



**GENERATOR INTERCONNECTION PROJECT
Level 4 & 5**

*For All Projects with Aggregate Generator Output of More Than 550 kW.
Level 4 is > 550 kWac to < 1 MWac; Level 5 is > 1 MWac*

ELECTRIC UTILITY CONTACT INFORMATION		FOR OFFICE USE ONLY	
Consumers Energy Interconnection Coordinator 1945 West Parnall Road (Room P12-235) Jackson, MI 49201 517-788-1432 Interconnection E-mail: customer.generation@cmsenergy.com		Application Number	
		Date and Time Application Received	
		Application Processing Track	
What Level is the Applicant Applying for?		What type of POI Interconnection is this?	
APPLICANT / ACCOUNT INFORMATION			
Project Name		Rate Type (Commercial, Industrial)	
Applicant Name or Legal Entity name		Applicant Mailing Address (state and zip)	
Applicant Phone Number		Applicant E-mail Address (Optional)	
Electric Service Account(s) #		Electric Service Meter Number(s)	
SYSTEM INSTALLER/ DEVELOPER INFORMATION Project Developer/Single Point of Contact			
Name and Title		Phone Number	
Developer company or Point of Contact Company Name:			
Address			
E-Mail Address			
LICENSED CONTRACTOR INFORMATION			
Name, Company			
Address			
E-Mail Address			
Phone			
Professional Engineer or Licensed Electrician Name, Number and expiration date			

EXISTING GENERATION ON SITE	
1. Other than electrically isolated backup generation, are there any existing generators on site? 2. Are you modifying or adding capacity to an existing system? 1. Existing systems onsite (YN) 2. Are you modifying or adding capacity to an existing system	What program is the existing generation enrolled in?
Current System Type (Solar, Wind, Anaerobic Digester, Diesel, etc.)	Total Generator(s) Nameplate AC Rating kW
Is the proposed new technology different than the existing technology type?	
GENERATION SYSTEM SITE INFORMATION	
Project Site Address, must include city, township, county, state, zip code	
Township: _____ in County: _____ Approximate GIS Location (Latitude, Longitude): _____	
Project Type (Base load, Peaking, Intermittent)	Energization Date for Project Interconnection Facilities
First Parallel Operation Date for Testing	Project Commercial Operation Date
Estimated Project Cost	Operation Mode
Peak annual site demand (kW):	
REQUIRED ATTACHMENTS	
Attached Site Plan - Page # _____	Attached Electrical One-Line Drawing - Page # _____
<i>(Per MPSC Rule – The One-Line Drawing must be signed and sealed by a licensed professional engineer, licensed in the State of Michigan.)</i>	
<ul style="list-style-type: none"> • See Attached Sample for Example Site Plan • See Attached Sample for Example Inverter Generator Electrical One-Line Drawing • See Attached Sample for Example Synchronous Generator Electrical One-Line Drawing • See Attached Sample for Example Induction Generator Electrical One-Line Drawing 	
Attached Specification for Equipment Page # _____	
Attached Applicant's Proof of General Liability Insurance for a minimum of \$2,000,000 for Level 4 and \$3,000,000 for Level 5 Page # _____	
Attached Site Control may be demonstrated by providing documents (must be attached): Page #	
<ul style="list-style-type: none"> - Ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing and operating a Distributed Energy Resource (DER). - An enforceable option to purchase or acquire a leasehold site. 	
A legally binding agreement transferring a present real property right to specified real property along with the right to construct and operate a DER on the specified real property for a period not less than 5 years.	
GENERATION SYSTEM MANUFACTURER INFORMATION	
System Type (Solar, Wind, Anaerobic Digester, Diesel, etc.):	Generator Type (Inverter, Induction, Synchronous)
Total Generator(s) Nameplate AC Rating	Expected Annual Output in Kilowatt Hours kWh/year
Generator A.C. Operating Voltage	Wiring Configuration (Single Phase, Two Phase, Three Phase)
Export Capacity (kW):	If power limited, list pr protective method (reverse power relay, min-import relay, UL PCS Certification, Load Offset):
If load offset, list the verifiable minimum load:	If Wind Turbine, what is the kW Rating?

