



INTERCONNECTION FACILITIES STUDY REPORT

GEN-2016-128
(IFS-2016-002-36)

Published July 2021

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
09/15/2020	SPP	Initial draft report issued.
10/15/2020	SPP	Updated final report issued and updated ILTCR eligibility.
01/21/2021	SPP	Updated final report issued. Updated cost allocation in Tables 3 and 6 based on DISIS Power Flow Reposting
07/28/2021	SPP	Updated final report issued. Tables 3 and 6 based on DISIS Power Flow Reposting

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2016-128/IFS-2016-002-36 is for a 176 MW generating facility located in Alfalfa, OK. The Interconnection Request was studied in the DISIS-2016-002 Impact Study for Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS). This request was restudied in the DISIS-2016-002-2 Impact Study for ERIS. The Interconnection Customer's requested in-service date is December 31st, 2019.

The interconnecting Transmission Owner, Oklahoma Gas and Electricity (OG&E), 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 eighty-eight (88) GE 2.0 MW Wind Turbine Generation Systems for a total generating nameplate capacity of 176 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 345 kV transformation substation with associated 34.5 kV and 345 kV switchgear;
- One 345/34.5 kV 120/160/200 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An overhead 345 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 345 kV bus at existing Transmission Owner substation ("Woodring 345 kV") 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 Turbine 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 communications 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** lists 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 (\$)	Estimated Lead Time
<u>GEN-2016-128 (TOIF) (OKGE) - 122662:</u> At an existing EHV substation, update relay settings on an existing Gen-Tie line to accommodate new protection settings.	\$15,000	100%	\$15,000	TBD
Total	\$15,000		\$15,000	

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
<u>GEN-2016-128 Interconnection (Non-Shared NU) (OKGE) - 122663:</u> No upgrades needed.	Ineligible	\$0	N/A	\$0	N/A
Total		\$0		\$0	

*GEN-2016-128 is sharing a Gen-Tie line with GEN-2016-068, which directly interconnects into the Woodring 345 kV Substation.

Table 2: Non-Shared Network Upgrade(s)

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 (\$)	Estimated Lead Time
<u>GEN-2016-119 Tap – Arcadia 345kV (DISIS-2016-022-2) – 122791</u> ; Build new terminal at new substation on Sooner to Spring Creek line being built for Gen-2016-119. Expand Arcadia Substation and re-route four transmission lines to allow for room for new transmission line to be brought in. Build approximately 47 miles of new 345kV line from new substation to Arcadia.	Eligible	\$67,234,906	4.57%	\$3,072,635	36 Months
<u>Viola 345/138 kV Transformer Ckt 2 (DISIS-2016-002-2) – 122792</u> ; Install a new 345 kV terminal on a new rung consisting of two (2) breakers, four (4) switches, and two (2) control panels. Install a new 138 kV terminal on an existing rung consisting of one (1) breaker, three (3) switches, three (3) PTs, and one (1) 400/440 MVA 345-138	Eligible	\$9,204,587	15.83%	\$1,457,086	18 – 24 Months
<u>Sooner – Spring Creek (GEN-2016-119 Tap) 345kV Substation (DISIS-2016-002-3) – 122627</u> ; Construct a new EHV substation. Install 4-345 kV 3000A breakers, line relaying, disconnect switches, and associated equipment	Ineligible	\$11,145,332	4.57%	\$509,341	18 Months
Total		\$87,584,825		\$5,039,062	

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
<u>Blackberry – Wolfcreek 345 kV Ckt1 (AECD) – 122765:</u> Build 86.15 miles of 345 kV line from Blackberry to Wolf Creek to achieve 1792/1792/1792/1792 (SN/SW/WN/WE) MVA ratings.	\$0	1/1/2026
<u>Viola 345/138 kV Transformer Ckt 1 – 50582:</u> Install new 345/138 kV transformer at Viola substation.	\$0	4/19/2018
<u>Clearwater – Viola 138 kV Ckt 1 – 50583:</u> Build new 21.8-mile 138 kV line from new Viola substation to Clearwater 138 kV substation.	\$0	11/16/2018
<u>Gill – Viola 138 kV Ckt 1 – 50584:</u> Build new 27.9-mile 138 kV line from new Viola substation to Gill 138 kV substation.	\$0	11/16/2018

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 MISO 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 Share (%)	Allocated Cost Estimate (\$)
<u>AECL Affected System Study Cycle Projects:</u> Rebuild the 18-mile-long Hamburg to Northboro 69 kV line to 336 ASCR.	\$7,434,000	1.7%	\$124,626
<u>AECL Affected System Study Cycle Projects:</u> Rebuild the 4.4-mile-long Phelps to Rockport 69 kV line to 336 ASCR.	\$1,817,000	1.7%	\$30,649
<u>AECL Affected System Study Cycle Projects:</u> Rebuild the 11.4-mile-long Linden to Phelps 69 kV line to 336 ASCR.	\$4,708,000	1.8%	\$85,254
<u>AECL Affected System Study Cycle Projects:</u> Rebuild the 4.136-mile-long Bevier to Macon Lake 69 kV line to 477 ASCR.	\$2,938,000	2%	\$58,009
<u>AECL Affected System Study Cycle Projects:</u> Rebuild the 2.2-mile-long Macon Lake to Axtell to Macon Tap 69 kV line to 477 ASCR.	\$1,562,000	1.9%	\$29,016
<u>AECL Affected System Study Cycle Projects:</u> Upgrade the 10.92-mile-section of Neosho to Sweetwater 69 kV line to 336 ASCR.	\$6,273,000	3%	\$189,194
<u>AECL Affected System Study Cycle Projects:</u> Add 0.08 p.u. series reactor on Washburn to Seligman 69 kV line.	\$675,000	2.7%	\$17,929
Total	\$25,407,000		\$534,676

