Zeeland Board of Public Works

Generator Interconnection Requirements

June 2015

INTRODUCTION

This Generator Interconnection Requirements document outlines the process, requirements, and agreements used to install or modify generation projects with aggregate generator output capacity within the following categories that are designed to operate in parallel with the Zeeland Board of Public Works ("Utility") electric system:

Category	Aggregate Generator Output
Category 1	less than 30 kW,
Category 2	30 kW or more, but less than 150 kW, or
Category 3	150 kW or more, but less than 750 kW.

The Utility also allows for "Expedited Generator Interconnection" procedures for generation sources with nameplate rating of 10 kW or less. Contact the Utility for the requirements and applicability.

Technical requirements (data, equipment, relaying, telemetry, metering) are defined according to type of generation, location of the interconnection, and mode of operation (Flow-back or Non-Flow-back). The process is designed to provide an expeditious interconnection to the Utility electric system that is both safe and reliable.

The term "Project" will be used throughout this document to refer to a merchant plant and other electric generating equipment and associated facilities that are not owned or operated by an electric utility. The term "Project Developer" means a person that owns, operates, or proposes to construct, own, or operate, a Project.

This document does not address other Project concerns such as environmental permitting, local ordinances, or fuel supply. Nor does it address agreements that may be required with the Utility and/or the transmission provider, or state or federal licensing, to market the Project's energy. An interconnection request does not constitute a request for transmission service.

It may be possible for the Utility to adjust requirements stated herein on a case-by-case basis. The review necessary to support such adjustments, however, may be extensive and interfere with study fees and the project schedule established and addressed in these requirements. Therefore, if requested by the Project Developer, adjustments to these requirements will only be considered if the Project Developer agrees in advance to compensate the Utility for the added costs of the necessary additional reviews and to also allow the Utility additional time for the additional reviews.

The Project Developer may apply for waiver from one or more provisions of these rules and the Utility may grant a waiver upon a showing of good cause.

CONTENTS

The Interconnection Process

This section outlines the process for interconnecting Projects to the Utility electric system. This includes both new Projects and modifications to existing Projects. The general process is shown in Figure 1.

The Utility is required to complete all of its obligations for interconnection of the Project to the Utility system within the time constraint shown below from the time a complete Interconnection Application is received by the Utility.

Utility Timing Requirement

Project Size	Timing Requirement
Category 1	3 Weeks
Category 2	4 Weeks
Category 3	6 Weeks

A completed Interconnection Application consists of an application, data (Appendix B or C), and a filing fee.

Project Size	Filing Fee
Category 1	$100
Category 2	$100
Category 3	$0.50 / kW

The filing fee will never be less than $100 or greater than $500.

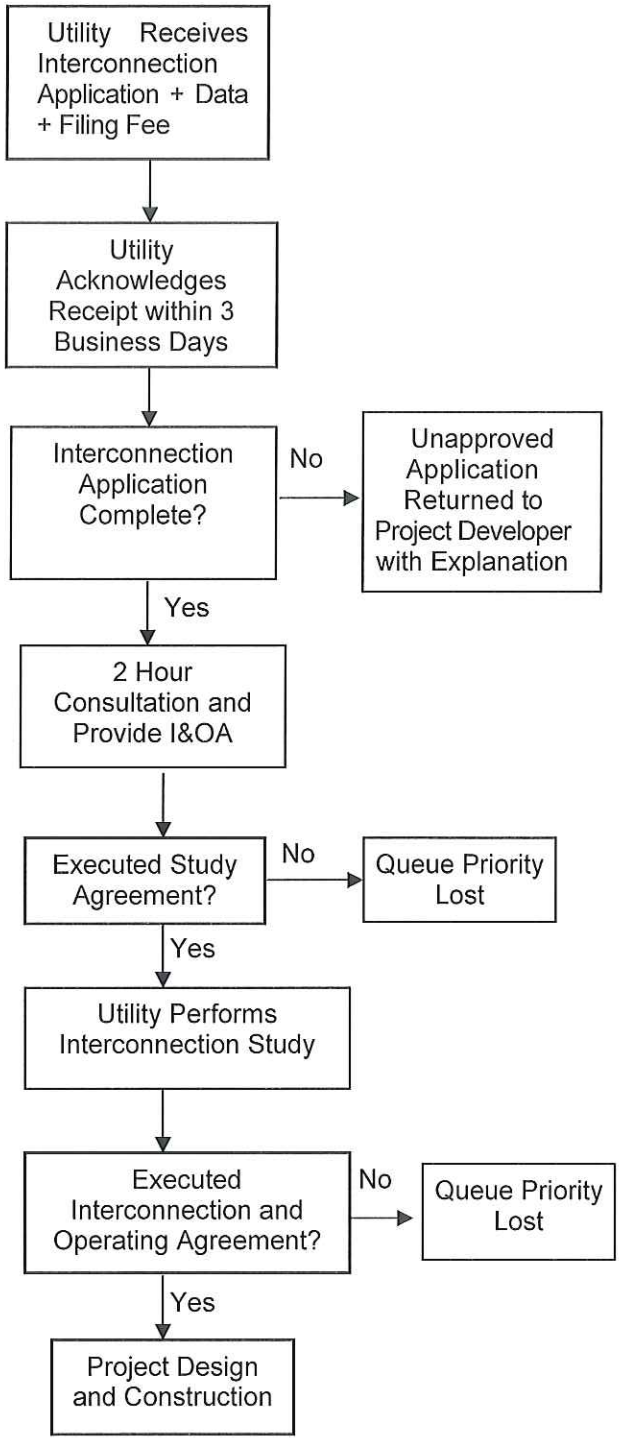
Delays that are the responsibility of Project Developer or attributable to the time lapse while the Utility diligently seeks to secure necessary rights-of-way, governmental permitting, zoning requirements, etc, will not be counted in the time to meet the deadline shown above. The Utility shall have no responsibility to pursue court action to obtain these items.

Interconnection Application

The Project Developer must first submit an Interconnection Application to the Utility. A separate application is required for each Project or Project site. A blank Interconnection Application can be found in Appendix A. A list of the required interconnection data, depending on the capacity rating and type of generation, can be found in Appendices B and C.

A complete submittal of required interconnection data and the filing fee must accompany the Interconnection Application. The Utility will notify the Project Developer within 3 business days of receipt of an Interconnection Application. If any portion of the Interconnection Application, data submittal, or filing fee is incomplete and/or missing, the unapproved Interconnection Application will be sent back to the Project Developer with the deficiencies clearly identified

Figure 1: Interconnection Process



INTERCONNECTION PROCESS

Once the Utility has accepted an Interconnection Application, the Project is assigned a position in the Project queue maintained by the Utility. The Project position in the Project queue is determined by the date the Utility received the accepted Interconnection Application. The Utility will provide the Project Developer up to two hours of consultation related to the Project's interconnection to the Utility system and will include a good faith estimate of the Utility's charges to complete the interconnection, including the estimated study fees, based on the information available to the Utility at that time.

Interconnection Study

The Utility will perform an Interconnection Study to determine the impact of the Project on the Utility's system, and the Utility's system modifications required for safe and reliable interconnection of the Project to the Utility system. The Project Developer is required to sign the Interconnection Study Agreement found in Appendix D and is encouraged to return the signed Interconnection Study Agreement to the Utility with the completed Interconnection Application to avoid delays in the interconnection process. Any delay in execution of the Interconnection Study Agreement will not count toward the interconnection deadlines.

The Utility will charge the Project Developer for the costs associated with completion of the Interconnection Study. If the Utility is required to sub-contract some or all work to third parties, the costs associated with the sub-contractor will automatically be passed through to the Project Developer. The additional costs borne by the Utility and charged to the Project Developer to recoup Utility expenses, will be the lesser of either of the following:

(1) Five percent of the estimated total cost of the Project, or

(2) $10,000

Interconnection Study fees are not required if the Interconnection Study determines that the Project's aggregate export capacity is less than 15% of the line section peak load and the project does not contribute more than 25% of the maximum short circuit current at the Point of Common Coupling (PCC) as defined by IEEE 1547.

Interconnection and Operating Agreement

The Utility will submit an Interconnection and Operating Agreement (I&OA) to the Project Developer, as soon as practical, after the 2 hour consultation described earlier. A sample Interconnection and Operating Agreement can be found in Appendix E.

The Interconnection and Operating Agreement will cover matters customarily addressed in such agreements in accordance with Good Utility Practice, including, without limitation, construction of facilities, system operation, interconnection cost and billing, defaults and remedies, insurance, and liability. All Utility costs, associated with making modifications to its distribution system, will be paid by the Project Developer.

Any delay in execution of the Interconnection and Operating Agreement will not count toward the interconnection deadlines.

Project Design and Construction

After the Interconnection and Operating Agreement is executed, the Utility will proceed to acquire necessary rights-of-way, procure required equipment, and design and construct the Interconnection

Facilities.

Ongoing Operations

The Project Developer and Utility will exchange contact information and update this information from time to time. A sample Contact List can be found in Appendix F.

TECHNICAL REQUIREMENTS

Technical Requirements

The following discussion details the technical requirements for the interconnection of Projects. The Utility has made efforts to simplify the technical requirements resulting in the adoption of IEEE Std. 1547, Standard for Interconnecting Distributed Resources with Electric Power Systems, being incorporated herein by reference.

Certain requirements, as specified by this document, must be met to provide compatibility between the Project and the Utility's electric system, and to assure that the safety and reliability of the electric system is not degraded by the interconnection.

Upgraded revenue metering may be required for the Project.

Major Component Design Requirements

The data requested in Appendix B or C, for all major equipment and relaying proposed by the Project Developer, must be submitted as part of the initial application for review and approval by the Utility. The Utility may request additional data be submitted as necessary during the study phase to clarify the operation of the Project.

Once installed, the interconnection equipment must be reviewed and approved by the Utility prior to being connected to the Utility's electric system and before Parallel Operation is allowed.

Data
The data that the Utility requires to evaluate the proposed interconnection is documented on a "fill in the blank" checklist by generator type in Appendices B and C.

A site plan, one-line diagrams, and interconnection protection system details of the Project are required as part of the application data. The generator manufacturer data package should also be supplied.

Isolating Transformer(s)

If a Project Developer installs an isolating transformer (typically Category 3 Projects), the transformer must comply with the current ANSI Standard C57.12. The transformer should have voltage taps on the high and/or low voltage windings sufficient to assure satisfactory generator operation over the range of voltage variation expected on the Utility electric system. The Project Developer also needs to assure sufficient voltage regulation at its facility to maintain an acceptable voltage level for its equipment during such periods when its Project is off-line. This may involve the provision of voltage regulation or a separate transformer between the Utility and the Project station power bus.

TECHNICAL REQUIREMENTS

The type of generation and electrical location of the interconnection will determine the isolating transformer connections. Allowable connections are detailed in the "Specific Requirements by Generator Type" section. Note: Some Utilities do not allow an isolation transformer to be connected to a grounded Utility system with an ungrounded secondary (Utility side) winding configuration, regardless of the Project type. Therefore, the Project Developer is encouraged to consult with the Utility prior to submitting an application.

The proper selection and specification of transformer impedance is important relative to enabling the proposed Project to meet Utility's reactive power requirements (see "Reactive Power Control").

Isolation Device

An isolation device is required for Category 3 Projects and should be placed at the Point of Common Coupling (PCC). It can be a circuit breaker, circuit switcher, pole top switch, load-break disconnect, etc., depending on the electrical system configuration. The following are required of the isolation device:

- Must be approved for use on the Utility system.
- Must comply with current relevant ANSI and/or IEEE Standards.
- Must have load break capability, unless used in series with a three-phase interrupting device.
- Must be rated for the application
- If used as part of a protective relaying scheme, it must have adequate interrupting capability. The Utility will provide maximum short circuit currents and X/R ratios available at the PCC, upon request.
- Must be operable and accessible by the Utility at all times (24 hours a day, 7 days a week).
- The Utility will determine if the isolation device will be used as a protective tagging point. If the determination is so made, the device must have visible open break provisions for padlocking in the open position and it must be gang operated. If the device has automatic operation, the controls must be located remote from the device.

Interconnection Lines

The physically closest available system voltage, as well as equipment and operational constraints influence the chosen point of interconnection. The Utility has the ultimate authority to determine the acceptability of a particular PCC.

Any new line construction to connect the Project to the Utility's electric system will be undertaken by the Utility at the Project Developer's expense. The new line(s) will terminate on a structure provided by the Project Developer.

Termination Structure

The Project Developer is responsible for ensuring that structural material strengths are adequate for all requirements, incorporating appropriate safety factors. Upon written request, the Utility will provide line tension information for maximum line dead-end tensions under heavy icing conditions. The structure must be designed for this maximum line tension along with an adequate margin of safety.

Electrical clearances shall comply with requirements of the National Electric Safety Code.

The installation of disconnect switches, bus support insulators, and other equipment shall comply with accepted industry practices.

Surge arrestors shall be selected to coordinate the BIL rating of major equipment components and shall comply with recommendations set forth in the current ANSI Standard C62.2.

Relaying Design Requirements

The interconnection relaying design requirements are intended to assure protection of the Utility electric system. Any additional relaying which may be necessary to protect equipment at the Project is solely the responsibility of the Project Developer to determine, design, and apply.

The relaying requirements will vary with the Project Category, the type of generation being used, and the mode of operation (Flow-back or Non-Flow-back).

