OWEN ELECTRIC COOPERATIVE
2012 – 2013 CONSTRUCTION WORK PLAN REPORT

Kentucky 37 Owen

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PURPOSE OF REPORT

This report documents the engineering analysis of, and summarizes the proposed construction for Owen Electric Cooperative (OEC) electric distribution system for the two-year planning period of 2012-2013.

The report also provides engineering support in the form of descriptions, costs and justifications of the required new facilities for a loan application to RUS in order to finance the proposed construction program.

GENERAL BASIS OF STUDY

The summer 2013 and winter 2014 projected total peak system loads were taken from the OEC 2010 Load Forecast (LF) as approved by RUS. Residential and small commercial loads were grown at rates consistent with the LF.

From 2005-2009, the annual average increase in residential energy sales was 2.0%. This rate is projected to be 2.0% over the next two years. Small commercial sales are projected to increase at 2.4% over the next two years. Large Commercial / Industrial energy sales are projected to increase at 7.7% over the next two years.

System analysis models are based on non-coincidental (NC) system peaks that are outlined in the LF. The projected winter 2014 NC peak (based on LF and GFR meeting) is 306,000 kW. The projected summer 2013 NC peak (based on LF and GFR meeting) is 310,000 kW. The projected peaks exclude Gallatin Steel. The system annual load factor is projected to average 48.0% over the next two years.

Winter and summer growth models were examined for what is generally a summer-peaking system; however some areas of the OEC system are winter peaking. Both seasons were reviewed to address system deficiencies for either season.

The current OEC 2006 Long Range Plan (LRP) load projections and improvement recommendations were reviewed to make sure that they generally agree with scope of the 2012-2013 construction work plan (CWP) recommendations.

A RUS Operations and Maintenance Survey (FORM 300) has been completed with the RUS GFR. This survey is used to determine portions of the construction required to replace physically deteriorated equipment and material, upgrade areas of the system to conform to code or safety requirements, and improve the reliability and quality of service. A copy of the survey is included in the Appendices of this report.

GENERAL BASIS OF STUDY (cont.)

A system analysis using RUS guidelines and the OEC Design Criteria was performed on all of the substations and distribution lines of the system. Milsoft Integrated Solutions' PC-Based Distribution Analysis Program – "Windmil" version 7.3 was used to analyze the existing system configuration that was modeled with the projected load growth.

For each deficiency that was found, alternate solutions were considered and economically evaluated.

SUMMARY - RESULTS OF PROPOSED CONSTRUCTION

Upon completion of the proposed construction, the system will provide adequate and dependable service to 58,480 residential customers as well as 22 industrial/large commercial loads and 2,320 small commercial loads. Average monthly residential usage is projected to be 1,064 kWh. It is estimated that there will be 3,500 idle services.

There will be one additional substation added to the OEC system upon completion of the CWP. The Messier-Bugatti (MBUSA) substation will be a 25MVA, 69-12.5kV substation dedicated to Messier Bugatti which has a total anticipated load of 18MW by November 2012. The dedicated MBUSA substation will almost completely offload the Duro1 transformer which is predominantly dedicated to Messier-Bugatti at present. The Duro 1 transformer will stay in service feeding its remaining native load, and serve as a backup source for contingency purposes to the surrounding area.

There are two planned substation upgrades in the CWP. Burlington substation which is presently a 14MVA substation will be increased to a 20MVA substation. Once the upgrade is complete, Burlington will relieve the Bullittsville substation by transferring a large industrial, Zumbiel, from Bullittsville to Burlington. Burlington substation also serves as a backup substation for the Western Regional Reclamation Facility of Sanitation District 1 (SD1). Therefore reserve capacity on the Burlington transformer is required. This substation upgrade will ensure that adequate reserve capacity will be available, and allow for native growth in the area that Burlington substation serves.

The second planned substation upgrade is for the Turkeyfoot Substation. Turkeyfoot also serves as a backup reserve for another SD1 facility on Narrows Road. The added reserve load puts the Turkeyfoot substation near capacity. Once the substation upgrade is complete Turkeyfoot Substation will more than likely become the primary feed for the Narrows Road pump station, and Richardson Substation will become the backup. The Turkeyfoot upgrade will also relieve the Richardson substation, specifically feeder 1902, which is heavily loaded.

The Noel substation will have fans added in 2012. The high side fuse of Grantslick II needs to be upgraded.

SUMMARY - RESULTS OF PROPOSED CONSTRUCTION (cont)

There are additional substations that are nearing capacity, and will be addressed in this CWP with load block transfers to adjacent substations. However each of these substations has been addressed in East Kentucky Power's 2012-2015 Construction Work Plan. Following this 2-year CWP period, the Williamstown and Bromley substations will be upgraded. Hebron Substation will be expanded with a second transformer, and a new substation will be considered to relieve the Banklick substation.

10.0 miles of site specific conductor replacement and conversion will take place in the two-year plan period. Additionally, 60 miles of overhead conductor and approximately 8 miles of underground will be selected for aged conductor replacement. These conductor replacement line sections will be selected based on conductor condition, operational experience and the number of customers served.

