



**Generation Interconnection Facilities
Study**

For

GEN-2002-026

November 21, 2003

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 121 MW of wind-powered generation on the Westar Energy (WR) transmission system near Council Grove, Kansas. The requested in-service date of the generating facility is December 2003. The requested in- service date is not possible. Prior to this Facilities Study, an Expedited System Impact Study was completed. The customer project will interconnect with the Westar Energy McDowell Creek – Morris County 115 kV transmission line.

Project Location and Existing Facilities

The customer project is located approximately 12 miles north of Council Grove, Kansas, in Morris and Wabaunsee counties. The WR 28.5-mile McDowell Creek – Morris County 115 kV transmission line crosses the proposed project property. The transmission line is constructed for 230 kV but operated at 115 kV. Existing plans are to convert the transmission line to 230 kV operation in the future. The interconnection facilities will be either a new substation built and operated at 115 kV or a new substation built at 230 kV and operated at 115 kV until the transmission line is converted to 230 kV operation. The interconnection substation would initially connect to the customer facilities at 115 kV. When the transmission line converts to 230 kV operation, the connection to the customer’s facilities must also convert to 230 kV operation or be disconnected. Customer will own, operate, and maintain step down transformation and the project substation. Figure 1 shows the WR transmission facilities in the area.

Interconnection Facilities

Interconnection to the WR transmission system will be by way of one of two options previously identified in the Expedited System Impact Study:

Option 1 – Tap the existing McDowell Creek – Morris County 115 kV line.

Option 5 – Tap the McDowell Creek – Morris County 115 kV line, but construct a 230 kV class substation that can be expanded into a ring bus when conversion of the line to 230 kV operation occurs.

With Option 1, the new 115 kV tap substation will have a tap for the interconnection step-down transformation and project substation equipped with a circuit breaker and 115 kV switches looking towards McDowell Creek and towards Morris County. Current planning is for the transmission line to be converted to 230 kV operation at some time in the future. When the transmission line is converted to 230 kV operation, the transmission line would be reconnected to span between the dead-end structures and the source to the 115 kV interconnection would be disconnected. Construction of this new 115 kV tap substation will require the acquisition of land adjacent to the existing transmission line right-of-way by WR. Figure 2 shows the proposed one-line and Figure 3 shows the conceptual layout of this option.

With Option 5, the substation would be constructed using 230 kV class equipment. Initially, during phase 1, it will operate like the 115 kV tap substation in Option 1 above. When the transmission line is converted to 230 kV operation, the interconnection substation would be expanded to a 230 kV ring-bus substation and converted to 230 kV operation, in phase 2. The interconnection step-down transformer would also be switched to 230 kV operation. The 230 kV ring-bus substation will have a terminal looking towards McDowell Creek, a terminal looking towards Morris County, and a terminal for the 230 kV step down transformation. Construction of this new substation, regardless of voltage, requires the acquisition of land adjacent to the existing transmission line right-of-way by WR. Figure 4 shows the initial one-line of this option when operating at 115 kV. Figure 5 shows the conceptual layout of phase 1 during 115 kV operation and Figure 6 shows the conceptual layout of phase 2 during 230 kV operation.

Interconnection Facilities Details

Option 1 – 115 kV Tap Substation

The estimated cost is for 10 acres of land, one (1) 115 kV breaker, two(2) 115 kV manual disconnect switches, two (2) 115 kV motor operated switches / circuit switchers, three (3) 115 kV VT's, three (3) 115 kV CT's, nine (9) 115 kV arresters, a new control building with bus area relaying and 48 VDC battery power, 115 kV station power transformer with 12 kV pad mount standby (manual throw-over), steel, bus, 115 kV billing metering, and all associated yard and conduit work. No 115 kV terminal upgrades are required at McDowell Creek or Morris County, but this is assuming the step down transformer is located directly adjacent to the tap substation (i.e.- the customer project will not have a 115 kV line).