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for [Insert Interconnection Amount] 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 [Insert all upgrades (TOIF, non-shared NU, shared NU, affected system, etc)] that is required for full interconnection service is summarized in the table below.

Table 6: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilitie Upgrade(s)	\$15,000
Non-Shared Network Upgrade(s)	\$0
Shared Network Upgrade(s)	\$5,039,062
Affected System Upgrade(s)	\$534,676
Total	\$5,588,738

*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).



FACILITY STUDY

for

Generation Interconnection Request 2016-128

176 MW Wind Generating Facility
In Alfalfa County
Oklahoma

February 5, 2020

Adam Snapp, PE
Lead Engineer
Transmission Planning
OG&E Electric Services

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Oklahoma Gas and Electric (OG&E) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer for SPP Generation Interconnection request Gen-2016-128. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system. The requirements for interconnection consist of updating relay settings at Woodring substation. This GIA will share the same Gen-Tie line as Gen-2016-068 which will be established by the time this GIA seeks energization. The total cost for OKGE to update settings at Woodring 345kV substation, the interconnection facility, is estimated at \$15,000.

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Introduction

The Southwest Power Pool has requested a Facility Study for the purpose of interconnecting a wind generating facility within the service territory of OG&E Electric Services (OKGE) in Alfalfa County Oklahoma. The proposed 345kV point of interconnection is at Woodring Substation in Garfield County Oklahoma. This substation is owned by OKGE.

The cost for updating relay settings on an existing terminal at Woodring 345kV Substation, the required interconnection facility, is estimated at \$15,000.

Network Constraints in the Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Interconnection Facilities

The primary objective of this study is to identify attachment facilities. The requirements for interconnection consist of adding a new 345kV terminal in Woodring Substation. This 345kV addition shall be constructed and maintained by OKGE under SPP-Gen-2016-068. The Customer did not propose a route of its 345kV line to serve its 345kV facilities. It is assumed that obtaining all necessary right-of-way for the line into the new OKGE 345kV substation facilities will not be a significant expense.

The total cost for OKGE to update relay settings at a terminal in Woodring Substation, the interconnection facility, is estimated at \$15,000. This cost does not include building the 345kV line from the Customer substation into Woodring Substation. The Customer is responsible for this 345kV line up to the point of interconnection. This line was previously constructed under SPP-GEN-2016-068. This cost does not include the Customer's 345-34.5kV substation and the cost estimate should be determined by the Customer. The Customer has stated that they will be sharing the same Gen-Tie line as SPP-Gen-2016-068.

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

The costs of interconnecting the facility to the OKGE transmission system are listed in Table 1.

Short Circuit Fault Duty Evaluation

It is standard practice for OG&E to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with re-closer de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.

For this generator interconnection, no breakers were found to exceed their interrupting capability after the addition of the Customer's generation and related facilities. OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there is no short circuit upgrade costs associated with the Gen-2016-128 interconnection.

Table 1: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2020 DOLLARS)
OKGE – Interconnection Facilities - At an existing EHV substation, update relay settings on an existing Gen-Tie line to accommodate new protection settings.	\$15,000
OKGE – Network Upgrades	\$0
OKGE - Right-of-Way for 345kV terminal addition	No Additional ROW
Total	\$15,000

Prepared by Adam Snapp, P.E.
Lead Engineer, Transmission Planning
OG&E Electric Services

