



**Revised page 4 & replaced page 7**

Date: ~~October 23, 2012~~  
Revised: June 6, 2013

**PROJECT NOTIFICATION**

**NAME:** Tamarack Sub (new sub) -- Build a new sub with a 22.4 MVA, 34/12 KV transformer.

**Companion Project:** East Belleville Sub-- Install a 34 KV breaker

**Companion Project:** Porter Rd Sub-- Install a 34 KV breaker

**Companion Project:** Line 3316 (new) East Belleville - Porter Rd 34 KV Line

Revision only affects  
Porter Rd Sub

**LOCATION:** Belleville Tamarack (new sub); East Belleville Sub; Porter Rd Sub

**IN SERVICE DATE:** 6/1/2014

**NOTIFICATION:** ~~Original~~ Rev. 1

**COMPANY:** AmerenIP **DIVISION:** VI **DP** 11316 **ISP** D13971 **SACF** = 17.6

**DESCRIPTION & SCOPE:** (1) Build a new distribution substation with one 22.4 MVA, 34.5/13.2 KV non-LTC transformer and 3 feeder positions on a new site that is being purchased in 2012. Construct a standard open-air urban distribution substation. The ultimate configuration at this location is two 22.4 MVA transformers and 6 feeders.

(2) East Belleville Sub-- Install a 34 KV, 2000 amps breaker for a new line terminal on the north bus (Transformer #5). The proposed line will feed Tamarack Distribution substation and terminate at O'Fallon Porter Rd. Substation.

(3) Porter Rd Sub-- Install a 34KV, 2000 amps breaker for the proposed line from East Belleville.

(4) The Division Engineering is responsible for building a new 34 KV line from East Belleville Sub to the proposed Tamarack Distribution Substation and extending the line to Porter Rd. Substation.

**JUSTIFICATION:** (1) Shiloh Valley transformer #1 is was expected to overloaded in 2012, and the loading is projected to increase due to area growth. The 2014 projected peak load is 11.4 MVA. The transformer's rating is 10.5 MVA (an 8% overload).

(2) O'Fallon transformer #1 is also projected to overload by 2014. The transformer's capacity is rated at 10.5 MVA. With a project 2014 load of 11.3 MVA, the transformer would be overloaded by 8%.

(3) East Belleville transformer #4 is projected to overload by 2016. The transformer's nameplate rating is 22.4 MVA (heat-run rating of 24.56 MVA). The transformer's projected load in 2016 is 24.7 MVA, which would be an overload of 1%. The area will continue to grow.

(4) Planning Criteria requires reserve capacity (in-station or feeder ties to other stations) in this area for contingency conditions. With transformers being heavily loaded, or in some cases overloaded, adequate capacity is not available to meet the reserve criteria. Additional capacity is required in the area. The proposed sub will off-load existing transformers and serve the expected future growth in the area.

(5) For an outage of Porter Rd 138/34KV transformer, Line 3311 will overload (loading=62.5 MVA, Rating =51.8 MVA). The outage will also result in low voltage at Pontiac and Porter Rd subs (Load V=0.94, Criteria = 0.96). The proposed line between East Belleville and Porter Rd will eliminate the problems.

(6) Ckt. 292 conductor out of Porter Rd is 477 SAC rated for 515 amps. The feeder is loaded to 597 amps. This is a 16% projected overload of the feeder conductor. With the new sub, the feeder would split and resolve the overload.

(7) Construction of the new 34 KV line will result in replacing some of the existing 12 KV spacer cables (improves reliability), as well as creating new feeder ties (provides operations flexibility and reduced outage duration).

Date: October 23, 2012

Tamarack Sub (new sub)

ESTIMATED COST:

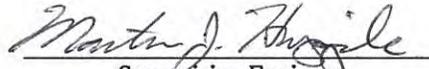
	W.O. #	Estimated Cost		
		2013	2014	Total
Tamarack Substation		\$ 1,397,000	\$ 2,052,000	\$3,449,000
East Belleville Sub		\$ 58,000	\$ 381,000	\$ 439,000
O'Fallon Porter Rd		\$ 120,000	\$ 320,000	\$ 440,000
34 KV Line		\$	\$ 4,000,000	\$ 4,000,000
Total		\$ 1,575,000	\$6,753,000	\$ 8,328,000

SUBMITTED BY:

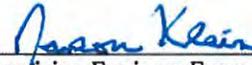


Engineer  
Distribution System Planning

APPROVED BY:



Supervising Engineer  
Distribution System Planning



Supervising Engineer Energy Delivery  
IL Division VI

*By signing this document the parties agree that the project is needed by the in-service date indicated. Further, the parties 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.*

cc:

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*Date: October 23, 2012*

## Tamarack Sub (new sub)

### **DETAILS**

#### **Tamarack Sub**

1. Install a 13.4/17.9/22.4 MVA, 34.4/13.2 KV (non-LTC) transformer. Initial construction is a single unit substation with 3 feeders. Ultimate configuration is a two unit urban sub with 6 feeders.
2. Recommended transformer tap setting is 35.3/13.2 (position B). This will provide 1.035 PU tap ratio.
3. Install 3 feeder positions equipped with recloser and 333 KVA regulators. For the initial construction, two of the feeders would go on one bay and the third feeder would go on the second bay. The next planned expansion would be to add the second transformer and fourth feeder (two feeders on each transformer). Ultimately, more feeders may be added to the transformers.
4. The feeders are mostly residential and small commercial customers with single-phase load. Open-air substation is recommended due to single-phase operation and reliability.
5. Install 1200 amp, 34 KV switching devices at the incoming line terminals for an Auto Sectionalizing (AS) scheme with SCADA control. To avoid limiting the line capacity, 800 amp Vipers should not be installed in the line. The line conductor would be 954 ACSR rated 981 amps Normal, 1255 amps Emergency.
6. SCADA control and status reporting per Ameren Standards.
7. Transformer protection requirements as specified by EDTS System Protection group and Ameren Standards.
8. Transformer and feeder metering installation in accordance with Ameren Standards.
9. The attached substation one-line shows the initial and ultimate substation configuration.

#### **East Belleville Sub**

1. Add a bay to the north end of the bus (Transformer #5).
2. Install a 34 KV, 2000 amps breaker for a new line (Line 3316) connecting to the bay. Line 3316 will exit sub overhead to the west.
3. Relocate Line 3305 to the north end of the new bay. New breaker to be purchased for relocated line terminal (maintenance funds could be used for the purchase if necessary). Line to exit underground to the east.
4. Vacated position (old L.3305) to be used for mobile sub or grounding transformer.
5. SCADA control and status reporting per Ameren Standards.
6. Relay scheme requirements as specified by EDTS System Protection group and Ameren Standards.

*Date: October 23, 2012*

Tamarack Sub (new sub)

**O'Fallon Porter Rd Sub**

1. Add a bay to the north bus and install a 34 KV, 2000 amps breaker. Move Line 3308 from its current terminal position to the new terminal.
- 2. Move Line 3481 to the terminal position vacated by Line 3308**
3. Connect the new Line 3316 coming from East Belleville Sub to the vacated Line 3481 terminal. Since Line 3308 goes north and Line 3316 will be going south, the swapping of the terminals will eliminate line crossings.
- 4. Make the necessary relay setting changes to the existing relays to account for the above line position swapping (or redirect the CT/PT circuits to the proper panels).**
5. SCADA control and status reporting per Ameren Standards.
6. Relay scheme requirements as specified by EDTS System Protection group and Ameren Standards.