All relaying proposed by the Project Developer to satisfy these requirements must be submitted for review and approved by the Utility. The data submitted for review must include information from the manufacturer indicating such certification, and the manufacturer must placard the equipment such that a field inspection can verify the certification.

Protective Relaying General Considerations

All relays must be equipped with targets or other visible indicators to show that the relay has operated.

If the protective system uses AC power as the control voltage, it must be designed to disconnect the generation from the Utility electric system if the AC control power is lost.

The relay system must be designed such that the generator is prevented from energizing the Utility electric system if that system is de-energized.

Momentary Paralleling

For situations where the Project will only be operated in parallel with the Utility electric system for a short duration (100 milliseconds or less), as in a make-before-break automatic transfer scheme, no additional relaying is required. Such momentary paralleling requires a modern integrated Automatic Transfer Switch (ATS) system, which is incapable of paralleling the Project for more than a short duration with the Utility's electric system. The ATS must be tested, verified and documented by the Project Developer for proper operation at least every 2 years. The Utility may be present during the testing.

Instrument Transformer Requirements (Category 3 Projects)

All relaying must be connected into instrument transformers.

All current connections shall be connected into current transformers (CT's). All CT's shall be rated to provide no more than 5 amperes secondary current for all normal load conditions, and must be designed for relaying use, with an "accuracy class" of at least C50. Current transformers with an accuracy class designation such as T50 are NOT acceptable. For three-phase systems, all three phases must be equipped with CT's.

All potential connections must be connected into voltage transformers (VT's). For single-phase connections, the VT's shall be provided such that the secondary voltage does not exceed 120 volts for normal operations. For three-phase connections, the VT's shall be provided such that the line-to-line voltage does not exceed 120 volts for normal operation, and both the primary and secondary of the VT's shall be connected for grounded-wye connections.

Direct Transfer Trip (DTT)

Direct Transfer Trip is generally not required for induction or Inverter-Type Projects. Direct Transfer Trip generally is not required for Synchronous Projects that will operate in the Non-Flow-back Mode since a simpler and more economical reverse power relay scheme can usually meet the requirements. For Synchronous

TECHNICAL REQUIREMENTS

Flow-back Projects the need for DTT is determined based on the location of the PCC. The Utility requires DTT when the total generation within a protective zone is greater than 33% of the minimum Utility load that could be isolated along with the generation. This prevents sustained isolated operation of the generation for conditions where generator protective relaying may not otherwise operate.

Direct transfer trip adds to the cost and complexity of an interconnection. A DTT transmitter is required for each Utility protective device whose operation could result in sustained isolated operation of the generator. An associated DTT receiver at the Project is required for DTT transmitter. A phone Data Circuit is required between each transmitter and receiver. Telemetry is required to monitor the status of the DTT communication.

At the Project Developer's expense, the Utility will provide the receiver(s) that the Project Developer must install, and the Utility will install the transmitter(s) at the appropriate Utility protective devices.

Reverse Power Relaying for Non-Flow-back
If metering for "Flow-back" Mode is not present, reverse power protection must be provided. The reverse power relaying will detect power flow from the Project into the Utility system, and operation of the reverse power relaying will separate the Project from the Utility system.

Automatic Reclosing
The Utility employs automatic multiple-shot reclosing on most of the Utility's circuit breakers and circuit reclosers to increase the reliability of service to its customers. Automatic single-phase overhead reclosers may be installed on distribution circuits to isolate faulted segments of these circuits.

The Project Developer is advised to consider the effects of Automatic Reclosing (both single-phase and three- phase) to assure that the Project's internal equipment will not be damaged. In addition to the risk of damage to the Project, an out-of-phase reclosing operation may also present a hazard to Utility's electric system equipment since this equipment may not be rated or built to withstand this type of reclosing.

The Utility will determine relaying and control equipment that needs to be installed to protect its own equipment from out-of-phase reclosing. Installation of this protection will be undertaken by the Utility at the Project Developer's expense.

Single-Phase Sectionalizing
The Utility also installs single-phase fuses and/or reclosers on its distribution circuits to increase the reliability of service to its customers. Three-phase generator installations may require replacement of fuses and/or single-phase reclosers with three-phase circuit breakers or circuit reclosers at Project Developer's expense.

Specific Requirements by Generator Type

If the interconnection system is certified by a nationally recognized testing laboratory to satisfy all requirements of IEEE Std. 1547, no additional equipment is required, except as noted below.

To satisfy IEEE Std. 1547 requirements for disconnection for faults, each generator must be equipped with voltage-controlled overcurrent relays. These relays shall measure and respond to currents and voltages in all three phases. Also, out-of-step relaying may be required as suggested in IEEE Std. 1547 for loss-of-synchronism conditions if the apparent voltage flicker from a loss-of-synchronism condition exceeds 5%.

If the interconnection system is not certified to satisfy requirements of IEEE Std. 1547, under/overvoltage, under/overfrequency, and voltage-controlled overcurrent relays will be required, and must conform to the requirements detailed in "Relay Setting Criteria" below. The under/overvoltage relays must monitor all three phases. All protection must use utility-grade relays.

TECHNICAL REQUIREMENTS

For a sample One-Line Diagram, see Appendix B.

Synchronous Projects – Isolation Transformer and Utility Ground Fault Detection
For Category 1 and Category 2 Projects, an isolation transformer will be required for three-phase Synchronous Projects. The isolation transformer must be incapable of producing ground fault current to the Utility system; any connection except delta primary (Project side), grounded-wye secondary (Utility side) is acceptable. A grounded-wye – grounded-wye transformer connection is acceptable only if the Project's single line-to-ground fault current contribution is less than the Project's three-phase fault current contribution at the PCC. Protection must be provided for internal faults in the isolating transformer; fuses are acceptable.

For Category 3 Projects, use the following criteria:

If the Project is connected to an ungrounded distribution system, the secondary winding (Utility side) of the isolation transformer must be connected delta.

If the Project is connected to a grounded distribution system, the developer has a choice of the following transformer connections:

1. A grounded wye – grounded wye transformer connection is acceptable only if the Project's single line-to-ground fault current contribution is less than the Project's three-phase fault current contribution at the PCC,
2. The isolation transformer may be connected for a delta secondary (Utility side) connection with any primary (Project side) connection, or
3. Ungrounded-wye secondary connection with a delta primary connection.

If the Project is connected to a grounded distribution system via one of the isolation transformer connections specified above, ground fault detection for Utility faults must be provided, and will consist of a (59N) ground overvoltage relay or (51N) overcurrent relay. The specific application of this relay will depend on the connection of the isolation transformer:

1. If a grounded-wye – grounded-wye transformer connection is used, a time overcurrent relay must be connected into a CT located on the Utility side isolation transformer neutral connection.
2. If a delta secondary/grounded-wye primary connection is used, a (59N) grounded overvoltage relay will be connected into the secondary of a set of three-phase VT's, which will be connected grounded-wye primary, with the secondary connected delta with one corner of the delta left open. The (59N) relay will be connected across this open-corner.
3. If an ungrounded-wye secondary/delta primary connection is used, a (59N) ground overvoltage relay will be connected into the secondary of a single VT, which will be connected from the ungrounded-wye neutral of the isolation transformer to ground.

Induction Projects
For Category 1 and Category 2 three-phase Projects, an isolation transformer connection is acceptable except grounded-wye (Utility side), delta (Project side). Protection must be provided for internal faults in the isolating transformer; fuses are acceptable. In cases where it can be shown that self excitation of the induction generator cannot occur when isolated from the Utility, the Utility may waive the requirement that the generator provide protection for Utility system ground faults.

For Category 3 Projects, use the following criteria:

If the Project is connected to an ungrounded distribution system, the secondary winding (Utility side) of the isolation transformer must be connected delta.

If the Project is connected to a grounded distribution system, the Project Developer has a choice of the following transformer connections:

1. The isolation transformer may be connected for a delta secondary (Utility side) connection with

any primary (Project side) connection, or
2. The isolation transformer may be connected for an ungrounded-wye secondary connection with a delta primary connection, or
3. The isolation transformer may be connected for a grounded-wye – grounded-wye connection.

If the Project is connected to a grounded distribution system via one of the isolation transformer connections specified above, ground fault detection for Utility faults must be provided. The specific application of this relay will depend on the connection of the isolation transformer:

1. If a delta secondary/grounded-wye primary connection is used, a (59N) ground overvoltage relay will be connected into the secondary of a set of three-phase VT's, which will be connected grounded-wye primary, with the secondary connected delta with one corner of the delta open. The (59N) relay will be connected across this open-corner.
2. If an ungrounded-wye secondary/delta primary connection is used, a (59N) ground overvoltage relay will be connected into the secondary of a single VT that will be connected from the ungrounded-wye neutral of the isolation transformer to ground.
3. If a grounded-wye – grounded-wye connection is used, a time overcurrent relay must be connected into a CT located on the Utility side isolation transformer neutral connection.

Protection must be provided for internal faults in the isolating transformer; fuses are acceptable. In cases where it can be shown that self excitation of the induction generator cannot occur when isolated from the Utility, the Utility may waive the requirement that the Project Developer provide protection for Utility system ground faults.

Inverter-Type Projects

For Category 1 and Category 2 Projects, no isolation transformer is required between the generator and the secondary distribution connection. If an isolation transformer is used for three-phase installations, any isolation transformer connection is acceptable except grounded-wye (Utility side), delta (Project side). Protection must be provided for internal faults in the isolating transformer; fuses are acceptable.

If the inverter has passed a certified anti-island test, the Utility may waive the requirement that the Project Developer provide protection for the Utility system ground faults.

For Category 3 Projects, an isolation transformer is required and must (without generation on-line) be incapable of producing ground fault current to the Utility system; and connection except delta primary (Project side), grounded-wye secondary (Utility side) is acceptable. Protection must be provided for internal faults in the isolating transformer; fuses are acceptable.

For a sample One-Line Diagram of this type of facility, see Appendix C.

Relay Setting Criteria

The relay settings as detailed in this section will apply in the vast majority of Category 3 applications. The Utility will issue relay settings for each individual project that will address the settings for these protective functions. All voltages will be adjusted for the specific VT ratio, and all currents will be adjusted for the specific CT ratio.

Undervoltage Relays

If an interconnection system, which is certified to meet IEEE Std. 1547 is used, the undervoltage set points as defined in IEEE Std. 1547 will be used. Otherwise, the undervoltage relays will normally be set to trip at 88% of the nominal primary voltage at the relay location, and must reset from a trip condition if the voltage increases to 90% of the nominal primary voltage at the relay location. In order to accommodate variations in this criteria, the trip point of the relays shall be adjustable over a range of 70% of the nominal voltage to 90% of the nominal voltage. The trip time shall not exceed 1.0 seconds at 90% of the relay setting.

Overvoltage Relays

If an interconnection system, which is certified to meet IEEE Std. 1547 is used, the overvoltage set points

as defined in IEEE Std. 1547 will be used. Two steps of overvoltage relaying are required. For the first overvoltage set point, the overvoltage relays will normally be set to trip at 107% of the nominal primary voltage at the relay location, and must reset from a trip condition if the voltage decreases to 105% of the nominal primary voltage at the relay location. In order to accommodate variations in this criteria, the trip point of the relays shall be adjustable over a range of 105% of the nominal voltage to 120% of the nominal voltage. The trip time shall not exceed 1.0 seconds at 110% of the relay setting.

Underfrequency Relays
If an interconnection system, which is certified to meet IEEE Std. 1547 is used, the underfrequency set points as defined in IEEE Std. 1547 will be used. Otherwise, the Underfrequency relay will normally be set for a trip point of 58.5 Hz, and must trip within 0.2 seconds. Relays with an inverse time characteristic (where the trip time changes with respect to the applied frequency) are not acceptable. These relays must respond reliably for applied source voltages as low as 70% of the nominal voltage.

Overfrequency Relays
If an interconnection system, which is certified to meet IEEE Std. 1547 is used, the overfrequency set points as defined in IEEE Std. 1547 will be used. Otherwise, the overfrequency relay will normally be set for a trip point of 60.5 Hz, and must trip within 0.2 seconds. Relays with an inverse time characteristic (where the trip time changes with respect to the applied frequency) are not acceptable. These relays must respond reliably for applied source voltages as low as 70% of the nominal voltage.

51V Relays – Voltage Controlled Overcurrent Relays
For synchronous generator applications, the (51V) relays must be set to detect any phase faults that may occur between the generator and the nearest three-phase fault clearing device on the Utility system. Since these faults may take up to 1-second to detect and isolate, the appropriate saturated direct-axis reactance of the generator will be used depending on its time constants. The settings of this device will consider the relay manufacturer's recommended practice for the type of generator and prime mover (mechanical energy source), and will be determined by the Utility for the specific system application.

59N Relays – Ground Fault Detection
This relay will be applied to detect ground faults on the Utility system when the Project is connected to a grounded Utility system via an ungrounded transformer winding. This relay will be set for a 10% shift in the apparent power system neutral. For an ungrounded-wye transformer winding with a single 120 V secondary VT, the setting will usually be 12 Volts. For a delta transformer winding with broken delta 120 V secondary VT's, the setting will usually be 20 Volts. The time delay will normally be 1 second.

51N Relays – Ground Fault Detection
This relay will be applied to detect ground faults on the Utility system when the Project is connected to a grounded Utility system via a grounded-wye transformer winding, and will be connected into a CT in the transformer neutral connection. This relay will be set to detect faults on the directly connected Utility system, and the timing will be set to comply with Utility practice for overcurrent relay coordination. The CT ratio and specific relay setting will be determined via a fault study performed by the Utility.

