INTERCONNECTION FACILITIES STUDY REPORT

GEN-2019-019

Published February 2025

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
February 5, 2025	SPP	Initial draft report issued.
February 18, 2025	SPP	TO-proposed revisions made. Final report issued.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2019-019 is for a 15.15 MW generating facility located in Sioux County, IA. The Interconnection Request was studied in the DISIS-2018-002/DISIS-2019-001 Impact Study for ER/NR. The Interconnection Customer's requested in-service date is January 30, 2027.

The interconnecting Transmission Owner, Northwest Iowa Power Cooperative (NIPCO), performed a detailed IFS at the request of SPP. The full report is included in Appendix A. SPP has determined that full Interconnection Service will be available after the assigned Transmission Owner Interconnection Facilities (TOIF), Non-Shared Network Upgrades, Shared Network Upgrades, Contingent Network Upgrades, and Affected System Upgrades that are required for full interconnection service are completed.

The primary objective of the IFS is to identify necessary Transmission Owner Interconnection Facilities, Network Upgrades, other direct assigned upgrades, cost estimates, and associated upgrade lead times needed to grant the requested Interconnection Service.

PHASE(S) OF INTERCONNECTION SERVICE

It is not expected that Interconnection Service will occur in phases. However, full Interconnection Service will not be available until all Interconnection Facilities and Network Upgrade(s) can be placed in service.

COMPENSATION FOR AMOUNTS ADVANCED FOR NETWORK UPGRADE(S)

FERC Order ER20-1687-000 eliminated the use of Attachment Z2 revenue crediting as an option for compensation. The Incremental Long Term Congestion Right (ILTCR) process will be the sole process to compensate upgrade sponsors as of July 1st, 2020.

INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES

The Generating Facility is proposed to consist of one (1) 14.5 MW gas turbine and one (1) 1.71 MW steam turbine for a total generating nameplate capacity of 15.15 MW.

The Interconnection Customer's Interconnection Facilities to be designed, procured, constructed, installed, maintained, and owned by the Interconnection Customer at its sole expense include:

- 12.47 kV underground cable collection circuits;
- All 12.47 Distribution facilities required to connect the Interconnection Customer's Generator Facilities to the POI;
- Generation and 12.47 kV Distribution equipment at the Interconnection Customer's Generator Facility necessary to maintain a composite power delivery at continuous rated power output at the high-side of the generator substation at a power factor within the range of 95% lagging and 95% leading in accordance with Federal Energy Regulatory Commission (FERC) Order 827. The Interconnection Customer may use inverter manufacturing options for providing reactive power under no/reduced generation conditions. The Interconnection Customer will be required to provide documentation and design specifications demonstrating how the requirements are met; and,
- All necessary relay, protection, control and communication systems required to protect Interconnection Customer's Interconnection Facilities and Generating Facilities and coordinate with Transmission Owner's relay, protection, control and communication systems.

TRANSMISSION OWNER INTERCONNECTION FACILITIES AND NON-SHARED NETWORK UPGRADE(S)

To facilitate interconnection, the interconnecting Transmission Owner will perform work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities.

Table 1 and **Table 2** list the Interconnection Customer's estimated cost responsibility for Transmission Owner Interconnection Facilities (TOIF) and Non-Shared Network Upgrade(s) and provides an estimated lead time for completion of construction. The estimated lead time begins when the Generator Interconnection Agreement has been fully executed.

Table 1: Transmission Owner Interconnection Facilities (TOIF)

Transmission Owner Interconnection Facilities (TOIF)	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Siouxland 69kV GEN-2019-019 Interconnection (TOIF) (NIPCO) (UID 143689): Facilitate the interconnection of GEN-2019-019 Estimated Lead Time: 12 Months	$1,176,290	100.00%	$1,176,290
Total	**$1,176,290**		**$1,176,290**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Siouxland 69kV GEN-2019-019 Interconnection (Non-shared NU) (NIPCO) (UID 143690): Facilitate the interconnection of GEN-2019-019 Estimated Lead Time: 12 Months	Ineligible	$1,167,956	100%	$1,167,956
Total		**$1,167,956**		**$1,167,956**

SHARED NETWORK UPGRADE(S)

The Interconnection Customer's share of costs for Shared Network Upgrades is estimated in **Table 3** below.