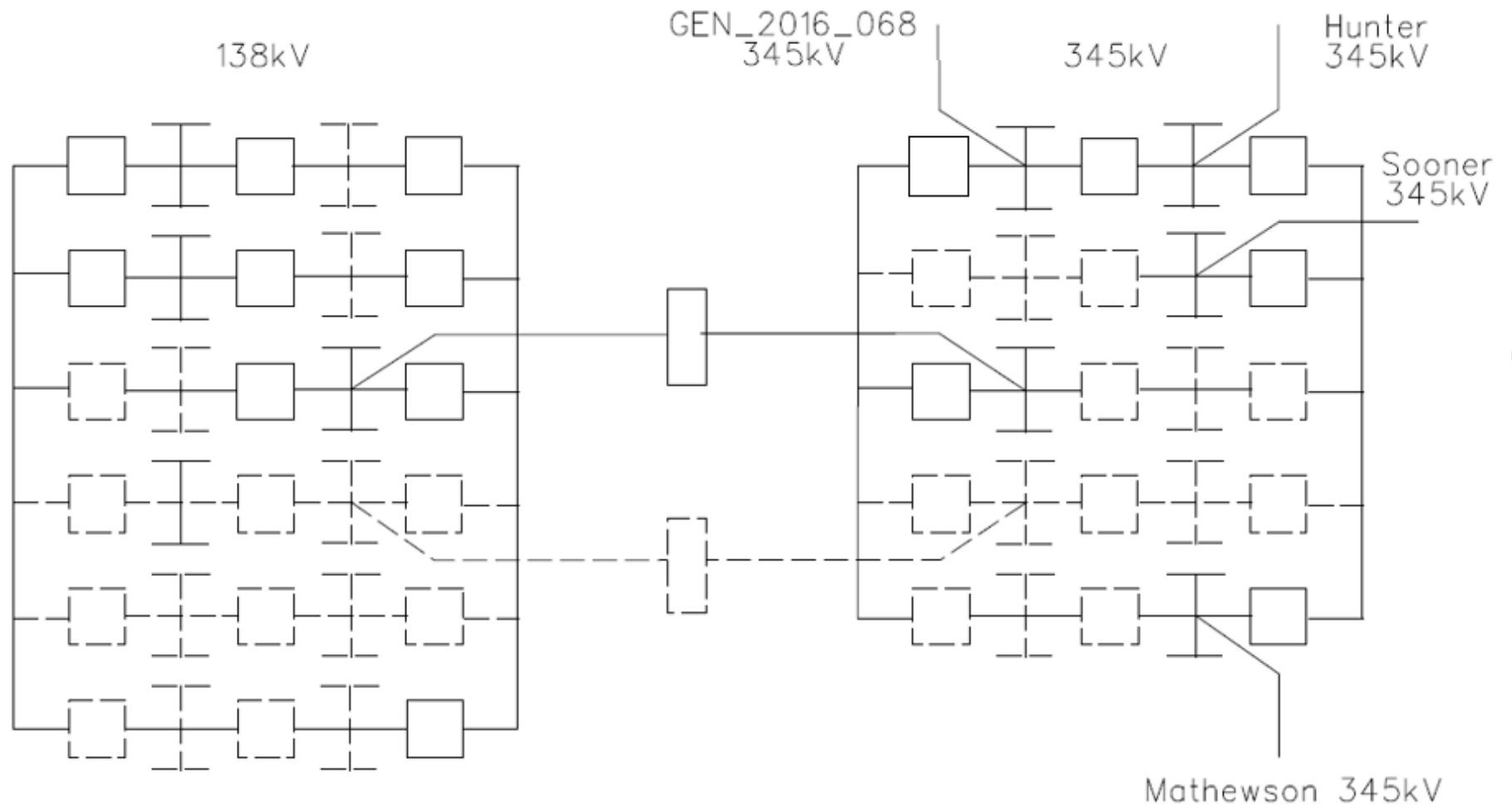
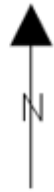
February 5, 2020

Reviewed by:

Steve M. Hardebeck, P.E.
Manager, Transmission Planning

Woodring Substation

GEN_2016_128





FACILITY STUDY

for

IFS-2016-002-2 for GI Cluster Impact Study For DISIS-2016-002-2

New Tap at Gen-2016-100/101/119 Substation on Sooner – Spring Creek line
New 345kV Transmission Line from New Tap to Arcadia Substation
In Payne, Logan, and Oklahoma Counties
Oklahoma

August 11, 2020

Adam Snapp, P.E.
Lead Engineer
Transmission Planning
OG&E Electric Services

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Oklahoma Gas and Electric (OG&E) performed the following Facility Study for Network Upgrades to satisfy the Facility Study Agreement executed by the requesting customer for SPP DISIS-2016-002-2 for Network Upgrades. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system. The requirements for the Network Upgrade are to build a new terminal at a new substation on Sooner - Spring Creek line being built for Gen 2016-100 and 119. OGE must also build approximately 47 miles of 345 kV transmission line from new substation serving GEN-2016-100 and 119 to Arcadia Substation. Arcadia Substation needs to be expanded and one transmission line re-routed to a new terminal to allow for room for the new transmission line to be brought in. Two other lines must be re-routed at Arcadia to accommodate expanded footprint of the substation but will remain in their current terminal locations.

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Introduction

The Southwest Power Pool has requested a Facility Study for Network Upgrades within the service territory of OG&E Electric Services (OKGE) in Payne and Oklahoma Counties in Oklahoma. The proposed Network Upgrade Facilities are for the addition of a 345kV terminal at a new substation in Payne county Oklahoma. This substation is being built to serve Gen-2016-100 and 119. Further network upgrades include the expansion of Arcadia substation, the installation of two 345kV breakers and a new terminal at Arcadia substation.

Network Constraints in the American Electric Power West (AEPW), Southwest Public Service (SPS), OKGE and Western Farmers Electric Cooperative (WFEC) systems may be verified with a transmission service request and associated studies.

Network Upgrade Facilities

The primary objective of this study is to identify Network Upgrades. The requirements for this Network Upgrade consist of the expansion of Arcadia substation, the building of a 345kV transmission line between the two substations, and the installation of a new terminal at Arcadia substation to re-route an existing line into in order to accommodate generator interconnection requests identified in SPP-GI DISIS-2016-002-2. These 345kV network upgrades shall be constructed and maintained by OKGE.