32 Relays – Reverse Power
The reverse power relay must be selected such that it can detect a power flow into the Utility system of a small fraction of the overall generator capacity. The relay will normally be set near its minimum (most sensitive) setting, and will trip after a 1 second time delay. The delay will avoid unnecessary tripping for momentary conditions.

Maintenance and Testing
The Utility reserves the right to test the relaying and control equipment that involves protection of the Utility electric system whenever the Utility determines a reasonable need for such testing exists.

The Project Developer is solely responsible for conducting proper periodic maintenance on the generating equipment and its associated control, protective equipment, interrupting devices, and main Isolation Device, per manufacturer recommendations.

TECHNICAL REQUIREMENTS

The Project Developer is responsible for the periodic scheduled maintenance on those relays, interrupting devices, control schemes, and batteries that involve the protection of the Utility electric system. If the interconnection system is certified to meet IEEE Std. 1547, the Standard requires that testing be conducted in accordance with written test procedures, and the nationally recognized testing laboratory providing certification, will require that such test procedures be available before certification of the equipment. Otherwise, a periodic maintenance program is to be established to test these relays at least every 2 years. Test reports of such testing shall be maintained by the Project Developer and made available for Utility inspection upon request for a period of four years.

Each routine maintenance check of the relaying equipment shall include both an exact calibration check and an actual trip of the circuit breaker or contractor from the device being tested. For each test, a report shall be submitted to the Utility indicating the results of the tests made and the "as found" and "as left" relay calibration values. Visually setting, without verification, a calibration dial or tap is not considered an adequate relay calibration check.

Installation Approval
The Project Developer must provide the Utility with 10 business days advance written notice of when the Project will be ready for inspection, testing, and approval.

Prior to final approval for Parallel Operation, the Utility's specified relay calibration settings shall be applied and a commissioning test must be performed on the generator relaying and control equipment that involves the protection of the Utility electric system. The commissioning test must be witnessed by the Utility and can be performed by the Utility at the Project Developer's request.

Telemetry and Disturbance Monitoring Requirements
If DTT is required, telemetry to monitor the DTT is also required. Disturbance monitoring is also recommended as being beneficial to the Project Developer and the Utility, but is not required in many cases.

Telemetry enables the Utility to operate the electric system safely and reliably under both normal and emergency conditions. The Utility evaluates the performance of the overall protective system for all faults on the electric system. It is critical that sufficient monitoring of the protective system is in place to determine its response. It is preferable to deploy disturbance monitoring into all Projects, but it can be expensive to deploy. Therefore, disturbance monitoring is required only for installations that already require telemetry.

The Project Developer shall provide a suitable indoor location, approved by the Utility, for the Utility's owned, operated, and maintained Remote Terminal Unit (RTU). The location must be equipped with a 48 V or 125 V DC power supply. The Project Developer must provide the necessary phone and data circuits, and install a telephone backboard for connections to the Utility RTU and metering equipment.

When telemetry is required, the following values will be telemetered:

1. Real and reactive power flow at the PCC.
2. Voltage at the PCC.
3. The status (normal/fail) of protective relay Communication Channels. A status indication of "FAIL" indicates the Communication Channel used for relaying (i.e. transfer trip) is unable to perform its protective function. This includes the following individual contacts from each individual Direct Transfer Trip receiver which is require by the Utility:
    a. Loss-of-guard (LOG) alarm
    b. Receive-trip relay (RTX)
    c. Lockout relay
4. The status (open/closed) of the main isolating breaker and each generating unit breaker (if the Project is composed of multiple units, a single logical (OR) status of the individual generator breaker states, indicating all generator breakers are open or any one or more generator breakers are closed, is permissible). A closed status would be indicated if any individual generator is on-line.

TECHNICAL REQUIREMENTS

Telemetry, when required, will be provided by the Utility at the Project Developer's expense. In addition to other telemetry costs, a one-time charge may be assessed to the Project Developer for equipment and software installed at the Utility's Control Center to process the data signals.

Miscellaneous Operational Requirements

Miscellaneous requirements include synchronizing equipment for Parallel Operation, reactive requirements, and system stability limitations.

Operating in Parallel

The Project Developer will be solely responsible for the required synchronizing equipment and for properly synchronizing the Project with the Utility electric system.

Voltage fluctuation at the PCC during synchronizing is limited by IEEE Std. 1547.

These requirements are directly concerned with the actual operation of the Project with the Utility:

- The Project may not commence parallel operation until approval has been given by the Utility. The completed installation is subject to inspection by the Utility prior to approval. Preceding this inspection, all contractual agreements must be executed by the Project Developer.

- The Project must be designed to prevent the Project from energizing into a de-energized Utility line. The Project's circuit breaker or contactor must be blocked from closing in on a de-energized circuit.

- The Project shall discontinue parallel operation with a particular service and perform necessary switching when requested by the Utility for any of the following reasons:

    1. When public safety is being jeopardized.

    2. During voltage or loading problems, system emergencies, or when abnormal sectionalizing or circuit configuration occurs on the Utility system.

    3. During scheduled shutdowns of Utility equipment that are necessary to facilitate maintenance or repairs. Such scheduled shutdowns shall be coordinated with the Project.

    4. In the event there is demonstrated electrical interference (i.e. Voltage Flicker, Harmonic Distortion, etc.) to the Utility's customers, suspected to be caused by the Project, and such interference exceeds then current system standards, the Utility reserves the right, at the Utility's initial expense, to install special test equipment as may be required to perform a disturbance analysis and monitor the operation and control of the Project to evaluate the quality of power produced by the Project. In the event that no standards exist, then the applicable tariffs and rules governing electric service shall apply. If the Project is proven to be the source of the interference, and that interference exceeds the Utility's standards or the generally accepted industry standards, then it shall be the responsibility of the Project Developer to eliminate the interference problem and to reimburse the Utility for the costs of the disturbance monitoring installation, removal, and analysis, excluding the cost of the meters or other special test equipment.

    5. When either the Project or its associated synchronizing and protective equipment is demonstrated by the Utility to be improperly maintained, so as to present a hazard to the Utility system or its customers.

    6. Whenever the Project is operating isolated with other Utility customers, for whatever reason.

    7. Whenever a loss of communication channel alarm is received from a location where a

communication channel has been installed for the protection of the Utility system.

8. Whenever the Utility notifies the Project Developer in writing of a claimed non-safety related violation of the Interconnection Agreement and the Project Developer fails to remedy the claimed violation within ten working days of notification, unless within that time the Project Developer and Utility agree in writing to a different procedure.

If the Project has shown an unsatisfactory response to requests to separate the generation from the Utility system, the Utility reserves the right to disconnect the Project from parallel operation with the Utility electric system until all operational issues are satisfactorily resolved.

Reactive Power Control
Synchronous generators that will operate in the Flow-back Mode must be dynamically capable of providing 0.90 power factor lagging (delivering reactive power to the Utility) and 0.95 power factor leading (absorbing reactive power from the Utility) at the Point of Receipt. The Point of Receipt is the location where the Utility accepts delivery of the output of the Project. The Point of Receipt can be the physical location of the billing meters or a location where the billing meters are not located, but adjusted for line and transformation losses.

Induction and Inverter-Type generators that will operate in the Flow-back Mode must provide for their own reactive needs (steady state unity power factor at the Point of Receipt). To obtain unity power factor, the Induction or Inverter-Type Project can:

1. Install a switchable Volt-Ampere reactive VAR supply source to maintain unity power factor at the Point of Receipt; or

2. Provide the Utility with funds to install a VAR supply source equivalent to that required for the Project to attain unity power factor at the Point of Receipt at full output.

There are no interconnection reactive power capability requirements for Synchronous, Induction, and Inverter-Type Projects that will operate in the Non-Flow-back Mode. The Utility's existing rate schedules, incorporated herein by reference, contain power factor adjustments based on the power factor of the metered load at these facilities.

Site Limitations
The Project Developer is responsible for evaluating the consequences of unstable generator operation or voltage transients on the Project equipment, and determining, designing, and applying any relaying which may be necessary to protect that equipment. This type of protection is typically applied on individual generators to protect the Projects.

The Utility will determine if operation of the Project will create objectionable voltage flicker and/or disturbances to other Utility customers and develop any required mitigation measures at the Project Developer's expense.

Revenue Metering Requirements

The Utility will own, operate, and maintain all required billing metering equipment at the Project Developer's expense.

Non-Flow-back Projects
A Utility meter will be installed that only records energy delivered to the Project.

Flow-back Projects
Special billing metering will be required. The Project Developer may be required to provide, at no cost to the Utility, a dedicated dial-up voice-grade circuit (POTS line) to allow remote access to the billing meter

by the Utility. This circuit shall be terminated within ten feet of the meter involved.

The Project Developer shall provide the Utility access to the premises at all times to install, turn on, disconnect, inspect, test, read, repair, or remove the metering equipment. The Project Developer may, at its option, have a representative witness this work.

The metering installations shall be constructed in accordance with the practices, which normally apply to the construction of metering installations for residential, commercial, or industrial customers. For Projects with multiple generators, metering of each generator may be required. When practical, multiple generators may be metered at a common point provided the metered quantity represents only the gross generator output.

The Utility shall supply to the Project Developer all required metering equipment and the standard detailed specifications and requirements relating to the location, construction, and access of the metering installation and will provide consultation pertaining to the meter installation as required. The Utility will endeavor to coordinate the delivery of these materials with the Project Developer's installation schedule during normal scheduled business hours.

The Project Developer may be required to provide a mounting surface for the metering equipment. The mounting surface and location must meet the Utility's specifications and requirements.

The responsibility for installation of the equipment is shared between the Utility and the Project Developer. The Project Developer may be required to install some of the metering equipment on its side of the PCC, including instrument transformers, cabinets, conduits, and mounting surfaces. The Utility shall install the meters and communication links. The Utility will endeavor to coordinate the installation of these items with the Project Developer's schedule during normal scheduled business hours.

Communication Circuits

The Project Developer is responsible for ordering and acquiring the telephone circuit required for the Project Interconnection. The Project Developer will assume all installation, operating, and maintenance costs associated with the telephone circuits, including the monthly charges for the telephone lines and any rental equipment required by the local telephone provider. However, at the Utility's discretion, the Utility may select an alternative communication method, such as wireless communications. Regardless of the method, the Project Developer will be responsible for all costs associated with the material and installation, whereas the Utility will be responsible to define the specific communication requirements.

The Utility will cooperate and provide information necessary for proper installation of the telephone circuits upon written request.

APPENDIX A

INTERCONNECTION APPLICATION

GENERATOR INTERCONNECTION APPLICATION

1. The undersigned Project Developer submits this Generator Interconnection Application and appropriate filing fee to interconnect a new Project to the Utility Electric System or to increase the capacity of an existing Project connected to the Utility Electric System.

2. A Project Developer requesting interconnection or an increase in the capacity of an existing Project to the Utility Electric System must provide the following information:

   a. Completed Interconnection Application Data sheet appropriate for the capacity rating and type of generating unit(s), as found in the Utility's Generator Interconnection Requirements (Interconnection Application Data sheet, found in Appendix B or C, must be attached to this Interconnection Application).

   b. Description of the equipment configuration and proposed interconnection one-line diagram (one-line diagram must be attached to this Interconnection Application).

   c. Project Developer (Single Point of Contact):

      Name:

      Address:

      _____

      Phone Number: _____

      Fax Number:

      e-mail Address:

      Project Site Address:

3. This Generator Interconnection Application shall be directed to the Utility representative as indicated below:

   Electric Operations Department
   Zeeland Board of Public Works
   350 E. Washington Ave
   Zeeland, MI 49464

4. I, the undersigned and authorized representative of the Project, submit this Generator Interconnection Application and required technical data for the Utility. I understand that upon acceptance, the Utility shall subsequently provide an Interconnection Study Agreement, if said Interconnection Study is determined to be necessary. The Interconnection Study Agreement will include the Scope of the Interconnection Study. I also understand that I shall be required to furnish certain required technical data as requested by the Utility in support of this study and reimburse the Utility for its study expenses.