Table 3: Interconnection Customer Shared Network Upgrade(s)

Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA				
Total		**$0**		**$0**

All studies have been conducted assuming that higher-queued Interconnection Request(s) and the associated Network Upgrade(s) will be placed into service. If higher-queued Interconnection Request(s) withdraw from the queue, suspend or terminate service, the Interconnection Customer's share of costs may be revised. Restudies, conducted at the customer's expense, will determine the Interconnection Customer's revised allocation of Shared Network Upgrades.

CONTINGENT NETWORK UPGRADE(S)

Certain Contingent Network Upgrades are **currently not the cost responsibility** of the Interconnection Customer but will be required for full Interconnection Service.

Table 4: Interconnection Customer Contingent Network Upgrade(s)

Contingent Network Upgrade(s) Description	Current Cost Assignment	Estimated In-Service Date
NA		

Depending upon the status of higher- or equally-queued customers, the Interconnection Request's in-service date is at risk of being delayed or Interconnection Service is at risk of being reduced until the in-service date of these Contingent Network Upgrades.

AFFECTED SYSTEM UPGRADE(S)

To facilitate interconnection, the Affected System Transmission Owner will be required to perform the facilities study work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities. **Table 5** displays the current impact study costs provided by either MISO or AECI as part of the Affected System Impact review. The Affected System facilities study could provide revised costs and will provide each Interconnection Customer's allocation responsibilities for the upgrades.

Table 5: Interconnection Customer Affected System Upgrade(s)

Affected System Upgrades Description	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA			
Total	**$0**		**$0**

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 15.15 MW can be granted. Full Interconnection Service will be delayed until the TOIF, Non-Shared NU, Shared NU, Contingent NU, Affected System Upgrades that are required for full interconnection service are completed. The Interconnection Customer's estimated cost responsibility for full interconnection service is summarized in the table below.

Table 6: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilities Upgrade(s)	$1,176,290
Non-Shared Network Upgrade(s)	$1,167,956
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$0
Total	**$2,344,246**

Use the following link for Quarterly Updates on upgrades from this report: https://spp.org/spp-documents-filings/?id=18641

A draft Generator Interconnection Agreement will be provided to the Interconnection Customer consistent with the final results of this IFS report. The Transmission Owner and Interconnection Customer will have 60 days to negotiate the terms of the GIA consistent with the SPP Open Access Transmission Tariff (OATT).

APPENDICES

A: TRANSMISSION OWNER'S INTERCONNECTION FACILITIES STUDY REPORT AND NETWORK UPGRADES REPORT(S)

See next page for the Transmission Owner's Interconnection Facilities Study Report and Network Upgrades Report(s).

Northwest Iowa Power Cooperative
Interconnection Facilities Study
GEN-2019-019

1. Background:

1.1 Per SPP Generation Interconnection Process 2019 revision[1], Northwest Iowa Power Cooperative (NIPCO) received a request to perform an Interconnection Facility Study Analysis for the following Interconnection Requests:

GI Request #	Point of Interconnection	Capacity (MW)	Fuel Type	Comments
GEN-2019-019	J15 Switching Station 69 kV	15.15	Thermal	Please provide interconnection upgrades and costs estimates needed to interconnection into the POI (SCERT UIDs# 143690 and 143689).

[1] SPP Tariff Attachment V Generator Interconnection Procedures (GIP) Section 8.4.4

2. Study Requirements:

NIPCO has performed this Interconnection Facility Study Analysis in accordance with SPP Tariff Attachment V, Generator Interconnection Procedures (GIP) Section 8.4.4 for the Interconnection Request(s) as described in Section 1.

