



**INTERCONNECTION
FACILITIES STUDY
REPORT**

GEN-2018-031

Published January 2024

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
January 26, 2024	SPP	Initial draft report issued.
February 2, 2024	SPP	Final report issued.

CONTENTS

Revision History	i
Summary	1
Introduction	1
Phase(s) of Interconnection Service	1
Compensation for Amounts Advanced for Network Upgrade(s).....	1
Interconnection Customer Interconnection Facilities	2
Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s)	3
Shared Network Upgrade(s)	4
Contingent Network Upgrade(s).....	5
Affected System Upgrade(s)	6
Conclusion.....	7
Appendices	8
A: Transmission Owner’s Interconnection Facilities Study Report and Network Upgrades Report(s).....	9

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2018-031 is for a 50 MW generating facility located in Jackson, MO. The Interconnection Request was studied in the DISIS-2018-001 Impact Study for ER. The Interconnection Customer's requested in-service date is May 31, 2025.

The interconnecting Transmission Owner, Independence Power & Light (INDN), 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 Seventeen (17) 2.9MW Inverters (PE FP3510M integrated skid) for a total generating nameplate capacity of 50 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:

- 34.5 kV underground cable collection circuits;
- 34.5 kV to 161 kV transformation substation with associated 34.5 kV and 161 kV switchgear;
- One 161/34.5 kV 40/57/67 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 0.4 mile overhead kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 161 kV bus at existing Transmission Owner substation ("Blue Valley 161kV Substation") that is owned and maintained by Transmission Owner;
- All transmission facilities required to connect the Interconnection Customer's substation to the POI;
- Equipment at the Interconnection Customer's substation 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 (\$)
<u>Transmission Owner's Blue Valley 161kV Substation GEN-2018-031 Interconnection (TOIF) (INDN) (UID155893): Facilitate the interconnection of GEN-2018-031 Estimated Lead Time: 39 Months</u>	\$390,000	100.00%	\$390,000
Total	\$390,000		\$390,000

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)
<u>Transmission Owner's Blue Valley 161kV Substation Interconnection Expansion (DISIS-2018-001) (UID155894): Facilitate the interconnection of GEN-2018-031 Estimated Lead Time: 39 Months</u>	Ineligible	\$3,990,000	100.00%	\$3,990,000
Total		\$3,990,000		\$3,990,000

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 (\$)
<u>TSMO’s Holt 345 kV Substation (UID158563): Line terminal work at the Transource owned Holt 345kV substation associated with building the Holt to Atchison new 345kV line. This will require Holt substation to be reconfigured to a 345kV breaker and a half from the current ring bus. Estimated Lead Time: 48 Months</u>	Eligible	\$20,623,461	1.02%	\$210,359
<u>EKC’s Holt to Atchison New 345 kV Line (DISIS-2018-001) (UID 158628): Evergy to build a new 345kV line from Holt (Transource) to Atchison (MEC) Line. The straight-line distance between these subs is approximately 22.5 miles. This estimate assumes a total line length of 25 miles. Estimated easement costs are included in this estimate but are only estimates. Estimated Lead Time: 48 Months</u>	Eligible	\$61,642,822	1.02%	\$628,757
Total		\$82,266,283		\$839,116

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

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 (\$)
<u>*MISO/MEC’s Atchison 345 kV Substation: substation and line work to accommodate the new proposed 345 kV line into Atchison County Substation</u>	\$12,500,000	1.02%	\$127,500
Total	\$12,500,000		\$127,500

***MISO/MEC’s Atchison 345 kV Substation cost estimate assumes:**

1. The existing third-party wind farm will be willing to move its existing overhead collector feeder and potentially a wind anemometer tower, in order to be able to move an existing line to a new terminal.
2. The cost for the wind farm’s work is not included and it should be noted the wind farm would not be required by FERC to move its feeder or provide the MidAmerican the easement to move the existing 345 kV line to make room for the proposed line
3. The existing dead-end structure for the line that will be moved can accommodate the new line
4. The proposed new line will have OPGW for the primary communications path for system protection
5. A second, independent communication path for system protection will be provided by the Transmission Owner of the new line and such costs are covered in their estimate of the proposed line

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 50 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)	\$390,000
Non-Shared Network Upgrade(s)	\$3,990,000
Shared Network Upgrade(s)	\$839,116
Affected System Upgrade(s)	\$127,500
Total	\$5,346,616

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).