BATTERY STORAGE INFORMATION	
Will a stored energy system be onsite (Battery):	Will there be more than one make and model battery type used in the design? If yes, how many? :
Total Battery Max Output Rating (kW): (All Batteries)	Total Number of All Batteries on site:
Aggregate Storage Capacity (All Batteries) : <i>(Note on Calculation: Sum of (Battery 1 Capacity (kWh) x # of Battery 1 Onsite) + (Battery 2 Capacity (kWh) x # of Battery 2 Onsite)</i>	
Battery 1 Chemistry Type: Lead Acid, Lithium Ion, Lithium Iron Phosphate or Other: Other:	
Battery 1 Information <i>Include Battery Spec Sheet in Application</i>	Battery 2 Information <i>Include Battery Spec Sheet in Application</i>
Is Battery 1 AC or DC coupled:	Is the Battery 2 AC or DC coupled:
Battery 1 manufacturer:	Battery 2 manufacturer:
Battery 1 Model Name:	Battery 2 Model Name:
# of Battery 1 style onsite:	# of Battery 2 Style onsite:
Battery 1 Capacity (kWh) per battery cabinet Make/Model 1:	Storage Capacity of Battery 2(kWh):
Maximum Continuous Output Rating (kW) per battery cabinet Make/Model 1:	Maximum Continuous Output Rating (kW) per battery cabinet Make/Model 2:
METER SOCKET DETAIL INFORMATION	
Electrician's Name:	Electrician's phone number:
Electric phase: Single, Two or Three:	
How many wires (2 or 3) for the Single Phase configuration:	How many wires (2 or 3) for the Two Phase configuration:
How many wires (3 or 4) for the Three Phase configuration:	What is the wire gauge leaving the panel going into the meter socket:
Single or Parallel conductor going in?	Wire size coming out of the meter socket (level 2 and 3 generator Meter info):
Is the service to the site:	Single or Parallel conductor coming out?
Generator AC Operating Voltage (120/240, 240/480, 120/208 three phase or 480* (*with Consumers Energy approval only):	
What is the GPS Location of the Generation Meter?	
Meter socket pickup location is based on the nearest Consumers Energy Service Center to the project. Consideration may be taken if your requested pickup location is different than assignment.	
METER SOCKET RETRIEVAL WILL NOT BE AVAILABLE UNTIL APPROVAL HAS BEEN GRANTED FOR CONSTRUCTION.	
Meter Socket requested pick up location:	Meter socket requested pick up date:

ISOLATING TRANSFORMER(S) BETWEEN GENERATOR(S) AND UTILITY

Are there any isolating transformer(s) between the generator(s) and utility:	
Transformer Model Number	Transformer Manufacturer
What is the rated kV of each winding? (Numerical Value only)? Rated kV and connection (delta, wye, wye-gnd) of each winding)	What is the kVA of each winding? (Numerical Values only)
What type of Connection does this winding have?	
What is the basic lightning impulse insulation Level (BIL) of each winding?	What are the fixed taps available for each winding?
What is the positive/negative range for any load tap changing (LTC) windings?	What is the %Z impedance on transformer self cooled rating
Percent Excitation current at rated kV	Load Loss Watts at full load or X/R ratio Full Load or X/R ratio

**SYNCHRONOUS, INDUCTION AND INVERTER GENERATOR - BASED SYSTEMS
(Must complete Subsequent pages and attach Electrical One-Line Drawing)**