2.1. The Interconnection Facility Study Analysis includes an evaluation of the following:

2.1.1. Perform/develop a substation layout, perform a preliminary bus design, determine all electrical equipment requirements, and if required determine a suitable site location to accommodate the Request. Develop/compile cost estimates for all NIPCO labor, overheads, equipment additions, modifications, etc. to accommodate the generator interconnection.

2.1.2. Develop an overall construction schedule for completion of the necessary additions and/or modifications.

2.1.3. Point Of Change of Ownership. For the purposes of this Study Analysis, the Point of Change of Ownership location is defined as the line side of the visual open switch just outside NIPCO's Garfield Substation where the Interconnection Customer's underground 12.47 kV line(s) connects to the visual open switch. Interconnection Customer will furnish and install the underground conductor and terminator assembly to the visual open switch.

2.1.4. Other Interconnection/Metering Requirements. Basic indication, metering, monitoring, control, and relaying requirements due to a generator interconnection are included in the cost estimate. NIPCO's generation metering requirements, as an SPP Transmission Owner, must be met.

3. Study Results for GEN-2019-019:

3.1. The following results document the analysis of the required facilities for this Interconnection Request as outlined in Section 1 for a new 69kV line terminal at the J15 69kV Switching Station, new 69 kV tap line, and new 12.47/69 kV generator step up substation (Garfield). NIPCO has determined that the following additions and improvements are required to maintain a safe and reliable interconnection to NIPCO's transmission system.

3.2 Switching Station

A 69kV terminal addition was built to accommodate the new generation resource interconnection. This terminal was added to the existing straight bus switching station. Reference Figure A1. All equipment followed NIPCO's internal design standards for minimum BIL, ampacity, and fault capabilities.

The associated work for the new 69kV line terminal included the following major additions:

- (1) 69kV Relaying Panel
- (1) 69kV Breaker
- (6) 69kV Breaker Disconnect Switches
- (1) Set of Line Surge Arrestors

Additional associated work included a review and update to relay/protection schemes and SCADA RTU configurations at the J15 Switching Station.

3.3 Tap Line

A 69kV tap line was built to accommodate the new generation resource interconnection. This tap line consists of 0.75 miles of 4/0 ACSR single circuit and 2 miles of 477 ACSR double circuit with an existing 69kV transmission line connecting to the J15 69kV Switching Station. Reference Figure A2. All equipment followed NIPCO's internal design standards for minimum BIL, ampacity, and fault capabilities.

3.4 Generator Step Up Substation

A 12.47/69kV, 12/16/20 MVA generator step up substation was built to accommodate the new generation resource interconnection. This substation connects to the 12.47kV underground cable from the Interconnection Customer and to the tap line to the J15 69kV Switching Station. Reference Figure A3. All equipment followed NIPCO's internal design standards for minimum BIL, ampacity, and fault capabilities.

The associated work for the new 12.47/69kV generator step-up substation included:

- (1) Land lease, grading, rock, ground grid, fencing
- (1) Control Building
- (1) Communications Rack
- (1) Battery Rack
- (1) Relaying Rack
- (1) 69kV Line Take-Off Structure
- (1) Set of Line Surge Arrestors
- (1) Set of Line PTs
- (6) 69kV Breaker Disconnect Switches
- (1) 69kV Breaker
- (1) 12.47/69kV, 12/16/20 MVA transformer
- (1) Set of 12.47kV Single-Phase Voltage Regulators
- (1) 12.47kV Underground Riser Structure
- (1) 12.47kV Visual Open Switch

3.5 Environmental Requirements

Compliance with all applicable federal, state and local regulations were strictly adhered to. Additionally, all applicable and required permits and approvals were obtained prior to construction.