Owen Electric
2010 Load Forecast
Residential Summary

	Customers			*Use Per Customer*			*Class Sales*		
	Annual Average	Annual Change	% Change	Monthly Average (kWh)	Annual Change (kWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
1990	27,499			947			312,603		
1991	28,760	1,261	4.6	995	48	5.1	343,499	30,896	9.9
1992	30,006	1,246	4.3	951	-44	-4.4	342,536	-962	-0.3
1993	31,319	1,313	4.4	1,008	57	6.0	378,860	36,323	10.6
1994	32,670	1,351	4.3	1,019	11	1.0	399,328	20,468	5.4
1995	33,989	1,319	4.0	1,033	14	1.4	421,304	21,976	5.5
1996	35,416	1,427	4.2	1,064	31	3.0	452,162	30,858	7.3
1997	37,159	1,743	4.9	1,031	-32	-3.0	459,953	7,791	1.7
1998	38,931	1,772	4.8	1,026	-6	-0.6	479,197	19,244	4.2
1999	40,550	1,619	4.2	1,053	27	2.7	512,392	33,194	6.9
2000	42,113	1,563	3.9	1,066	13	1.3	538,817	26,426	5.2
2001	43,799	1,686	4.0	1,073	7	0.6	563,943	25,125	4.7
2002	45,779	1,980	4.5	1,120	47	4.4	615,132	51,189	9.1
2003	47,906	2,127	4.6	1,081	-39	-3.5	621,331	6,199	1.0
2004	49,741	1,835	3.8	1,094	13	1.2	652,706	31,375	5.0
2005	51,461	1,720	3.5	1,127	34	3.1	696,107	43,402	6.6
2006	52,935	1,474	2.9	1,070	-57	-5.0	679,964	-16,143	-2.3
2007	54,003	1,068	2.0	1,152	82	7.7	746,858	66,894	9.8
2008	54,427	424	0.8	1,133	-19	-1.7	740,085	-6,773	-0.9
2009	54,805	378	0.7	1,092	-41	-3.6	718,201	-21,884	-3.0
2010	55,299	494	0.9	1,108	16	1.5	735,354	17,153	2.4
2011	56,212	913	1.7	1,091	-17	-1.5	736,129	775	0.1
2012	57,302	1,090	1.9	1,078	-13	-1.2	741,123	4,994	0.7
2013	58,480	1,178	2.1	1,064	-14	-1.3	746,663	5,540	0.7
2014	59,695	1,215	2.1	1,062	-2	-0.2	760,875	14,212	1.9
2015	60,960	1,265	2.1	1,060	-2	-0.2	775,178	14,303	1.9
2016	62,244	1,284	2.1	1,060	1	0.1	792,060	16,882	2.2
2017	63,530	1,286	2.1	1,060	0	0.0	808,370	16,310	2.1
2018	64,823	1,293	2.0	1,062	1	0.1	825,758	17,388	2.2
2019	66,151	1,328	2.0	1,065	3	0.3	845,043	19,285	2.3
2020	67,534	1,383	2.1	1,065	1	0.1	863,358	18,315	2.2
2021	68,960	1,426	2.1	1,067	1	0.1	882,748	19,390	2.2
2022	70,433	1,473	2.1	1,069	3	0.3	903,883	21,135	2.4
2023	71,940	1,507	2.1	1,073	4	0.3	926,445	22,562	2.5
2024	73,465	1,525	2.1	1,077	4	0.3	949,186	22,740	2.5
2025	75,028	1,563	2.1	1,078	1	0.1	970,462	21,277	2.2
2026	76,615	1,587	2.1	1,080	2	0.2	993,002	22,540	2.3
2027	78,203	1,588	2.1	1,081	1	0.1	1,014,825	21,823	2.2
2028	79,791	1,588	2.0	1,082	1	0.1	1,036,228	21,403	2.1
2029	81,378	1,587	2.0	1,082	-1	-0.1	1,056,133	19,905	1.9
2030	82,966	1,588	2.0	1,084	3	0.2	1,079,339	23,206	2.2

Owen Electric
2010 Load Forecast
Small Commercial Summary

	Customers			*Use Per Customer*			*Class Sales*		
	Annual Average	Annual Change	% Change	Annual Average (MWh)	Annual Change (MWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
1990	654			71			46,235		
1991	745	91	13.9	82	12	16.5	61,339	15,104	32.7
1992	820	75	10.1	75	-7	-8.6	61,727	389	0.6
1993	879	59	7.2	75	0	-0.1	66,082	4,355	7.1
1994	939	60	6.8	77	2	2.5	72,341	6,259	9.5
1995	1,007	68	7.2	92	15	20.0	93,085	20,744	28.7
1996	1,087	80	7.9	85	-7	-7.5	92,937	-148	-0.2
1997	1,165	78	7.2	88	2	2.9	102,512	9,575	10.3
1998	1,264	99	8.5	90	2	2.2	113,645	11,133	10.9
1999	1,373	109	8.6	92	2	1.8	125,681	12,036	10.6
2000	1,510	137	10.0	93	1	1.5	140,359	14,678	11.7
2001	1,625	115	7.6	87	-6	-6.3	141,591	1,232	0.9
2002	1,690	65	4.0	82	-5	-6.1	138,298	-3,293	-2.3
2003	1,753	63	3.7	86	4	5.2	150,927	12,629	9.1
2004	1,791	38	2.2	90	4	4.5	161,106	10,180	6.7
2005	1,853	62	3.5	96	6	6.8	178,068	16,962	10.5
2006	1,930	77	4.2	107	11	11.8	207,408	29,340	16.5
2007	2,016	86	4.5	112	5	4.6	226,685	19,277	9.3
2008	2,086	70	3.5	103	-9	-8.4	214,939	-11,746	-5.2
2009	2,134	48	2.3	94	-9	-8.7	200,851	-14,088	-6.6
2010	2,175	41	1.9	96	2	1.6	208,010	7,158	3.6
2011	2,215	40	1.8	96	1	0.6	213,146	5,136	2.5
2012	2,264	49	2.2	97	0	0.4	218,708	5,562	2.6
2013	2,320	56	2.5	97	0	0.3	224,898	6,190	2.8
2014	2,381	61	2.6	97	0	0.3	231,414	6,515	2.9
2015	2,445	64	2.7	97	0	0.2	238,219	6,805	2.9
2016	2,510	65	2.7	98	0	0.3	245,227	7,008	2.9
2017	2,577	67	2.7	98	0	0.2	252,322	7,095	2.9
2018	2,644	67	2.6	98	0	0.2	259,459	7,137	2.8
2019	2,712	68	2.6	98	0	0.2	266,695	7,236	2.8
2020	2,782	70	2.6	99	0	0.2	274,155	7,460	2.8
2021	2,854	72	2.6	99	0	0.2	281,873	7,718	2.8
2022	2,929	75	2.6	99	0	0.2	289,834	7,961	2.8
2023	3,006	77	2.6	99	0	0.2	298,034	8,200	2.8
2024	3,084	78	2.6	99	0	0.2	306,389	8,356	2.8
2025	3,164	80	2.6	100	0	0.2	314,899	8,510	2.8
2026	3,246	82	2.6	100	0	0.2	323,596	8,697	2.8
2027	3,328	82	2.5	100	0	0.2	332,370	8,773	2.7
2028	3,410	82	2.5	100	0	0.2	341,167	8,797	2.6
2029	3,493	83	2.4	100	0	0.1	349,971	8,804	2.6
2030	3,576	83	2.4	100	0	0.1	358,777	8,807	2.5

