

**PROJECT NOTIFICATION****PROJECT NAME:** North Decatur Transformer #5 Replacement and Relocate**LOCATION:** Oreana (Q33) and North Decatur (Q09) Substations**IN SERVICE DATE:** 6/1/2015**NOTIFICATION:** Revision 1**COMPANY:** AIC**MAP ID#:** N/A**ISP:** D66046**DIVISION:** 3**DP** 11127**SACF** = 27.10**DESCRIPTION & SCOPE:**

Retire North Decatur Transformer #5 and existing 69kV facilities and relocate replacement 138/69kV transformer to Oreana Substation, where it is to be connected to an expanded 138kV ring bus. (Note: The 138kV bus expansion is addressed on a separate Job Description TP-601) Install a new 69kV bus at Oreana with two 69kV line terminals for Lines 6605 and 6606 taps into Oreana Sub, add a MOAB switch south of the tap and use the segment of line to N. Decatur Sub as a tie to Line 6609 outside of the N. Decatur Sub so that Oreana becomes the new 69kV source to W. Illiopolis. Retire 69kV facilities in the N. Decatur Substation.

**JUSTIFICATION:**

The existing N. Decatur Transformer #5 has been evaluated by maintenance and indications are that it has reached its end of life. The 69kV facilities at N. Decatur Substation are to the point of needing replacement due to size limitations. The cost of moving the location of the 138/69kV transformer to Oreana is more than replacement of the N. Decatur facilities, but it will bring the 69kV source about 5 miles closer to its primary loads and will enhance future ability to transfer Monticello to the new transformer, relieving the Bondville Rt. 10 transformer of this load under normal conditions. This will also free up the existing structures between the N. Decatur and Oreana substations for future expansion of the 34kV network on the north east part of the town.

**ESTIMATED****COST:**

	2014	2015	Total
Electric Distribution	\$3,350,000	\$2,137,300	\$5,487,300
Electric Transmission	\$750,000	\$266,951	\$1,016,951
Total	\$4,100,000	\$2,404,251	\$6,504,251

Matthew Sensenbach      6/17/14

**Matthew Sensenbach****Date**

Associate Engineer

Distribution System Planning

Martin J. Hipple      6/17/14

**Martin J. Hipple****Date**

Supervising Engineer

Distribution System Planning

Robert Zuege      5/6/14

**Robert Zuege****Date**

Supervising Engineer

The signatories agree that the project is needed by the in-service date indicated. Furthermore, the signatories, and the Departments they represent, agree to work with diligence to coordinate the schedule of their respective efforts to assure the total project comes together, as planned, including initiating necessary budget components, work documents, designs and materials, and construction resources in a manner that achieves overall project success by the then current, approved in-service date. Each party has responsibility for performing its part on time.

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cc:

R. D. Pate	J. P. Barud	C. Gilson	M. A. Borkowski	D. K. Jones
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R. L. Gruenewald	R. J. Rauschenbach	R. K. Dodd	D. L. Williams	D. E. Starwalt
J. M. Robinson	M. J. Johnson	D. R. Waggoner	D. W. DeWeese	D. D. Kramer
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R. A. Niemerg	W. J. Hughes			<a href="#">PN/JD Repository</a>

**Revision 1 Changes:**

- Cost estimate updated for new layout of substation for initial build. Initial and future 69kV facilities will be built to the south of the existing 138kV ring bus instead of initial facilities to the west and future facilities to the east. Ultimate 138kV configuration to be a 4 branch breaker and a half layout.
- Updated initial and ultimate one lines to reflect design changes. A fourth branch has been added in the 138kV ultimate breaker and a half layout which allows the bulk transformers to have their own position instead of tapped off the main West and East 138kV buses.

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**DETAILS**

Oreana Substation:

1. Replace and relocate N. Decatur Transformer #5 to Oreana Substation. Transformer will be tapped between breaker 1618 and new 138kV breaker located between breakers 1606 and 1618. See Attachment 1 for the new Oreana 138/69kV transformer specifications.
2. Install a new 69kV bus with two 69kV line terminals for Lines 6605 and 6606.
3. Minimum continuous current-carrying capability of the 69kV breaker and disconnect switches of 1200A.
4. See Attachments 2 and 3 for mark-ups of Oreana related changes.