\$1,298,000 (115 kV tap substation).
\$1,298,000

Option 5 – 115x230 kV Tap Substation (Future ring-bus provision) – Phase 1

The estimated cost is for 10 acres of land, one (1) 230 kV breaker, four (4) 230 kV motor operated disconnect switches, three (3) 115 kV VT's, three (3) 230 kV CT's, nine (9) 115x230 kV arresters, a new control building with redundant bus area relaying and dual 125 VDC battery power, 115 kV station power transformer with 12 kV pad mount standby (automatic throw-over), steel, bus, 115 kV billing metering, and all associated yard and conduit work. No 115 kV terminal upgrades are required at McDowell Creek or Morris County during this phase, but this is assuming the step down transformer is located directly adjacent to the tap substation (i.e.- the customer project will not have a 115 kV line).

Option 5 – Future 230 kV Ring-bus Conversion – Phase 2

When the McDowell Creek – Morris County transmission line is converted to 230 kV in the future, this will require the following modifications at the substation. The addition of

two (2) 230 kV breakers, five (5) 230 kV motor operated disconnect switches, nine (9) 230 kV CCVT's, four (4) 230 kV line traps, two (2) terminals of 230 kV EHV line relaying, 230 kV station power transformer, steel, bus, and associated yard and conduit work.

\$2,264,000 (115 kV tap substation).

\$1,228,000 (230 kV ring bus conversion).

\$3,492,000

Note that the ring bus conversion cost is an estimated future cost and is subject to inflation factors. The cost estimate is based upon today's dollars (i.e.- as if the substation were converted today).

A one to two (1-2) week outage would be required to install two 230 kV switches. These switches would be strategically located in order to be able to take the line to McDowell Creek and most of the ring bus out of service while still being able to serve the customer source breaker from Morris County. Once these two switches are installed, the project could be served "radially" from Morris Co. at 115 kV while work to install the remaining 230 kV switches and breakers on the ring is being completed. The McDowell Creek line terminal relaying (including traps and CCVT's) could also be installed as well as the transformation and relaying at the McDowell Creek substation.

When the 230 kV source from McDowell Creek is ready to go into service, another one to two (1-2) week outage would be required to replace the customer source 115 kV metering VT's with 230 kV CCVT's and to check out the project relaying for 230 kV source operation. A 230 kV switch would also be installed in this source (standard layout for full ring). At this time the customer's main transformer would need to be switched to 230 kV operation. After this, the project would be fed from the new 230 kV source from McDowell Creek substation. This would again be a "radial" feed while the Morris County source is converted to 230 kV. To convert the Morris County source, new line terminal relaying (including traps and CCVT's) would be installed as well as a 230 kV breaker and relaying at Morris County substation. Upon completion of the Morris County conversion work, the project would be operated with both sources closed in. There may be a short (1-2 day) outage required to close in the second source in order to test the control circuits.

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

Option 1 - 115 kV Tap Substation:

| | |
|----------|-------------------|
| 22 weeks | Engineering Time |
| 38 weeks | Procurement Time |
| 36 weeks | Construction Time |

13 months Total Project

Figure 7 shows a project schedule for Option 1.

Option 5 - 115x230 kV Substation – Phase 1:

| | |
|----------------------------------|-------------------|
| 26 weeks | Engineering Time |
| 45 weeks | Procurement Time |
| 39 weeks | Construction Time |
| 14.5 months Total Project | |

Figure 8 shows a project schedule for Option 5, Phase 1.

The design and material ordering will only commence following a signed Engineering and Procurement Agreement executed by both <Customer> and Westar Energy or following full execution of the Open Access Transmission Tariff Interconnection and Operating Agreement which includes Southwest Power Pool as signatory.

Westar Energy also maintains its own Facility Connection Requirements, which is available upon request.

The estimated time to complete either option includes only 9 weeks time to acquire land for the interconnection substation.