Owen Electric
2010 Load Forecast
Large Commercial Summary
Excluding Gallatin

	Customers			*Use Per Customer*			*Class Sales*		
	Annual Average	Annual Change	% Change	Annual Average (MWh)	Annual Change (MWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
1990	2			10,061			20,123		
1991	2	0	0.0	12,404	2,343	23.3	24,809	4,686	23.3
1992	2	0	0.0	12,096	-308	-2.5	24,192	-617	-2.5
1993	2	0	0.0	12,268	172	1.4	24,535	343	1.4
1994	4	2	100.0	6,301	-5,967	-48.6	25,204	669	2.7
1995	6	2	50.0	4,885	-1,416	-22.5	29,310	4,106	16.3
1996	8	2	33.3	4,450	-435	-8.9	35,603	6,293	21.5
1997	10	2	25.0	3,384	-1,067	-24.0	33,835	-1,768	-5.0
1998	12	2	20.0	2,692	-691	-20.4	32,309	-1,527	-4.5
1999	17	5	41.7	2,543	-149	-5.5	43,239	10,930	33.8
2000	20	3	17.6	3,792	1,248	49.1	75,839	32,600	75.4
2001	23	3	15.0	4,239	447	11.8	97,497	21,658	28.6
2002	21	-2	-8.7	5,405	1,166	27.5	113,503	16,006	16.4
2003	28	7	33.3	4,259	-1,146	-21.2	119,256	5,753	5.1
2004	30	2	7.1	4,623	364	8.5	138,685	19,430	16.3
2005	36	6	20.0	4,807	184	4.0	173,061	34,376	24.8
2006	26	-10	-27.8	7,618	2,811	58.5	198,064	25,003	14.4
2007	13	-13	-50.0	14,780	7,162	94.0	192,139	-5,925	-3.0
2008	16	3	23.1	13,256	-1,524	-10.3	212,094	19,955	10.4
2009	15	-1	-6.3	13,121	-135	-1.0	196,810	-15,283	-7.2
2010	19	4	26.7	11,408	-1,713	-13.1	216,749	19,938	10.1
2011	19	0	0.0	12,189	781	6.8	231,587	14,838	6.8
2012	21	2	10.5	12,928	739	6.1	271,488	39,901	17.2
2013	22	1	4.8	12,925	-3	0.0	284,344	12,856	4.7
2014	23	1	4.5	12,837	-88	-0.7	295,246	10,902	3.8
2015	24	1	4.3	12,756	-81	-0.6	306,150	10,904	3.7
2016	25	1	4.2	12,686	-70	-0.6	317,152	11,001	3.6
2017	26	1	4.0	12,690	4	0.0	329,940	12,788	4.0
2018	27	1	3.8	12,696	6	0.0	342,789	12,849	3.9
2019	28	1	3.7	12,703	7	0.1	355,689	12,900	3.8
2020	29	1	3.6	12,713	10	0.1	368,677	12,988	3.7
2021	30	1	3.4	12,727	14	0.1	381,797	13,120	3.6
2022	31	1	3.3	12,744	17	0.1	395,063	13,267	3.5
2023	32	1	3.2	12,765	21	0.2	408,486	13,422	3.4
2024	33	1	3.1	12,789	24	0.2	422,044	13,559	3.3
2025	34	1	3.0	12,815	26	0.2	435,715	13,671	3.2
2026	35	1	2.9	12,843	28	0.2	449,503	13,788	3.2
2027	36	1	2.9	12,872	29	0.2	463,387	13,884	3.1
2028	37	1	2.8	12,901	29	0.2	477,327	13,940	3.0
2029	38	1	2.7	12,929	28	0.2	491,295	13,969	2.9
2030	39	1	2.6	12,956	27	0.2	505,278	13,982	2.8

SERVICE AREA

OWEN ELECTIC COOPERATIVE is a RUS-funded electric distribution cooperative. OEC is located in Northern Kentucky. OEC serves portions of Boone, Kenton, Campbell, Grant, Pendleton, Carroll, Scott and Owen Counties. The headquarters are located in Owenton, KY (Owen County). *See Map on following page.*

