SPP Southwest Power Pool

Facility Study for Generation Interconnection Request GEN – 2003 – 019

SPP Coordinated Planning
(#GEN-2003-019)

September 2004

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP) Westar Energy, Inc. (WERE) performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer and SPP for SPP Generation Interconnection request Gen-2003-019. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff Attachment V, which covers new generation interconnections on SPP's transmission system.

Generation Interconnection Facilities Study

For

GEN-2003-019

September 20, 2004

Introduction

This report summarizes the results of a Facility Study performed for the Southwest Power Pool (SPP) by Westar Energy to evaluate a generation interconnection request by <Customer> for 250 MW of wind-powered generation on the regional transmission system west of Salina, Kansas. The requested in-service date of the generating facility is November 2005. Prior to this study, both a Feasibility Study and a System Impact Study were completed. The proposed <Customer's> project will interconnect with the Westar Energy Summit – Midwest Energy Knoll 230 kV line.

Project Location and Existing Facilities

The project is located west of Salina, Kansas, in Lincoln and Ellsworth counties approximately 24 miles west of Salina, Kansas. The existing Summit – Knoll 230 kV transmission line passes through the Customer's project boundary and is adjacent to the proposed Customer's interconnection facility substation. The Customer's interconnection will be effected at a new 230 kV ring-bus substation approximately 28 miles west of the existing Summit substation. The substation would connect to the Customer's facilities at 230 kV. The Customer will own, operate, and maintain facilities to the project substation and the project substation. Figure 1 shows the regional transmission facilities in the area. Figure 2 shows the Customer's project area and the proposed point of interconnection.

Interconnection Facilities

Interconnection of the Customer's project to the regional transmission system will be by way of a new 230 kV ring-bus substation on the existing Summit – Knoll 230 kV transmission line. The substation will have a terminal looking towards Summit, a terminal looking towards Knoll, and a terminal looking towards the Customer's project. The terminal looking towards the Customer's project will be the point of interconnection and will be where required interconnection metering is installed. Construction of this new substation requires land adjacent to the existing transmission line right-of-way.

230 kV Ring Bus Substation

The estimated cost is for three (3) 230 kV breakers, nine (9) 230 kV motor operated switches, nine (9) 230 kV arresters, four (4) 230 kV CCVT's, six (6) 230 kV CT's, six (6) 230 kV PT's, a new control building with redundant primary relaying and battery power, station power generator, steel including three (3) full tension dead-end structures, bus, 230 kV metering, and all associated yard and conduit work. In addition, SPP requires that interconnection metering be of revenue metering accuracy. Interconnection metering is required on both the terminal to the project facility and on the terminal to Midwest Energy. To connect the substation to the existing Summit – Knoll 230 kV line, work is required to break the line and route it into the substation.

$3,615,000 (230kV "ring bus" substation).
$ 248,000 (230 kV transmission line work).
$ 232,000 (Midwest Energy interconnection metering).

$ 232,000 (Project interconnection Metering).
$4,327,000

Figure 3 shows the proposed interconnection substation layout. Figure 4 shows the proposed interconnection substation one line. The Customer will incur additional costs for the transmission line to the project facility and for the project facility substation. Depending on the exact design configuration there may also be a need for a Customer provided capacitor bank. These costs are not presented in this Generation Interconnection Facilities Study.

The following are the approximate time lines for the project. These are based on Westar Energy's engineering time, average procurement time, and assumes good weather during construction. The amount of time per task may change if consultants are hired to perform this work.

230 kV Ring Bus Substation:

4 months	Engineering Time
6 months	Procurement Time
6 months	Construction Time
16 months Total	

The estimated time to complete does not include time to acquire land for the interconnection substation.

The schedule may be subject to reduction in overall time depending upon the precise scheduling of activities. The design and material ordering will only commence following execution of a Large Generator Interconnection Agreement by the Customer.

Westar Energy also maintains its own Facility Connection Standard. This Standard will be provided to The Customer upon request.

Network Upgrades

A part of the evaluation of impacts includes the delivery of the full output of the proposed project into the interconnected transmission system. Two facilities are identified as being overloaded during single contingencies for the proposed 250 MW output of the project. These facilities are: Summit – Northview 115 kV line; and JEC – Hoyt 345 kV line. Required mitigation of the 7.23-mile Summit – Northview 115 kV line is to replace 50 structures in order to increase the rating of the line to full 100 degree C operation. Because of security considerations in the Salina area, the work on this line will need to be done while the line is energized. Total costs include construction, dismantling and O&M and are estimated at $1,050,000. Required mitigation of the 24.30-mile JEC – Hoyt 345 kV line is to replace 80 structures in order to increase the rating of the line to full 100 degree C operation. Because of security considerations, this line can only be take out of service during those periods of time that one unit at the Jeffrey Energy Center is out of service. Typically, this occurs in the spring and fall seasons. Assuming the work is

scheduled to coincide with unit outages, the total of construction, dismantling, and O&M is estimated at $2,720,000.