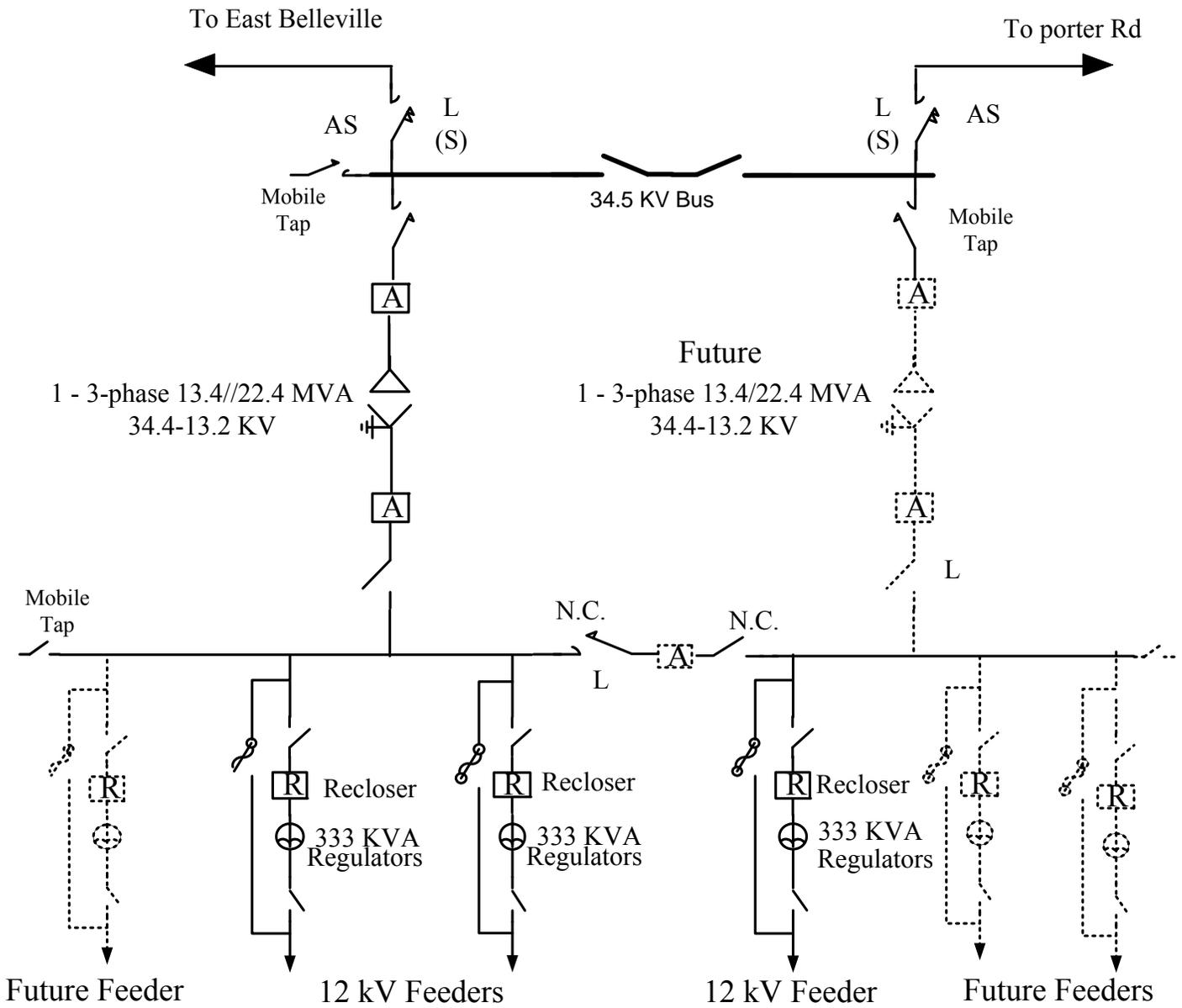
**Line 3316 (new): East Belleville to O'Fallon Porter Rd. Sub**

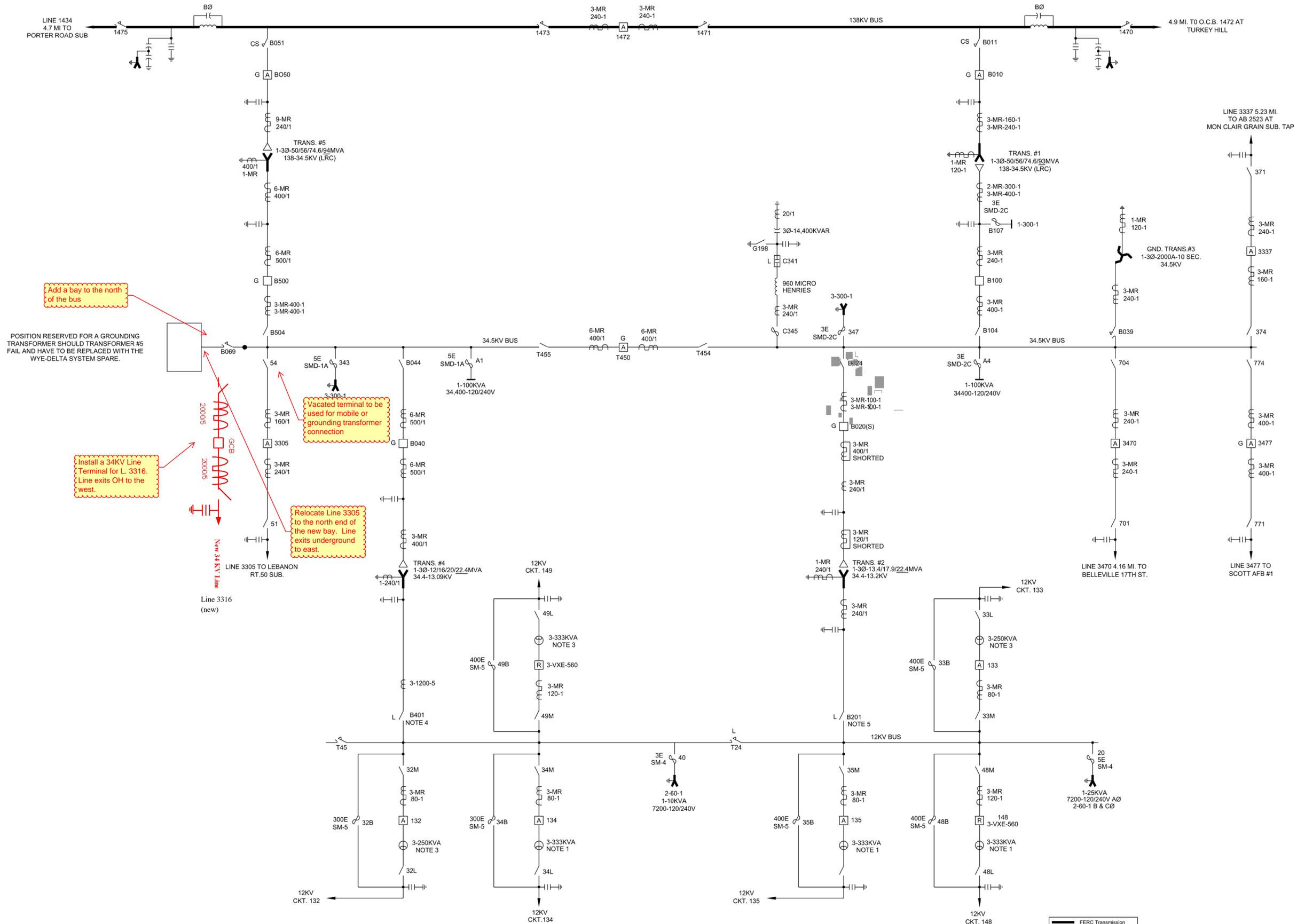
1. Build a 34 KV line between East Belleville and Porter Road Substations per Ameren Standards (approximately 8 miles).
2. Recommended conductor is 954 ACSR (45/7) Rail.
3. The line should go in and out of the proposed Tamarack distribution substation.
4. An Auto Sectionalizing scheme is planned at Tamarack Sub. The sub is about midway between East Belleville and Porter Rd. Substations