Authorized Signature: _____

Printed Name:

_____

Title: _____

Company Name: _____

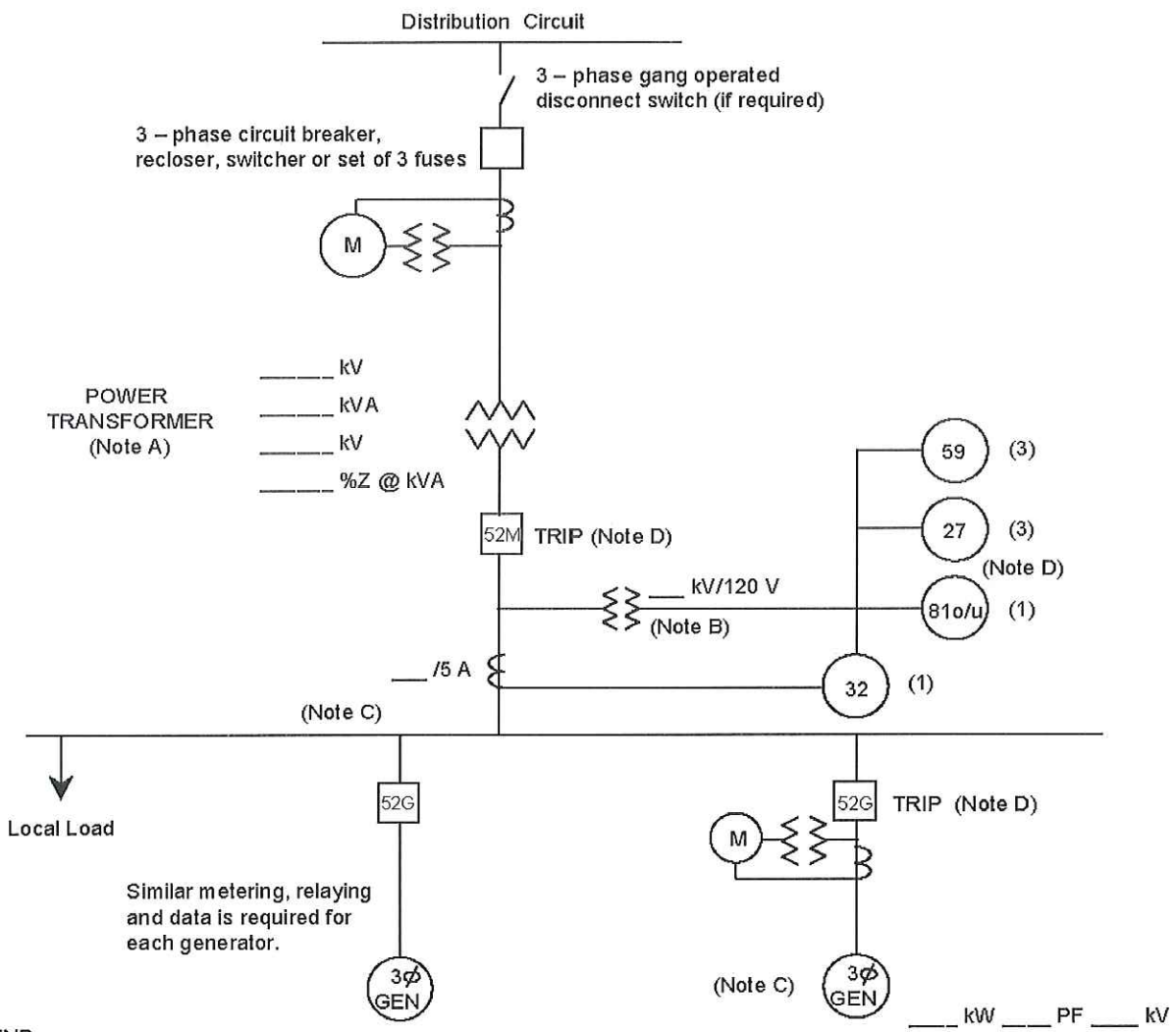
Date: _____

APPENDIX B

SYNCHRONOUS AND INDUCTION GENERATORS

REQUIRED DATA

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR SYNCHRONOUS GENERATOR INSTALLATIONS
LESS THAN 30 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
59	Overvoltage
81o/u	Over/Underfrequency

NOTES

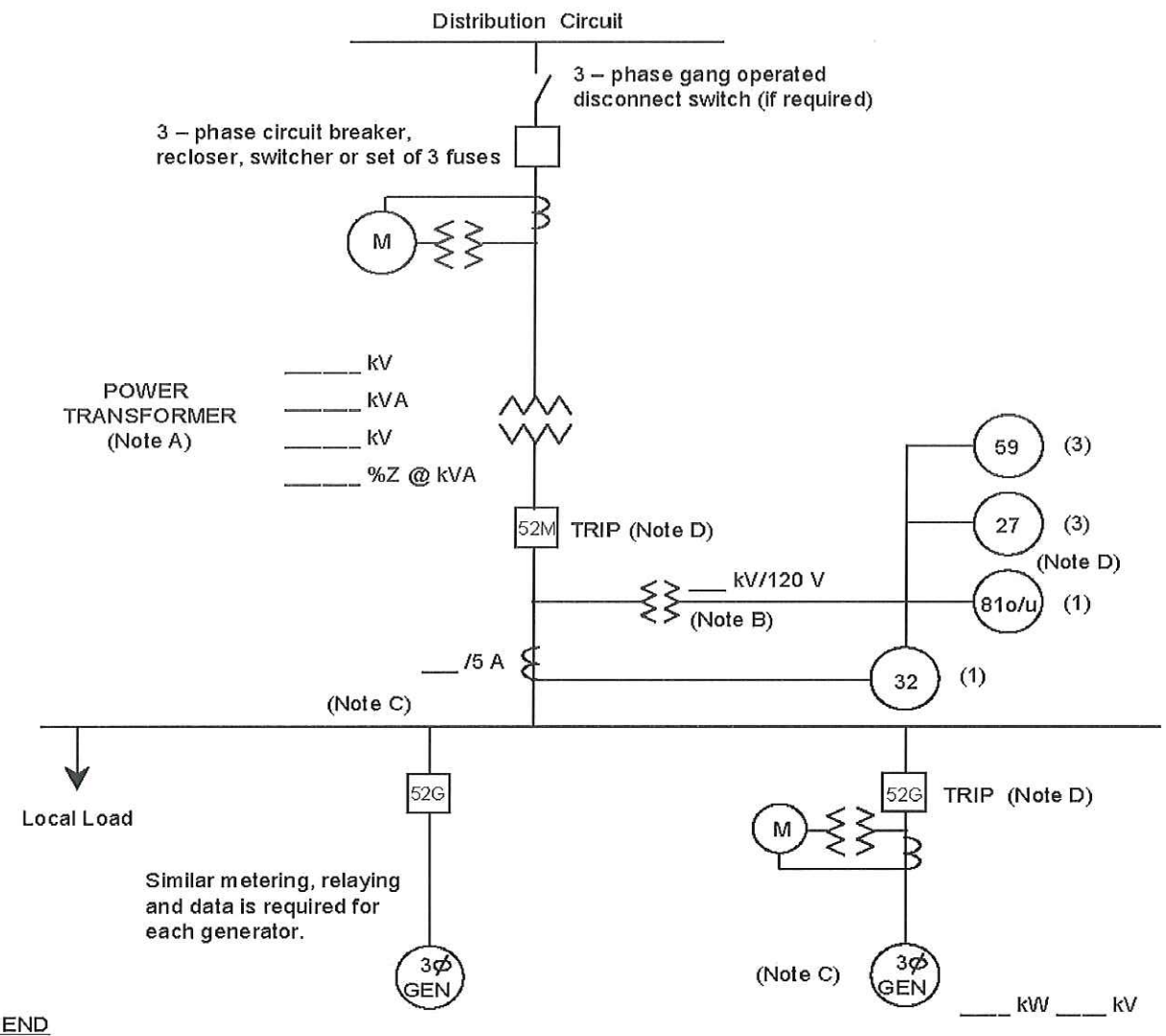
A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR INDUCTION GENERATOR INSTALLATIONS
LESS THAN 30 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
59	Overvoltage
81o/u	Over/Underfrequency

NOTES

A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

SYNCHRONOUS OR INDUCTION GENERATORS – AGGREGATE < 30 kW
INTERCONNECTION APPLICATION DATA FOR: _____
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data on which the requested information is provided.

General Information

Item No	Data Description	Attached Page No
1	Flow-back or Non-Flow-back	
2	Project Type (Base load, peaking, intermediate)	
3	Site Plan	
4	Simple One-Line Diagram(s) for Project and Project Load	
5	Detailed One-Line Diagram(s) for Project	
6	Energization Date for Project Interconnection Facilities	
7	First Parallel Operation Date for Testing	
8	Project Commercial Operation Date	
9	Estimated Project Cost	

The following information on these system components shall appear on the preliminary One-Line Diagram, including manufacturer make and model for the items listed below:

- Breakers - Rating, location and normal operating status (open or closed)
- Buses - Operating voltage
- Capacitors - Size of bank in kVAR
- 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

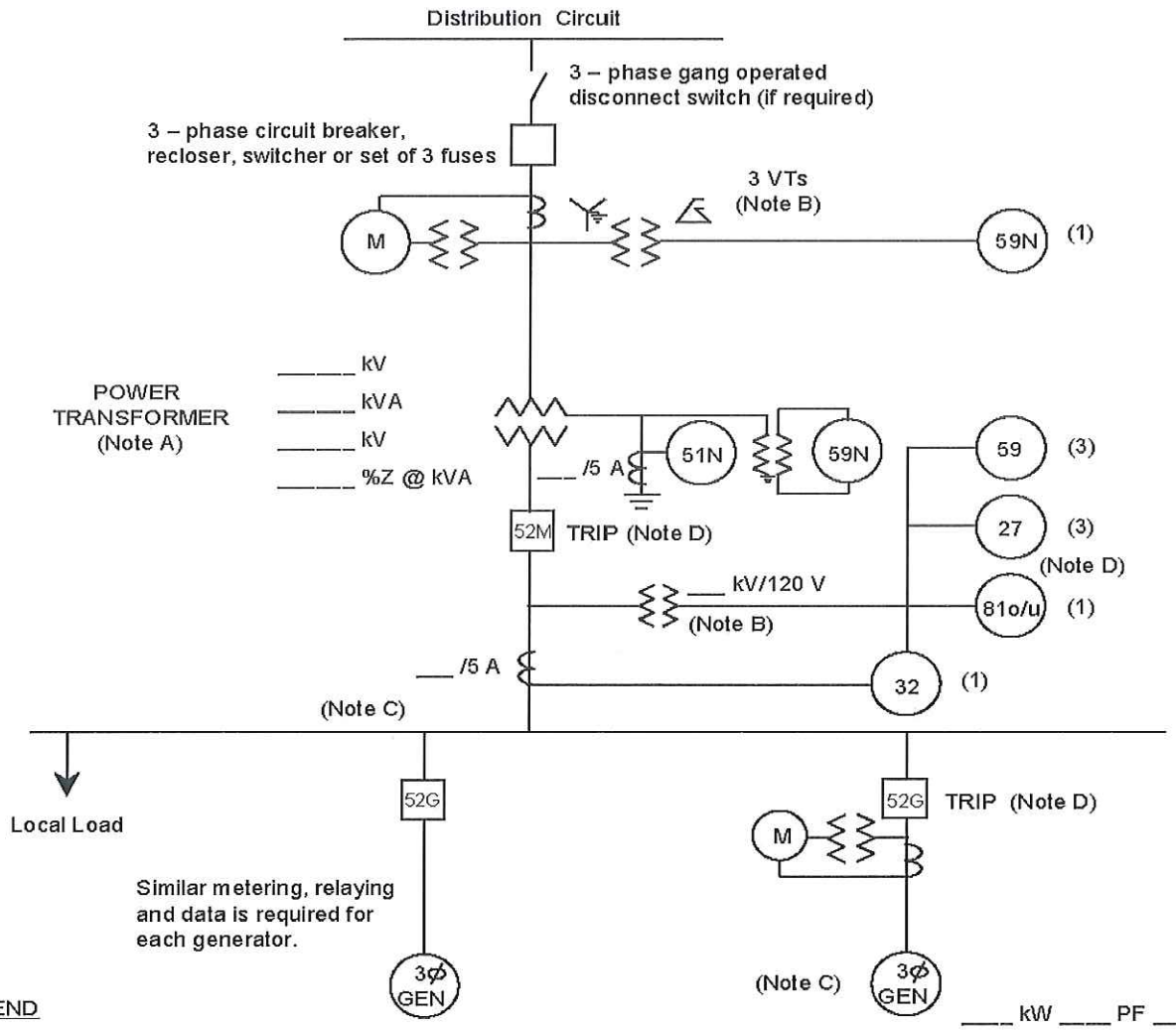
SYNCHRONOUS OR INDUCTION GENERATORS – AGGREGATE < 30 kW
INTERCONNECTION APPLICATION DATA FOR: _____
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique generator.