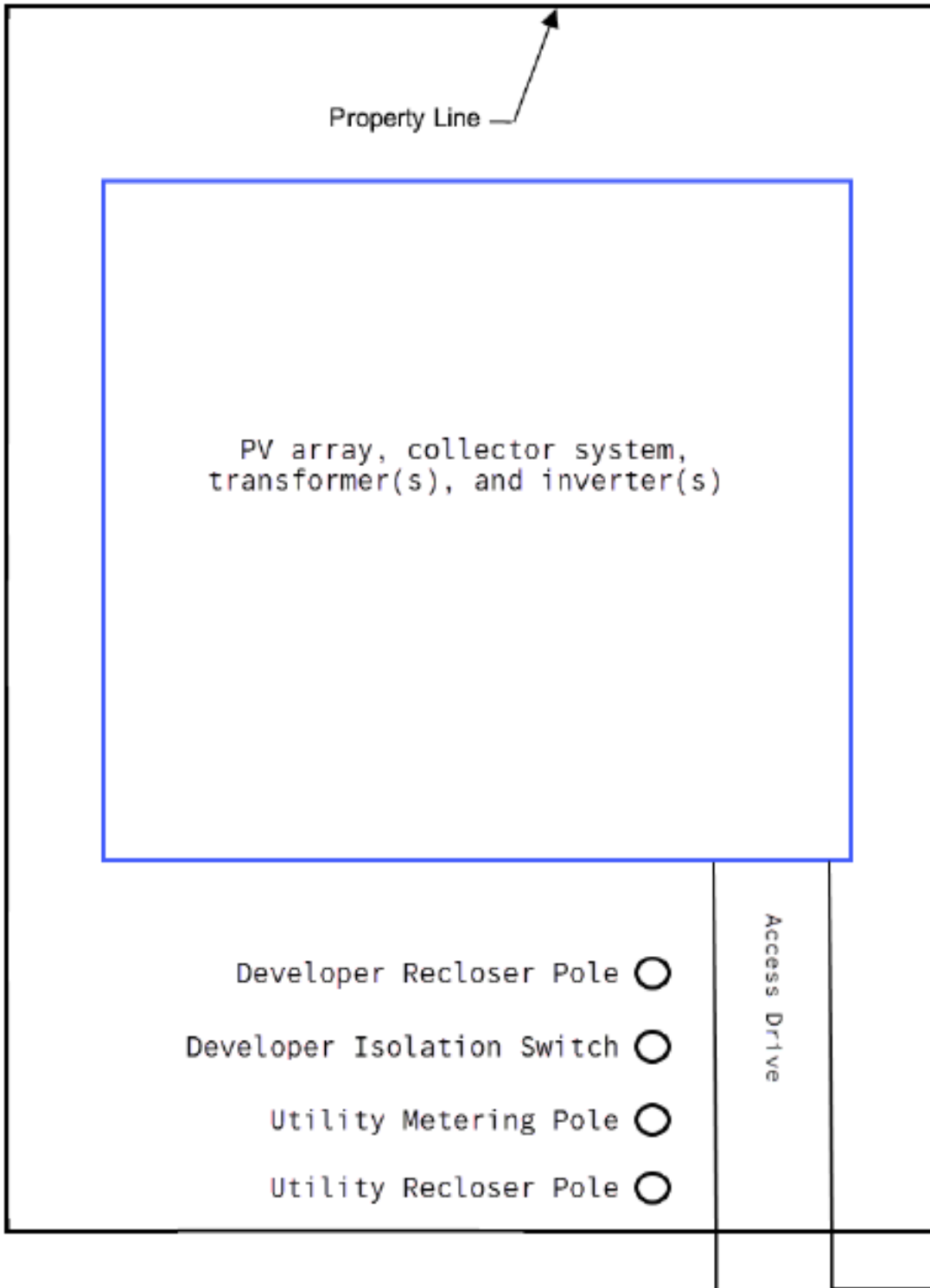
- The following information on these system components shall appear on the Electrical One-Line Drawing:
- Breakers – Rating, location and normal operating status (open or closed)
 - Buses – Operating voltage
 - Capacitors – Size of bank in Kvar
 - Circuit Switchers – Rating, location and normal operating status (open or closed)
 - Current Transformers – Overall ratio, connected ratio
 - Fuses – Normal operating status, rating (Amps), type
 - Generators – Capacity rating (kVA), location, type, method of grounding
 - Grounding Resistors – Size (ohms), current (Amps)
 - Isolating Transformers – Capacity rating (kVA), location, impedance, voltage ratings, primary and secondary connections and method of grounding
 - Potential Transformers – Ratio, connection
 - Reactors – Ohms/phase
 - Relays – Types, quantity, IEEE device number, operator lines indicating the device initiated by the relays
 - Switches – Location and normal operating status (open or closed), type, rating
 - Tagging Point – Location, identification

INVERTER GENERATOR - BASED SYSTEMS				
Will there be more than one type of inverter used in the design:		Number of Unique Inverters by Make/Model:		Total Inverters:
Count of Inverters by Type (up to 7 may be displayed)	Manufacturer & Model (Name/Number)	Inverter Power Rating (kW)	Power Factor	Output Voltage
Total Generator(s) Nameplate AC Rating kWac		Total Generator(s) Nameplate DC Rating, where applicable kWdc		Does the project intend to inject/flowback into the grid? What is the Export Capacity of the project?
Is this inverter(s) certified?		Is the Inverter tested to IEEE 1547.1?		Will the inverter(s) be power limited?
Are microinverters being installed on-site?		<p>Microinverter Policy</p> <p>Once the project has been approved for construction, pictures of installed equipment must be submitted on forms. Microinverter picture submissions should include one of the following:</p> <ol style="list-style-type: none"> 1. Pictures of all uninstalled microinverters at the physical location including unique identifiers such as a serial number. Pictures that are not taken at the physical location will result in return for correction. 2. A Manufacturer System Summary Report may be provided in lieu of pictures providing it has the following identifiers: <ul style="list-style-type: none"> o Physical site location of the installed equipment. o Unique serial or manufacturer number(s) of installed equipment. o Equipment numbers should not be the same as other installs. <p>Date report was generated.</p>		

