



**Ameren Services**  
Distribution System Planning

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**DATE:** June 26, 2007  
**TO:** File  
**FROM:** Randy Schlake (691)  
**RE:** New Alton Bulk Substation – Interim Status Report #2  
**CC:** David Strawhun (691)

The extension of I-255 north of Highway 143 in Madison County, Illinois, will spur development in the existing rural area. Load growth is expected to exceed the capacity of the Mississippi Bulk Substation by 2008 and add approximately 100 MVA within 20 years. Although adding a third 138-34.5 kV unit at the Mississippi Bulk Substation would provide adequate transformer capacity, the substation is in the wrong location to effectively serve new load in the growth area. Several 34.5 kV feeders would need to be extended and reconductored, but voltage regulation and reduced reliability due to excessive circuit length would remain persistent problems.

In preference to expanding the Mississippi Bulk Sub, Ameren has decided to construct a new bulk substation to serve existing and future load in the northern and northwestern portions of Madison County. This memorandum serves to document progress to date regarding this important project.

#### SUBSTATION LOCATION

On April 3, 2006, Ameren CIPS closed on the purchase of 31.28 acres in the southeast quadrant of the intersection of Seminary Road and Bockstruck Lane, abutting the I-255 corridor.

#### SUBSTATION CONFIGURATION

The substation site is suitable for an ultimate development of three 112 MVA, 138-34.5 kV step-down power transformers. The electrical configuration will include three 138 kV bus sections, two 138 kV bus tie breakers, three 34.5 kV bus sections, two 34.5 kV bus tie breakers, nine outgoing 34.5 kV feeder breakers and two 28.8 MVAR capacitor banks. The site also includes room to accommodate a two-unit, 138-12.47 kV distribution substation. The substation layout will be similar to that employed for the Highway N Substation (copy attached).

From the new bulk substation, it is anticipated that one (1) 34.5 kV circuit will be installed to the west to reserve a portion of MISS-73. Four (4) circuits are planned to provide normal and reserve service to Godfrey, Bethany and the northwest portion of Madison County. Two (2) circuits will be constructed to provide normal and reserve service to the north central portion of Madison county. The final two circuits will provide normal service to Humbert & Fosterburg substations, utilizing an existing portion of MISS-74 to allow each circuit to reserve the other.

The new bulk sub and 34.5 kV feeder circuits will be implemented in stages, to support the development of the I-255 corridor. The initial installation will off-load the Mississippi Bulk Sub, retaining it as a reserve power source. A second transformer will be installed when load grows to the point that Mississippi no longer offers sufficient reserve capacity. A third unit will be installed at a future date, when required for increased substation capacity.

PRELIMINARY CONSTRUCTION SCHEDULE

Although the need for a new substation is clear, the optimum schedule for its construction is not readily apparent. Timing should coincide with load expansion, predominantly related to the development of the I-255 corridor. The construction of this highway extension is controlled by Illinois state government expenditures, which are presently on hold due to financial limitations. The balance of this discussion assumes that load in the Alton area will increase as illustrated in the following table.

<b>Year</b>	2006	2007	2008	2009	2010	2015	2020	2025	2030
<b>MVA</b>	157	159	169	170	171	185	210	235	260

The 10 MVA load increase shown in 2008 represents a new ethanol plant proposed to be built at the old Jefferson Smurfit site in Alton. Although the plans for this plant are not finalized, it or one of several other possible new customers is expected to be added within two years. Even without the proposed ethanol plant, the rating of the Mississippi Bulk Substation is expected to be exceeded by 2009.

The new Alton Bulk Substation is expected to be constructed in three phases. Phase 1 will include a 138kV double-circuit line with only one circuit installed and the first 138-34.5 kV transformer with 34 kV switchgear. Four 34 kV circuits should be constructed to supply normal service to Bethany, Godfrey, Humbert and Fosterburg distribution substations, thereby transferring approximately 44 MVA of load to the new Alton Bulk Sub from the Mississippi Bulk Sub. Mississippi would be retained as the reserve source to the four distribution subs, resulting in a combined capacity of approximately 200 MVA in the Alton area. The cost of Phase 1 is estimated to be \$11.5M in 2007 dollars. Assuming 5% overall project cost escalation per year and the load growth profile noted above, the SACF for Phase 1 of the project is expected to be approximately \$15/kva-hr by the year 2014.

Note that the cost of Phase 1 can be significantly reduced if an existing 112 MVA transformer can be relocated to the site. The timing of this project should be considered in relation to the ongoing ConocoPhillips 138 kV Service Upgrade Project, since the ConocoPhillips project will greatly reduce loading at the Roxford Bulk Sub and release one of the existing bulk sub transformers for use elsewhere.

Since permitting and construction of a new transmission line requires lead time of 5.5 years, the Job Description for Phase 1 of the new Alton Bulk Substation will need to be released by the end of 2008 to meet a mid-2014 in-service date. This will allow Ameren to monitor load growth and Illinois state funding of the I-255 expansion until mid-2008 before initiating the development and approval of the Job Description.

Phase 2 of the project will include the second 138 kV circuit, the second 138-34 kV transformer, and four additional 34 kV distribution feeders. The cost of Phase 2 is estimated to be \$4.9M in 2007 dollars. With the load growth projected above, Phase 2 of the project is expected to be justified by 2020.

Phase 3 of the project will include one 34 kV circuit to reserve MISS-73 in the western portion of Madison County and two 34 kV circuits to extend AmerenCIPS service to the north and northeast of Alton. The cost of Phase 3 is estimated to be \$3.2M in 2007 dollars, but the timing of the expansion cannot be accurately predicted at this time.

Since the rate of area load growth will depend on the I-255 highway expansion project and overall economy of the area, it cannot be forecast with a high degree of certainty at this time. As presently forecast, the new two-unit Alton Bulk Substation should be sufficient until 2030. Load growth beyond 100 MVA may require a third transformer at the new bulk substation. The timing of this unit is purely conjecture at this point, but it is expected to be required sometime after 2030. This may be further delayed by the expansion of load served by the Mississippi Bulk Substation. Approximately 44 MVA of capacity will be released at Mississippi when the first unit of the new Alton Bulk Sub is installed and the judicious use of this capacity may impact the expansion of load served by the new substation, especially in the central and southern portions of Madison County.

OVERALL SUMMARY

- Development of the I-255 corridor north of Alton is expected to drive load expansion in north and northwest Madison County totaling 100 MVA over 20 years.
- A new 138-34.5 kV bulk substation is planned to meet this expansion and will be located in the southeast quadrant of the intersection of Seminary Road and Bockstruck Lane.
- The substation, including the first 112 MVA transformer, is expected to be on-line by 2014, providing normal service to four existing distribution substations to be transferred from the Mississippi Bulk Substation.
- The second 112 MVA transformer will probably be installed at the new bulk substation by approximately 2020.
- A third 112 MVA transformer may be required after 2030, depending on the ultimate load expansion following the development of the I-255 corridor.
- The ultimate cost (in 2007 dollars) of this expansion is estimated at \$19.6M for the new bulk substation and nine 34.5 kV feeder circuits.  
(Perhaps less if existing transformer(s) are available to be redeployed.)
- Ameren has until mid-2008 to monitor area load growth and governmental funding of the I-255 expansion before initiating the next phase of this project. With the rate of load growth projected herein, a Job Description should be issued by the end of 2008 to facilitate a mid-2014 in-service date for the 138 kV line and new Alton Bulk Substation.