PJM Guideline
Single-Line Diagram (SLD)

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Background

- Clarify and ensure SLD provided by Developer is standardized and uniform.
- Enhance the data review process at PJM to be more concise in timely manner.
- Provide SLD guidelines based on lessons learned from TC1 DP1 review.

  Majority short-circuit "deficiencies" are due to discrepancies / conflicting data found between SLD with Queue Point (QP).

Definition

A single-line diagram is:

- An engineering drawing
- Showing a layout and design of a project's electrical power system
- From the Point of Interconnection (POI) through the generator units

Should be kept accurate and updated as equipment in the facility is added, removed or changed

Single-Line Diagram

Single-line diagram should show:

- Point of Interconnection (POI) to the Transmission Owner's system with voltages
- High-side generator step-up transformer (GSU) with voltages, MVA rating and winding configuration
- High-side circuit breaker (CB)
- Metering between high-side CB and GSU
- Generator collector bus
- Individual generating unit's step-up transformers and breakers with voltages, MVA rating and winding configuration
- Generators with voltages and MVA rating

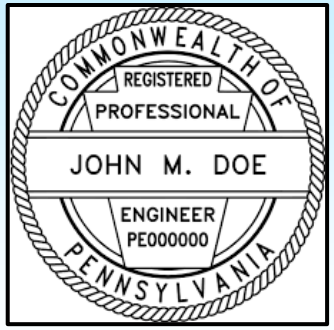
Data in SLD must:

- Fulfill Transmission Owners (TO) requirements, otherwise deficient.
- Match with data provided in Queue Point (QP), otherwise deficient.

An acceptable SLD must be attached in QP.

Missing SLD and/or non-compliance SLD will be considered a major deficiency, conceivably resulting in the project being withdrawn if not addressed.

SLD: Preferred



Do use a single-line diagram (SLD) with a Professional Engineer (PE) stamp to ensure the SLD is created in a standardized and coherent manner.

PE stamp is preferred.