INDEPENDENCE
★ POWER & LIGHT ★

Independence Power & Light

FACILITY STUDY FOR SOUTHWEST POWER POOL
GENERATOR INTERCONNECTION REQUEST

GEN-2018-031

REV 1

November 2023

Introduction

Pursuant to the Southwest Power Pool (SPP) Open Access Transmission Tariff (Tariff) and at the request of SPP, Independence Power & Light (IPL) performed the following Facility Study for the following Interconnection and/or Network Upgrade(s) to satisfy the Facility Study Agreement executed by the requesting Interconnection Customer (Customer) for SPP Generation Interconnection Request **GEN-2018-031**.

Upgrade Type	Upgrade ID	Description
Interconnection	155893	Blue Valley 161kV Substation (Sub A) GEN-2018-031 Interconnection (TOIF) (INDN)
Interconnection	155894	Blue Valley 161kV Substation (Sub A) Interconnection Expansion (DISIS-2018-001)

The request for interconnection was placed with SPP in accordance with the Tariff, which covers new generation interconnections on SPP member’s transmission system. The Customer requests interconnection service for a 50MW battery storage facility. The requirements for interconnection consist of adding a line position and associated equipment to the existing IPL Substation A 161kV ring bus.

The Facility Study does not guarantee the availability of transmission service necessary to deliver the additional generation to any specific point inside or outside the SPP transmission system. The transmission network facilities may not be adequate to deliver additional generation output to the transmission system. If the Customer requests firm transmission service under the SPP Tariff at a future date, Network Upgrades or other new construction may be required to provide the service requested under the SPP Tariff.

Study Requirements

IPL has performed this Facility Study report in accordance with the Generator Interconnection Procedures (GIP), Attachment V, Section 8.11 for the noted Interconnection and/or Network Upgrade(s).

The Facility Study report includes an evaluation of the following:

- 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 labor, overheads, equipment additions, modifications, etc. to accommodate the generator interconnection.

- Develop an overall construction schedule for completion of the necessary additions and/or modifications.
- Point Of Change of Ownership. For the purposes of this Facility Study report, the Point of Change of Ownership location is defined as the take-off structure(s) at the IPL Substation/Switching Station where the Interconnection Customer's transmission line(s) connects to the take-off structure(s). Interconnection Customer will furnish and install the conductor jumper and insulator assembly to the take-off structure(s).
- Other Interconnection/Metering Requirements. Basic indication, metering, monitoring, control, and relaying requirements due to a generator interconnection are not included in the cost estimate. IPL's generation metering requirements, as an SPP Transmission Owner, must be met. A list of specific needs will be provided by IPL once design has progressed. Interconnection customer is to install metering equipment at the Collector station.

Cost & Time Estimates

Cost estimates are accurate to +/- twenty (20) percent, based on current prices, in accordance with Section 8.11 of the Attachment V Generator Interconnection Procedures (GIP). However, cost fluctuations in materials are significant and the accuracy of this estimate at the time of actual procurement and construction cannot be assured.

GEN-2018-031

IPL Substation A

Transmission Owner Interconnection Facilities (TOIF)

TOIF at the IPL Substation A include:

- One (1) 16kV A-Frame.

TOIF Cost \$390,000

Non-Shared Network Upgrades

Non-Shared Network Upgrades at IPL Substation A include:

- Three (3) 16kV disconnect switches
- One (1) 16kV SF6 gas circuit breaker
- One (1) new control enclosure
- One (1) 16kV bus support

- Two (2) station service transformers
- Three (3) 161kV surge arresters
- Three (3) new 161kV voltage transformers
- New cable trench for previously mentioned equipment
- Relaying for the new 161kV circuit breaker/161kV line position

Non-Shared Network Upgrades Cost \$3,990,000

A preliminary station plan view (Appendix A) and a preliminary station one-line (Appendix B) are provided in this report.