Network upgrades for this GI cluster study include the addition of a new 345kV terminal to the new substation built for Gen-2016-100 and 119 as well as relay equipment and other upgrades at Arcadia to allow the addition of a new transmission line.

Total cost of all Network Upgrades is estimated at \$67,234,906 and will take 36 months to construct.

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

The costs of interconnecting the facility to the OKGE transmission system are listed in Table 1.

Short Circuit Fault Duty Evaluation

It is standard practice for OG&E to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with re-closer de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.

For this Network Upgrade, no breakers were found to exceed their interrupting capability after the addition of the line terminals at the new EHV substation and Arcadia as well as addition of related facilities. OG&E found no breakers that exceeded their interrupting capabilities on their system. Therefore, there is no short circuit upgrade costs associated with this DISIS-2016-002-2 Network Upgrade.

Table 1: Required Interconnection Network Upgrade Facilities

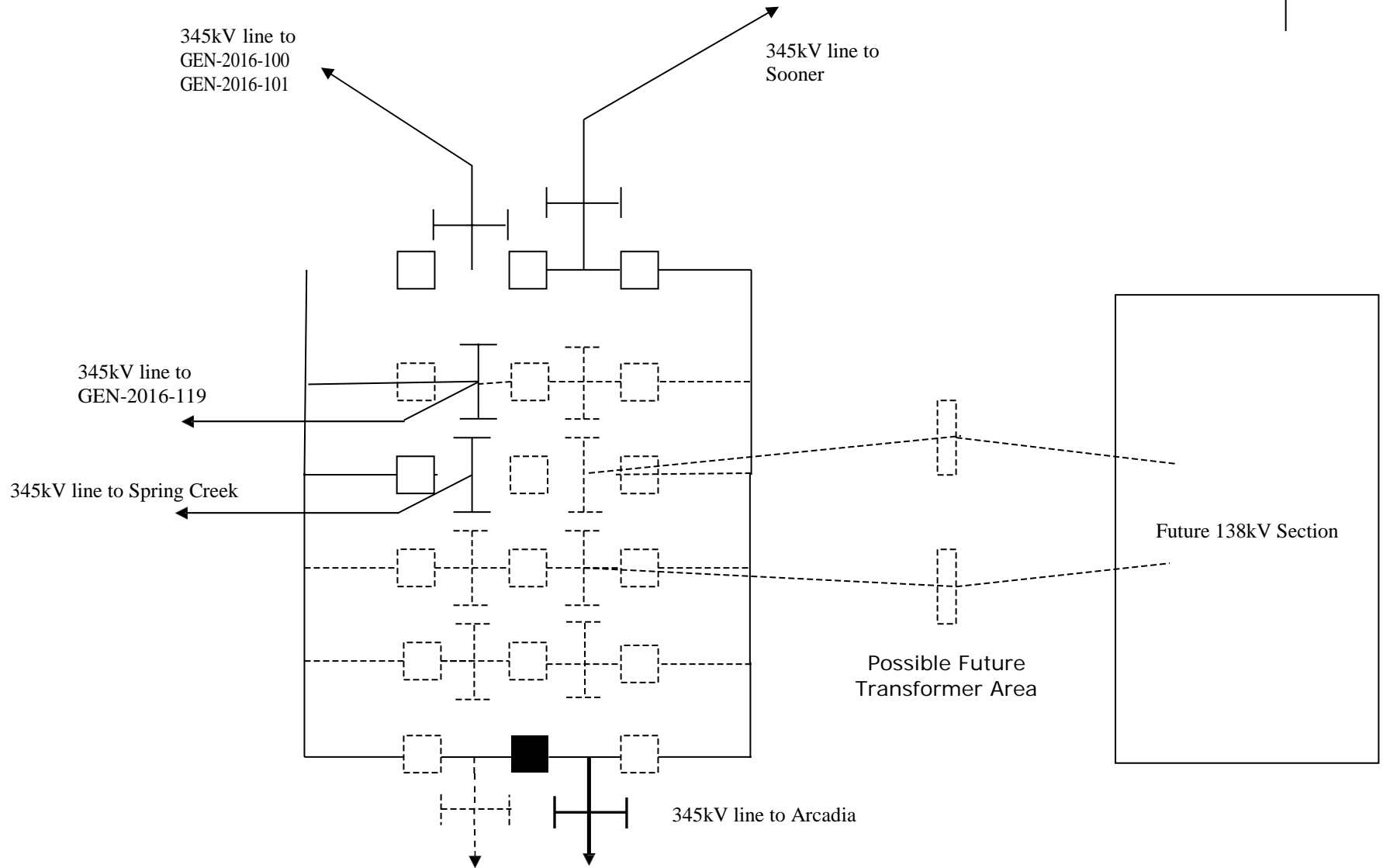
Facility	ESTIMATED COST (2020 DOLLARS)	Estimated Lead time
OKGE – Network Upgrades at a new EHV sub, Install 1-345kV 3000A breakers, line relaying, disconnect switches, and associated equipment. Build approx. 47 Miles of 345kV Transmission line from new EHV substation to Arcadia Substation Bring in 345kV line to Arcadia substation. Line relaying and all associated equipment. Expand Arcadia substation, Install new rung, 2-345kV breakers, Dead end structure, line switch, line relaying, metering including CTs and PTs. Re-route existing 345kV line into new terminal and two other existing lines around expanded substation.	\$67,234,906	36 Months
OKGE – Transmission Line ROW obtainment	Not Included	12 Months
Total	\$67,234,906	36 months