DRAWING	***Preliminary XYZ***		
DESIGNED	DATE	DRAWING NO	REV

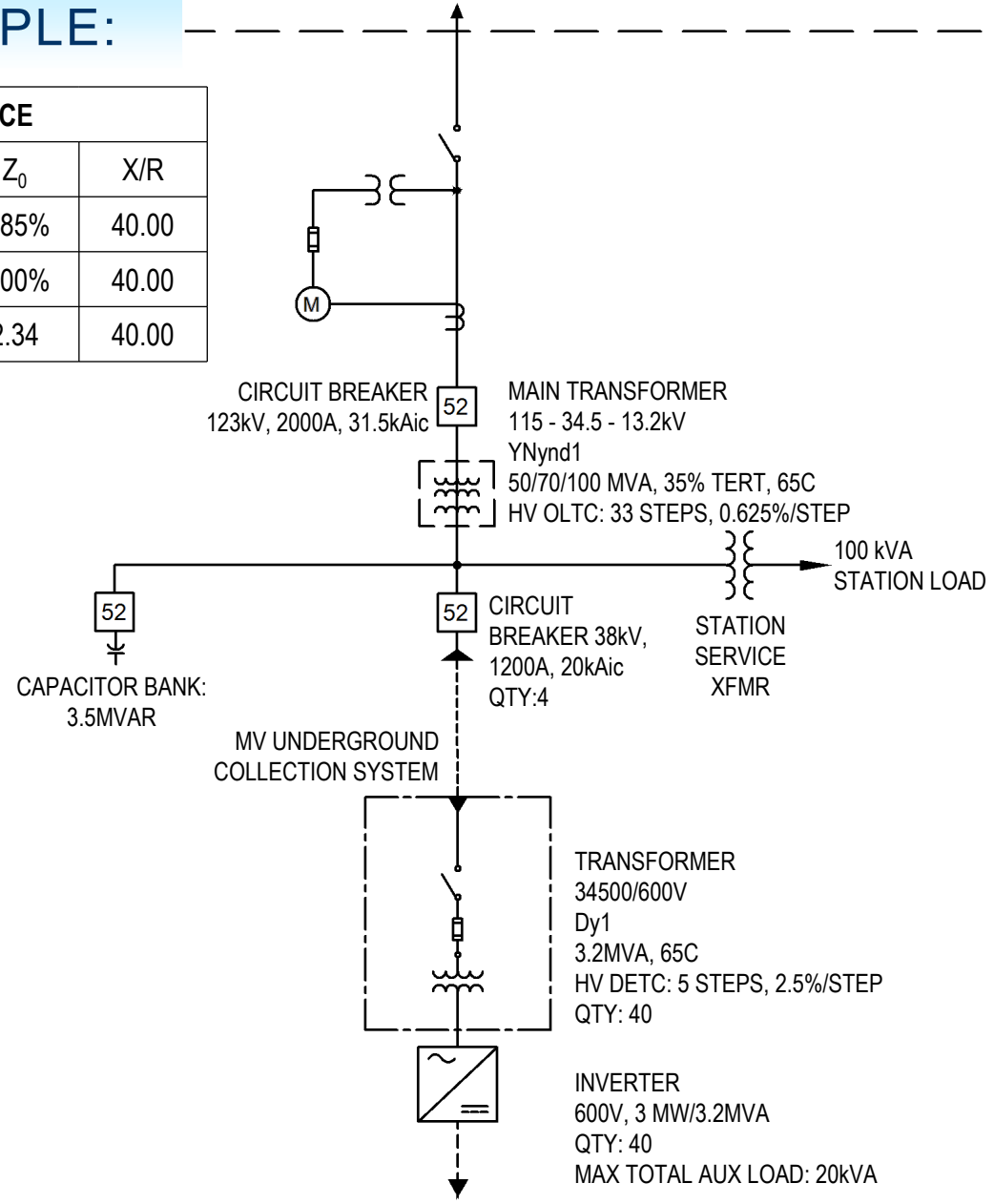
Do use preliminary engineering drawings for permitting purposes – not for construction.

Preliminary drawings are considered acceptable.

PREFERRED EXAMPLE:

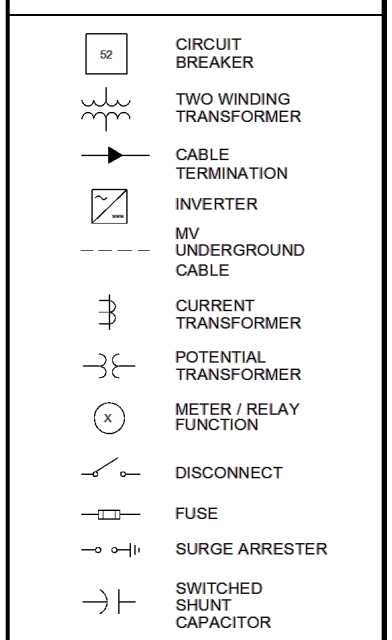
MAIN TRANSFORMER IMPEDENCE					
	MVA_{Base}	Z_1	X/R	Z_0	X/R
ZH-X	96	7.00%	40.00	6.85%	40.00
ZH-Y	96	9.00%	40.00	8.00%	40.00
ZX-Y	96	2.34%	40.00	2.34	40.00

GSU IMPEDANCE	
MVA_{Base}	3.2
$Z_{1,\ H\text{-}X}$	6.54%
X/R	8.00
$Z_{0,\ H\text{-}X}$	4.40%
X/R	8.00

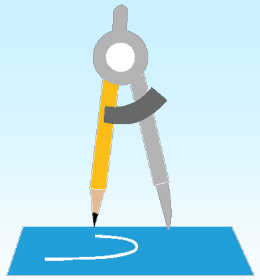


COLLECTION SYSTEM EQUIVALENT IMPEDANCE		
MVA_{Base}	100 MVA	
V_{Base}	34.50 kV	
f	60 Hz	
C	1.2345 µF	
B	2.3456%	
	Z1	Z0
R	0.1234%	0.1234%
X	0.1234%	0.1234%

