ST. CHARLES SINCE 1834	**AGENDA ITEM EXECUTIVE SUMMARY**	
	Title:	Recommendation to Award Purchase of Capacitor Banks to Border States
	Presenter:	Tom Bruhl

Please check appropriate box:

	Government Operations	X	Government Services 01.28.13
	Planning & Development		City Council
	Public Hearing		

Estimated Cost:	$86,368	Budgeted:	YES	X	NO	

If NO, please explain how item will be funded:

Executive Summary:

In November, 2012, the City deployed the first new capacitor bank on Stern Avenue. The unit had the desired impacts of lowering total power (KVA) on the line and increasing voltage. Using historical data from our SCADA system, and quick analysis, we have determined eight additional installations that would have similar positive effects for our system. The City went out for bids and got only one timely response. Border States (representing Cooper) was the low bidder. They were the manufacturer of our first unit, and the price per bank was in line with the original purchase.

Attachments: *(please list)*

SCADA snapshots and calculations, bid tabulation

Recommendation / Suggested Action *(briefly explain)***:**

Recommendation to award purchase of eight 600kVAR overhead capacitor banks from Border States in the amount of $86,368.

For office use only:	*Agenda Item Number: 5.l*

Capacitor Bank Results

Deploying a capacitor bank on an electric distribution system with poor power factor should have the following results:

- Voltage increase (capacitors act similar to a water tower on a water system, stabilizing pressure)
- Line amps decrease
- Total power on line decreases
- Power factor increases

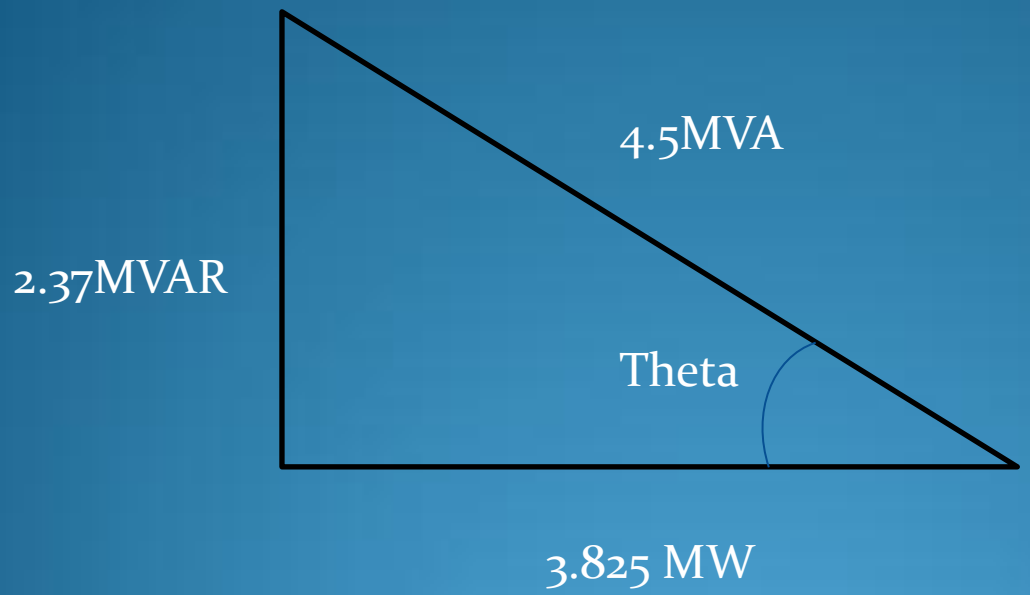
Capacitor Bank Results

On November 13, 2012, the City of St. Charles deployed a 1.2 MVAR capacitor bank to Circuit 513 on Stern Avenue. The average conditions before the turn on were:

- Bus voltage 7,407V
- 200A per phase
- 4.5MVA of load on the circuit
- 0.85 Power Factor

Capacitor Bank Results

Pre-existing conditions in phasor diagram:



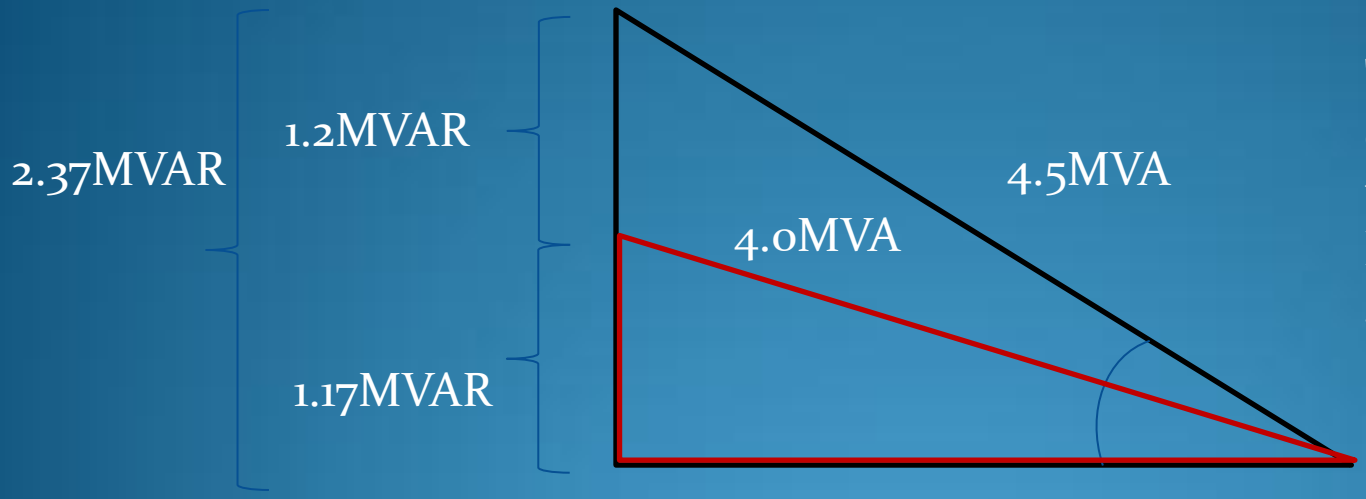
MVA or Total Power is most significant because it represents that load that the substation transformer and the line need to carry.

For Example – 5T1 at Dukane Drive Sub is rated at 25MVA

Theta = 31.8 degrees
Power Factor = Cos (Theta) = 0.85

Capacitor Bank Results

Theoretical calculations in phasor diagram:



Theoretical calculation is that the total power on the line will drop to 4.0MW by reducing MVAR by 1.2