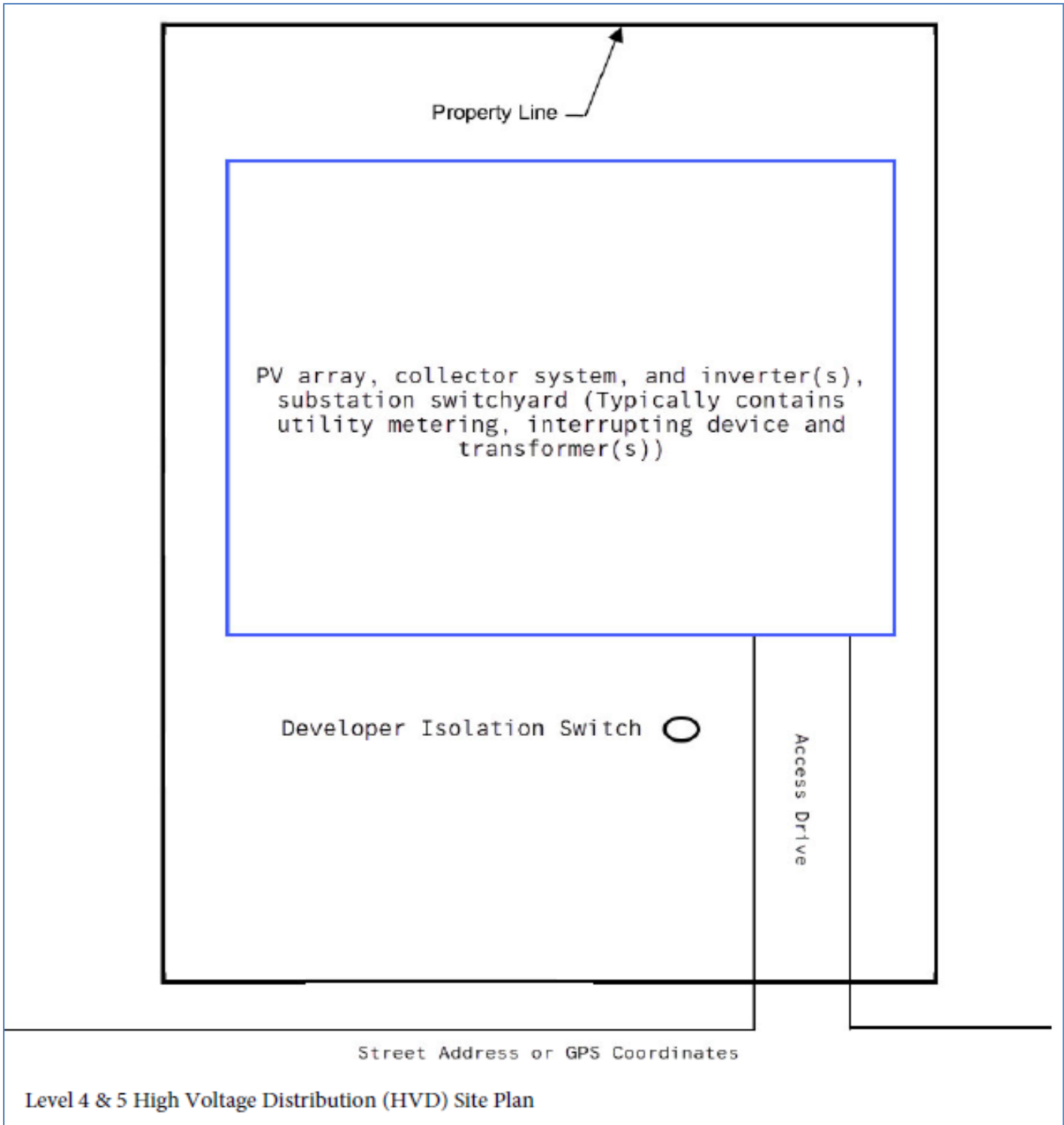
SYNCHRONOUS GENERATORS		
GENERATOR INFORMATION		
Manufacturer	Model Name	Model Number
Generator Nameplate Voltage		Total Generator Nameplate AC Rating (kW)
Generator Nameplate Power Factor (pf)		RPM
Manufacturer	Model Name	Model Number
TECHNICAL INFORMATION		
Stator Resistance in ohms		
Negative Sequence Reactance in ohms		
Zero Sequence Reactance in ohms		
Neutral Grounding Resistor in ohms (If Applicable)		
Direct Axis Transient Reactance (unsaturated) in ohms		
Direct Axis Transient Reactance (saturated) in ohms		
Direct Axis Sub-Transient Reactance (unsaturated) in ohms		
Direct Axis Sub-Transient Reactance (saturated) in ohms		
Direct Axis Reactance (Unsaturated)		
Direct Axis Reactance (Saturated)		
Quadrature Axis Transient Reactance (Unsaturated)		
Quadrature Axis Transient Reactance (unsaturated) in ohms		
Leakage Reactance		
Direct Axis Transient Open Circuit Time Constant		
Quadrature Axis Transient Open Circuit Time Constant		
Direct Axis Sub-Transient Open Circuit Time Constant		
Quadrature Axis Sub-Transient Open Circuit Time Constant		
Short Circuit Current Contribution From Generator at the Point of Common Coupling		
Rotating Inertia of Overall Combination Generator, Prime Mover, Couplers and Gear Drives		
Station Power Load When Generator is Off-Line, Watts, pf		
Station Power Load During Start-Up, Watts, pf		
Station Power Load During Operation, Watts, pf		