Figure 1 – Westar Energy Area Transmission

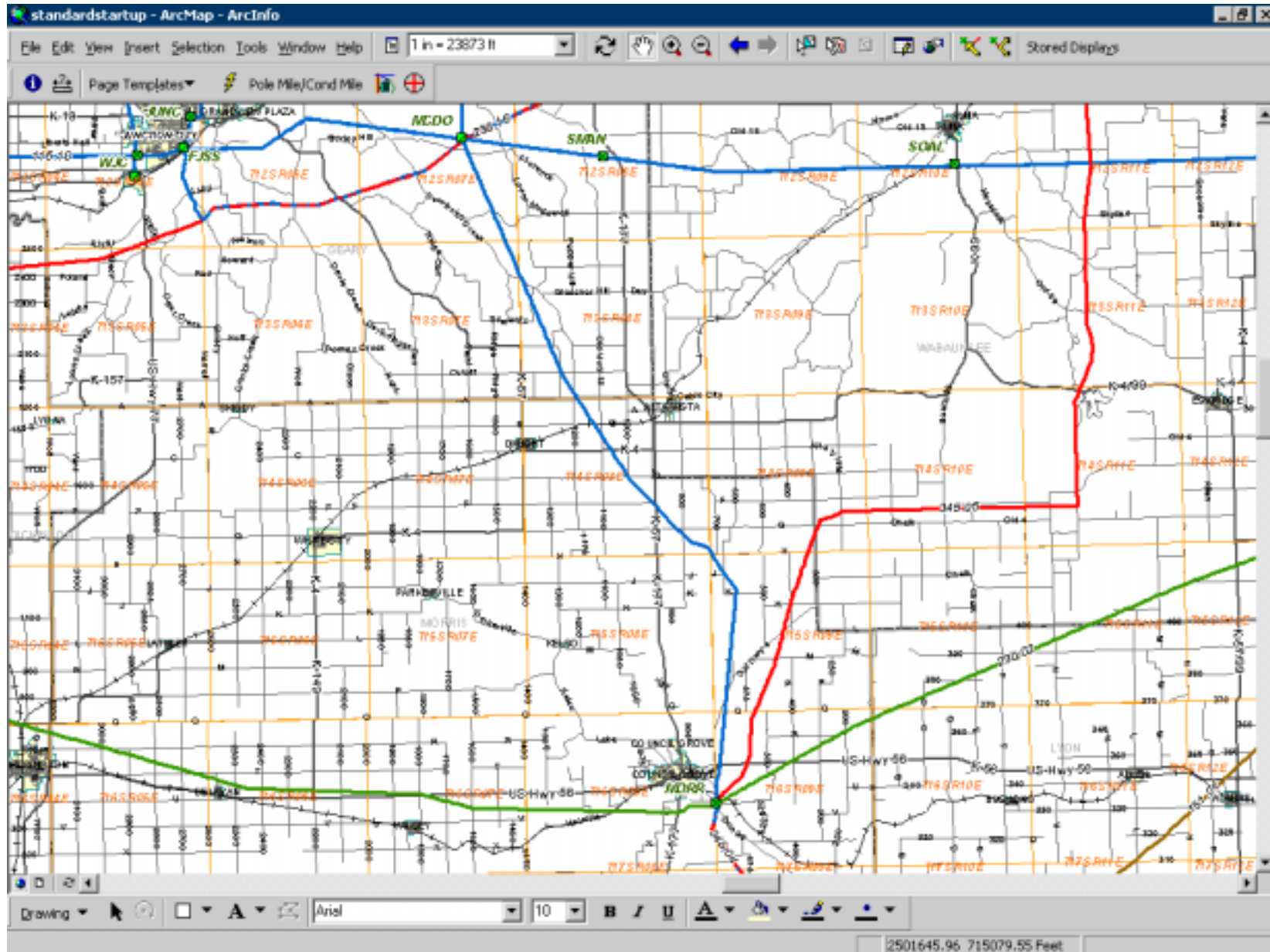


Figure 2 – Option 1 - 115 kV Tap Substation One-Line