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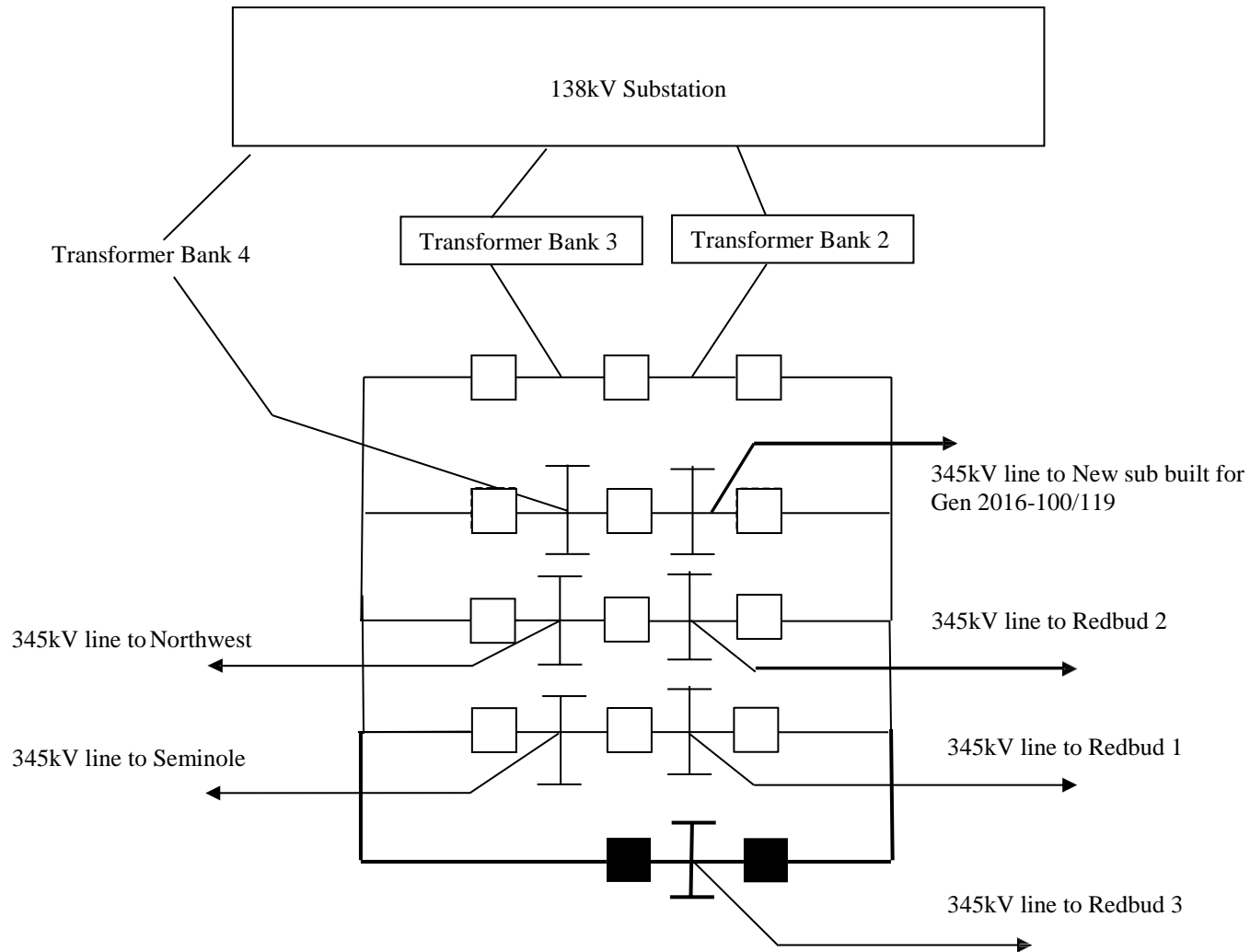
August 11, 2020

Reviewed by:
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Manager- Transmission Planning
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Substation developed for GEN-2016-100/119



Arcadia Substation





Interconnection Facilities Study

Network Upgrades associated with DISIS-2016-002-2

September 2020

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-2016-002-2 Interconnection Request(s) mentioned below.

- GEN-2016-100
- GEN-2016-101
- GEN-2016-111
- GEN-2016-112
- GEN-2016-114
- GEN-2016-119
- GEN-2016-122
- GEN-2016-128
- GEN-2016-133 thru 146
- GEN-2016-153

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):

Network Upgrade	Description	SCERT UID	DISIS Estimate
Hoyt - JEC 345kV Rebuild	Rebuild the existing JEC - Hoyt 345 kV line as double circuit 345 kV with normal/minimal emergency rating of 1792 MVA. Network upgrade shared by four requests: GEN-2016-111, GEN-2016-112, GEN-2016-114, GEN-2016-22.	122705	\$49,284,648.00
Viola 345/138kV Transformer CKT 2	Build second 345/138/13.8kV transformer at Viola.	122792	\$9,038,339.00
Reno 345/115 kV Transformer Ckt 1	Replace existing Reno transformer with one rated 400/440.	122793	\$4,683,106.00
Reno 345/115 kV Transformer Ckt 2	Replace existing Reno transformer with one rated 400/440	122794	\$4,683,106.00

Hoyt – Jeffrey EC 345kV Rebuild

345kV Transmission Line

The estimated cost is for 24.3 miles of single 345kV circuit with new bundled 1590 Lapwing ACSR line with 64mm OPGW static wire, eight (8) steel dead end structures, one-hundred forty-three (143) steel tangent structures, four (4) steel running angle structures, and no distribution underbuild.

345kV Substation

At Hoyt 345kV substation, the estimated cost is for removal of the wavetrap, replace line arrestors, add fiber, and upgrade groundmat.

At Jeffrey EC 345kV substation, the estimated cost is for removal the wavetrap, replace line arrestors, and add fiber.

Total Cost

The total cost estimate for this Network Upgrade is:

\$	49,140,587	345kV Transmission Line
\$	490,863	345kV Substation
\$	153,427	AFUDC
\$	0	Contingency
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\$	49,784,877	Total

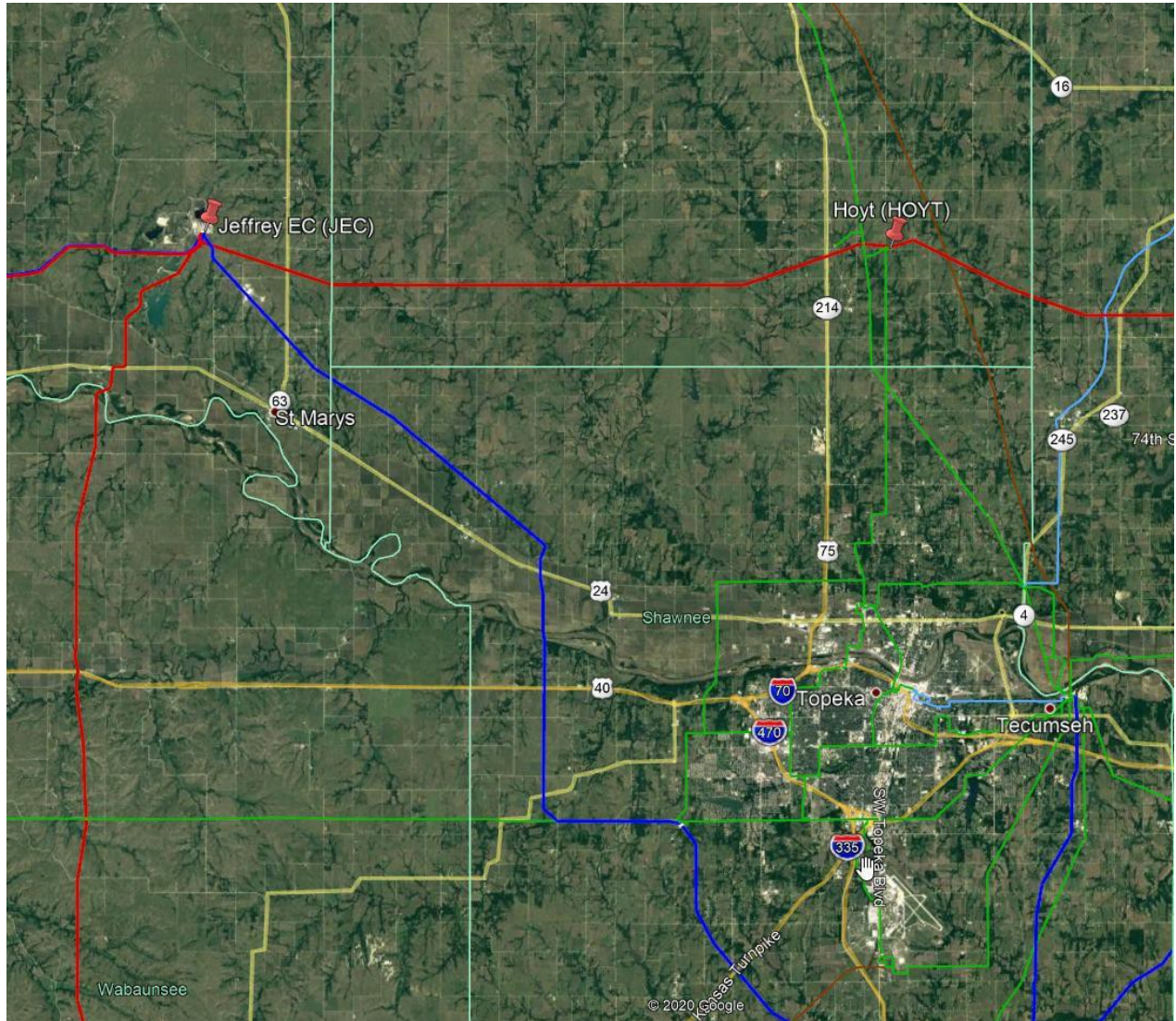
This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings 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	12	Months
Procurement Time	12	Months
Construction Time	12	Months
<hr/>		
Total Project Length	24-36	Months