Additional facilities were also noted as being overloaded during single contingencies for the proposed 250 MW output of the project. There facilities are: Auburn 230-115 kV transformer #2, Exide Junction – Summit 115 kV 4.94 mile line, and the Goodyear Junction – Northland 115 kV 3.44 mile line. The required mitigation for the Auburn 230-115 kV transformer #2 is to add the second transformer with all of the associated and interconnecting hardware. Total costs include construction, installation and O&M costs are estimated at $ 3,000,000. The required mitigation for the Exide Junction – Summit 115 kV line is to rebuild and reconductor the 4.94 miles of line with 1192 ACSR. Total costs include construction, dismantling and O&M costs and are estimated at $ 1,250,000. The required mitigation of the Goodyear Junction – Northland 115 kV to rebuild and reconductor the 3.44 miles of line. Total costs include construction, dismantling and O&M costs and are estimated at $ 1,150,000.

$1,050,000 (Summit – Northview 115 kV line).
$2,720,000 (JEC – Hoyt 345 kV line).
$3,000,000 Auburn 230-115 kV transformer #2
$1,250,000 Exide Junction – Summit 115 kV 4.94 mile line
$1,150,000 Goodyear Junction – Northland 115 kV 3.44 mile line
$9,170,000

If the Customer elects to reduce the size of the project to 190 MW as requested during the feasibility study, the costs to alleviate the overloads are reduced to an additional $5,400,000.

Project Impact on Fault Current

For purposes of evaluating fault current impact on the Westar Energy system, the Customer's project was modeled as a single synchronous generator at the Summit 230 kV bus. Three phase fault currents increased approximately 7 percent and phase-to-ground fault currents increased approximately 9.5 percent. No circuit breaker or circuit switcher at 345 kV, 230 kV, or 115 kV in the Salina area is overdutied due to the proposed project.

Figure 1 – Area Transmission Facilities

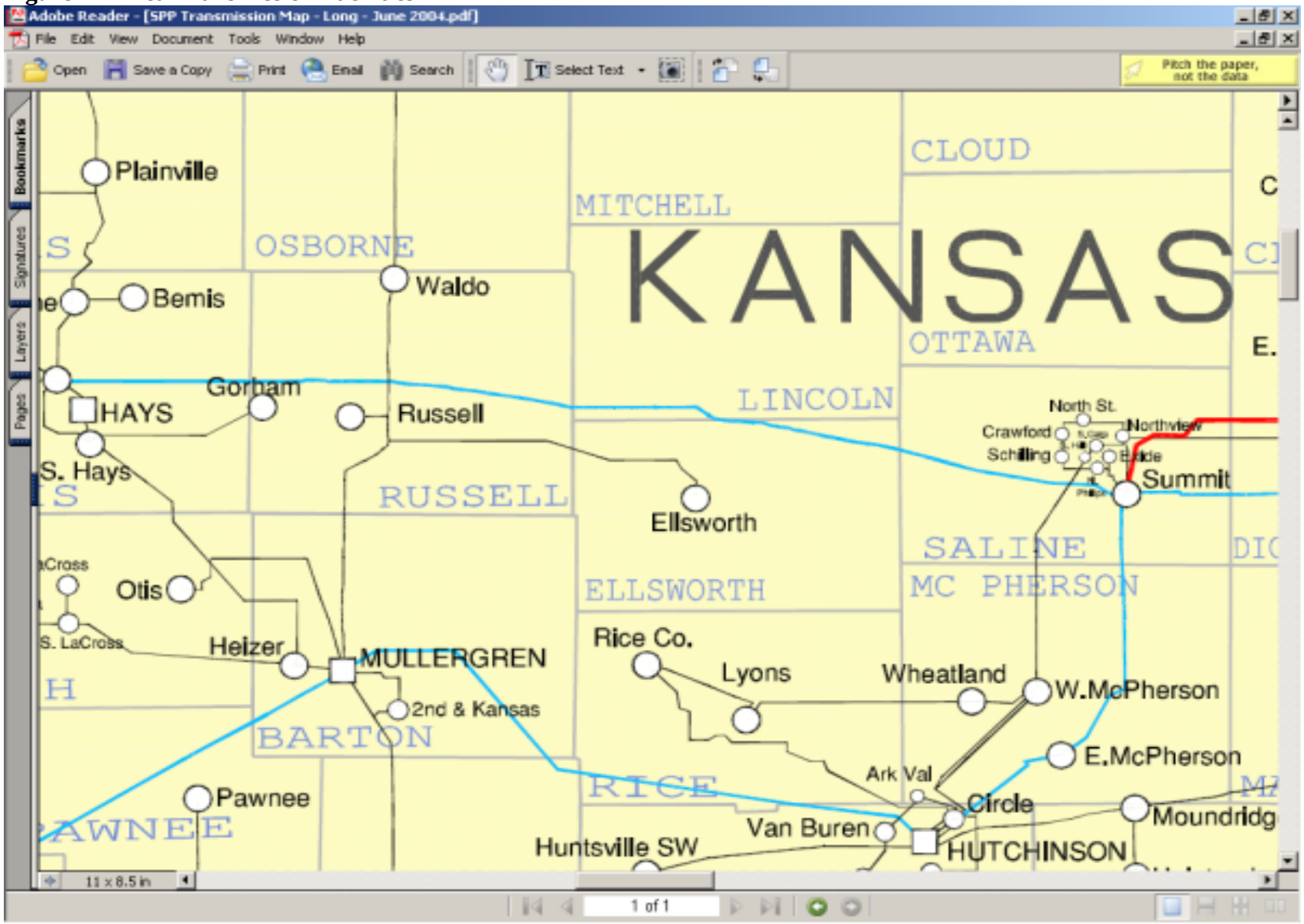

Figure 2 – Project Location

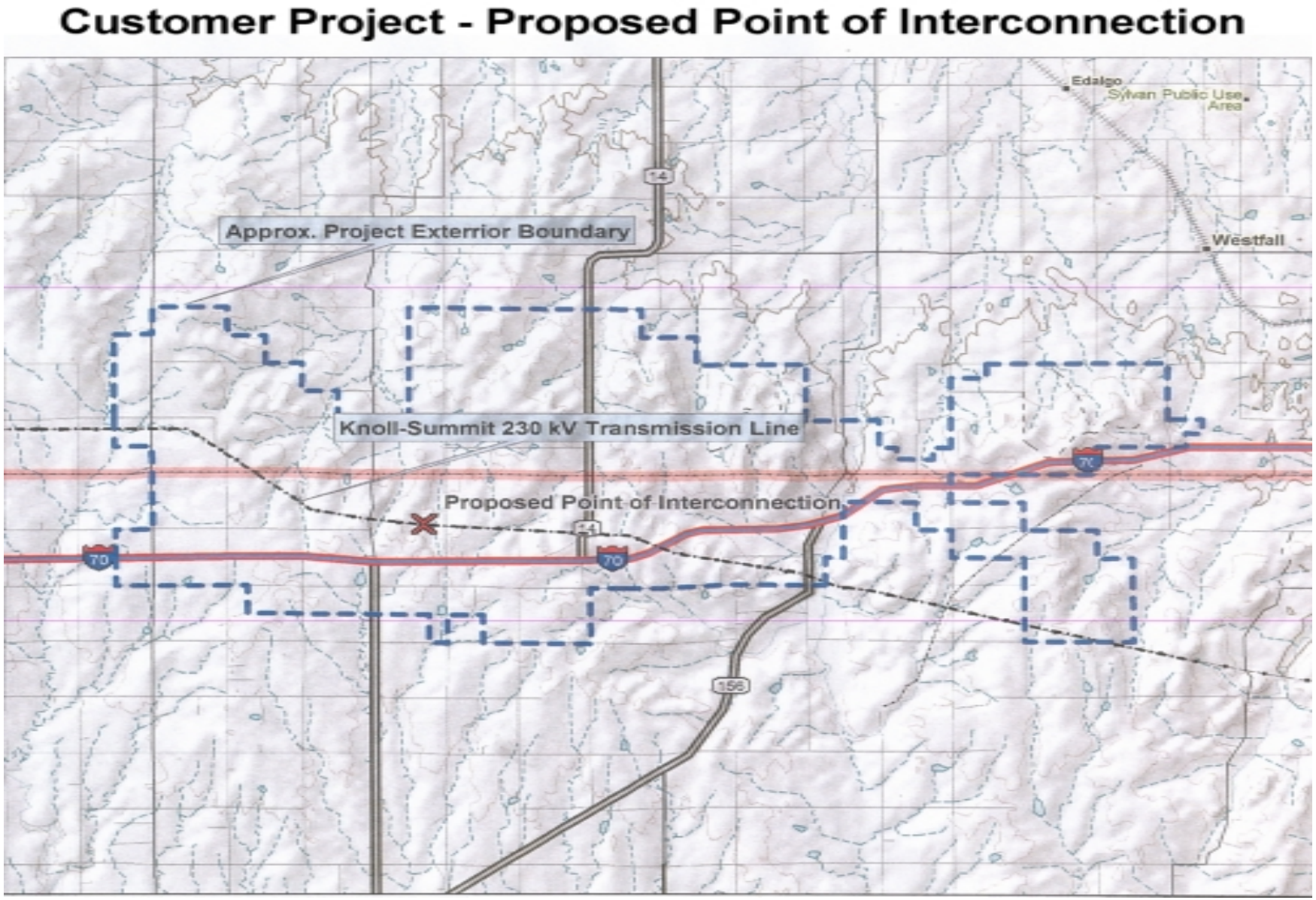