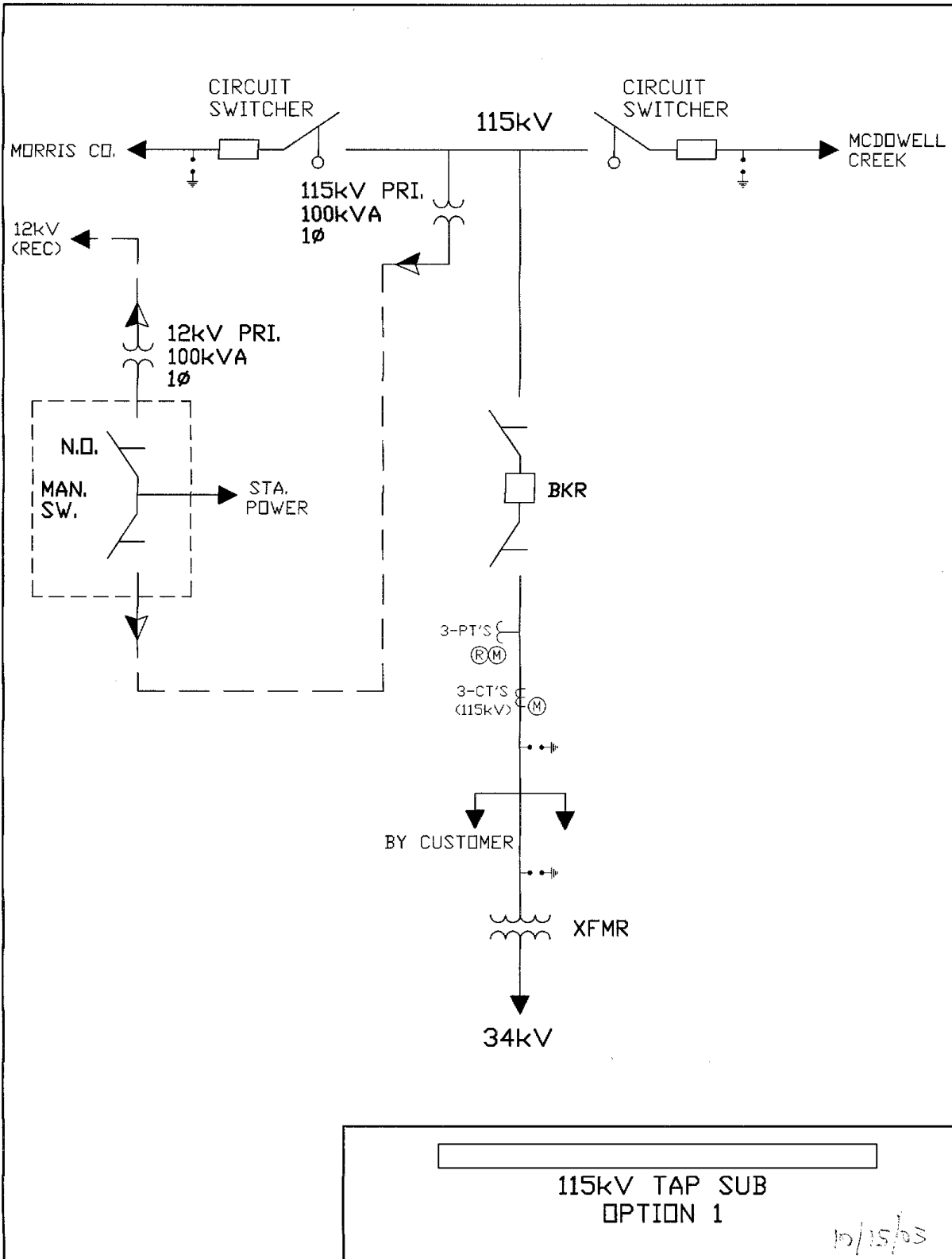


Figure 3 – Option 1 – 115 kV Tap Substation Layout

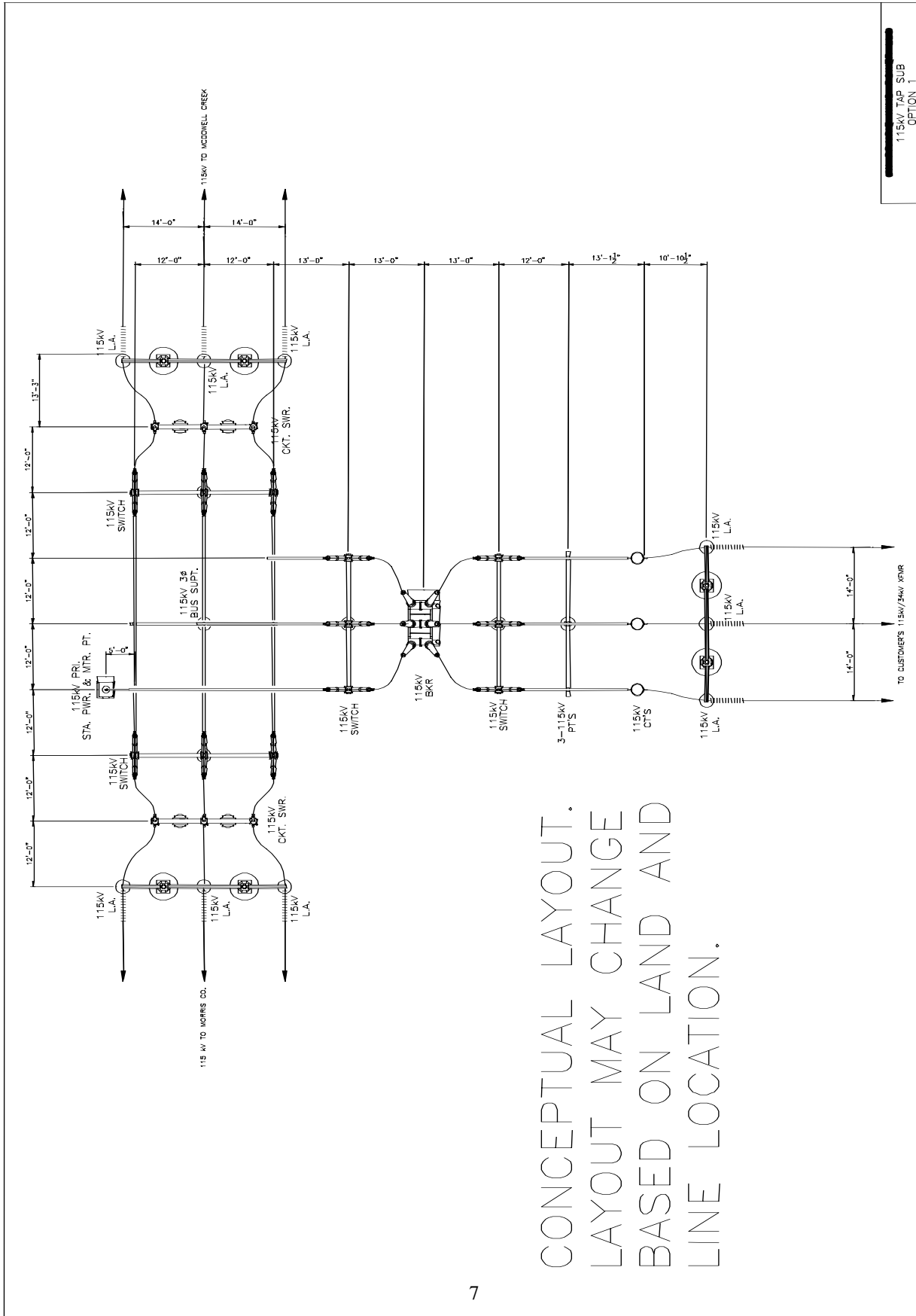