Time Estimate

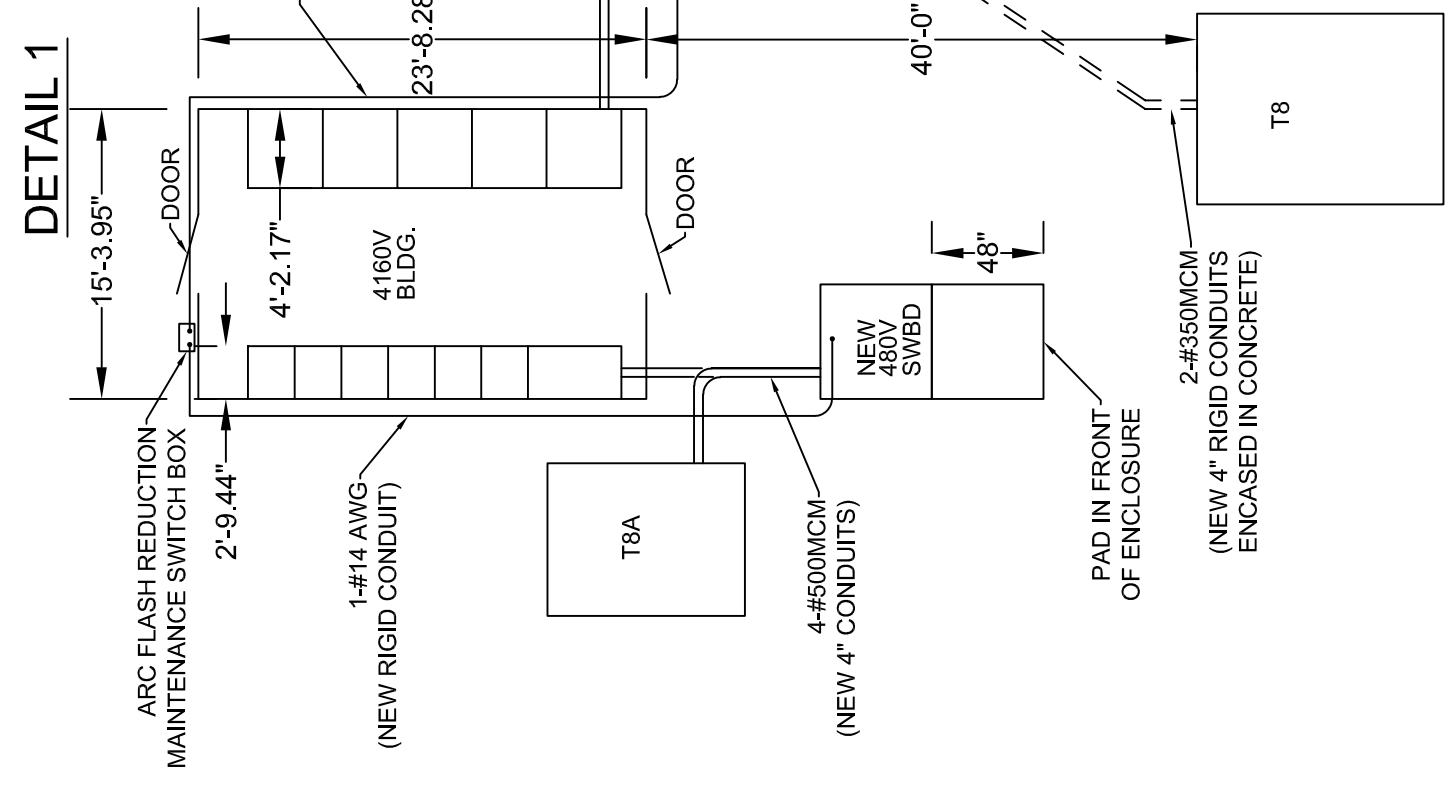
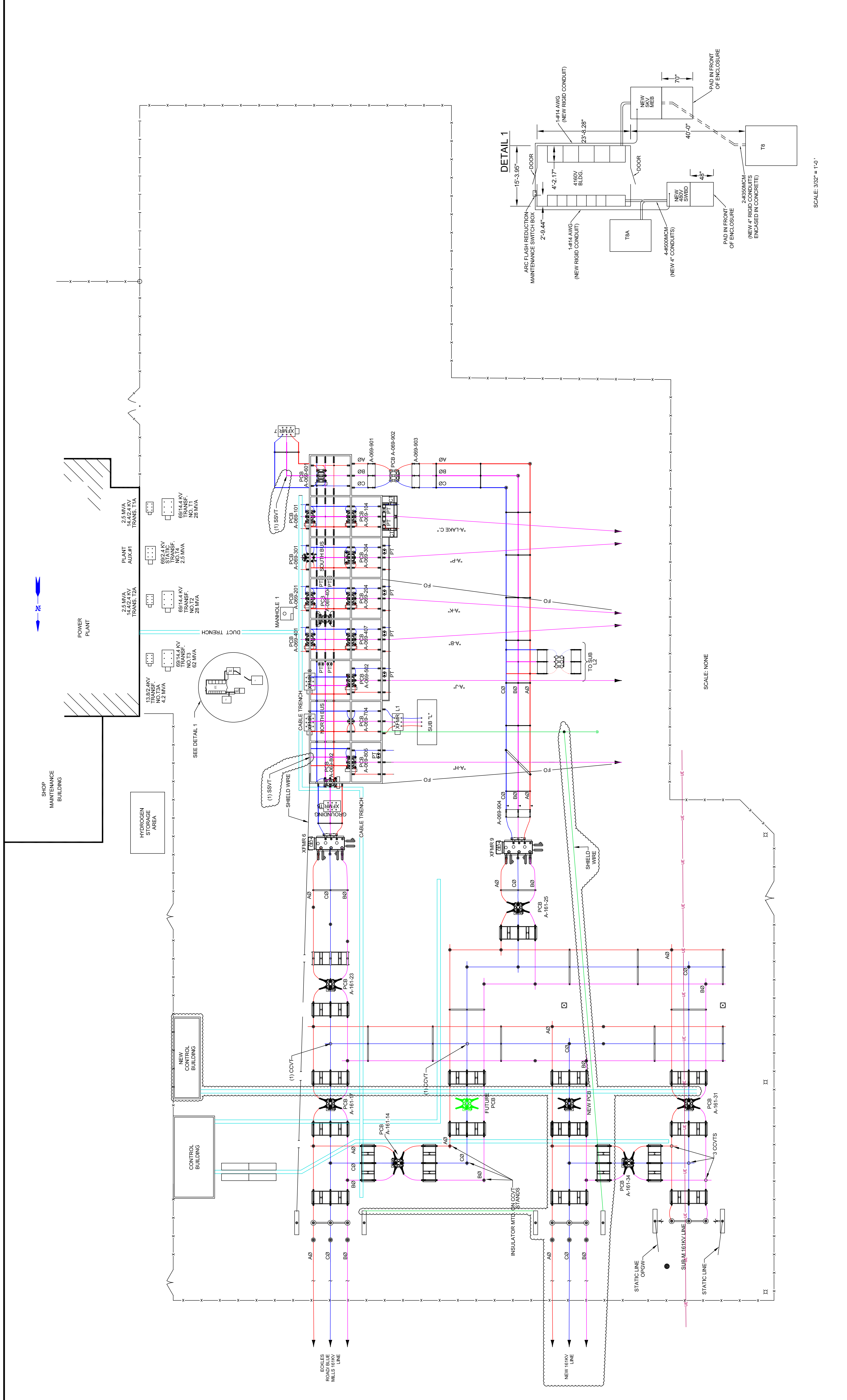
Time Estimates are based on the current version of the project schedule and some processes of each category running concurrently. Time estimates are estimates and are not guaranteed. Construction and procurement times may vary due to the fluctuating nature of labor availability, labor productivity, unavoidable delays, and material availability. Further, construction times may be impacted by poor weather conditions, the ability to schedule necessary system outages as required and without delay, and the Interconnection Customer’s ability to provide necessary funding, security, and/or information in a timely manner, such that it does not cause delays in the schedule.