2.37 – 1.2 – 1.17MVAR

Theta2 = 17 degrees
Cos (Theta2) = 0.96 = Power Factor

0.5MVA=V*I
I=23A

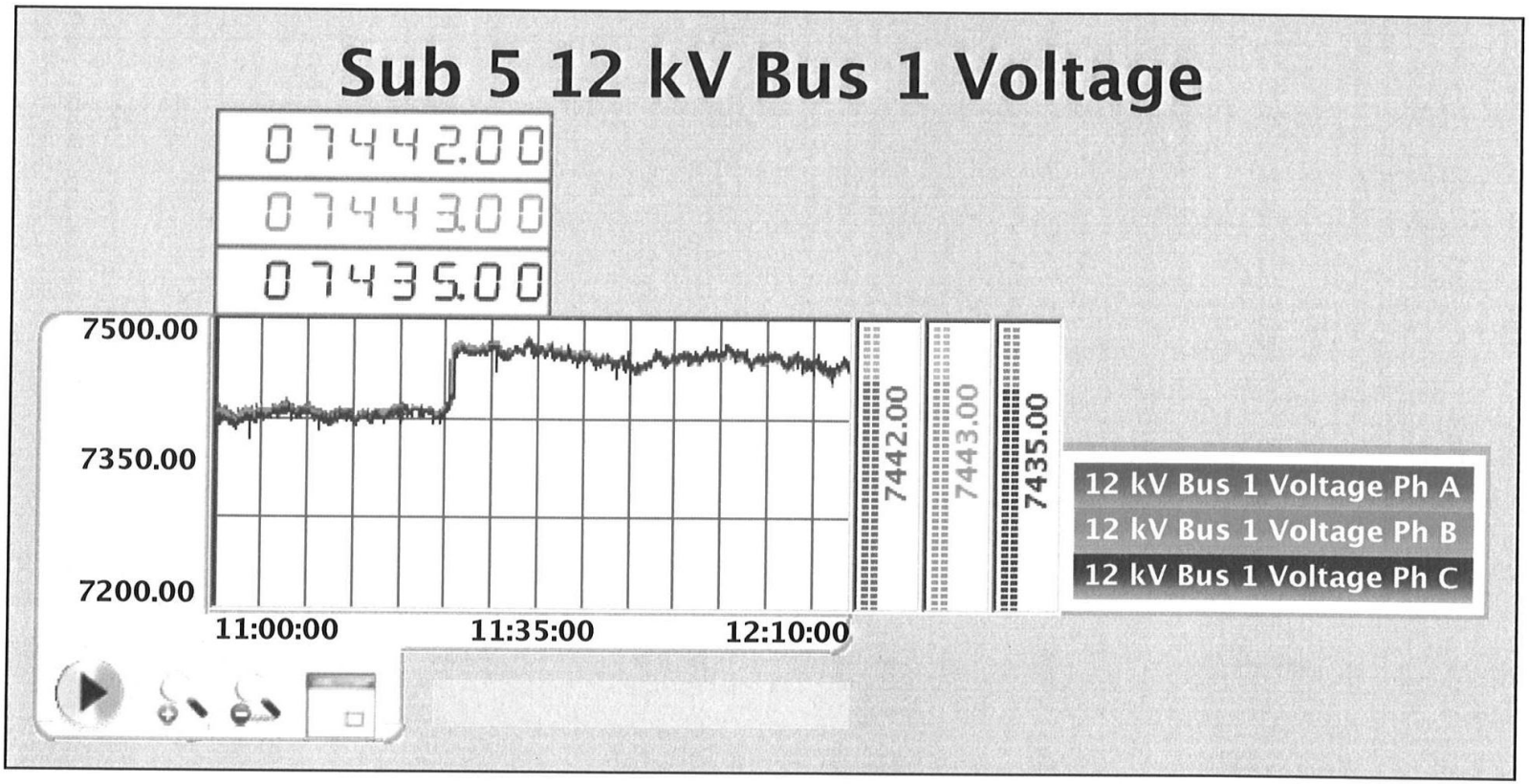
Capacitor Bank Results

Upon energizing:

- Bus voltage increased to 7,470V (0.8% rise)
- Line amps dropped to 177A per phase (23A decrease)
- Load dropped to 4.0MVA (0.5MVA decrease)
- Power Factor improved to 0.96