Figure 1 – Hoyt-Jeffrey EC 345kV Line



Viola 345-138kV TX-2 Transformer Addition

345kV and 138kV Substation

At Viola 345kV substation, the estimated cost is for a new 345kV terminal on a new rung consisting of two (2) breakers, four (4) switches, and two (2) control panels. Also, at Viola 138kV substation, the estimated cost is for a new 138kV terminal on an existing rung consisting of one (1) breaker, three (3) switches, three (3) PTs, and one (1) 400/440 MVA 345-138kV transformer with LTCs.

Total Cost

The total cost estimate for this Network Upgrade is:

\$	9,177,056	345kV and 138kV Substation
\$	27,531	AFUDC
\$	0	Contingency
<hr/>		
\$	9,204,587	Total

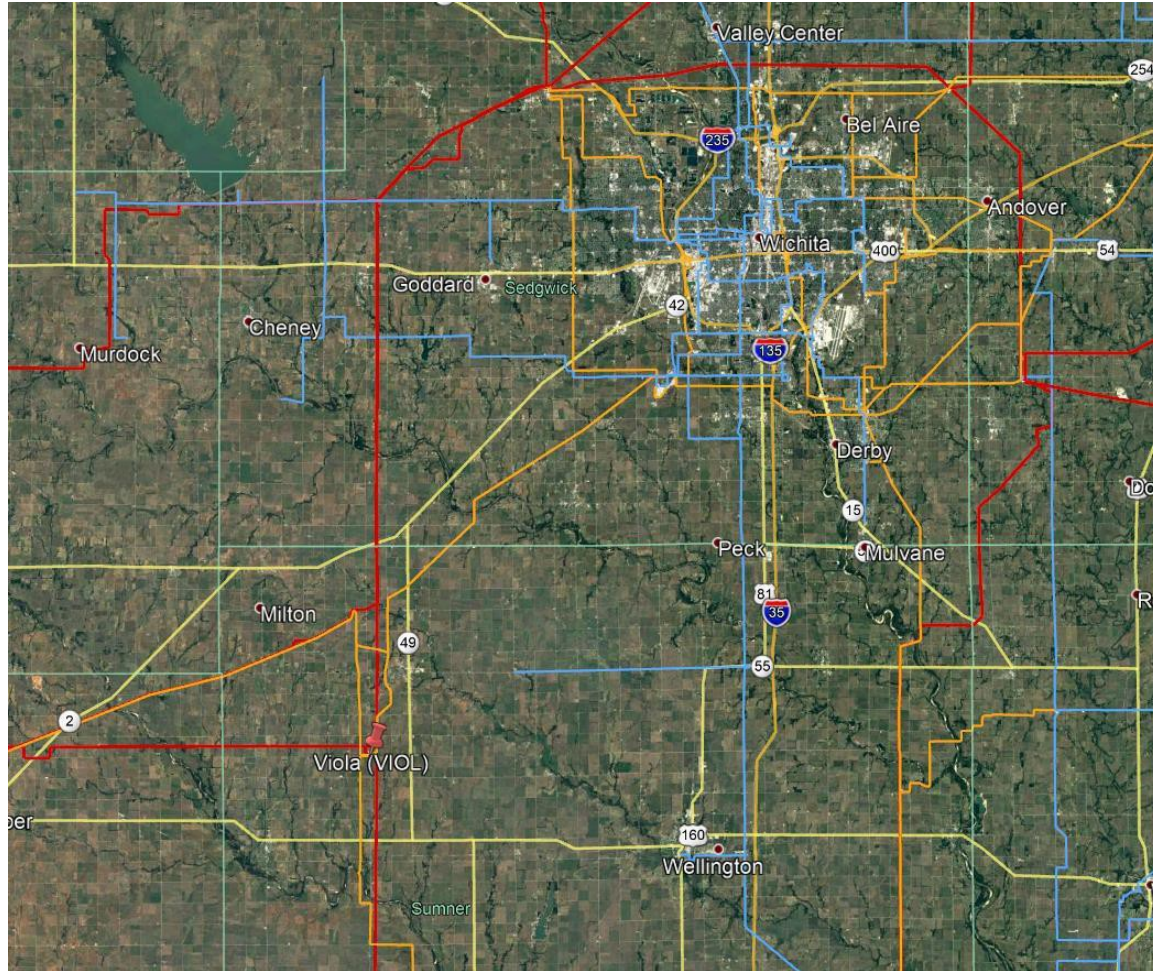
This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings 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	6	Months
Procurement Time	12	Months
Construction Time	6	Months
<hr/>		
Total Project Length	18-24	Months

Figure 2 – Viola Substation



Reno County 345-115kV TX-1 Transformer Replacement

345kV and 115kV Substation

At Reno County 345kV and 115kV substation, the estimated cost is for one (1) 345-115kV 400/440 MVA transformer with LTCs, and removal of the existing transformer.