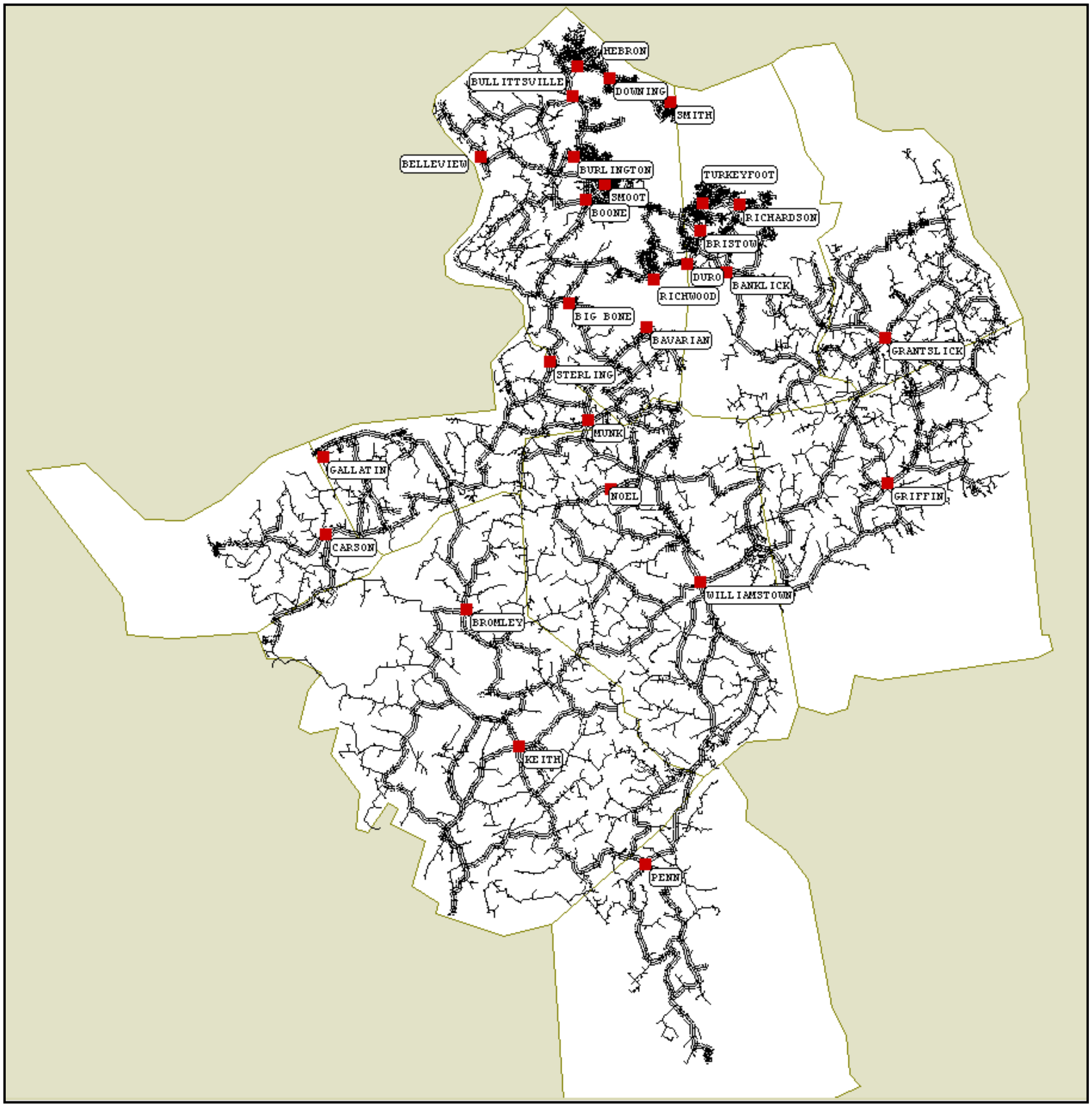
The OEC service area is due south of Cincinnati, Ohio and north of Georgetown, Kentucky. The system has a fine balance of large industrial and commercial customers combined with a large residential base due to the close proximity to Cincinnati.

The following data is from OEC's 12/10 RUS Form 7:

Total Services in Place	***60,166***
MWH Purchased	***2,224,298***
MWH Sold	***2,174,225***
Maximum MW Demand	***418.0***
Total Utility Plant	***$217,086,977***
Plant Dollars Per Active Member	***$3,826***
Consumers/Mile	***12.6***

OEC will operate 27 delivery points and distributes power at a primary voltages of 12.5/7.2 kV and 14.4/25 kV over approximately 4,500 miles of line.

OEC SYSTEM MAP



GENERATION and TRANSMISSION POWER SUPPLIER

East Kentucky Power Cooperative (EKP) provides all power and energy needs to OEC. EKP provides service to the twenty-seven distribution substations. EKP is located in Winchester, Kentucky.

The 2010 Load Forecast (LF) is a joint effort between OEC and EKP. OEC provides loading data and system growth predictions to EKP for use in the LF growth models.

All new distribution, transmission, and substation construction requirements are considered simultaneously as a “one system” concept - between OEC & EKP - for the orderly and economical development of the total system. All of the recommendations relative to power supply and delivery are discussed with EKP.

SUMMARY OF CONSTRUCTION PROGRAM AND COSTS

Owen Electric's distribution system was analyzed in order to identify the construction requirements needed to adequately serve the projected CWP load of 310 MW. Improvements were identified based on voltage drop, conductor loading, system reliability improvements, economic conductor analysis and operational experience. A narrative list of system improvements is located in Section IV.

A breakdown of proposed construction projects by RUS 740C codes is listed below in Table I-C-1.

Table I-C-1
System Additions and Improvements Summary

RUS Form 740C Category	Category Name	Estimated Cost
100	New Distribution Line	$4,862,246
300	Line Conversion & Replacement	$1,462,292
600	Misc. Equip. & Poles	$11,873,546
700	Outdoor Lights, AMR & SCADA/DA H/W & S/W	$1,302,509
1500	GIS	$1,174,000
	2012-2013 CWP TOTAL	$20,674,593

100 – New Construction planned to serve 1,763 new services.

300 – 10.0 miles of conductor upgrading and replacement.

600 - Miscellaneous distribution equipment and pole changes. This includes aged conductor replacement, voltage regulators, switched capacitors, sectionalizing, automated meters, transformers, pole changes and increased service capacity upgrades.

700 – Other Distribution Items - Outdoor lighting, and software and hardware for AMI, and SCADA/DA.

1500- GIS Items – Related Hardware and Software for GIS and field inventory.