Figure 4 – Option 5 – 115 kV Partial Ring Substation One-Line

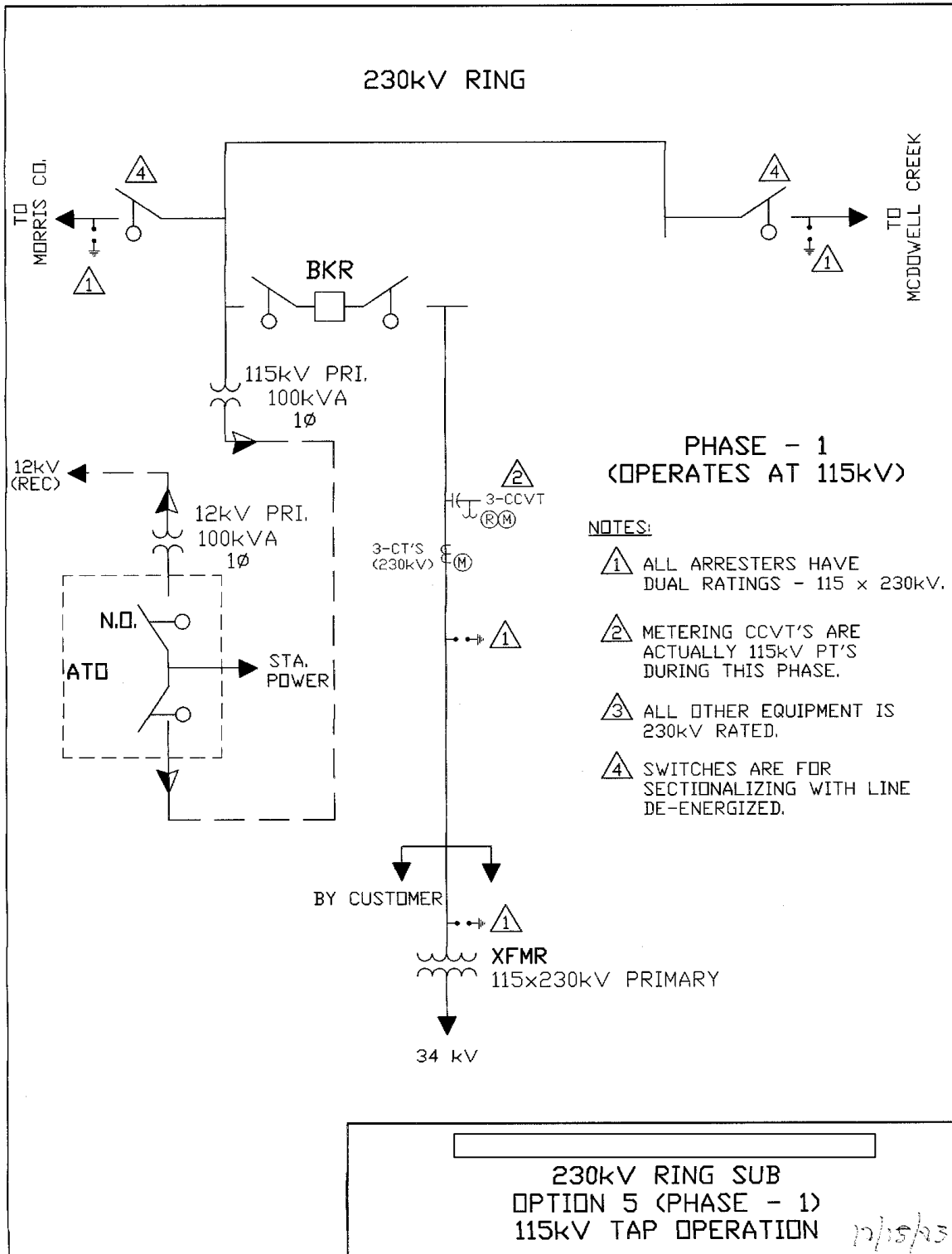


