
 California ISO	Operations	ISO Version:	2.5
Single and Three Line Drawing Requirements		Effective Date:	06/01/2017



# California ISO


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## Single and Three Line Drawing Requirements

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## REVISION HISTORY

<b>VERSION NO.</b> <small>(Must match header)</small>	<b>DATE</b>	<b>REVISED BY</b>	<b>DESCRIPTION</b>
1.0	03/20/15	MU	Created Document
2.0	03/24/15	MU	Revised Document
2.1	10/12/15	MU	Revised Requirement Details
2.2	10/23/15	MU	Revised Requirement Details
2.3	11/13/15	MU	Revised Requirement Details
2.4	06/01/17	RLS	<ol style="list-style-type: none"> <li>1. Clarified requirements for existing facilities and as-built documents.</li> <li>2. Added identifying information to the drawings to allow them to be more closely linked to CAISO records.</li> <li>3. Moved a requirement from the general section to the SLD section.</li> <li>4. Clarified CT polarity requirement.</li> </ol>
2.5	12/11/19	DK	Revised Requirement Details for 3LD.

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## Purpose

The purpose of this document is to provide a checklist of items the ISO will use to determine that the required New Resource Implementation Single Line and Three Line drawings are acceptable.

\*All drawing submittals must be emailed to [nri@caiso.com](mailto:nri@caiso.com) and follow the file naming convention as outlined in the NRI Guide.

## Common checklist for Single and Three Line Drawings

1. Located in each of the drawings:

A. **New Construction Sites**


- I. The drawing(s) must be marked as “Issued for Construction” in some form.
- II. Each drawing must bear an Electrical Engineer’s Professional Engineer (PE) stamp.

B. **Existing Sites (Such as Existing Qualifying Facilities)**

In this section, the adjective “Existing As-Built” (as it pertains to drawings) means that the drawings are maintained as part of the customer’s *ongoing engineering and change management processes*. Evidence for this type of drawing includes but is not limited to dated approval signatures with an “As-Built” marking. The drawing must accurately document the current existing installation. The term “Existing As-Built” drawings specifically excludes drawings that are not maintained as part of the customer’s ongoing engineering and change management processes or that do not accurately document the existing installation.

I. Option 1:

- Begin with an “Existing As-Built” drawings (as defined above). If existing As-Built drawings do not exist, see Option 2.
- Add proposed CAISO metering circuits to the “Existing As-Built” drawings. Clearly distinguish between the as-built elements and the proposed additions and changes on the drawings
- Include the following notation on the drawings: “Includes proposed modifications”.
- This option does not require a P.E. stamp.

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II. Option 2:

- Create new “As-Built” drawings. This may be accomplished by redrawing an “Existing As-Built” drawing (as previously defined) or through conducting a site survey. In either case, the new “As-Built” drawing must accurately document the current existing installation. Mark these new drawings as “As-Built”.
- If an “Existing As-Built” drawing is used to redraw a new “As-Built” drawing, the “Existing As-Built” drawing must be submitted as well.
- If the proposed CAISO metering circuits do not yet exist, add the proposed CAISO metering circuits to the new “As-Built” drawings. Clearly distinguish between the as-built elements and the proposed additions or changes. Include the notation: “Includes proposed modifications”.
- Obtain an electrical Professional Engineer review. The drawings must be stamped by the electrical Professional Engineer who performed the review on every drawing page.


C. Include the Generator Interconnection Agreement Project Name on the drawings. The Project Name is available in the executed 2-Party or 3-Party Interconnection Agreements. It is possible that the Project Name may differ from the New Resource Implementation (NRI) project name. For this reason, also provide at least one of the following three items on the drawings:

- I. The Project Address (the location of the facility where the resource exists)
- II. The 2-Party queue number (only when a 2-Party interconnection agreement exists).
- III. The New Resource Implementation Number (ISO Project Number)

D. CAISO revenue meters shall be labeled and indicated as such.

E. Current and Potential Transformers revenue metering devices

- I. Current Transformer (CT) – shall indicate **turns ratios** and are consistent between SLD and 3LD.
- II. Potential Transformer (PT) – shall indicate **turns ratios** and are consistent between SLD and 3LD.

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## Single Line Drawing Checklist


Single Line Drawings shall conform to the CAISO BPM for Telemetry and BPM for Metering (and Attachment B)

2. Single-Line Drawings shall include but not limited to:
  - A. All generation reference drawings, which can include more than one sheet to show the connection of the generator to the switchyard then to the utility connection shall be submitted.
    - I. Single line drawings consisting of more than one sheet shall include the sheet references to each other's sheet reference.
    - II. An overall drawing to show how reference drawings are interconnected.
  - B. Connection from Generator to the ISO Control Grid:
    - I. Connection from generating unit(s) or collection bus(s) level to the point of interconnection. Identify the point of interconnection by name.
    - II. Low and high side voltage levels (in kV).
    - III. Substation connection point.
    - IV. Direction of ISO Control Grid.
  - C. All breakers
    - I. Breaker(s) location disconnecting the generator from the grid. These are typically ANSI device 04 or 52.
    - II. Each breaker shall be named/numbered uniquely.
  - D. All Switches/MOD and alike shall be named/numbered uniquely.
  - E. Each Transformer shall have a unique name if more than one is on the drawings.
  - F. Each Transformer shall indicate MVA ratings.
  - G. Each Transformer shall indicate kV ratings.
  - H. Auxiliary load(s) greater than 1 MW.

## Three Line Drawing Checklist

Three Line Drawings shall conform to the CAISO BPM for Metering (and Attachment B)

3. Three-Line Drawing shall include:
  - A. Location of the Revenue Meter - shall show on the drawing where the meter is placed electrically.
  - B. CAISO Revenue meter wiring to the proposed CT's and PT's (e.g. wiring from CT's and PT's to terminal block to CAISO meter socket).
  - C. Each meter shall be connected to its own test switch.

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D. Direction of ISO Control Grid.

E. CTs polarity:

- Polarity marks shall be clearly indicated with a mark on the primary side and a mark on the secondary side. Commonly used marks such as dots, squares, or plus signs are acceptable.
- The polarity mark on the primary side must be in the direction of the ISO control grid. Existing qualifying facilities may show the existing polarity direction even if the direction is not in the direction of the ISO control grid.