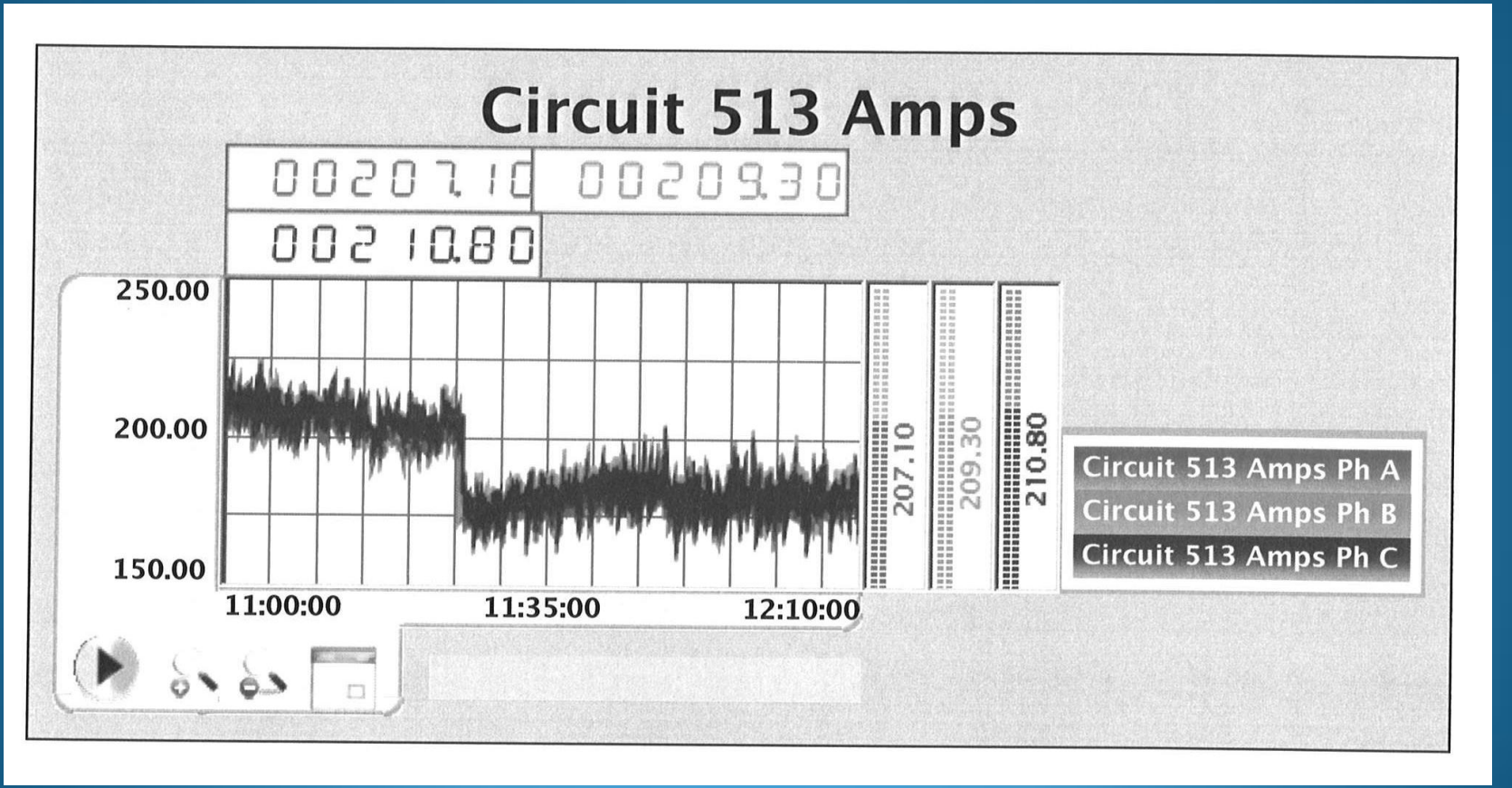
Capacitor Bank Results

SCADA Data Screen Shot of Bus Voltage:



Capacitor Bank Results

SCADA Data Screen Shot of Line Amps:



Capacitor Bank Quick Benefits

The performance of this capacitor bank justifies continued deployments:

IMEA charges us $0.25 per KVAR per month, so this 1,200KVAR unit will shave $300 per month off of our power bill. The approximate $10,000 unit will pay for itself in less than 3 years based on this alone.

Pad mounted units are about 4 x as expensive, so primary focus will be on overhead deployments.

Capacitor Bank Long Term Benefits

Installing capacitor banks:

- Reducing the total power that our substation transformers and feeders need to carry
- Will help continued deferral of major capital reinforcement projects.
- Lower the total MVA carried by the lines, which reduce the resistive heat losses, which shave the delta between the number of KWH that we buy from IMEA and the KWH that we sell to our customers.

Capacitor Bank Next Steps

1- Procure and install (8) – 600KVAR overhead units on circuits identified using historical SCADA data.

2 – Utilize modeling software to identify and prioritize additional installations for FY13/14.

3 – Evaluate opportunities to use centralized control to implement was is called volt/var control that has been proven to reduce peak.

Bid: 12.47kV Pole-Mount Capacitor Banks #130103

Supplier	Total Cost		Mfg or Agent	Delivery
Border States Electric, N29 W23606 Woodgate Ct. E., Pewaukee, WI 53072	$86,368		Cooper Industries, Bryce Washebeck	
ABB, T&D Products, Inc.- ABB Rep., 4200 Cantera Dr., Ste. #216, Warrenville, IL 60555	N/A		T&D Products, Inc. (Mfg.), Tom Lubniewski	N/A

:cjb

Bid Recap Sheets\CapacitorOverhead Banks