Figure 3 – Interconnection Facilities Layout

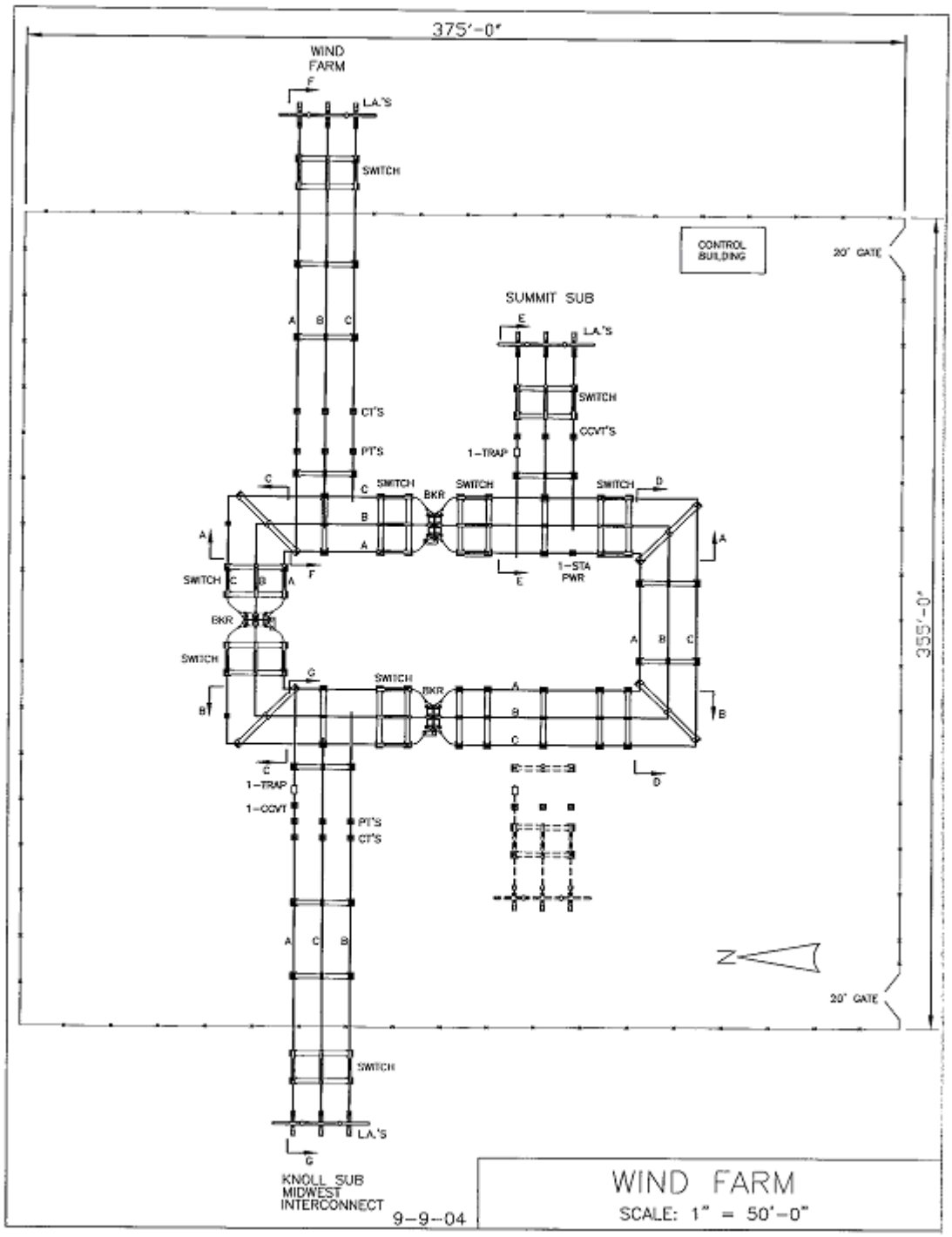

Figure 4 – Interconnection Facilities One-Line