OWEN ELECTRIC 2012-2013 Construction Workplan
COST SUMMARY SPREADSHEET

NEW CONSTRUCTION -- RUS CODE 100

ITEM	RUS CODE		AVE. $/CONSUMER	# CONS.		2012	2013	TOTAL
New Overhead Construction	100		$4,366	448		$958,917	$997,273	$1,956,190
New Underground Construction	101		$1,932	1,270		$1,202,477	$1,250,576	$2,453,053
New LP Construction	102		$10,067	45		$176,954	$276,049	$453,003
			TOTAL CODE 100:	1,763		$2,338,348	$2,523,898	$4,862,246

LINE CONVERSION / REPLACEMENT - RUS CODE 300

SUB - SECTION	RUS CODE	Original Conductor	INST. COND/#-PH	$/MILES	# OF MILES	2012	2013	TOTAL
Banklick 45098 - 45414	327	1 ph #2 ACSR	3 ph 336 ACSR	$167,300	0.8	$0	$139,194	$139,194
Big Bone 27348 - 27079	328	1 ph 6A CWC	3 ph 1/0 ACSR	$135,600	0.3	$40,680	$0	$40,680
Carson 51 - 29	329	1 ph #2 ACSR	3 ph #2 ACSR	$100,000	0.2	$20,000	$0	$20,000
Hebron 19954 - 19420	330	3 ph 1/0 ACSR	3 ph 336 ACSR	$167,300	1.1	$184,030	$0	$184,030
Keith 17337 - 21023	331	1 ph #2 ACSR	3 ph #2 ACSR	$100,000	2.3	$230,000	$0	$230,000
MBUSA	332	Getaways		$167,300	1.1	$200,000	$0	$200,000
Munk 27260-25585	333	1 ph #2 ACSR	3 ph 1/0 ACSR	$135,600	1.0	$0	$141,024	$141,024
Penn 34875 - 67711	334	1 ph #2 ACSR	3 ph 1/0 ACSR	$135,600	0.8	$0	$112,819	$112,819
Williamstown 67678 - 39269	335	1 ph #2 ACSR	3 ph 1/0 ACSR	$135,600	0.6	$81,360	$0	$81,360
Williamstown 38823 - 36268	336	1 ph 1/0 ACSR	3 ph 336 ACSR	$167,300	1.8	$0	$313,186	$313,186
			TOTAL CODE 300:		10.0	$756,070	$706,222	$1,462,292

CARRYOVERS are in BOLD

OWEN ELECTRIC 2012-2013 Construction Workplan
COST SUMMARY SPREADSHEET CON'T

MISCELLANEOUS DISTRIBUTION EQUIPMENT – RUS CODE 600's

ITEM	RUS CODE		2 YR. AVE. COST	# ITEMS		2012	2013	TOTAL
New Underground Transformers	601		$2,071	164		$143,794	$195,884	$339,678
New 3ph UG Transformers	601		$18,441	17		$126,118	$187,375	$313,493
New Overhead Transformers	601		$1,032	1,057		$426,364	$664,603	$1,090,967
New Meters	601		$255	150		$18,750	$19,500	$38,250
New Polyphase Meters	601		$406	90		$14,256	$22,239	$36,495
Retrofit Polyphase Meters	601		$310	112		$34,720	$0	$34,720
Disconnect Collars	601		$239	120		$14,040	$14,602	$28,642
Instrument Transformers	601		$712	198		$54,905	$86,013	$140,918
Service Upgrades	602		$3,706	230		$417,888	$434,603	$852,491
Sectionalizing	603					$544,320	$500,000	$1,044,320
Voltage Regulators	604					$359,200	$234,700	$593,900
Capacitors	605					$135,000	$135,000	$270,000
Pole Changes	606		$4,728	550		$1,274,663	$1,325,649	$2,600,312
Miscellaneous - Replacement	607					$650,000	$650,000	$1,300,000
Conductor Replacement (OH)	608			60 miles		$624,000	$648,960	$1,272,960
Conductor Replacement (UG)	608			8 miles		$958,200	$958,200	$1,916,400
			TOTAL					
			MISC. CODE 600'S:			$5,796,218	$6,077,328	$11,873,546

OTHER DIST. ITEMS - RUS CODE 700

ITEM	RUS CODE		2 YR. AVE. COST	# ITEMS		2012	2013	TOTAL
Outdoor Lighting	701		$1,394	256		$174,882	$181,877	$356,759
SCADA /DA	704					$590,125	$155,625	$745,750
AMI Equipment	705					$100,000	$100,000	$200,000
			TOTAL CODE 700:			$865,007	$437,502	$1,302,509

GIS - RUS CODE 1500

ITEM	RUS CODE		2 YR. AVE. COST	# ITEMS		2012	2013	TOTAL
Hardware/Software	1500					$0	$174,000	$174,000
Field Inventory	1500					$0	$1,000,000	$1,000,000
			TOTAL CODE 700:			$0	$1,174,000	$1,174,000

2012-2013 Kentucky 37 - Owen **CONSTRUCTION WORK PLAN TOTAL:** **$20,674,593**

DISTRIBUTION SYSTEM DESIGN CRITERIA

Each of the following criteria items were reviewed and accepted by the RUS General Field Representative on August 11, 2011.

1) The minimum primary voltage (on a 120 volt base) is 118 volts after re-regulation. The source voltage is 126 volts.

2) Primary conductors will be evaluated for replacement, or alternative action, if they exceed 75% of their thermal rating.

3) The following line equipment will not be thermally loaded by more than the percentage shown:

		a. Winter	Summer
ii.	Transformers	130%	100%
iii.	Voltage Regulators	130%	100%
iv.	Step Up / Down Transformers	130%	100%
v.	Reclosers / Line Fuses	80%	80%

4) Underground conductors will be considered for replacement on an as needed basis.

5) Overhead conductors will be considered for replacement on an as needed basis.

6) New primary construction is to be either overhead, or underground, based on governmental or environmental regulations, local restrictions, favorable economics, developmental requests, or safety concerns.

7) Single-phase lines with more than 45 Amps of load current will be evaluated for multi-phasing.

DISTRIBUTION LINE AND EQUIPMENT COSTS

Construction cost estimates for the two year planning period are shown in Table II-B-1. Cost summaries for distribution equipment are shown in Table II-B-2.

Table II-B-1
Line Construction Cost Estimates
Annual Projected Dollars/Mile*

SIZE	TYPE	2012	2013
1/0 ACSR	CONV 3-PH	$135,600	$141,000
336.4 ACSR	CONV 3-PH	$167,300	$174,000
#2 ACSR	REPL 1-PH	$42,300	$44,000
1/0 ALUG	REPL 1-PH	$130,000	$135,200
1/0 ALUG	CONV 3-PH	$300,000	$312,000
500 MCM ALUG	CONV 3-PH	$590,000	$613,600

Table II-B-2
Distribution Equipment Cost Estimates
Annual Projected Unit Costs*

DEVICE	TYPE	2012	2013
V.Regulators (3)	219 amp	$64,600	$67,200
V.Regulators (3)	150 amp	$45,600	$47,500
V.Regulators (1)	100 amp	$26,400	$27,500

* Dollar amounts reflect material, direct labor costs, and a 60% indirect labor overhead multiplier.

STATUS OF PREVIOUS CWP ITEMS

All projects from the 2010-2011 CWP have been completed except the following:

740 C #	Project Description	Status
301	Moffett Rd	Carryover - 327
309	Aulick Rd.	Cancelled –Alternate solution planned.
310	Butler-Greenwood	Deferred
311	Williams Rd.	Carryover - 330
313	Fortner Ridge Rd.	Deferred
314	Breck Rd.	Deferred
315	Swope Rd.	Carryover - 331
317	Violet Rd.	Deferred
324	Fairview-Knoxville Rd.	Deferred
325	Ragtown Rd.	Carryover - 335
326	Keefer Rd.	Carryover - 336

ANALYSIS OF 2006 LONG RANGE PLAN

The 2006 Twenty-Year Long Range Plan (LRP) consists of three load block levels. Load block "A" was a five-year load level, load block "B" represented the 10-year load level, and load block "C" represented the 20 year load level. The Long Range Load Level ("C") system summer 2026 peak is approximately 550 MW (excluding Gallatin Steel). The summer 2013 system peak projected in this CWP is 310 MW.

In **Load Block A**, the LRP recommended four new substation sites and expansions to three existing substation sites. The new substations were Burlington, Sterling, Woolper Creek, and Blanchet. The substations to be expanded/doubled were Munk, Williamstown and Banklick.

The Burlington and Sterling substations were added during the 2008-2009 CWP. The Burlington substation is scheduled for an upgrade by summer 2013 in order for it to serve as an emergency backup for a critical load. The Woolper Creek substation will be called the Belleview substation, and will be completed during the 2010-2011 CWP. The Blanchet substation has been deferred pending analysis of the Penn substation service territory and the future rehabilitation/upgrade of the Penn substation.

Expansion of the Munk substation has been deferred because of load transfer from the Munk service territory to the Noel substation. Also it has been determined that an expansion of the Munk substation is not feasible because of space limitations. The alternative to the Munk expansion was a proposed substation near the town of Crittenden. Due to slower economic growth than anticipated in the LRP, the need for a substation around the Crittenden area has been deferred.

The Williamstown expansion will need to occur at the onset of the next CWP. A new 5MW amusement park, The Ark, will be served by the Williamstown substation and is scheduled to open in late 2014 or early 2015.

The Banklick substation expansion will be analyzed in the next Construction Work Plan. To increase reliability between Banklick and Grantslick substation, a new substation site may be selected in lieu of a substation upgrade at Banklick. Until a new substation or upgrade of Banklick is available, load transfers can be managed with Bristow and Duro to offload Banklick.

In **Load Block B**, the LRP recommended three substation expansions, and three new substation sites. These new substations were North Point, Independence, and Toebben. The substations recommended for expansion were Noel, Bullittsville, and Woolper Creek (now called Belleview).

ANALYSIS OF 2006 LONG RANGE PLAN –con't

Due to slow residential expansion in western Boone County, the North Point substation is no longer considered as a preferred solution. A large planned residential/commercial community off of North Bend Road, on the eastern part of the Hebron substation territory, has made an expansion of the existing Hebron substation the preferred solution for offloading the existing Hebron transformer. A second transformer at Hebron will be needed at the beginning of the next CWP.

The remaining planned new construction and expansion of substations outlined in Load Block B are not needed in this CWP, and presently are not scheduled with EKP. Load growth will be monitored in each of these areas to determine when the planned expansions will be necessary.

In **Load Block C (Long-Range Level),** the LRP recommended six new substation sites. These substations were Waterloo, Richwood, Alexandria, Lake Williamstown, Sulphur Well, and North Holbrook.

The Richwood substation was expedited due to expansion in the Duro industrial park area. The Richwood substation was energized the summer of 2010.

The 2006 LRP recommended numerous distribution upgrades that include aged conductor replacement over the 20-year Long Range Planning period.

The 2012-2013 CWP is in basic agreement with the current LRP. All recommendations in the current LRP were closely analyzed during the updating process.

OPERATIONS & MAINTENANCE SURVEY

The current O&M Survey ("Review Rating Summary") was completed in July 2009. A copy of the survey is included as an Appendix of this report.

OEC will continue to coordinate with other utilities through frequent follow-ups concerning joint use compliance. This will alleviate issues with poles left standing next to electric poles once a line has been changed.

SECTIONALIZING STUDIES

A sectionalizing study analyzes the existing overcurrent protection scheme and proposes changes to improve the overall effectiveness of the scheme.
Sectionalizing studies take place on a substation-by-substation basis.

The four main goals of a sectionalizing study are Safety, Reliability, Coordination, and Protection.