North Decatur Substation:

1. Retire and remove all hardware related to N. Decatur Trf #5, the 69kV line terminals for lines 6605, 6606, and 6609, and the 69kV bus work.
2. See Attachments 4 and 5 for mark-ups of North Decatur related changes.

Line 6609:

1. The new source for Line 6609 will be Oreana Substation via its tie to Line 6606 outside of the N. Decatur Substation, creating an extended line segment from W. Illiopolis Substation to the new MOAB at Oreana.
2. This combined 6609/6606 line will be called Line 6606D.
3. Fault Indicators to be added to Line 6606D.
4. See attachments 5, 6, & 7 for mark-ups of Line 6609 changes.

Other:

1. Substation protective devices per System Protection. System Protection is to notify Distribution Planning of any changes to existing RLLs and the value of any new RLLs.
2. Metering per Ameren standards
3. Full SCADA installation and control of all 69 kV breakers. SCADA to include manual override capability by Dispatch of LTC. Recorded data to include Bulk Autotransformer LTC Tap position.

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**SPECIAL CONSIDERATIONS**

1. See related Job Description (TP-601) which addresses the associated Transmission related changes to the 138kV bus at Oreana. The transmission related costs are included in this document for informational purposes.
2. The PN is written as if a new 112 MVA transformer will be purchased as the replacement transformer; however, a surplus or spare transformer with a minimum rating of 93 MVA could be used in this application, if available.
3. Moving N. Decatur Trf #5 to Oreana and transferring the existing loads to the new transformer will initially add approximately 25 MW to this transmission source under summer peak conditions. When Monticello is switched over to Oreana as a primary source, the anticipated summer peak load would be approximately 40 MW.
4. The new location of the 69kV source at Oreana will reduce the exposure of Line 6605 by five miles.
5. The 69kV at N. Decatur presently serves the W. Illiopolis distribution substation, which is a split 138/12kV and 69/12kV substation. In the past, the 69kV was used in part to supply a large customer load in Illiopolis, which is now defunct. Tying Line 6609 to Line 6606 will prevent needing a new terminal inside the Oreana Substation.
6. A preferred method of serving W. Illiopolis load would be to use the 138kV source as primary for the entire load, and the new 69kV source as the back-up source. A long term solution for Illiopolis is a bulk supply transformer, possibly at Lanesville.
7. The ROW and facilities presently used by Lines 6605 and 6606 between N. Decatur and Oreana will be able to be used as the source for any expansion in the northeast part of Decatur, utilizing this infrastructure to expand the coverage of the 34kV network.
8. Per System Protection review of the Transmission System/Subtransmission System/Bulk Substation the following ultimate available bolted 69kV fault current conditions may be expected. The following values are assumed with a 5.6% impedance transformer at 67.2 MVA.

	1Ø	3Ø
Sym. Current	9738 Amps	8811 Amps
X/R Ratio	25.0175	28.4346

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Attachment 1:

Transformer Specifications

1. One 67.2/89.6/112 MVA (65° C rise), 138-69kV Autotransformer
2. High-side no-load taps: 131.1 kV, 134.5 kV, 138 kV, 141.5 kV, 144.9 kV (suggested in-service tap -138kV)
3. ±10% LTC on the 69kV winding.
4. Impedance to be approximately 8-10% (100 MVA base)
5. A load and temperature profile and updated loss evaluation costs supplied below.
6. Capitalized equivalent of transformer losses:
  - a. \$4000/kW Fe no-load losses
  - b. \$1100/kW Cu load losses @ OA rating

Oreana Transformer 24 Hour Load Duration Data  
 138/69kV 112 MVA top rated

<u>Hour</u>	<u>Long-term Emergency</u>	<u>Four-hour Emergency</u>	<u>Ambient Temperature</u>
1	83	66	88
2	81	64	87
3	79	63	85
4	78	62	83
5	78	62	82
6	81	64	83
7	90	72	85
8	103	82	86
9	112	89	89
10	122	97	91
11	129	102	94
12	133	151	97
13	135	153	99
14	137	154	102
15	135	153	103
16	134	134	104
17	133	133	103
18	129	129	102
19	124	124	100
20	124	124	98
21	119	119	95
22	109	109	92
23	98	98	90
24	89	89	90