**SPECIAL CONSIDERATIONS**

1. Division Engineering is required to review feeder protection and coordination with Tamarack Substation equipment.
2. Review proposed MAP feeder automation projects that may need coordination, or should be done simultaneously with Tamarack Substation project.

# Tamarack Sub





POSITION RESERVED FOR A GROUNDING TRANSFORMER SHOULD TRANSFORMER #5 FAIL AND HAVE TO BE REPLACED WITH THE WYE-DELTA SYSTEM SPARE.

Add a bay to the north of the bus

Install a 34KV Line Terminal for L. 3316. Line exits OH to the west.

Vacated terminal to be used for mobile or grounding transformer connection

Relocate Line 3305 to the north end of the new bay. Line exits underground to east.

NOTE 1: 437/482/526/592/668A  
 NOTE 2: 219/241/263/295/350 A  
 NOTE 3: 328/361/394/443/525 A  
 NOTE 4: DISABLE TRF #4 GND. RLY. (PNL 10F) BEFORE OPENING DISC. B401.  
 NOTE 5: DISABLE TRF #2 GND. RLY. (PNL 10R) BEFORE OPENING DISC. B201.

NOTICE OF LIMITED RESPONSIBILITY  
 THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT DRAWINGS AND DOCUMENTS BEARING HIS/HER SEAL. SIGNATURE OR INITIALS HERE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR INITIALS.

REV	DATE	DRF	DESCRIPTION	ENG	APP
20	02-19-10	RLM	AS BUILT REVISIONS - REV 19	RCF	
21	04-06-10	RLM	CHANGED CKT 349 TO 148	KAV	
22	07-01-10	RLM	AS BUILT REVISIONS - REV 18	RCF	
23	01-07-11	RLM	UPGRADE TRF #2 AND ADD BKR B020 - JS370877	APG	
24	6-23-11	EM	AS BUILT REVISIONS - REV 23 JS370877	APG	
25	11-17-11	EM	AS BUILT REVISIONS	APG	
26	1-5-12	EM	FIELD REVISIONS	APG	

PREPARED FOR  
**Ameren**  
 ILLINOIS  
 DECATUR, ILLINOIS

ONE LINE DIAGRAM  
 EAST BELLEVILLE  
 SUBSTATION

DATE: 05-05-06  
 SCALE: NONE

ST. LOUIS MISSOURI	REV 26	DATE 05-05-06
	SCALE NONE	
	PLOTTED	E-BEL17-51.0