1. Safety – Sectionalizing devices should be able to detect and interrupt the full range of fault currents available in their zone of protection coverage. Calculated minimum fault current values should be detected and cleared by the protective device.

2. Reliability – Limit the outage hours per consumer by isolating or "sectionalizing" faulted portions of the circuit so that the minimum number of customers are interrupted. Additional devices – where needed – will further limit the overall outage hours.

3. Coordination – Good protective device coordination will ensure that the closest device to the fault opens. Fault locating is also enhanced. Miscoordination of protective devices can cause confusion and ultimately add to outage times.

4. Protection – A well designed protection scheme will minimize damage to the distribution system by limiting the time that damaging overcurrent is present on the faulted portion of the system.

Changes that can affect the coordination scheme include: load growth; substation transformer capacity increases; reconductoring distribution lines; single-phase to three-phase conversions; changes in the system's circuit configuration; and the addition of loads in specific locations.

The ongoing, substation-by-substation sectionalizing study will continue after the completion of the CWP report. General sectionalizing device cost projections will be listed in the "603" category in this report.

TABLE II-E-1
SUBSTATION LOAD TABLE

HISTORICAL AND FORECAST LOAD IN KVA

	Installed Capability				Existing Winter		2 Year Winter Unimproved		2 Year Winter Improved		Existing Summer		2 Year Summer Unimproved		2 Year Summer Improved		
NAME	Nameplate (kVA)	Cooling	Winter Rating (kVA)	Summer Rating (kVA)	Jan '11 (kVA)	% Load	Jan '14 (kVA)	% Load	Jan '14 (kVA)	% Load	July '11 (kVA)	% Load	July '13 (kVA)	% Load	July '13 (kVA)	% Load	Notes
Bank Lick	14000	OAFA-65C	17100	13620	10,098	59.05%	11,232	65.68%	9,384	54.88%	12,253	89.96%	12,802	93.99%	10,614	77.93%	5
Bavarian	20000	OAFAFA-65C	14400	14400	4,675	32.47%	5,444	37.81%	5,444	37.81%	3,658	25.40%	4,172	28.97%	4,172	28.97%	
Big Bone	14000	OAFA-65C	17100	13620	3,626	21.20%	4,163	24.35%	4,273	24.99%	3,814	28.00%	4,064	29.84%	4,133	30.35%	
Boone Distribution	25000	OAFAFA-65C	17100	17100	11,172	65.33%	12,969	75.84%	12,969	75.84%	13,537	79.16%	13,953	81.60%	13,953	81.60%	
Bristow	14000	OAFA-65C	17100	13620	6,204	36.28%	8,063	47.15%	8,063	47.15%	6,555	48.13%	6,667	48.95%	6,667	48.95%	
Bristow II	14000	OAFA-65C	14400	13620	5,757	39.98%	7,375	51.22%	8,374	58.15%	7,781	57.13%	8,322	61.10%	9,832	72.19%	6
Bromley	14000	OAFA-65C	13740	13620	7,678	55.88%	7,984	58.11%	7,825	56.95%	6,177	45.35%	6,350	46.62%	6,159	45.22%	
Bullittsville	14000	OAFA-65C	17100	13620	7,019	41.05%	8,042	47.03%	6,770	39.59%	13,385	98.27%	13,976	102.61%	10,832	79.53%	2,8
Burlington	14000	OAFA-65C	14400	14010	7,498	52.07%	15,099	104.85%	8,199/11,677	56.94%/81.09%	10,179	72.66%	16,786	119.81%	9,319/13,043	66.52%/93.10%	2
Carson	11200	OA-65C	13740	11080	7,030	51.16%	8,929	64.99%	8929	64.99%	6,409	57.84%	8,653	78.10%	8,649	78.06%	
Downing #1	14000	OAFA-65C	17100	13620	6,835	39.97%	7,667	44.84%	7,667	44.84%	10,221	75.04%	10,488	77.00%	10,488	77.00%	
Downing #2	14000	OAFA-65C	14400	13620	2,631	18.27%	2,730	18.96%	2,730	18.96%	3,340	24.52%	3,390	24.89%	3,390	24.89%	
Duro #1	14000	OAFA-65C	14400	13620	10,543	73.22%	21,209	147.28%	945	6.56%	12,220	89.72%	19,922	146.27%	1,065	7.82%	3
Duro #2	14000	OAFA-65C	13700	13620	5,170	37.74%	7,055	51.50%	7,889	57.58%	8,997	66.06%	6,015	44.16%	6,692	49.13%	5
Gallatin County #2	20000	OAFAFA-65C	20730	18500	5,459	26.33%	5,612	27.07%	5,612	27.07%	8,677	46.90%	11,377	61.50%	11,377	61.50%	
Grants Lick #1	14000	OAFA-65C	14400	13620	7,886	54.76%	8,766	60.88%	8,763	60.85%	7,243	53.18%	7,666	56.28%	7,661	56.25%	
Grants Lick #2	20000	OAFAFA-65C	17100	17100	15,842	92.64%	16,910	98.89%	16,918	98.94%	13,315	77.87%	13,452	78.67%	13,456	78.69%	9
Griffin	11200	OA-65C	13740	11070	7,657	55.73%	9,449	68.77%	9,445	68.74%	8,493	76.72%	8,675	78.36%	8,667	78.29%	
Hebron	20000	OAFAFA-65C	23610	19200	9,183	38.89%	12,561	53.20%	12,128	51.37%	15,676	81.65%	18,194	94.76%	17,646	91.91%	7
Keith	11200	OA-65C	13740	8820	9,762	71.05%	11,024	80.23%	11,137	81.06%	7,249	82.19%	7,517	85.23%	7,676	87.03%	
Keith #2	11200	OA-65C	15720	11070	1,564	9.95%	1,570	9.99%	1,570	9.99%	1,717	N/A	1,720	15.54%	1,720	15.54%	
Munk	14000	OAFA-65C	17100	13620	11,852	69.31%	12,171	71.18%	12,171	71.18%	9,305	68.32%	9,647	70.83%	9,639	70.77%	
Oakley Noel	11200	OA-65C	13740	11080	9,310	67.76%	10,740	78.17%	10,731	78.10%	9,585	86.51%	9,915	89.49%	9,909	89.43%	4
Penn	14000	OAFA-65C	14400	13620	10,688	74.22%	11,822	82.10%	11,891	82.58%	9,456	69.43%	9,837	72.22%	9,917	72.81%	
Richardson #1	14000	OAFA-65C	17100	13620	7,864	45.99%	11,341	66.32%	8,206/8,183	48.0%/47.9%	10,812	79.38%	13,532	99.35%	10,461/9,364	76.9%/68.8%	1
Richardson #2	11200	OA-65C	14400	11080	4,137	28.73%	4,717	32.76%	4,717	32.76%	4,465	40.30%	4,562	41.17%	4,562	41.17%	
Richwood	20000	OAFAFA-65C	24800	19200	4,440	17.90%	5,790	23.35%	5,790	23.35%	9,094	47.36%	8,588	44.73%	8,588	44.73%	
Sterling	20000	OAFAFA-65C	14400	14400	6,547	45.47%	8,170	56.74%	8,058	55.96%	8,129	56.45%	9,444	65.58%	9,374	65.10%	
Turkey Foot	14000	OAFA-65C	14400	13620	9,525	66.15%	11,570	80.35%	14,683/14,701	102%/102%	7,993	58.69%	8,829	64.82%	11,796/12,867	86.6%/94.5%	1,10
W. M. Smith #1	14000	OAFA-65C	14400	13620	5,793	40.23%	6,068	42.14%	6,068	42.14%	8,753	64.27%	9,127	67.01%	9,127	67.01%	
W. M. Smith #2	14000	OAFA-65C	14400	13620	6,330	43.96%	6,746	46.85%	6,746	46.85%	9,635	70.74%	9,799	71.95%	9,800	71.95%	
W. R. Smoot #1	11200	OA-65C	17100	13620	7,641	44.68%	9,374	54.82%	9,375	54.82%	9,348	68.63%	9,748	71.57%	9,748	71.57%	
W. R. Smoot #2	14000	OAFA-65C	14400	13620	8,448	58.67%	8,817	61.23%	8,817	61.23%	10,123	74.32%	10,237	75.16%	10,237	75.16%	
Williamstown	14000	OAFA-65C	17100	13620	11,630	68.01%	12,780	74.74%	12,708	74.32%	11,412	83.79%	12,809	94.05%	12,570	92.29%	
Belleview	11200	OA-65C	14400	11080	N/A	N/A	N/A	N/A	7,880	54.72%	N/A	N/A	N/A	N/A	9,172	82.78%	
Messier	25000	OAFAFA-65C	31000	24000	N/A	N/A	N/A	N/A	20,228	65.25%	N/A	N/A	N/A	N/A	19,310	80.46%	