INDUCTION GENERATORS		
GENERATOR INFORMATION		
Manufacturer	Model Name	Model Number
Generator Nameplate Voltage		Total Generator Nameplate AC Rating (kW)
Generator Nameplate Power Factor (pf)		RPM
TECHNICAL INFORMATION		
Minimum and Maximum Acceptable Terminal Voltage		
Synchronous Rotational Speed		
Rotation Speed at Rated Power		
Slip at Rated Power		
Minimum and Maximum Acceptable Terminal Voltage		
Motoring Power (kW)		
Neutral Grounding Resistor in ohms (If Applicable)		
I ² 2t or K (Heating Time Constant)		
Rotor Resistance in ohms		
Stator Resistance in ohms		
Stator Reactance in ohms		
Rotor Reactance in ohms		
Magnetizing Reactance		
Short Circuit Reactance		
Exciting Current		
Temperature Rise		
Frame Size		
Design Letter		
Reactive Power Required in Vars (No Load)		
Reactive Power Required in Vars (Full Load)		
Short Circuit Current Contribution from Generator at the Point of Common Coupling		
Rotating Inertia, H in Per Unit on kVA Base, of Overall Combination Generator, Prime Mover, Couplers and Gear Drives		
Station Power Load When Generator is Off-Line, Watts, pf		
Station Power Load During Start-Up, Watts, pf		
Station Power Load During Operation, Watts, pf		
Rotating Inertia, H in Per Unit on kVA Base, of Overall Combination Generator, Prime Mover, Couplers and Gear Drives		
Station Power Load During Operation, Watts, pf		
Station Power Load During Start-Up, Watts, pf		
Station Power Load when Generator is Off-Line, Watts, pf		

Level 4 & 5 Low Voltage Distribution (LVD) Site Plan

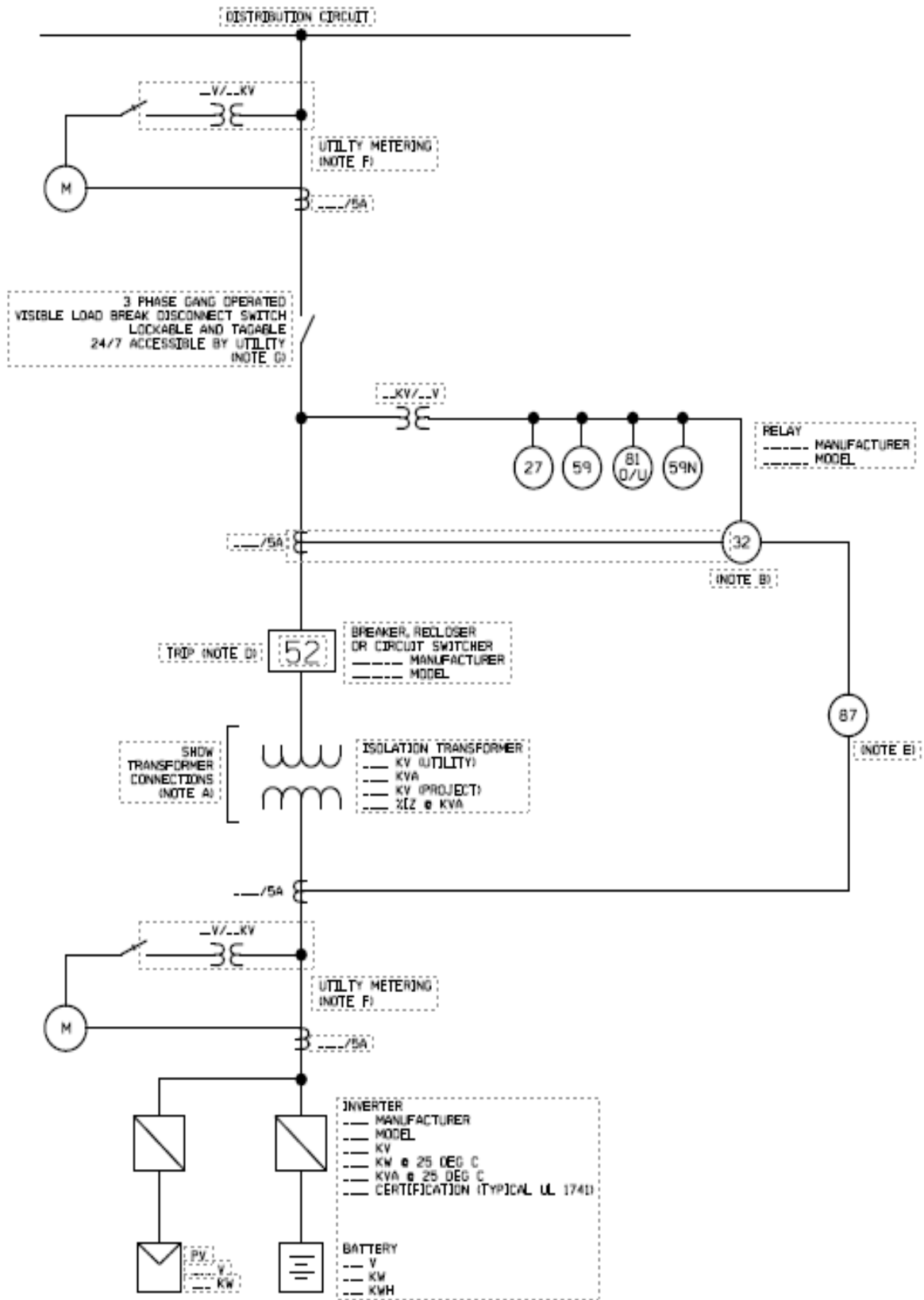


Street Address or GPS Coordinates



Weblink to State of Michigan / Plats:
http://www.cis.state.mi.us/platmaps/sr_subs.asp

**SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY
TYPICAL ISOLATION AND FAULT PROTECTION FOR INVERTER GENERATOR**



LEGEND

- 27 Undervoltage
 - 32 Reverse Power (Not Required for Flow-Back)
 - 51N Neutral overcurrent (required for grounded secondary)
 - 59 Oversvoltage
- Form 1221 12-2025

59N Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u Over/Underfrequency

NOTES

A) See technical requirements for permissible transformer connections. Transformer connections proposed shall be shown on the one-line diagram by the Applicant. Transformer connections and primary grounding to be approved by Utility.

B) The 27, 59, 59N, and 81O/U relays shall be connected to VTs located at the point of common coupling, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g. ungrounded wye or delta winding connections) on a grounded distribution system is not allowed.

C) Any additional equipment necessary to protect the Project is the sole responsibility of the Applicant to determine, design, and apply.