GENERATION TIE LINE EQUIVALENT IMPEDANCE		
MVA_{Base}	100 MVA	
V_{Base}	115 kV	
f	60 Hz	
C	0.12345 µF	
B	0.12345%	
	Z1	Z0
R	0.12345%	0.1234 %
X	0.12345%	0.1234 %



SLD: Not Preferred



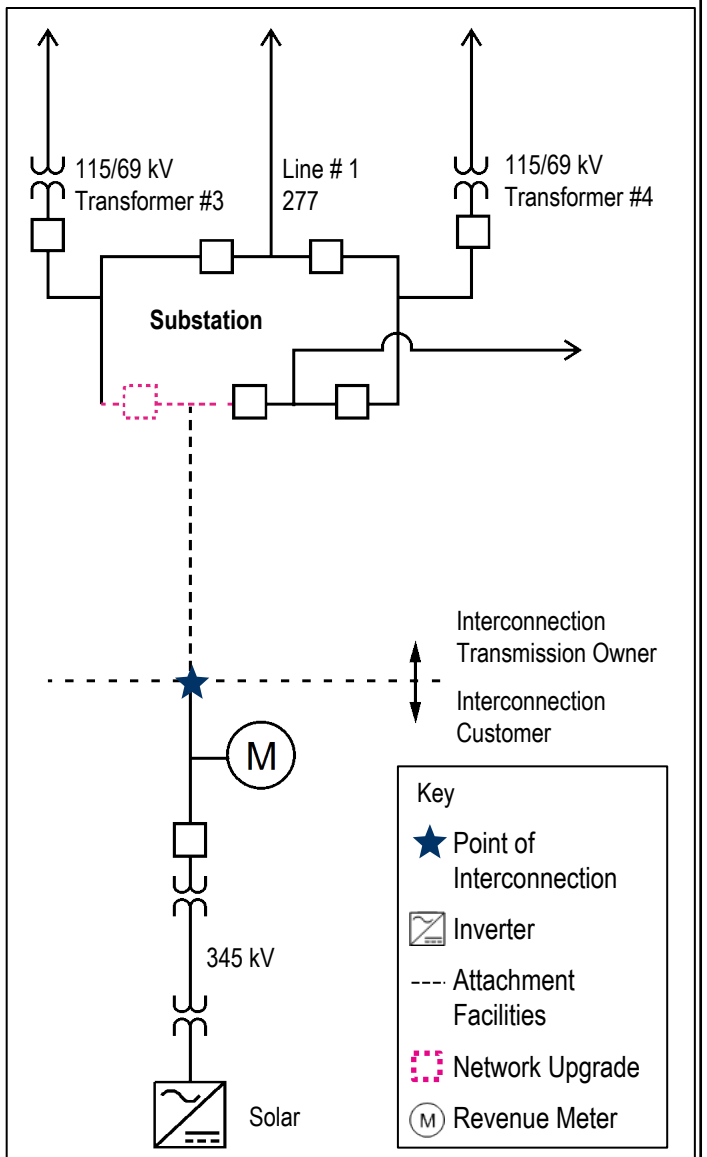
Please don't use slider diagram of PSSE (*.sld).

This is not considered an acceptable SLD.

Please don't use an over-simplified SLD created out of basic drawing tools.

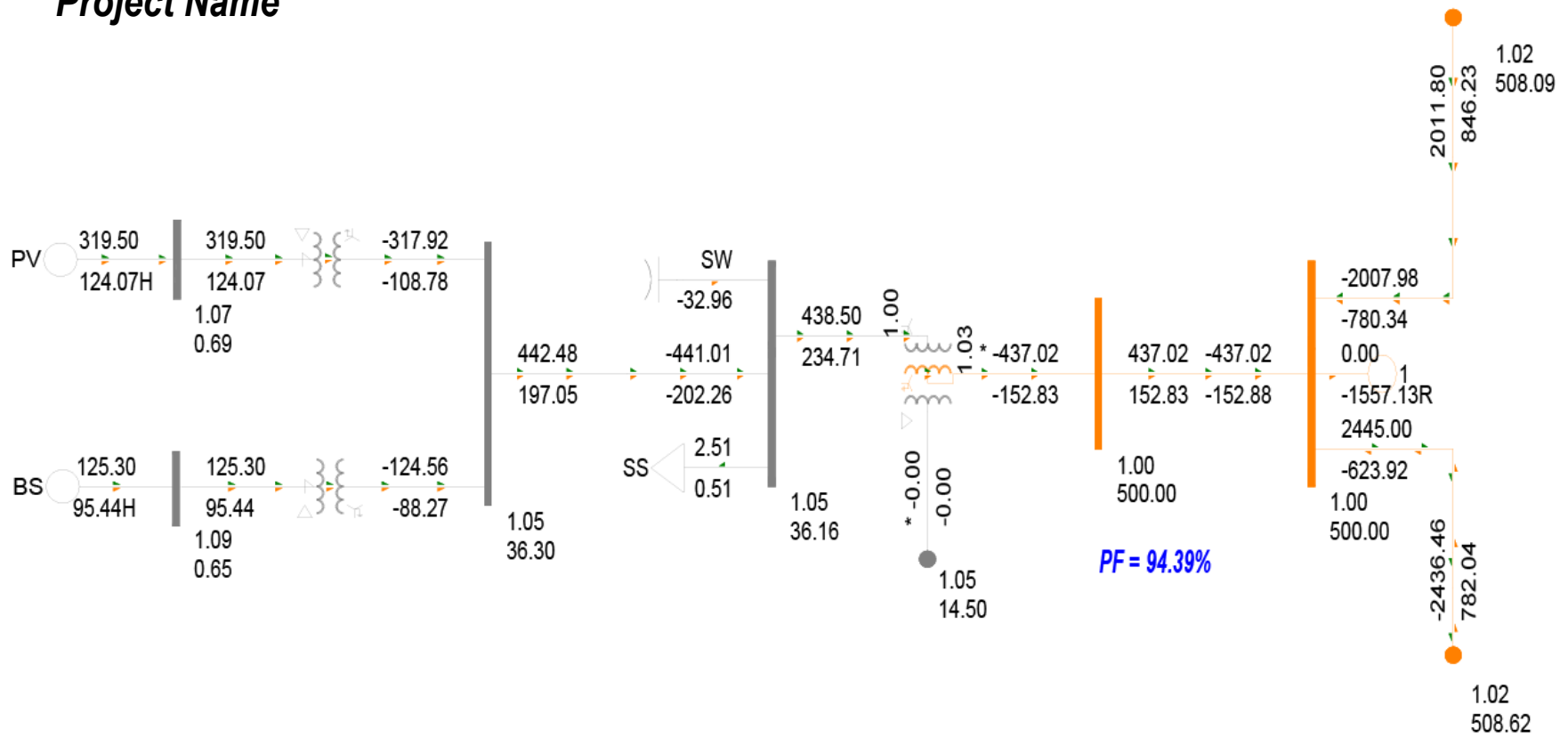
Such as Windows Paint – this may not be considered an acceptable SLD.

Single-Line Diagram



NOT PREFERRED EXAMPLE:

Project Name



Bus - Voltage (kV/pu)
Branch - MW/Mvar
Equipment - MW/Mvar

Company Name

Day, Mon. XX XXXX XX:XX

kV: >0.000 <=100.000 <=161.000 <=230.000 <=345.000 <=500.000 <=765.000 >765.000

Key Takeaways

1	2	3
SLD submitted in QP is expected to be standard, uniform, updated and accurate.	One-line diagram or SLD is an engineering drawing showing queue project's detail layout from POI to generator units.	SLD is neither slider diagram PSSE (*.sld), nor made out of Windows Paint.

Contact

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