Figure 6 – Option 5, Phase 2 – 230 kV Ring Bus Substation One-Line

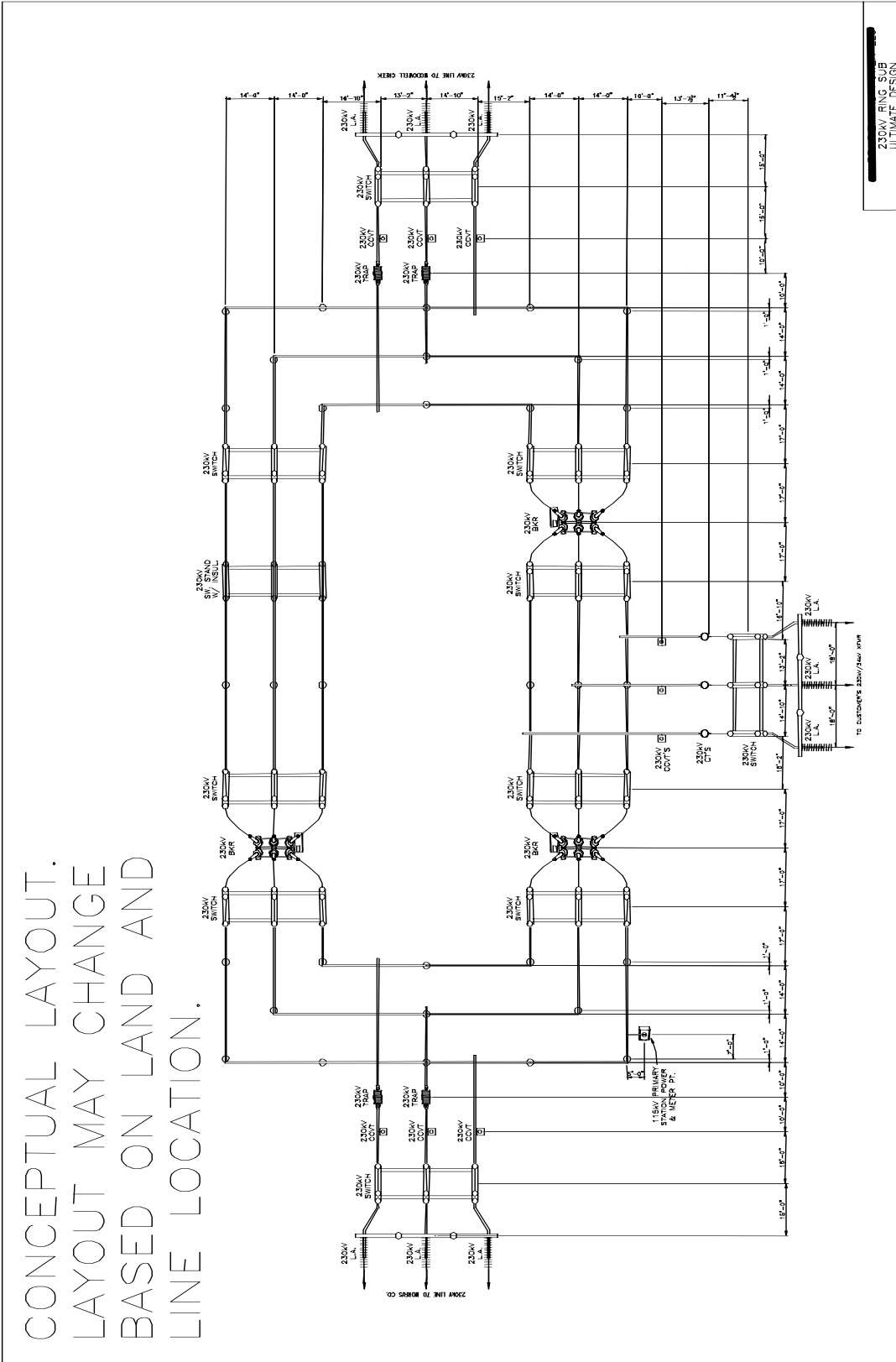


Figure 7 – Option 1 – 115 kV Tap