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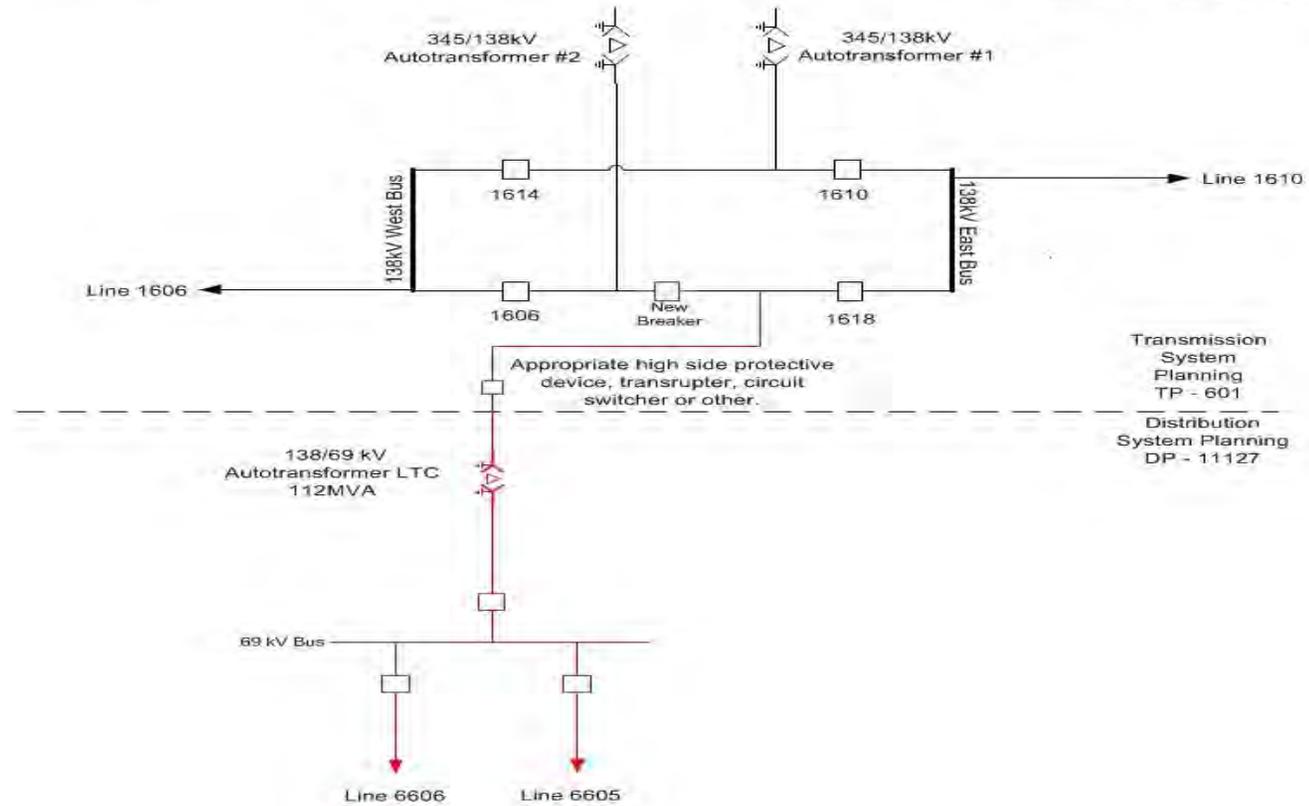
Attachment 2

Oreana Sub Partial One Line:

Ameren Illinois Utilities Oreana Substation One Line

- This sketch is intended to depict the electrical topology. Physical locations may vary, as long as the electrical capability is equivalent.

- The purpose of this sketch is to identify the ultimate configuration for the 69KV facilities.
- Isolation switches typically omitted for drawing clarity.