Activity	Duration
Engineering	12 Months
Procurement	24 Months
Construction	9 Months
Total Project Length	39 Months

Short Circuit Fault Duty Evaluation

IPL reviewed short circuit analysis for the Sub A 161 kV substation to determine if the addition of GEN-2018-031 would cause the available fault currents to exceed the interrupting capability of any existing circuit breakers. The review found fault currents within circuit breaker interrupting capability with the addition of the GEN-2018-031.

Appendix A – IPL Substation A Preliminary Plan View



SCALE: 3/32" = 1'-0"

REV.	DATE	DESCRIPTION
5	08-14-18	UPDATED LAYOUT
4	05-18-12	TRANSFORMER DESIGNATIONS UPDATE
3	06-11-12	TRANSFERRED TO NEW IPL BORDER
2	08-26-09	ADDED FIBER OPTIC CABLE
1	02-08-08	ADDED NEW IPL BORDER

BY	APPD.	DESCRIPTION
JAK	JAK	
JLD	JLD	
REV	AS NOTED	

DRAWN BY:	PDL	PB	NH	DR	DT	REV	JLD	JAK	BY	APPD.	DESCRIPTION
	SFG										

DATE	SCALE	CAD NAME
12/1999	AP001-5.DWG	

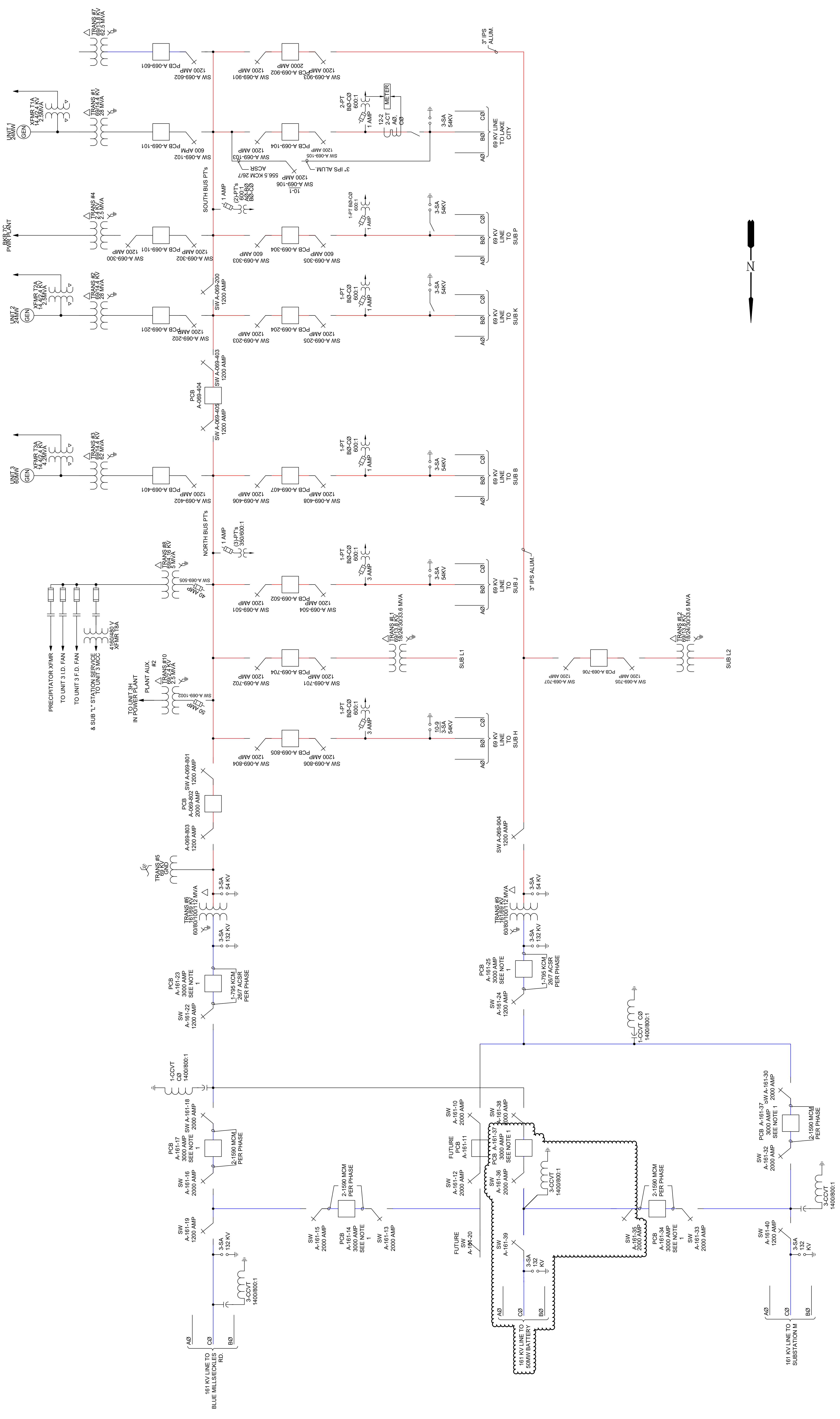
LEGEND

FO — FIBER OPTIC CABLE

NOTES:

- CONTRACTOR TO INSTALL SPLICE CANNISTERS 8'-0" ABOVE FINISH GRADE.
- INSTALL A 50' STORAGE LOOP WITH EACH SPLICE CANNISTER.

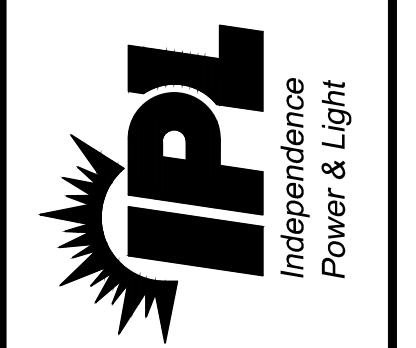
Appendix B – Preliminary One-Line



REV.	DATE	DESCRIPTION	BY	APPD.	SCALE	CAD NAME	DATE	REV.	APPD.	SCALE
11	02-07-19	COMBINED AND UPDATED SIMPLE ONE LINE								
10	05-11-16	ADDED SUB L STATION SERVICE								
9	07-24-15	UPDATE PER FIELD VERIFICATION								
8	04-02-15	AS BUILT - BREAKER REPLACEMENT A-069-301 J041837								
7	03-15-14	BREAKER REPLACEMENT A-069-301 J041837								
6	09-18-12	TRANSFORMER DESIGNATIONS UPDATE								

REV.	DATE	DESCRIPTION	BY	APPD.	SCALE	CAD NAME	DATE	REV.	APPD.	SCALE
11	02-07-19	COMBINED AND UPDATED SIMPLE ONE LINE								
10	05-11-16	ADDED SUB L STATION SERVICE								
9	07-24-15	UPDATE PER FIELD VERIFICATION								
8	04-02-15	AS BUILT - BREAKER REPLACEMENT A-069-301 J041837								
7	03-15-14	BREAKER REPLACEMENT A-069-301 J041837								
6	09-18-12	TRANSFORMER DESIGNATIONS UPDATE								