Substation Project Schedule

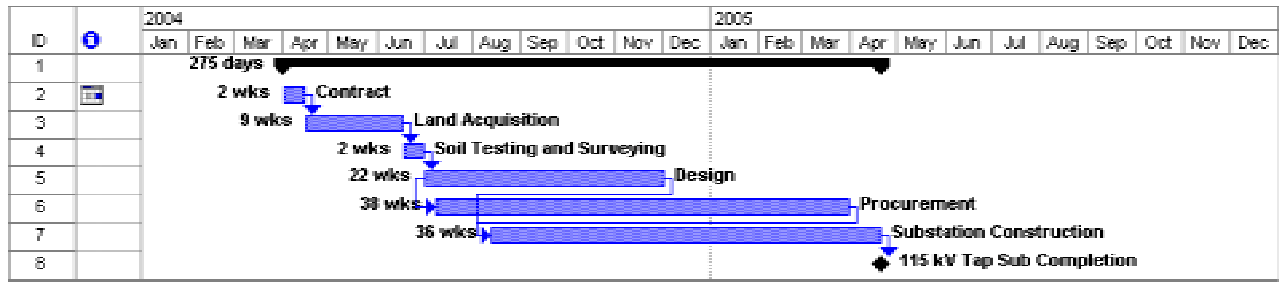


Figure 8 – Option 5 – 230 kV Tap Substation Project Schedule