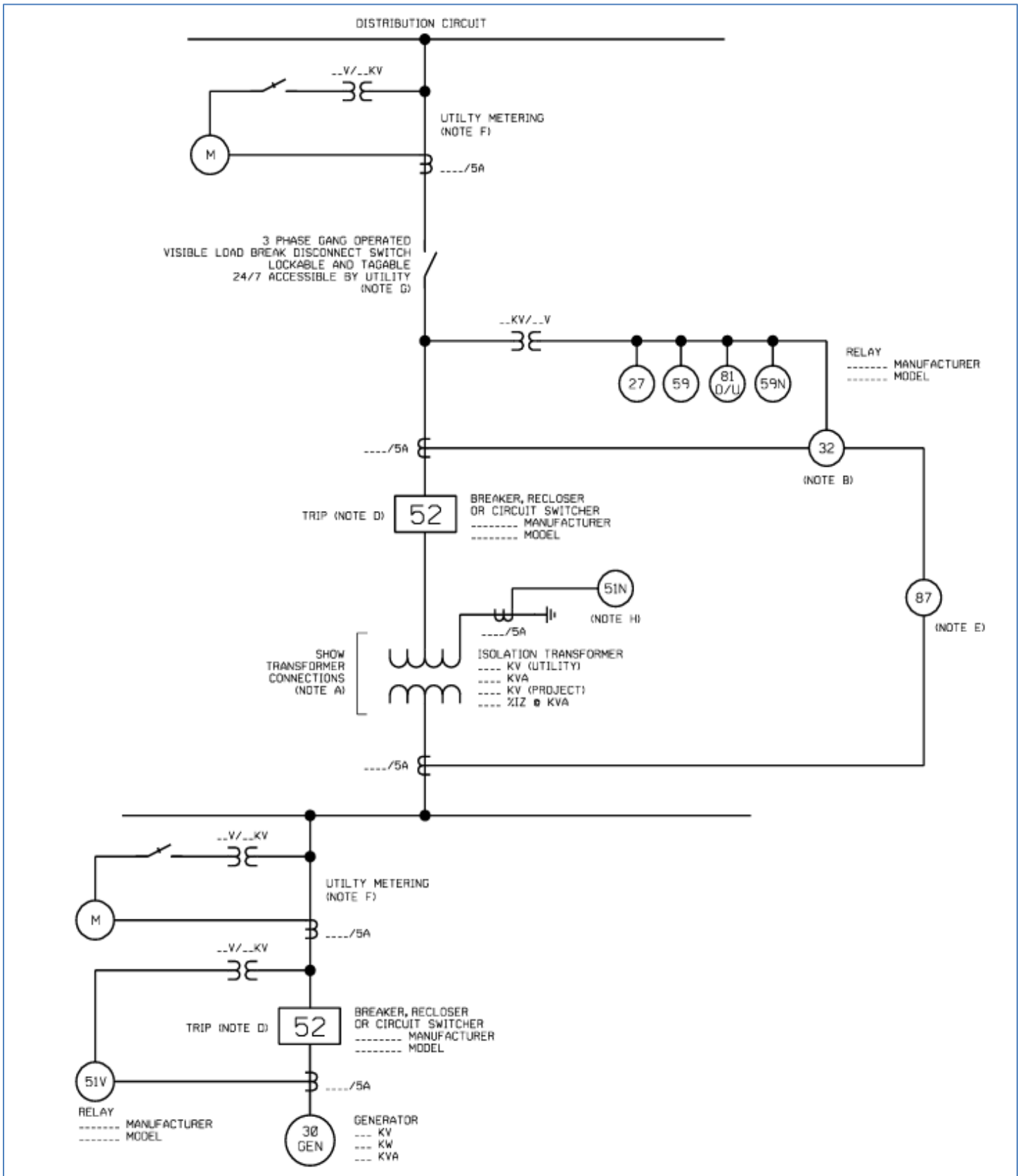
D) Tripping of an approved interrupting device between the point of common coupling and distributed energy resource is acceptable, depending on if the Applicant wants to serve its own isolated load after loss of Utility service.

E) Transformers 15 MVA (self-cooled rating) or larger shall be equipped with differential (87) relaying.

F) Utility metering equipment will be supplied by the utility.

G) The isolation device is to be located on the utility side of the metering CTs and VTs when connected to the high voltage distribution system.

**SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY
TYPICAL ISOLATION AND FAULT PROTECTION FOR SYNCHRONOUS GENERATOR**



LEGEND
 27 Undervoltage
 32 Reverse Power (Not Required for Flow-Back)
 51N Neutral overcurrent (required for grounded secondary)
 59 Overvoltage

59N Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u Over/Underfrequency

NOTES

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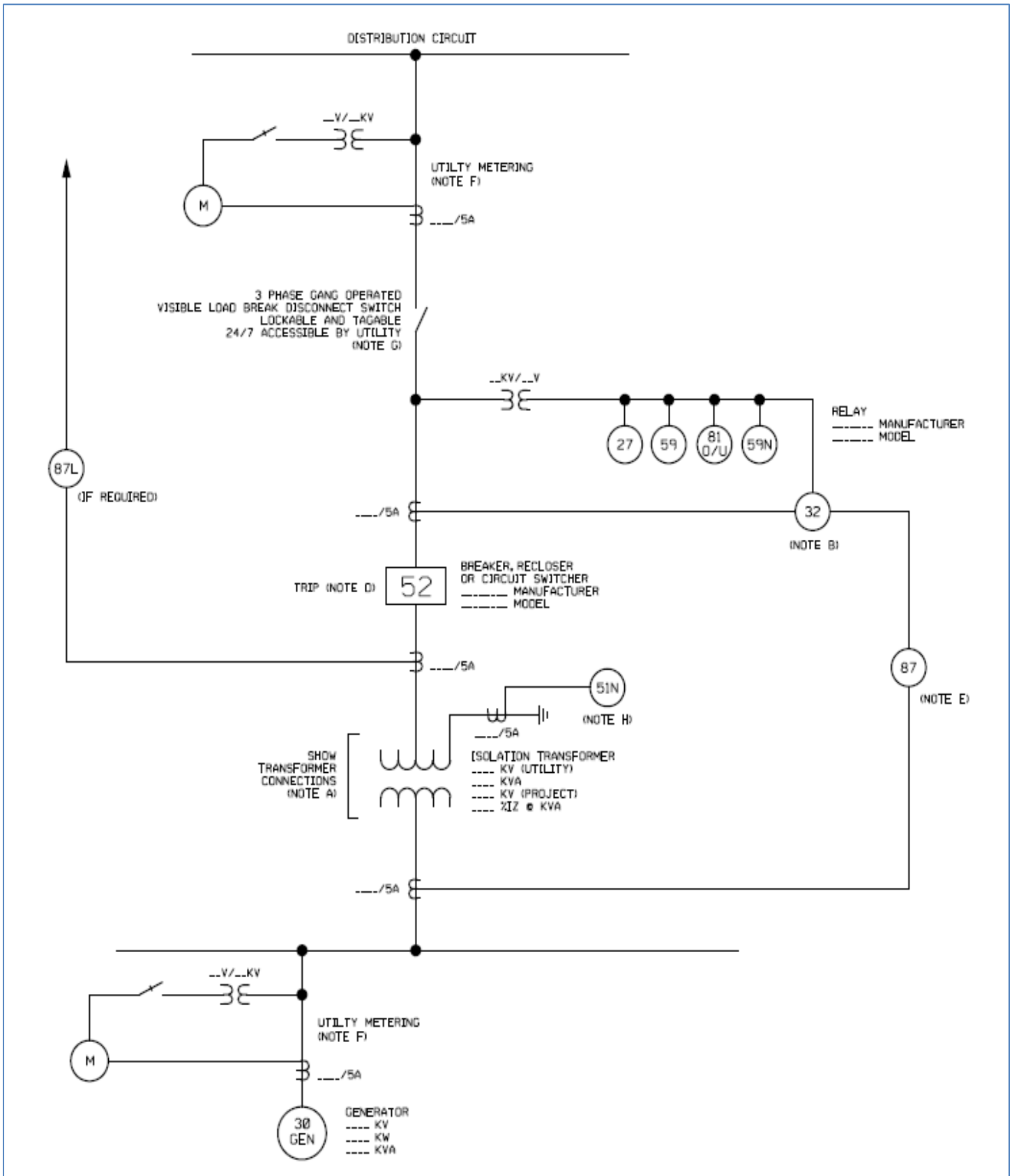
F) Utility metering equipment will be supplied by the utility.

G) The isolation device is to be located on the utility side of the metering CTs and VTs when connected to the high voltage distribution system.

----- Note H only applies to Synch Gens and Induction Generators -----

H) The 51N relay is required for isolation transformers with a Delta (Project) and Grounded Wye (Utility) winding connections. Refer to Note A for permissible transformer connections.

**SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY
TYPICAL ISOLATION AND FAULT PROTECTION FOR INDUCTION GENERATOR**



LEGEND

- 27 Undervoltage
- 32 Reverse Power (Not Required for Flow-Back)
- 51N Neutral overcurrent (required for grounded secondary)
- 59 Overvoltage

59N Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u Over/Underfrequency

NOTES

A) See technical requirements for permissible transformer connections. Transformer connections proposed shall be shown on the one-line diagram by the Applicant. Transformer connections and primary grounding to be approved by Utility.

B) The 27, 59, 59N, and 81O/U relays shall be connected to VTs located at the point of common coupling, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g. ungrounded wye or delta winding connections) on a grounded distribution system is not allowed.

C) Any additional equipment necessary to protect the Project is the sole responsibility of the Applicant to determine, design, and apply.

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E) Transformers 15 MVA (self-cooled rating) or larger shall be equipped with differential (87) relaying.

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G) The isolation device is to be located on the utility side of the metering CTs and VTs when connected to the high voltage distribution system.

----- Note H only applies to Synch Gens and Induction Generators -----

H) The 51N relay is required for isolation transformers with a Delta (Project) and Grounded Wye (Utility) winding connections. Refer to Note A for permissible transformer connections.