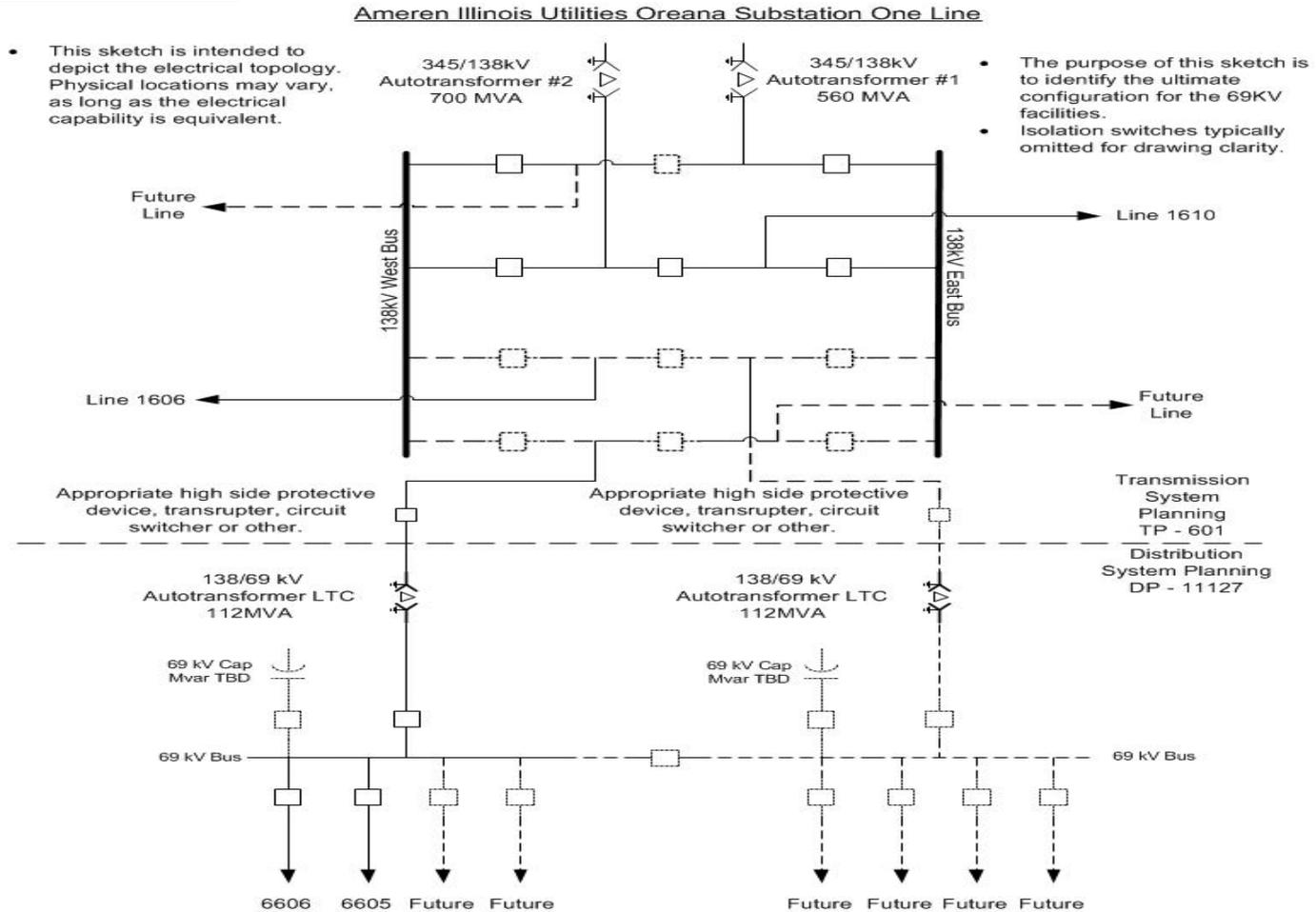


MS - 12/18/2013  
 Revised - 4/28/2014

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Attachment 3

Oreana Sub Partial Ultimate One-Line:



- This sketch is intended to depict the electrical topology. Physical locations may vary, as long as the electrical capability is equivalent.