CITY OF INDEPENDENCE
POWER & LIGHT DEPARTMENT
SUBSTATION "A"
ONE-LINE DIAGRAM



REV.	DATE	DESCRIPTION	BY	APPD.	SCALE	CAD NAME	DATE	REV.	APPD.	SCALE
11	02-07-19	COMBINED AND UPDATED SIMPLE ONE LINE								
10	05-11-16	ADDED SUB L STATION SERVICE								
9	07-24-15	UPDATE PER FIELD VERIFICATION								
8	04-02-15	AS BUILT - BREAKER REPLACEMENT A-069-301 J041837								
7	03-15-14	BREAKER REPLACEMENT A-069-301 J041837								
6	09-18-12	TRANSFORMER DESIGNATIONS UPDATE								

REV.	DATE	DESCRIPTION	BY	APPD.	SCALE	CAD NAME	DATE	REV.	APPD.	SCALE
11	02-07-19	COMBINED AND UPDATED SIMPLE ONE LINE								
10	05-11-16	ADDED SUB L STATION SERVICE								
9	07-24-15	UPDATE PER FIELD VERIFICATION								
8	04-02-15	AS BUILT - BREAKER REPLACEMENT A-069-301 J041837								
7	03-15-14	BREAKER REPLACEMENT A-069-301 J041837								
6	09-18-12	TRANSFORMER DESIGNATIONS UPDATE								



Interconnection Facilities Study

**Costs associated with
DISIS-2018-001**

December 2023

Introduction

This report summarizes the scope of the Interconnection Facilities Analysis for Network Upgrade(s) to determine costs related to the addition of the SPP-GI DISIS-2018-001 Interconnection Request(s). Evergy, as a TO, is receiving an unprecedented amount of GI interconnect requests. The cost estimates and interconnect information supplied are based on current system configuration. There are many cases of multiple GI's requesting POIs at the same substation. Ongoing changes in Evergy's transmission system configuration could affect the required system upgrades and costs necessary to meet any particular GI interconnect request in the future.

Southwest Power Pool Generation Interconnection Request:

Per the SPP Generator Interconnection Procedures (GIP), SPP has requested that Evergy perform an Interconnection Facilities Study (IFS) for Network Upgrade(s) in accordance with the Scope of Interconnection Facilities Study GIP Section 8.10 and the Interconnection Facilities Study Procedures in accordance with GIP Section 8.11 for the following Interconnection Request(s):

Upgrade Type	UID	Upgrade Name	Lead Time	DISIS Cost Estimate
Current Study	158628	Build Holt to Atchison New 345kV Line	48	\$61,642,822
Current Study	158563	Build Holt to Atchison new 345kV Line (Transource)	48	\$20,623,461

Build new Holt to Atchison 345kV line (DISIS-2018-001)

345kV Substation

Line terminal work at the Transource owned Holt 345kV substation associated with building the Holt to Atchison new 345kV line. This will require Holt substation to be reconfigured to a 345kV breaker and a half from the current ring bus. UID 158563

Total Cost

The total cost estimate:

\$	1,104,600	Transmission Line
\$	19,422,439	Substation
\$	96,422	AFUDC
\$	0	Contingency
<hr/>		
\$	20,623,461	Total

This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings cannot be assured.

Time Estimate

Time estimates are based on current version of the project schedule and some processes of each category run concurrently.

Engineering Time	36-48	Months
Procurement Time	36-48	Months
Construction Time	36-48	Months
<hr/> Total Project Length	36-48	Months

Build new Holt to Atchison 345kV line (DISIS-2018-001)

345kV Line

Every to build a new 345kV line from Holt (Transource) to Atchison (MEC) Line. The straight-line distance between these subs is approximately 22.5 miles. This estimate assumes a total line length of 25 miles. Estimated easement costs are included in this estimate but are only estimates. UID 158628

Total Cost

The total cost estimate:

\$ 59,584,649	Transmission Line
\$	Substation
\$ 2,058,173	AFUDC
\$ 0	Contingency
<hr/> \$ 61,642,822	Total

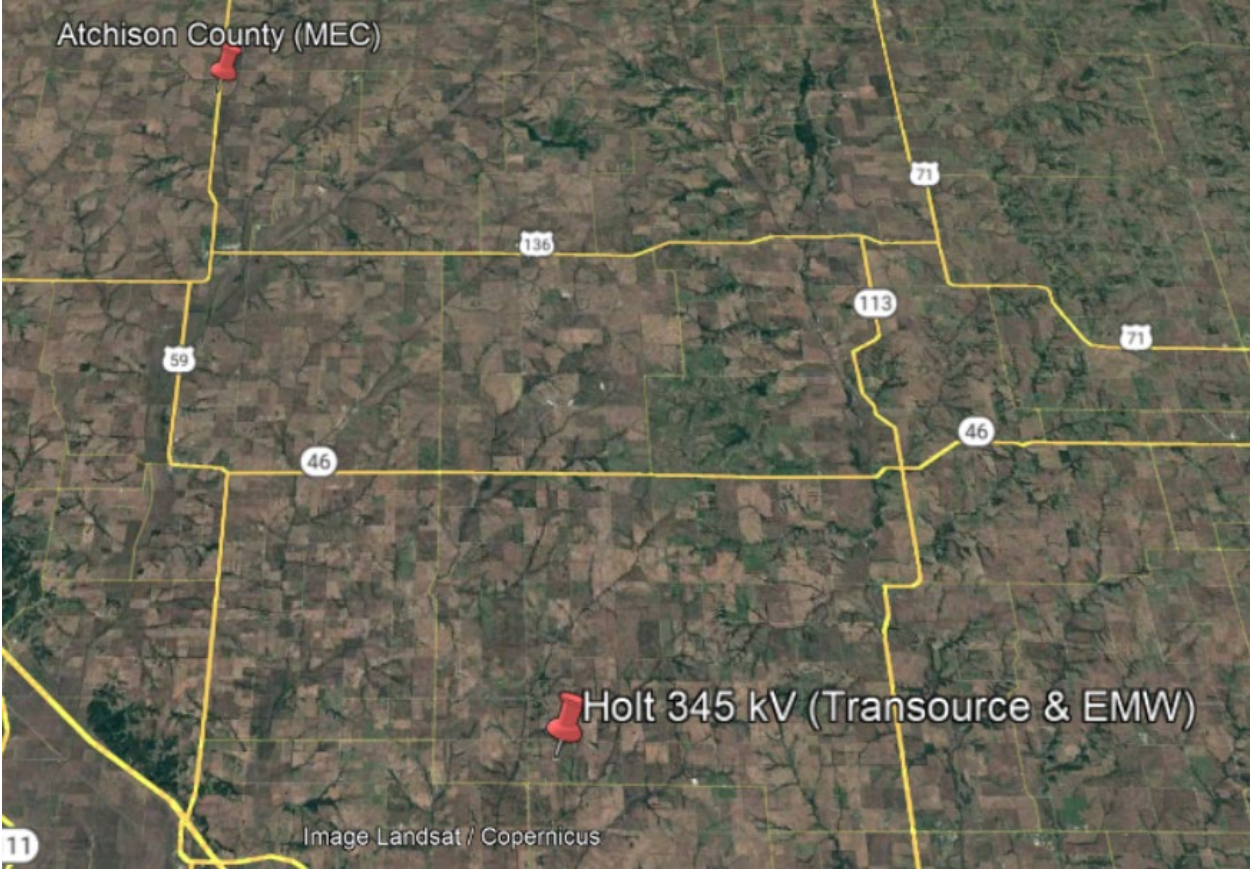
This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings cannot be assured.

Time Estimate

Time estimates are based on current version of the project schedule and some processes of each category run concurrently.

Engineering Time	36-48	Months
Procurement Time	36-48	Months
Construction Time	36-48	Months
<hr/> Total Project Length	36-48	Months

Figure 1 –New Holt-Atchison 345kV Line



Holt 345kV substation