Total Cost

The total cost estimate for this Network Upgrade is:

\$	4,669,098	Substation
\$	14,007	AFUDC
\$	0	Contingency
<hr/>		
\$	4,683,105	Total

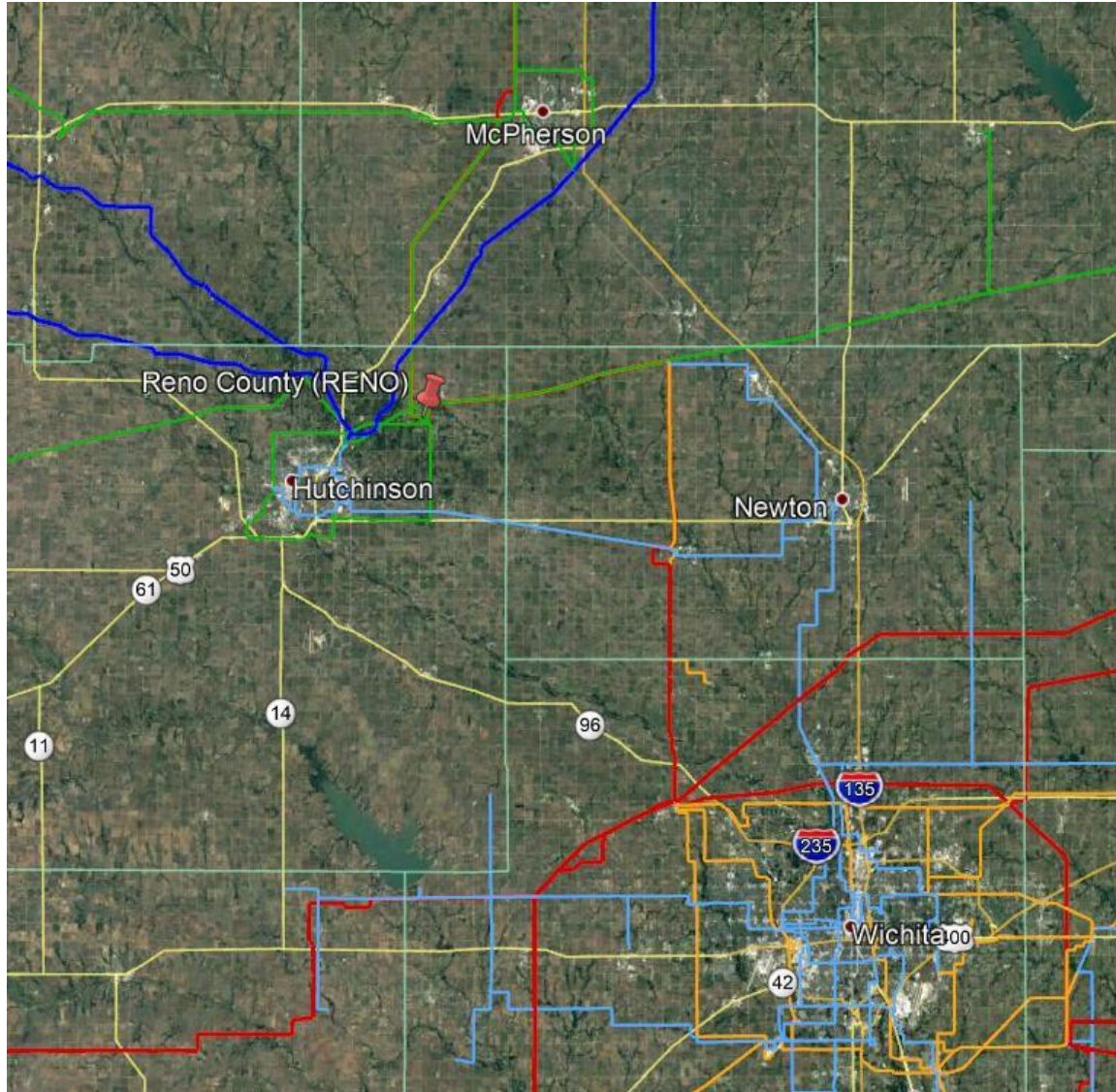
This estimate is accurate to +/- twenty (20) percent, based on current prices, in accordance with Attachment A of Appendix 4 of the Interconnection Facilities Study Agreement. However, recent cost fluctuations in materials are very significant and the accuracy of this estimate at the time of actual settings 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	6	Months
Procurement Time	12	Months
Construction Time	6	Months
<hr/>		
Total Project Length	18-24	Months

Figure 3 – Reno County Substation



Reno County 345-115kV TX-2 Transformer Replacement

345kV and 115kV Substation

At Reno County 345kV and 115kV substation, the estimated cost is for one (1) 345-115kV 400/440 MVA transformer with LTCs, and removal of the existing transformer.

Total Cost

The total cost estimate for this Network Upgrade is:

\$	4,669,098	Substation
\$	14,007	AFUDC
\$	0	Contingency
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\$	4,683,105	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	6	Months
Procurement Time	12	Months
Construction Time	6	Months
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Total Project Length	18-24	Months