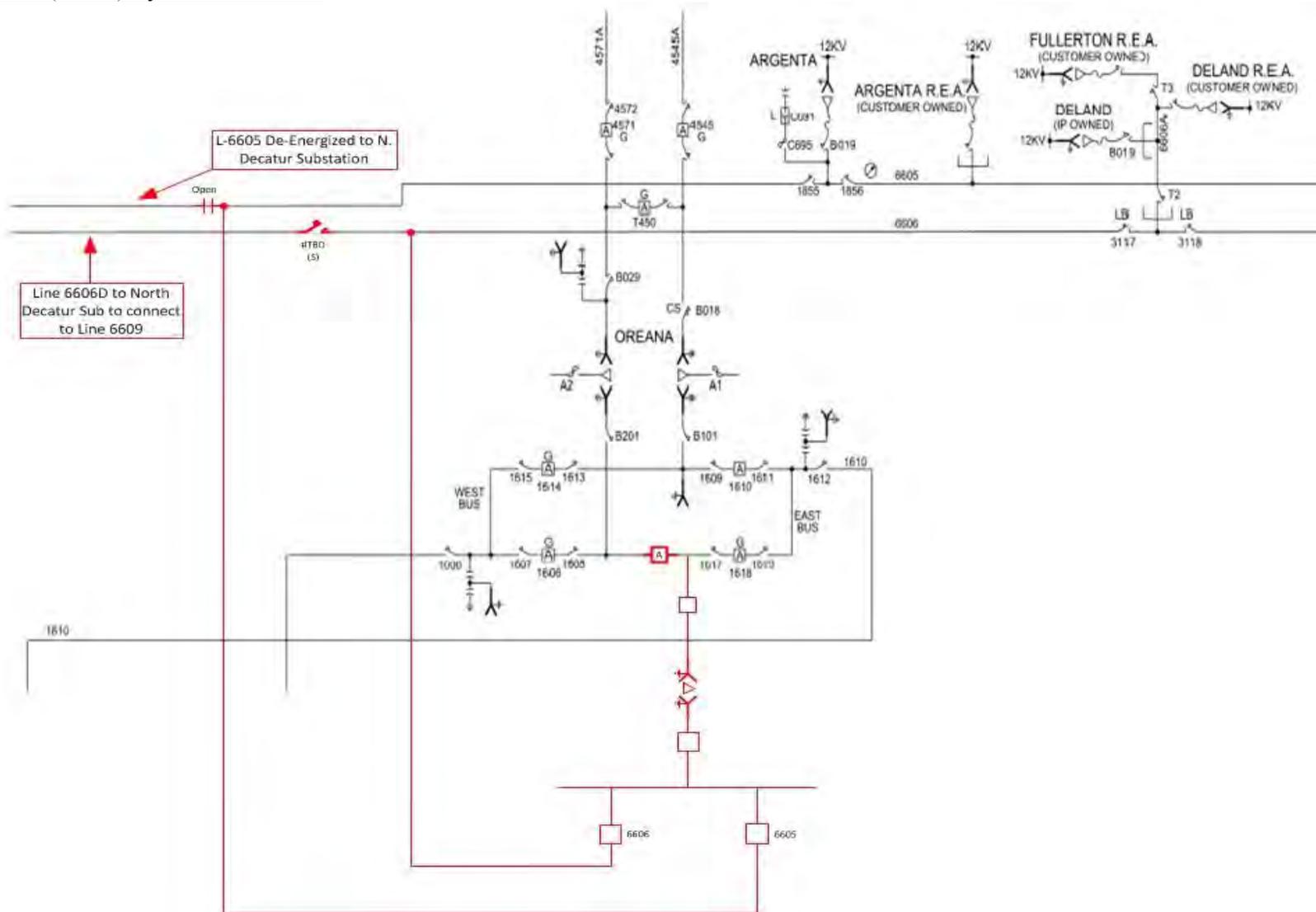
- The purpose of this sketch is to identify the ultimate configuration for the 69KV facilities.
- Isolation switches typically omitted for drawing clarity.