Electric Generator(s) at the Project: **Generator No _____**

Item No	Data Value	Data Description	Attached Page No
1		Generator Type (synchronous or induction)	
2		Generator Nameplate Voltage	
3		Generator Nameplate Watts or Volt-Amperes	
4		Generator Nameplate Power Factor (pf)	
5		Short Circuit Current contribution from generator at the Point of Common Coupling (single-phase and three-phase)	
6		National Recognized Testing Laboratory Certification	
7		Written Commissioning Test Procedure	

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR SYNCHRONOUS GENERATOR INSTALLATIONS
30 kW OR LARGER, BUT LESS THAN 150 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
51N	Neutral overcurrent (required for grounded secondary)
59	Overvoltage
59N	Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u	Over/Underfrequency

NOTES

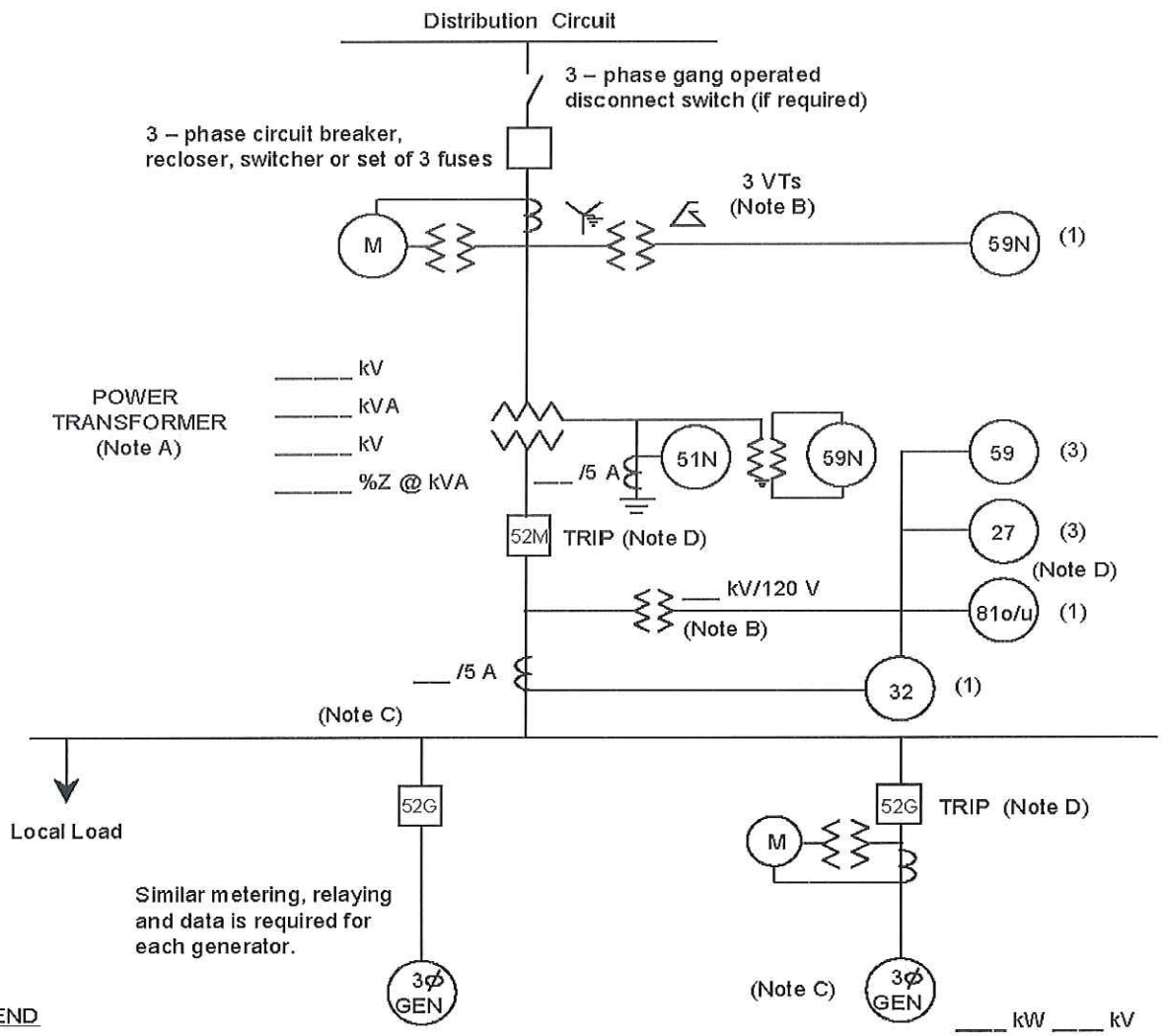
A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR INDUCTION GENERATOR INSTALLATIONS
30 kW OR LARGER, BUT LESS THAN 150 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
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 connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

SYNCHRONOUS OR INDUCTION GENERATORS - AGGREGATE ≥ 30 kW, BUT < 150 kW

INTERCONNECTION APPLICATION DATA FOR: _____

PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data on which the requested information is provided.

General Information

Item No	Data Description	Attached Page No
1	Flow-back or Non-Flow-back	
2	Project Type (Base load, peaking, intermediate)	
3	Site Plan	
4	Simple One-Line Diagram(s) for Project and Project Load	
5	Detailed One-Line Diagram(s) for Project	
6	Energization Date for Project Interconnection Facilities	
7	First Parallel Operation Date for Testing	
8	Project Commercial Operation Date	
9	Estimated Project Cost	

The following information on these system components shall appear on the preliminary One-Line Diagram, including manufacturer make and model for the items listed below:

- Breakers - Rating, location and normal operating status (open or closed)
- Buses - Operating voltage
- Capacitors - Size of bank in kVAR
- 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

SYNCHRONOUS OR INDUCTION GENERATORS - AGGREGATE ≥ 30 kW, BUT < 150 kW

INTERCONNECTION APPLICATION DATA FOR: _____

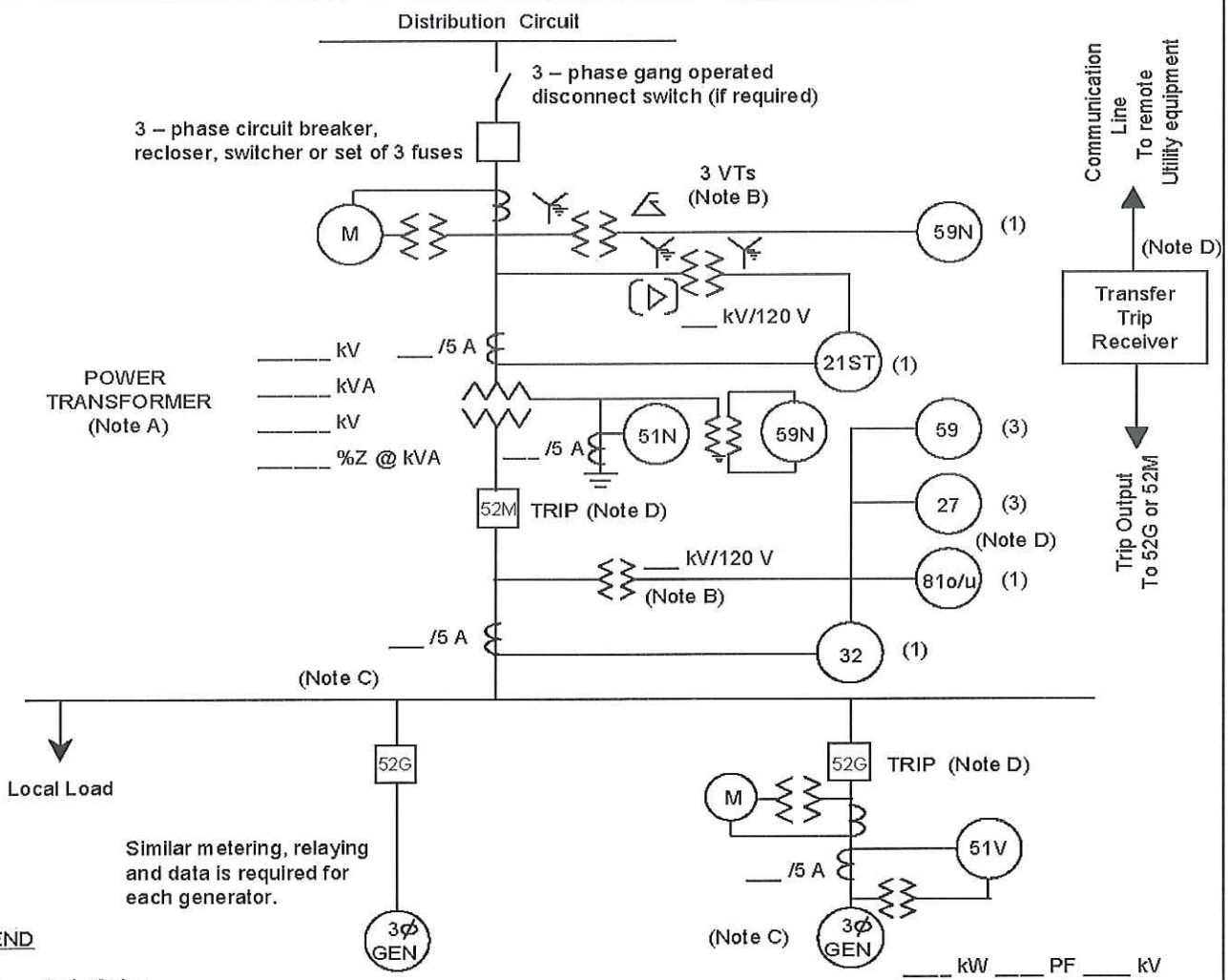
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique generator.

Electric Generator(s) at the Project **Generator No _____**

Item No	Data Value	Data Description	Attached Page No
1		Generator Type (synchronous or induction)	
2		Generator Nameplate Voltage	
3		Generator Nameplate Watts or Volt-Amperes	
4		Generator Nameplate Power Factor (pf)	
5		Direct axis reactance (saturated)	
6		Direct axis transient reactance (saturated)	
7		Direct axis sub-transient reactance (saturated)	
8		Short Circuit Current contribution from generator at the Point of Common Coupling (single-phase and three-phase	
9		National Recognized Testing Laboratory Certification	
10		Written Commissioning Test Procedure	

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR SYNCHRONOUS GENERATOR INSTALLATIONS
150 kW OR LARGER, BUT LESS THAN 750 kW



LEGEND

21ST	Out-of-step
27	Undervoltage
32	Reverse Power (not required for sellback)
51V	Voltage controlled overcurrent
51N	Neutral overcurrent (required for grounded secondary)
59	Overvoltage
59N	Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u	Over/Underfrequency

NOTES

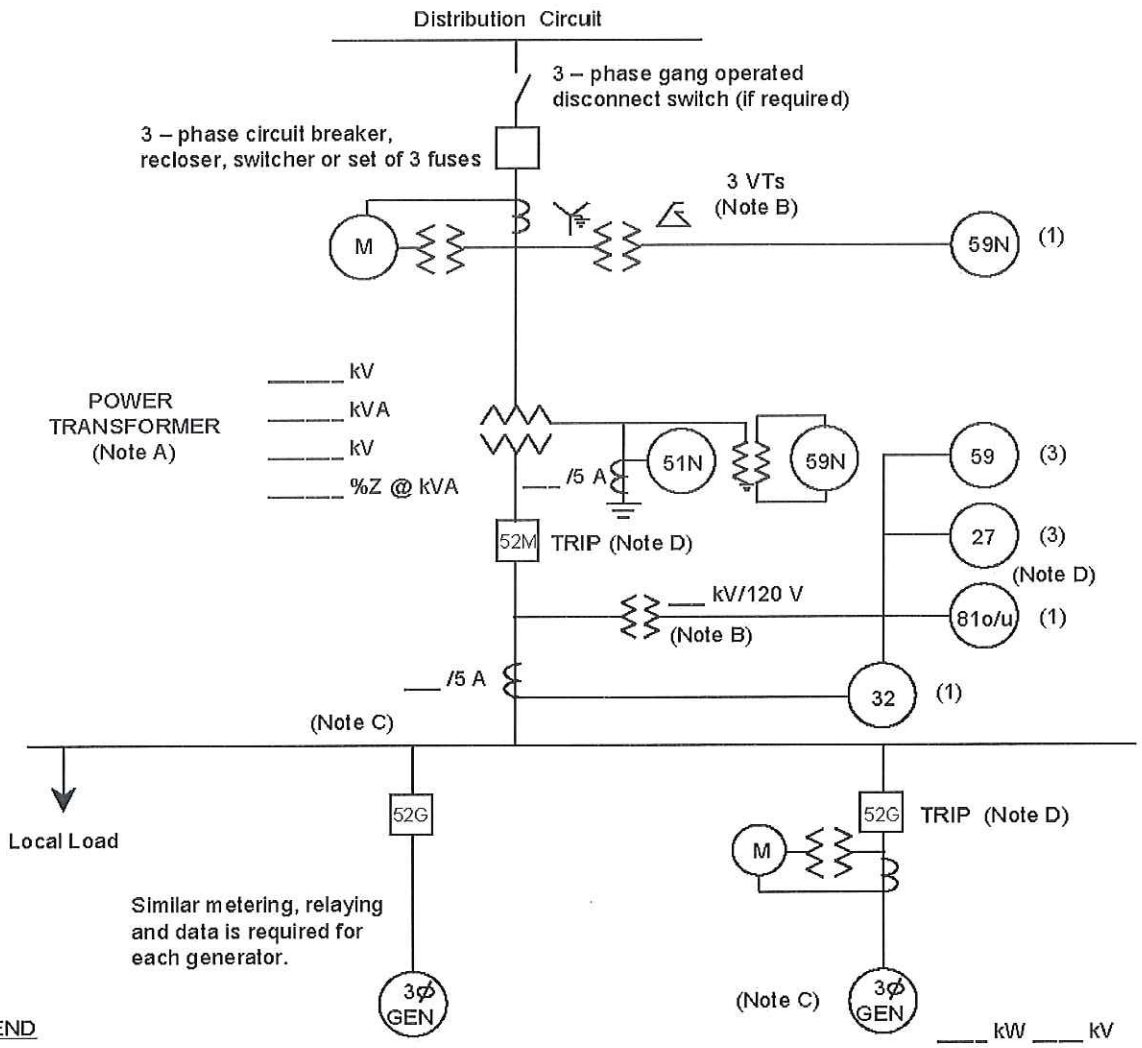
A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR INDUCTION GENERATOR INSTALLATIONS
150 kW OR LARGER, BUT LESS THAN 750 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
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 connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

SYNCHRONOUS OR INDUCTION GENERATORS – AGGREGATE ≥ 150 kW, BUT < 750 kW

INTERCONNECTION APPLICATION DATA FOR: _____

PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the tables below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique transformer.

General Information

Item No	Data Description	Attached Page No
1	Flow-back or Non-Flow-back	
2	Project Type (Base load, peaking, intermediate)	
3	Site Plan	
4	Simple One-Line Diagram(s) for Project and Project Load	
5	Detailed One-Line Diagram(s) for Project	
6	Energization Date for Project Interconnection Facilities	
7	First Parallel Operation Date for Testing	
8	Project Commercial Operation Date	
9	Estimated Project Cost	

Isolating Transformer(s) between Generator(s) and Utility: Transformer No _____

Item No	Data Description	Attached Page No
1	Rated kV and connection (delta, wye, wye-gnd) of each winding	
2	kVA of each winding	
3	BIL of each winding	
4	Fixed taps available for each winding	
5	Positive/negative range for any LTC windings	
6	%Z Impedance on transformer self cooled rating	

The following information on these system components shall appear on the preliminary One-Line Diagram, including manufacturer make and model for the items listed below:

- 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

SYNCHRONOUS OR INDUCTION GENERATORS – AGGREGATE ≥ 150 kW, BUT < 750 kW

INTERCONNECTION APPLICATION DATA FOR: _____

PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique generator.

Electric Generator(s) at the Project: **Generator No** _____

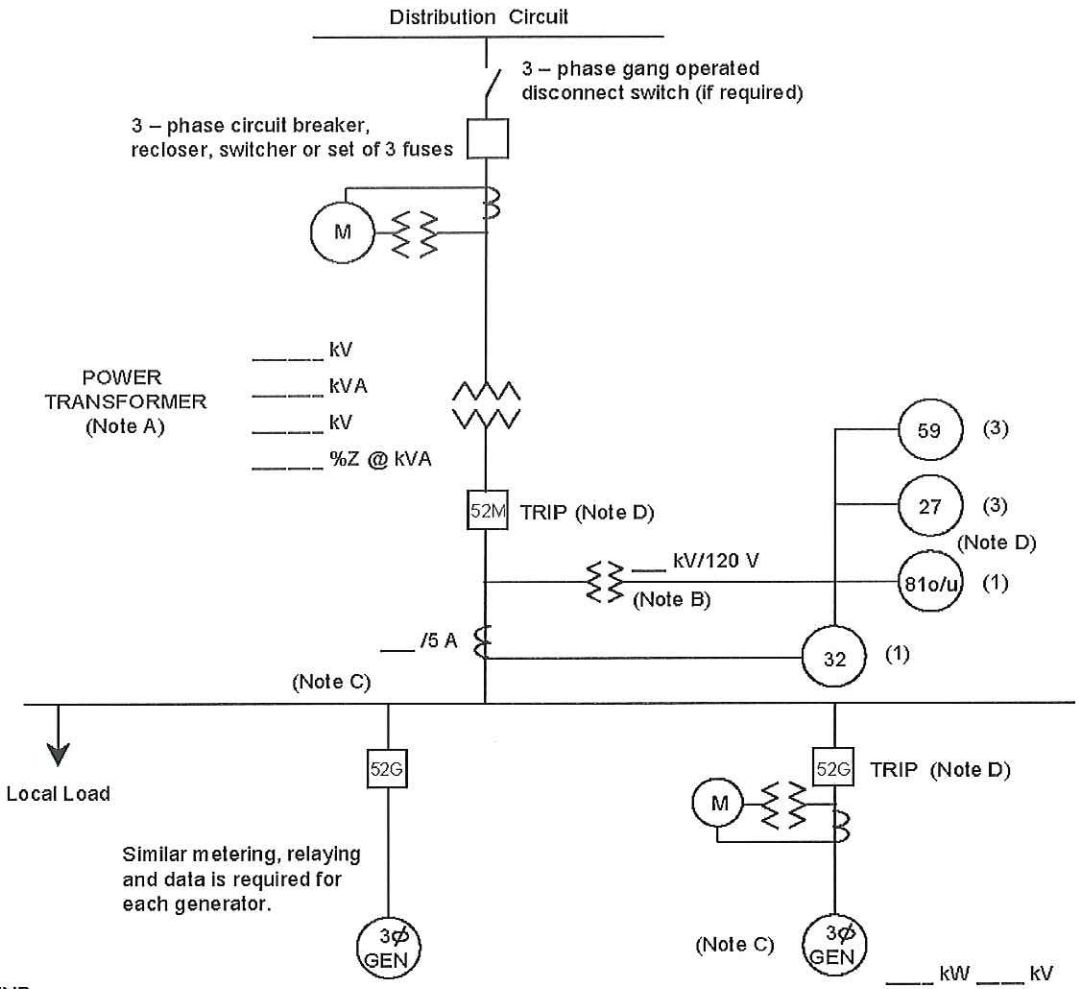
Item No	Data Value	Data Description	Attached Page No
1		Generator Type (synchronous or induction)	
2		Generator Rated Voltage	
3		Generator Rated Volt-Amperes	
4		Generator Rated Power kW	
5		Number of Poles	
6		Synchronous Rotational Speed	
7		Rotation Speed at Rated Power	
8		Slip at Rated Power	
9		Minimum and Maximum Acceptable Terminal Voltage	
10		Motoring Power (kW)	
11		Neutral Grounding Resistor (If Applicable)	
12		I_2^2t or K (Heating Time Constant)	
13		Rotor Resistance	
14		Stator Resistance	
15		Stator Reactance	
16		Rotor Reactance	
17		Magnetizing Reactance	
18		Short Circuit Reactance	
19		Exciting Current	
20		Temperature Rise	
21		Frame Size	
22		Design Letter	
23		Reactive Power Required in Vars (No Load)	
24		Reactive Power Required in Vars (Full Load)	
25		Short Circuit Current contribution from generator at the Point of Common Coupling	
26		Rotating inertia, H in Per Unit on kVA Base, of overall combination generator, prime mover, couplers and gear drives	
27		Station Power load when generator is off-line, Watts, pf	
28		Station Power load during start-up, Watts, pf	
29		Station Power load during operation, Watts, pf	
30		National Recognized Testing Laboratory Certification (if applicable)	
31		Written Commissioning Test Procedure	

APPENDIX C

INVERTER-TYPE GENERATORS

REQUIRED DATA

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR INVERTER GENERATOR INSTALLATIONS
LESS THAN 30 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
59	Overvoltage
81o/u	Over/Underfrequency

NOTES

A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

INVERTER-TYPE GENERATORS – AGGREGATE < 30 kW
INTERCONNECTION APPLICATION DATA FOR: _____
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data on which the requested information is provided.

General Information

Item No	Data Description	Attached Page No
1	Flow-back or Non-Flow-back	
2	Project Type (Base load, peaking, intermediate, other)	
3	Site Plan	
4	Simple One-Line Diagram(s) for Project and Project Load	
5	Detailed One-Line Diagram(s) for Project	
6	Energization Date for Project Interconnection Facilities	
7	First Parallel Operation Date for Testing	
8	Project Commercial Operation Date	
9	Estimated Project Cost	

The following information on these system components shall appear on the preliminary One-Line Diagram, including manufacturer make and model for the items listed below:

- Breakers - Rating, location and normal operating status (open or closed)
- Buses - Operating voltage
- Capacitors - Size of bank in kVAR
- 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

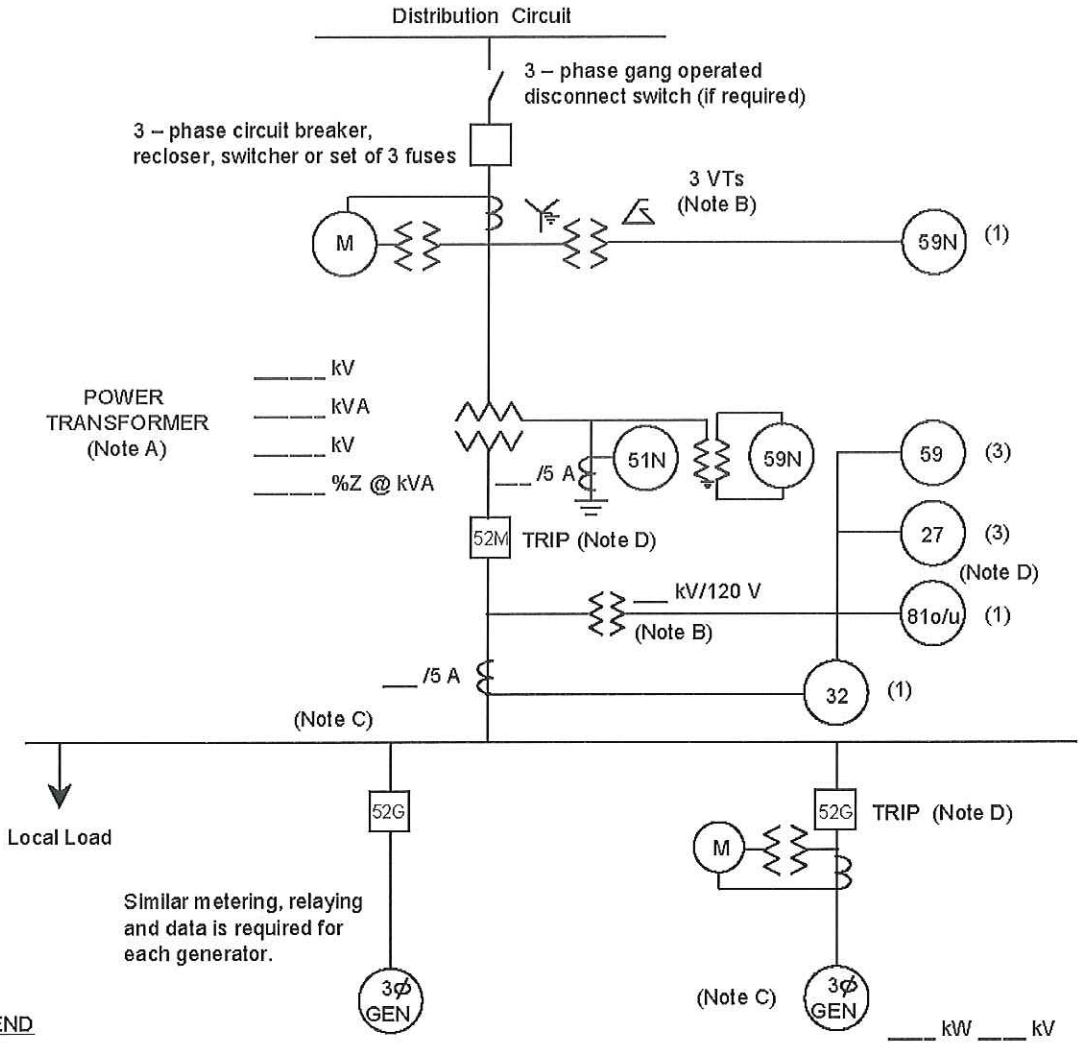
INVERTER-TYPE GENERATORS – AGGREGATE < 30 kW
INTERCONNECTION APPLICATION DATA FOR: _____
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique generator.

Electric Generator(s) at the Project: **Generator No _____**

Item No	Data Description	Attached Page No
1	Generator Type (Inverter)	
2	Generator Nameplate Voltage	
3	Generator Nameplate Watts or Volt-Amperes	
4	Generator Nameplate Power Factor (pf)	
5	Short Circuit Current contribution from generator at the Point of Common Coupling (single-phase and three-phase)	
6	National Recognized Testing Laboratory Certification	
7	Written Commissioning Test Procedure	

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR INVERTER GENERATOR INSTALLATIONS
30 kW OR LARGER, BUT LESS THAN 150 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
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 connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

INVERTER-TYPE GENERATORS - AGGREGATE ≥ 30 kW, BUT < 150 kW
INTERCONNECTION APPLICATION DATA FOR: _____
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data on which the requested information is provided.

General Information

Item No	Data Description	Attached Page No
1	Flow-back or Non-Flow-back	
2	Project Type (Base load, peaking, intermediate, other)	
3	Site Plan	
4	Simple One-Line Diagram(s) for Project and Project Load	
5	Detailed One-Line Diagram(s) for Project	
6	Energization Date for Project Interconnection Facilities	
7	First Parallel Operation Date for Testing	
8	Project Commercial Operation Date	
9	Estimated Project Cost	

The following information on these system components shall appear on the preliminary One-Line Diagram, including manufacturer make and model for the items listed below:

- Breakers - Rating, location and normal operating status (open or closed)
- Buses - Operating voltage
- Capacitors - Size of bank in kVAR
- 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

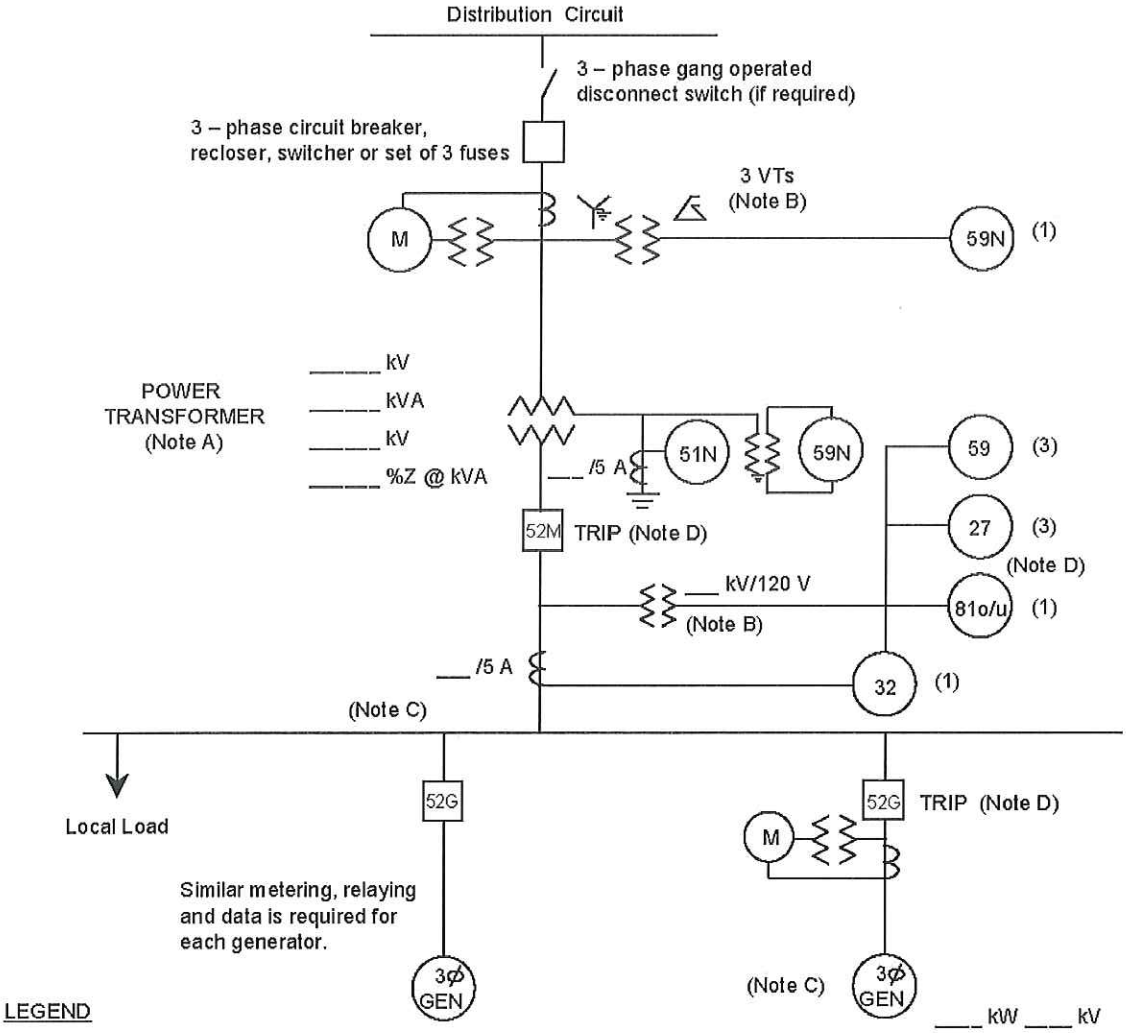
INVERTER-TYPE GENERATORS - AGGREGATE ≥ 30 kW, BUT < 150 kW
INTERCONNECTION APPLICATION DATA FOR: _____
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique generator.

Electric Generator(s) at the Project: **Generator No _____**

Item No	Data Description	Attached Page No
1	Generator Type (Inverter)	
2	Generator Nameplate Voltage	
3	Generator Nameplate Watts or Volt-Amperes	
4	Generator Nameplate Power Factor (pf)	
5	Short Circuit Current contribution from generator at the Point of Common Coupling (single-phase and three-phase)	
6	National Recognized Testing Laboratory Certification	
7	Written Commissioning Test Procedure	

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR INVERTER GENERATOR INSTALLATIONS
150 kW OR LARGER, BUT LESS THAN 750 kW



LEGEND

27	Undervoltage
32	Reverse Power (not required for sellback)
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 connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

INVERTER-TYPE GENERATORS - AGGREGATE ≥ 150 kW, BUT < 750 kW

INTERCONNECTION APPLICATION DATA FOR: _____

PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique transformer.

General Information

Item No	Data Description	Attached Page No
1	Flow-back or Non-Flow-back	
2	Project Type (Base load, peaking, intermediate, other)	
3	Site Plan	
4	Simple One-Line Diagram(s) for Project and Project Load	
5	Detailed One-Line Diagram(s) for Project	
6	Energization Date for Project Interconnection Facilities	
7	First Parallel Operation Date for Testing	
8	Project Commercial Operation Date	
9	Estimated Project Cost	

Isolating Transformer(s) between Generator(s) and Utility: Transformer No ____

Item No	Data Description	Attached Page No
1	Rated kV and connection (delta, wye, wye-gnd) of each winding	
2	kVA of each winding	
3	BIL of each winding	
4	Fixed taps available for each winding	
5	Positive/negative range for any LTC windings	
6	%Z Impedance on transformer self cooled rating	

The following information on these system components shall appear on the preliminary One-Line Diagram, including manufacturer make and model for the items listed below:

- 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-TYPE GENERATORS - AGGREGATE ≥ 150 kW, BUT < 750 kW
INTERCONNECTION APPLICATION DATA FOR: _____
PROVIDED BY: _____ DATE: _____

Instructions: Attach data sheets as required. Indicate in the table below the page number of the attached data (manufacturer's data where appropriate) on which the requested information is provided. Provide one table for each unique generator.

Electric Generator(s) at the Project: **Generator No _____**

Item No	Data Description	Attached Page No
1	Generator Type (Inverter)	
2	Generator Nameplate Voltage	
3	Generator Nameplate Watts or Volt-Amperes	
4	Generator Nameplate Power Factor (pf)	
5	Minimum and Maximum Acceptable Terminal Voltage	
6	Reactive Capability Curve showing overexcited and underexcited limits (Reactive Information if non-synchronous)	
7	Short Circuit Current contribution from generator at the Point of Common Coupling	
8	Nationally Recognized Testing Laboratory Certification	
9	Written Commissioning Test Procedure	

APPENDIX D

INTERCONNECTION STUDY AGREEMENT

[Project]
Interconnection Study Agreement for
Generator Interconnection

WHEREAS, proposals to construct or upgrade a Project which will be operated in parallel with and interconnected with Zeeland Board of Public Works ("Utility") electric system must be reviewed by the Utility to determine how it will impact the Utility's electric system.

WHEREAS, on _____ Utility received from _____ ("Project Developer") a Generator Interconnection Application.

WHEREAS Utility has determined that an Interconnection Study is necessary to determine whether the Utility electric system can accommodate the requested interconnection.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein set forth, the Utility and the Project Developer agree as follows:

1. The Utility shall complete or cause to be completed an Interconnection Study in accordance with the Utility's Generator Interconnection Requirements and this Agreement.

2. The Utility will charge the Project Developer for the Interconnection Study. The Utility may use consultants, sub-contractors, engineers, etc for assistance in the Study. The costs associated with third parties to assist the Utility will be passed directly to the Project Developer. Additional direct charges from the Utility shall not exceed the lesser of either of the following:

   (a) 5% of the estimated total cost of the Project
   (b) $10,000

The Utility shall not charge the Project Developer if the Project's aggregate export capacity is less than 15% of the line section peak load and the Project does not contribute more than 25% of the maximum short circuit current at the point of interconnection. The Project Developer will be billed for the cost of the Interconnection Study at the conclusion of the Interconnection Study.

3. The Project Developer is to return this executed Interconnection Study Agreement to the Utility as soon as possible. The interconnection process will not proceed until the fully executed Interconnection Study Agreement is received.

4. The Utility shall supply a copy of the completed Interconnection Study to the Project Developer.

5. Any notice or request made to or by either Party regarding this Agreement shall be made to the representative of the other Party, or its designated agent, as indicated below.

Utility	Project Developer
_____	_____
	_____
Name	
_____ Company	
Address 1 _____	_____
Address 2 _____	_____

IN WITNESS WHEREOF, the Parties have caused this Interconnection Study Agreement to be

executed by their respective authorized officials.

_____	_____
By:	By:
_____	_____
_____	_____
(Signature)	(Signature)
_____	_____
(Typewritten or Printed Name)	(Typewritten or Printed Name)
Title	Title
_____	_____
Date	Date

APPENDIX E

INTERCONNECTION AND OPERATING AGREEMENT

GENERATOR INTERCONNECTION & OPERATING AGREEMENT

PART I

Project Developer Name:_____

Project Service Address: _____Account #:

Township/County/City: _____ State:_____ Zip Code:

Project Developer Contact Name:_____

Telephone:_(___)_____ Fax:_(___) _____ E-mail:

Mailing Address (if different):

Equipment Specifications: Make: _____Model:

Property Owner Name (If different from Project Developer):_____

Property Owner Address:_____

Telephone:_(___)_____ Fax:_(___) _____ E-mail: _____

Township/County/City: _____

Property Owner Contact Name:_____

Telephone:_(___)_____ Fax:_(___) _____ E-mail: _____

Service Type: Single Phase / Three Phase (circle one) Voltage Level: _____

This section is to be completed by a Zeeland Board of Public Works representative.

Work Order Number: _____

Good Faith Estimate for Interconnection: $_____

Electric Field Manager Location: _____

PART I I

Terms and Conditions on the reverse side hereof are a part of this Agreement. PROJECT DEVELOPER ACKNOWLEDGES HAVING READ SAID TERMS AND CONDITIONS.

PROJECT DEVELOPER	**ZEELAND BOARD OF PUBLIC WORKS**
By: _____ (Signature)	By: _____ (Signature)
Printed Name: _____	Printed Name: _____
Title: _____	Title: _____

PROPERTY OWNER (If different from PROJECT DEVELOPER

By: _____ (Signature)	By: _____ (Signature)
Printed Name: _____	Printed Name: _____
Title: _____	Title: _____

Effective Date:

PART II

TERMS AND CONDITIONS

This GENERATOR INTERCONNECTON & OPERATING AGREEMENT (hereinafter, this Agreement), is made and entered into as of the Effective Date identified in Part I, between the Zeeland Board of Public Works, a Michigan municipality 350 E. Washington Ave, Zeeland, MI 49464, herein termed "Utility", and the Project Developer, herein termed "Project Developer." Utility and Project Developer are hereinafter sometimes referred to individually as "Party" and collectively as "Parties" where appropriate.

1. **Request for Service**: The Project Developer hereby requests to interconnect and operate in parallel a generation plant with aggregate generation of [Project size] ("Project"), as indicated in Part I, to Utility' distribution system. In order to provide said interconnection, it may be necessary for Utility to install certain Interconnection Facilities of which the general location and type of facilities are depicted in Exhibit 1 - Interconnection Diagram. Exhibit 1 shall also define the design and physical construction of all the Interconnection Facilities of which the Project Developer shall solely bear the costs. The Parties desire to enter into this Agreement for purposes, among others, of describing the Interconnection Facilities and associated appurtenances to interconnect the Project to Utility' distribution system. This Agreement does not address the sale of electricity to or from Utility.

2. **Deposit Requirements**: Prior to construction, Project Developer shall pay 50% of the good faith estimate, indicated in Part I. If during construction, Utility determines that the cost of the Interconnection Facilities varies significantly from the original good faith estimate, Utility will notify the Project Developer in writing. Utility shall have the right to delay or suspend all construction of its Interconnection Facilities until Project Developer responds to the notice. If the Project Developer's response and acceptance of this new cost estimate is not received within **5 business days**, Utility may terminate this Agreement by written notice to the Project Developer. Upon such termination, Utility will refund, without interest, the Project Developer's payment, less any expenses incurred to provide interconnection service to the location described in Part I of this Agreement.

3. **Payment Schedule**:

Payment	Amount Due	Milestone Description	Target Due Date (Number of Weeks from Completion of Application)
1	50% or $ figure	Execution of Generator Interconnection & Operating Agreement	0
2	50% or $ figure	Construction Complete	6
	$	Good Faith Estimate Total	
	True-up (invoice or refund)	Three weeks after Construction Complete	9

All payments shall be made payable to Utility and shall be sent to Zeeland Board of Public Works, Attention: Accounting, 350 E. Washington Ave, Zeeland, MI 49464, or by wire transfer to a Utility' bank account or such other manner or at such place as Utility shall, from time to time, designate by notice to Project Developer. Payments made by wire transfer shall reference the appropriate invoice number for which payment is being made. When Utility has determined that all costs and expenses are accounted for on its books, Utility will issue a final invoice or credit to reconcile the good faith estimate with the final work order estimate of the interconnection. The final work order estimate will be reviewed and reconciled to the good faith estimate for each portion of the interconnection covered under this Agreement. If Utility' final work order estimates are less than the good faith estimate provided in Part I, Utility shall refund the incremental amount to Project Developer. If Utility' final work order estimates are greater than the good faith estimate provided in Part I, Utility shall issue a final invoice to the Project Developer for the incremental amount. Any payment not made on or before the due date shall bear interest, from the date due until the date upon which payment is made, at an annual percentage rate of interest equal to the lesser of (a) the prime rate published by the Wall Street Journal (which represents the base rate on corporate loans posted by at least 75% of the nation's banks) on the date due, plus 2%, or (b) the highest rate permitted by law.

4. **Site Preparation/Access**: At its own expense, the Project Developer shall make the proposed Project site available to Utility. Said site shall be free from hazard and shall be adequate for the operation and construction of the Interconnection Facilities necessary to connect the proposed Project. Utility, its agents and employees, shall have full right and authority of ingress and egress at all reasonable times on and across the premises of the Project for the purpose of installing, operating, maintaining, inspecting, replacing, repairing, and removing its Interconnection Facilities located on the premises. The right of ingress

and egress, however, shall not unreasonably interfere with Project Developer's use of its premises.

5. **Easements/Permits**: If necessary, prior to the installation of the Interconnection Facilities and anytime thereafter, Utility will acquire required permits and necessary easements for its Interconnection Facilities. These easements / permits may include, but shall not be limited to, easements to clear trees, and necessary rights-of-way for installation and maintenance of its Interconnection Facilities. The Project Developer shall reimburse Utility for its costs and expenses for acquiring such easements / permits.

6. **Parallel Operation:** It is understood that the Project will normally remain connected to and be operated in parallel with Utility' distribution system. The Project Developer shall, at its expense, install and properly maintain protective equipment and devices and provide sufficiently trained personnel to protect its equipment and service, and the equipment and service of Utility from damage, injury or interruptions during the Project's parallel operation with Utility' distribution system, and, without limiting the indemnity provided in Section 12, will assume any loss, liability or damage to the Project caused by lack of or failure of such protection. Such protective equipment specifications and design shall be consistent with the Zeeland Board of Public Works Generator Interconnection Requirements. Prior to the Project operating in parallel with Utility distribution system, the Project Developer shall provide satisfactory evidence to Utility that it has met the requirements set forth in the Zeeland Board of Public Works Generator Interconnection Requirements. Requirements include, but are not limited to, approval from the local building code inspector.

7. **Testing:** The Project Developer shall perform operational testing and inspection of the Project at least 5 days before interconnection. The Project Developer shall contact Utility and arrange for a mutually agreeable time for performing said tests. Utility may send qualified personnel to the Project site to inspect the Project and observe the testing. Project Developer shall provide Utility a written test report when such testing and inspection is completed and prior to interconnection. Protective relay equipment shall be tested every two (2) years (unless an extension is agreed to by Utility) to verify the calibration indicated on the latest relay setting document issued by Utility. Tests shall be conducted or witnessed by Utility at Project Developer's expense. The results of such tests shall be provided to Utility in writing for review and approval. Utility may, at any time and at Utility' expense, inspect and test the Project to verify that the required protective interconnection equipment is in service, properly maintained, and calibrated to provide the intended protection. If necessary, this inspection may also include a review of Project Developer's pertinent records. Inspection, testing and / or approval by Utility or the omission of any inspection, testing and/or approval by Utility pursuant to this Agreement shall not relieve the Project Developer of any obligations or responsibility assumed under this Agreement.

8. **Obligation to Connect:** Utility shall not be obligated to continue the interconnection to the Project if any one or more of the following conditions exist, including but not limited to: (a) those conditions listed in the Zeeland Board of Public Works Generator Interconnection Requirements, (b) the electrical characteristics of the Project are not compatible with the electrical characteristics of Utility' distribution system, (c) the Project Developer is deficient in following either the voltage schedule or reactive power schedule established by Utility, (d) an emergency condition exists on Utility's distribution system, (e) Project Developer's protective relay equipment fails, resulting in a lack of the level of protection required by prudent utility practice, (f) the Project Developer's Project is determined to be disrupting Utility customers or (g) Utility requires disconnecting the Project in order to construct, install, maintain, repair, replace, remove, investigate, inspect or test any part of Utility's Interconnection Facilities or any other Utility equipment associated with the interconnection (also if a required component (example: phone line) or required modification to allow interconnection fails or becomes incapacitated and is not repaired in a timely manner). Utility shall electrically connect or reconnect its distribution system to the Project when, in Utility' sole opinion, the conditions named above cease to exist. Under any of the conditions listed above, Utility will follow procedures for disconnecting and re-connecting the interconnection.

9. **Subcontractors:** Either Party may hire a subcontractor to perform its obligations under this Agreement. However, each Party shall require its subcontractors to abide by the terms of this Agreement. Each Party shall remain primarily liable to the other Party for the performance of such subcontractor. Hiring a subcontractor does not release either Party from any of its obligations.
10. **Force Majeure:** Neither Party shall be considered to be in Default with respect to any obligation hereunder other than the obligation to pay money when due, if prevented from fulfilling such obligation by Force Majeure. A Party unable to fulfill any obligation hereunder (other than an obligation to pay money when due) by reason of Force Majeure shall give notice and the full particulars of such Force Majeure to the other Party in writing or by telephone as soon as reasonably possible after the occurrence of the cause relied upon. Telephone notices given pursuant to this article shall be confirmed in writing as soon as reasonably possible and shall specifically state full particulars of the Force Majeure, the time and date when the Force Majeure occurred and when the Force Majeure is reasonably expected to cease. The Party affected shall exercise due diligence to remove such disability with reasonable dispatch, but shall not be required to accede or agree to any provision not satisfactory to it in order to settle and terminate a strike or other labor disturbance.

11. **Assignment**: This Agreement shall not be assigned by the Project Developer except with the previous written consent of Utility and any attempted assignment without such consent shall be void.

12. **Indemnity:** Each Party shall at all times assume all liability for, and shall to the extent permitted by law indemnify and save the other Party harmless from, any and all damages, losses, claims, demands, suits, recoveries, costs, legal fees, and expenses for injury to or death of any person or persons whomsoever occurring on its own system, or for any loss, destruction of or damage to any property of third persons, firms, corporations or other entities occurring on its own system, including environmental harm or damage arising out of or resulting from, either directly or indirectly, its own Interconnection Facilities, or arising out of or resulting from, either directly or indirectly, any electric energy furnished to it hereunder after such energy has been delivered to it by such other Party, unless caused by the sole negligence or intentional wrongdoing of the other Party. The provisions of this Section 12 shall survive termination or expiration of this Agreement.

13. **Insurance:** Project Developer shall obtain and continuously maintain throughout the term of this Agreement liability insurance covering bodily injury and property damage liability with a per occurrence and annual policy aggregate amount of at least $1,000,000.

    When requested in writing by Utility, said limit shall be increased each year that this Agreement is in force to a limit no greater than the amount arrived at by increasing the original limit by the same percentage change as the Consumer Price Index - All Urban Workers (CPI-U.S. Cities Average). Such policy shall include, but not be limited to, contractual liability for indemnification assumed by Project Developer under this Agreement.

    Evidence of insurance coverage on a certificate of insurance shall be provided to Utility upon execution of this Agreement and thereafter within ten (10) days after expiration of coverage; however, if evidence of insurance is not received by the 11th day, Utility has the right, but not the duty, to purchase the insurance coverage required under this Section and to charge the annual premium to Project Developer. Utility shall receive thirty (30) days advance written notice if the policy is cancelled or substantial changes are made that affect the additional insured. At Utility' request, Project Developer shall provide a copy of the policy to Utility. All certificates and notices shall be mailed to:

Zeeland Board of Pubic Works

350 E. Washington Ave.

Zeeland, MI 49464

14. **Limitation on Liability**: NEITHER PARTY SHALL IN ANY EVENT BE LIABLE TO THE OTHER FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES SUCH AS, BUT NOT LIMITED TO, LOST PROFITS, REVENUE OR GOOD WILL, INTEREST, LOSS BY REASON OF SHUTDOWN OR NON-OPERATION OF EQUIPMENT OR MACHINERY, INCREASED EXPENSE OF OPERATION OF EQUIPMENT OR MACHINERY, COST OF PURCHASED OR REPLACEMENT POWER OR SERVICES OR CLAIMS BY CUSTOMERS, WHETHER SUCH LOSS IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

15. **Governing Law**: This Agreement shall be deemed to be a Michigan contract and shall be construed in accordance with and governed by the laws of Michigan, exclusive of its conflict of laws principles. In the event that any change in law or administrative rule or regulation that would materially alter the terms and conditions of this Agreement, either Party shall have the right to seek modification of this Agreement without prior written consent of the other Party.

16. **Effective Date, Term, and Termination:** The Effective Date of this Agreement shall be the date of execution, as identified in Part I, and shall continue in effect until this Agreement is terminated as provided herein. The Agreement may be terminated at any time by mutual agreement of both Parties, or by either Party upon giving the other at least ninety (90) days written notice if one or more of the conditions exist as outlined in Section 8, Obligation to Connect.

17. **Retirement:** Upon termination of this Agreement pursuant to Section 16 or at such time after any of the Interconnection Facilities described herein are no longer required, then the need for the retirement of said Interconnection Facilities shall be mutually determined by the Parties. Retirement of said Interconnection Facilities may include without limitation (i) dismantling, demolition, and removal of equipment, facilities, and structures, (ii) security, (iii) maintenance and (iv) disposing of debris. The cost of such removal shall be borne by the Party owning such Interconnection Facilities.

18. **Breach and Default:** A breach of this Agreement ("Breach") shall occur upon the failure of a Party to perform or observe any material term or condition of this Agreement. A default of this Agreement ("Default") shall occur upon the failure of a Party in Breach of this Agreement to cure such Breach. Examples of Default include, but are not limited to:

    a. Failure to pay money when due;
    b. Failure to comply with any material term or condition of this Agreement, including but not limited to any material Breach of a representation, warranty or covenant made in this Agreement;
    c. A Party: (i) becomes insolvent; (b) files a voluntary petition in bankruptcy under any provision of any federal of state bankruptcy law or shall consent to the filing of any bankruptcy or reorganization petition against it under any similar law; (c) makes a general assignment for the benefit of its creditors or (d) consents to the appointment of a receiver, trustee, or liquidator;
    d. Assignment of this Agreement in a manner inconsistent with the terms of this Agreement;
    e. Failure of either Party to provide such access rights, or a Party's attempt to revoke or terminate such access rights, as provided under this Agreement;
    f. Failure of either Party to provide information or data to the other Party as required under this Agreement, provided the Party entitled to the information or data under this Agreement requires such information or data to satisfy its obligations under this Agreement.

    In the event of a Breach or Default by either Party, the Parties shall continue to operate and maintain, as applicable, its Interconnection Facilities, including but not limited to: protection and Metering Equipment, transformers, communication equipment, building facilities, software, documentation, structural components and other facilities and appurtenances that are reasonably necessary for Utility to operate and maintain its distribution system and for the Project Developer to operate and maintain its Project in a safe and reliable manner. Upon a Default, the non-defaulting Party shall give written notice of such Default to the defaulting Party. The defaulting Party then has 30 days to cure the Default. If a Default is not cured within the period provided for herein or as agreed to by the Parties, the non-defaulting Party shall have the right to terminate this Agreement by written notice and shall be relieved of any further obligations hereunder. Further, in the event of such termination, the non-defaulting Party shall be entitled to recover from the defaulting Party all amounts due hereunder, plus all other damages and remedies to which it is entitled at law or in equity. The provisions of this Section 18 will survive termination of this Agreement.

19. **No Partnership:** This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

20. **Severability:** If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction or other governmental authority, (1) such portion or provision shall be deemed separate and independent, (2) the Parties shall negotiate in good faith to restore insofar as practicable the benefits to each Party that were affected by such ruling, and (3) the remainder of this Agreement shall remain in full force and effect.

21. **Entire Agreement:** This Agreement and the Zeeland Board of Public Works Generator Interconnection Requirements shall constitute the entire understanding between the Parties with respect to the subject matter hereof, supersede any and all previous understandings between the Parties with respect to the subject matter hereof, and binds and insures to the benefit of the Parties, their successors, and permitted assigns. No amendments or changes to this Agreement shall be binding unless made in writing and duly executed by both Parties.

22. **No Third Party Beneficiaries:** This Contract is intended for the benefit of the parties hereto and does not grant any rights to any third parties unless otherwise specifically stated herein.

23. **Notices**: All notices required hereunder shall be in writing and shall be sent by United States mail or delivered in person to the Parties at their respective addresses as set forth in Part I. Either Party may at any time change the addressee or address to which notices to it are to be mailed or delivered by giving notice of such change to the other Party. All Notices shall become effective upon date of receipt.

Addresses for Notification:

Utility: Zeeland Board of Public Works
350 E. Washington Ave.
Zeeland, MI 49464
Telephone: (616) 772-6212
Fax: (616) 772-6242

Project Developer: _____
_____
_____
Attn:_____

Telephone: ( ) _____

Fax : ( )_____

Property Owner (If different than Developer)

_____
_____
Attn:_____

Telephone: ( ) _____

Fax : ( )_____

24. Other:

_____
_____
_____
_____
_____
_____

EXHIBIT 1
INTERCONNECTION DIAGRAM

(Insert one of the eighteen One-Line Diagrams (PDF file) for the various size and type of generator that will be installed.)

APPENDIX F

CONTACT LIST

CONTACT LIST
Normal Operations and Emergency Switching

GENERAL

Switching and clearance procedures for Zeeland Board of Public Works ('Utility") and the Project Developer provides important documentation to ensure safe working conditions and orderly and reliable service when work is required on the Interconnection Facilities.

PROCEDURE

1. Emergency Switching Procedure:

Operating Authority for the Project Developer will be handled by the following "Priority Contact List."

a.	Project Developer's Plant	( )
b.	Project Operator (pager)	( )
	or mobile	( )
c.	1st Contact Name (home phone)	( )
d.	Second Contact:	If applicable
e.	Third Contact:	If applicable

Operating Authority for Utility will be the Electric Operations Department located in the Power Plant in Zeeland, Michigan. Telephone numbers are either: (_____) or (_____)

2 Scheduled Outage Procedure:

Request initiated by the Project Developer.

Operating Authority for the Project Developer will be (Contact Name), Project Operator or an authorized representative. (Contact Name) or an authorized representative will contact the Electric Operations Department to make the necessary arrangements and to agree on the switching procedures.

Request initiated by Utility.

Scheduling Authority for Utility will be the Electric Operations Department located in the Power Plant in Zeeland Michigan. Contact numbers are either (_____)or (_____).

The Electric Operations Department at the Utility will contact (Contact Name) or an authorized representative to make necessary arrangements and to agree on switching procedures.

NOTE: Each authority will attempt to provide a minimum of 72 hours notice on scheduled outage requests, except in an emergency or imminent equipment failure.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the Effective Date identified below.

(PROJECT DEVELOPER'S NAME) ZEELAND BOARD OF PUBLIC WORKS

By _____ By _____

Title Title

Effective Date