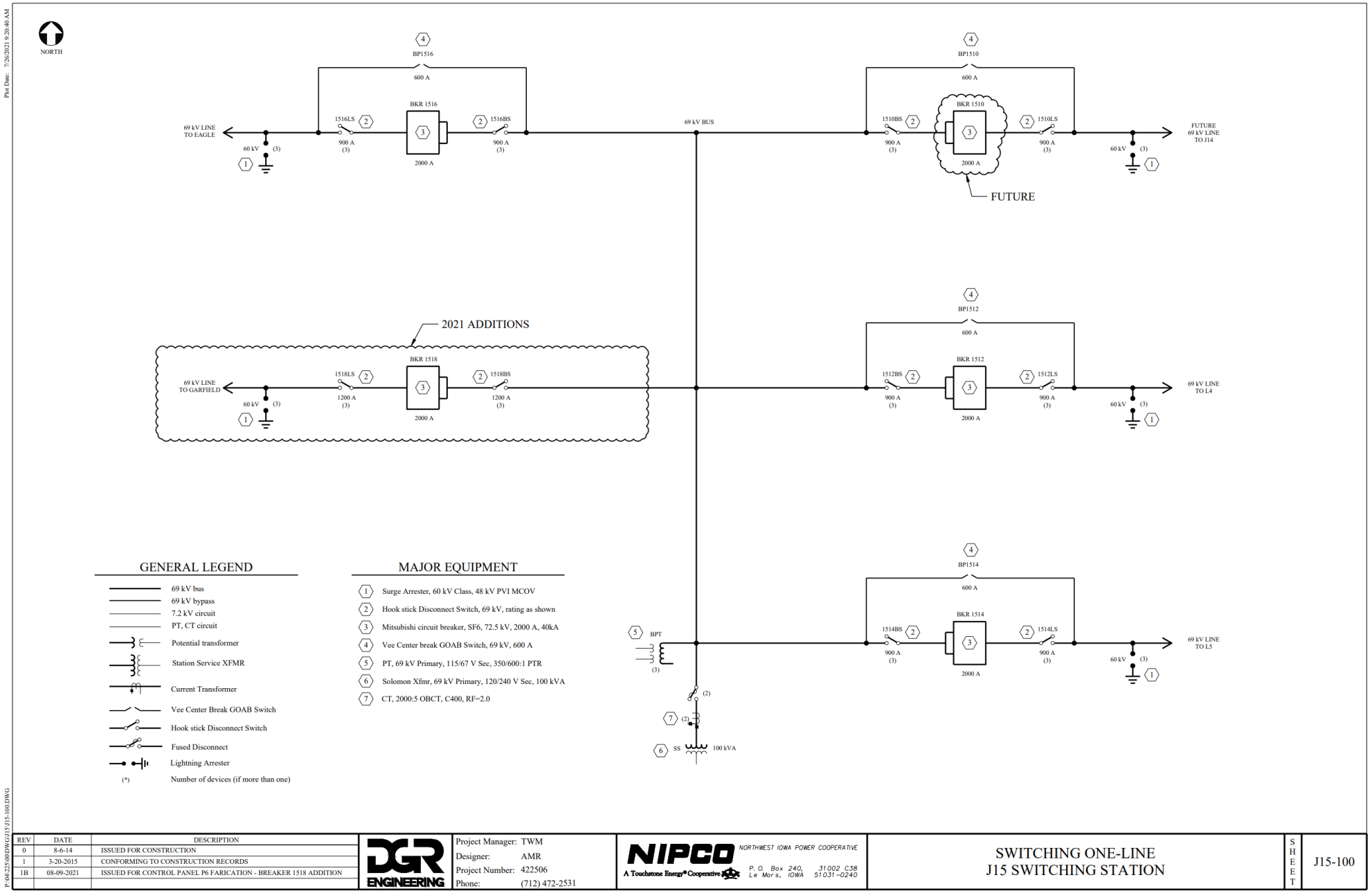
3.6 Cost Estimate

GEN-2019-019 Estimated Costs Non Shared Network Upgrades	Current Year $
Line Costs	
Engineering Labor	$41,401
Construction Labor	$523,783
Reactive Compensation (Labor & Materials)	$0
Material	$423,950
Right of Way	$4,600
Line Sub Total	**$993,734**
Station Costs	
Engineering Labor	$62,102
Construction Labor	$61,666
Site Property Rights	$0
Reactive Compensation	$0
Material	$50,454
Right of Way	$0
Station Sub Total	**$174,221**
AFUDC	$0
Contingency	$0
Non - Shared Network Upgrades total	**$1,167,956**

GEN-2019-019 Transmission Owner Interconnect Facilities	Current Year $
Line Costs	
Engineering Labor	$40,935
Construction Labor	$295,337
Reactive Compensation (Labor & Materials)	$0
Material	$241,639
Right of Way	$0
Line Sub Total	**$577,911**
Station Costs	
Engineering Labor	$61,403
Construction Labor	$295,337
Site Property Rights	$0
Reactive Compensation	$0
Material	$241,639
Right of Way	$0
Station Sub Total	**$598,379**
AFUDC	$0
Contingency	$0
TOIF Subtotal	**$1,176,290**

TOTAL INTERCONNECTION COST	**$2,344,246**

Figure A1: J15 Switching Station One-Line Diagram



GENERAL LEGEND

- 69 kV bus
- 69 kV bypass
- 7.2 kV circuit
- PT, CT circuit
- Potential transformer
- Station Service XFMR
- Current Transformer
- Vee Center Break GOAB Switch
- Hook stick Disconnect Switch
- Fused Disconnect
- Lightning Arrester
- (*) Number of devices (if more than one)

MAJOR EQUIPMENT

1. Surge Arrester, 60 kV Class, 48 kV PVI MCOV
2. Hook stick Disconnect Switch, 69 kV, rating as shown
3. Mitsubishi circuit breaker, SF6, 72.5 kV, 2000 A, 40kA
4. Vee Center break GOAB Switch, 69 kV, 600 A
5. PT, 69 kV Primary, 115/67 V Sec, 350/600:1 PTR
6. Solomon Xfmr, 69 kV Primary, 120/240 V Sec, 100 kVA
7. CT, 2000:5 OBCT, C400, RF=2.0

REV	DATE	DESCRIPTION
0	8-6-14	ISSUED FOR CONSTRUCTION
1	3-20-2015	CONFORMING TO CONSTRUCTION RECORDS
1B	08-09-2021	ISSUED FOR CONTROL PANEL P6 FARICATION - BREAKER 1518 ADDITION

DGR ENGINEERING

Project Manager: TWM
Designer: AMR
Project Number: 422506
Phone: (712) 472-2531

NIPCO — A Touchstone Energy® Cooperative
NORTHWEST IOWA POWER COOPERATIVE
P. O. Box 240, Le Mars, IOWA 31002 C38 51031-0240

SWITCHING ONE-LINE
J15 SWITCHING STATION

SHEET J15-100

Plot Date: 7/26/2021 9:20:40 AM

P:\04\2250\DWG\J15\J15-100.DWG

Figure A2: J15 Switching Station to Garfield to Siouxland Energy Center Generation System One-Line

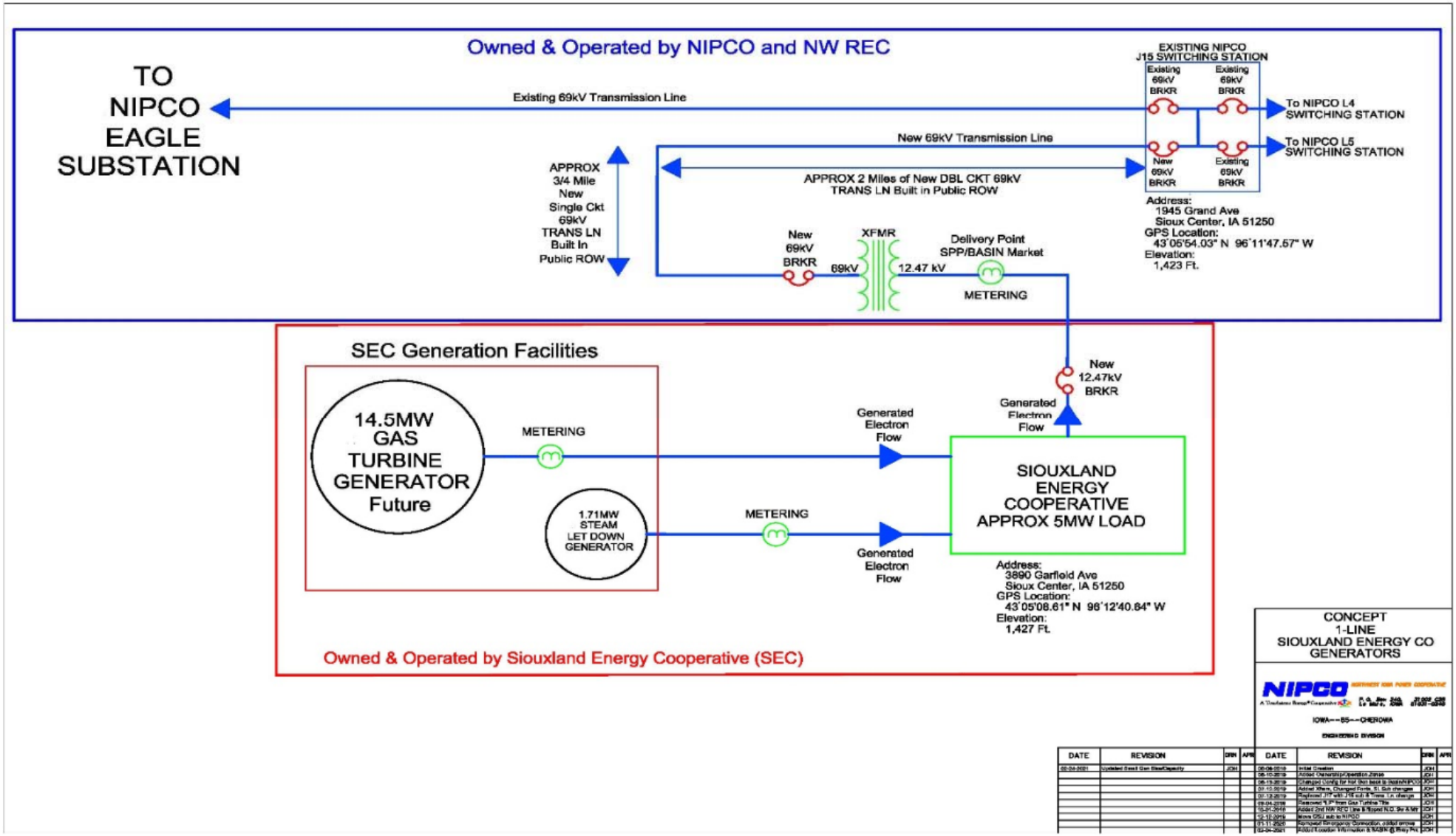
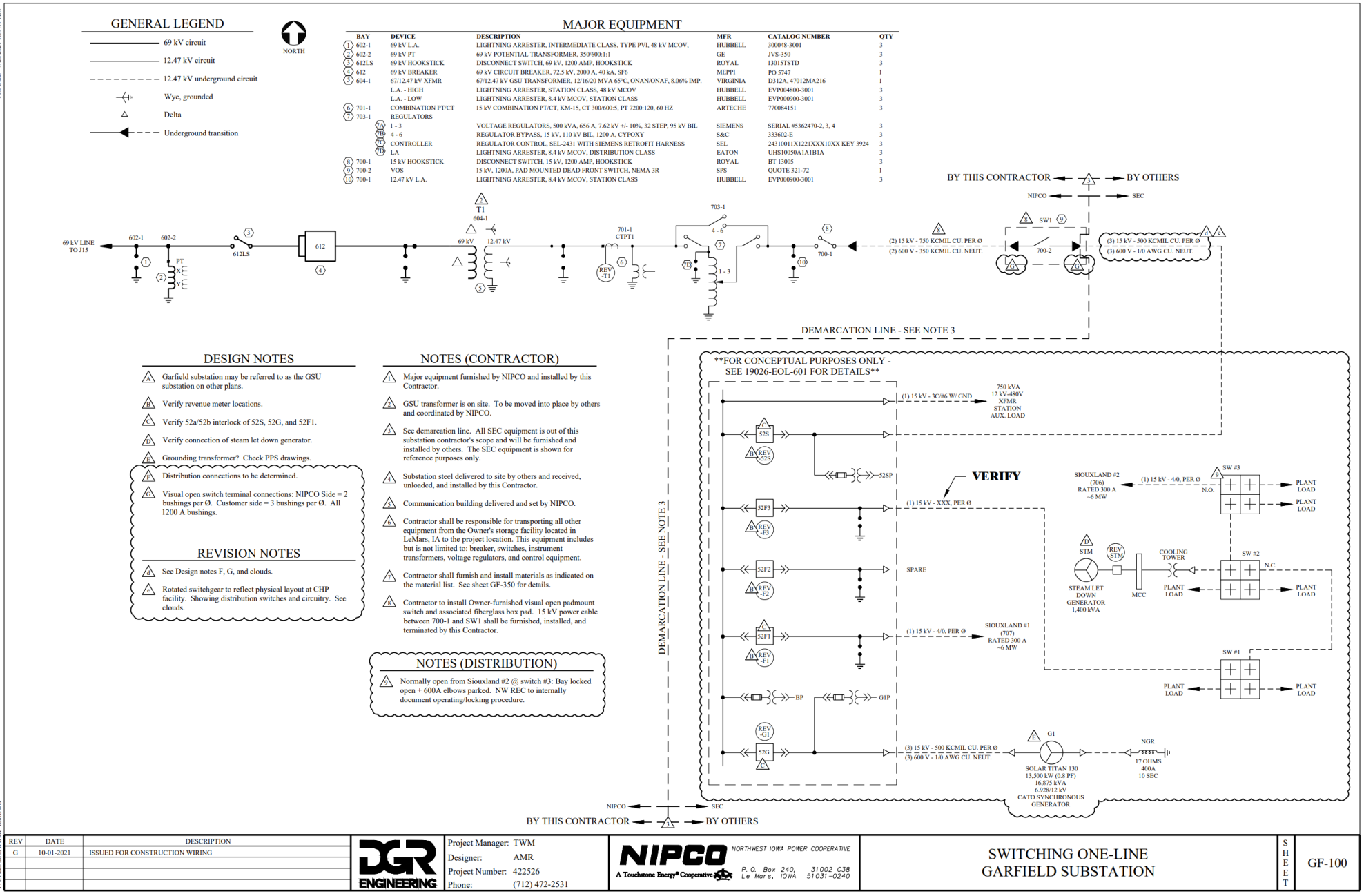


Figure A3: Garfield Step-Up Substation One-Line



REV	DATE	DESCRIPTION
G	10-01-2021	ISSUED FOR CONSTRUCTION WIRING

DGR ENGINEERING

Project Manager: TWM
Designer: AMR
Project Number: 422526
Phone: (712) 472-2531

NIPCO NORTHWEST IOWA POWER COOPERATIVE
A Touchstone Energy® Cooperative
P. O. Box 240, 31002 C38
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SWITCHING ONE-LINE
GARFIELD SUBSTATION

SHEET GF-100

Plot Date: 9/29/2021 9:57:19 AM

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