MS – 3/20/2014  
 Revised – 4/28/2014

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Attachment 4

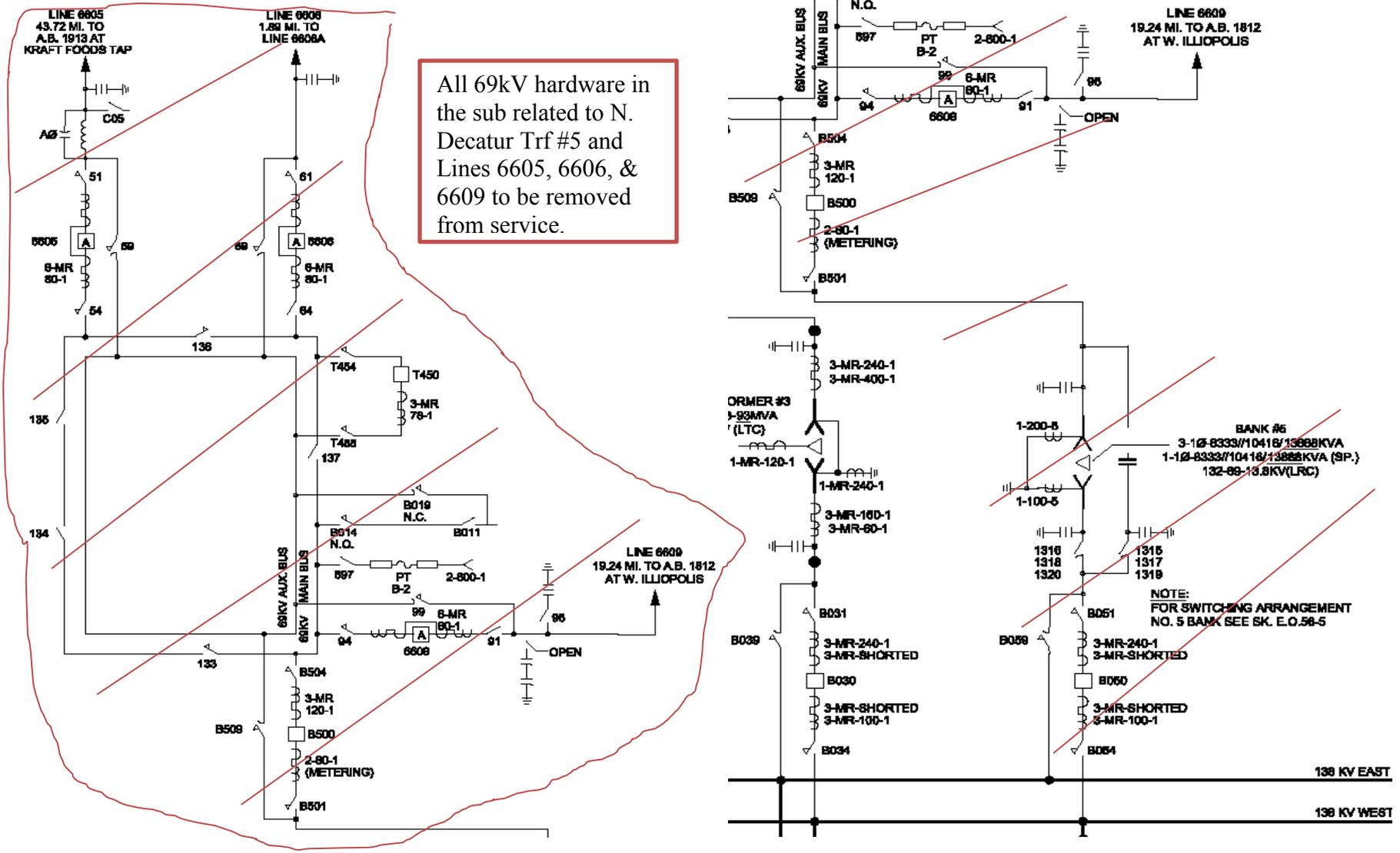
Partial Decatur (North) System One Line:



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Attachment 5

Partial Sections of North Decatur Sub One-Line:

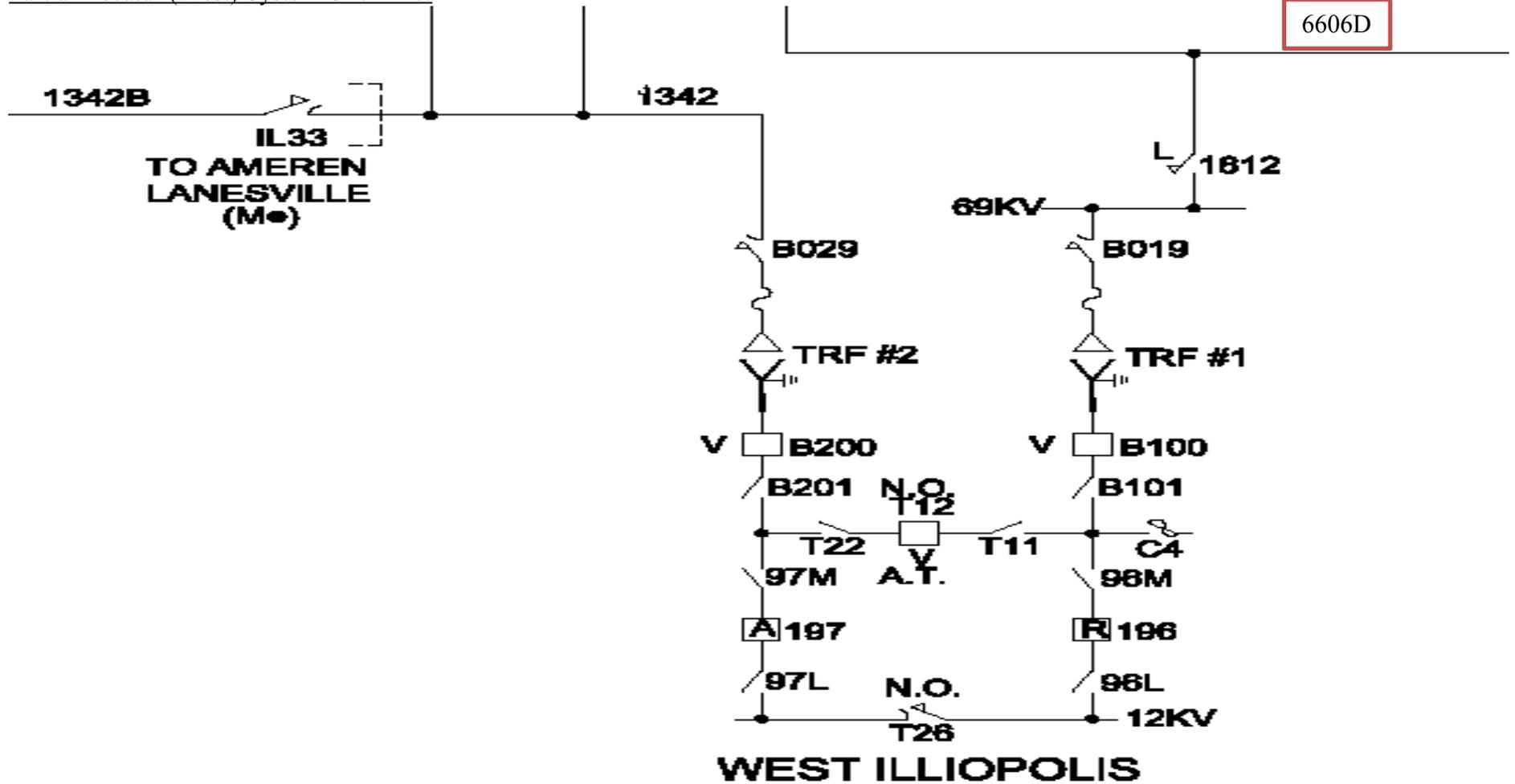




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Attachment 7

Partial Decatur (West) System One-Line:



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Attachment 8

Partial West Illiopolis Substation One-Line:

