(1)	(2)	(1)	Seal	(1)	Seal
R2B	Multifamily - 3 or more units	(1)	(2)	(1)	Seal	(1)	Seal
R3	1&2 Family over 3 stories	(4)	(4)	(4)	Seal	(4)	(3)
R4	Assisted Living	(4)	(4)	(4)	Seal	(4)	(3)
R5A	1 Family attached 1-3 Stories	(4)	(4)	(4)	Seal	(4)	(3)
R5B	2 Family attached 1-3 Stories	(4)	(4)	(4)	Seal	(4)	(3)
R5C	1 family detached 1-3 Stories	(4)	(4)	(4)	Seal	(4)	(3)
R5D	2 Family Detached 1-3 Stories	(4)	(4)	(4)	Seal	(4)	(3)
S1	Storage Moderate Hazard	(1)	(2)	(1)	Seal	(1)	Seal
S2	Storage - Low Hazard	(1)	(2)	(1)	Seal	(1)	Seal
U	Temporary, Miscellaneous	(1)	(2)	(1)	Seal	(1)	Seal
ANY	Hazardous Location	Seal	Seal	Seal	Seal	Seal	Seal

Seal- Engineer's Seal Required

- (1) Master Electrician or Contractor's qualified individual on state license can do drawings if of same quality as a professional engineer would normally submit
- (2) Master Electrician or Contractor's qualified individual on state license can do drawings if of same quality as a professional engineer would normally submit,
- (3) if work involves only branch circuits 30 amps and under, no panels or feeders included
- (3) Voltages over 600 volts not permitted in this use
- (4) No plans are required



Department of Planning & Development Review

Policy 08-04

2011

Bureau of Permits & Inspections
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Richmond, Virginia 23219

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Fax: 804-646-6948



“Committed to Building a Better Richmond Together”

Reference Documents for this Policy:

- 2009 International Building Code
- 2008 National Electrical Code
- 2009 International Model Energy Code

Important Phone Numbers:	Electrical Plans	Permits for:	Zoning: 646-6340
Main Number: 646-4169	Review: 646-3611	Sewer Connection, On-site	Fax Number: 646-6948
Single Family Plan Review:	Mechanical Plans	Storm Sewer , Driveways,	Permit Fax: 646-1568
646-6975	Review: 646-6982	Work in Streets & Alleys,	
Structural Plans Review:		Land Disturbing;	
646-6978		Flood Plain Information;	<i>For Inspection Requests,</i>
Plumbing Plans Review:		Chesapeake Bay Preserva-	<i>please use our automated</i>
646-6979		tion Program:	system, SPANLINK:
		646-6956	646-0770