1. SD1 on Richardson 1 / Turkeyfoot
   Autumn Dr. permanently switched to Turkeyfoot.
   Circlewood Dr. fed from opposite substation as SD1
2. Relieved by Belleview
3. Relieved by Messier Substation
4. Add fans.
5. Relieved by Duro 2 and Bristow 2 block load transfer
6. Relieved Banklick Substation
7. Relieved by block load transfer to Bullittsville
8. Relieved Hebron
9. High side fuse needs to be upgraded
10. Tap Changer needs to be upgraded in short term plus oil cooler until substation upgrade.

Owen
Distribution Substation Equipment Ratings

Substation Identification			Substation Voltage		Transformer				Regulator				Regulator Tap Changer			High-Side Fuse					Limits			
CoopID	Prefix	MV90 Name	Primary	Secondary	Nameplate	Cooling	Summer	Winter	Nameplate	Cooling	Summer	Winter	Amps	Summer	Winter	Amps	Type	TCC	Summer	Winter	Summer		Winter	
37	N013	BANK LICK	69	12.47	14	OA/FA-65C	13.62	18.14	686	OA-65C	26.3	34.4	900	19.4	19.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N070	BAVARIAN	138	12.47	20	OA/FA/FA-65C	19.20	24.84	466	OA-65C	17.9	23.4	668	14.4	14.4	100	SS	PMA	27.4	27.4	**14.40**	**TC**	**14.40**	**TC**
37	N036	BIG BONE	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	900	19.4	19.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N015	BOONE DIST.	69	12.47	25	OA/FA/FA-65C	24.00	31.05	933	OA-65C	35.8	46.8	1093	23.6	23.6	125	SMD1A	153-1	17.1	17.1	**17.10**	**F**	**17.10**	**F**
37	N047	BRISTOW #1	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	900	19.4	19.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N047A	BRISTOW #2	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N073	BROMLEY	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	100	SMD1A	119-1	13.7	13.7	**13.62**	**T**	**13.70**	**F**
37	N028	BULLITTSVILLE	69	12.47	14	OA/FA-65C	13.62	18.14	686	OA-65C	26.3	34.4	900	19.4	19.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N077	BURLINGTON	69	12.47	14.4	OA/FA-65C	14.01	18.66	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	153-1	17.1	17.1	**14.01**	**T**	**14.40**	**TC**
37	N033	CARSON	69	24.94	11.2	OA-65C	11.07	15.72	484	OA-65C	18.5	24.3	480	20.7	20.7	100	SMD1A	119-1	13.7	13.7	**11.07**	**T**	**13.70**	**F**
37	N062	DOWNING #1	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	900	19.4	19.4	125	SMD2B	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N062A	DOWNING #2	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N055	DURO #1	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N055A	DURO #2	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	100	SMD1A	119-1	13.7	13.7	**13.62**	**T**	**13.70**	**F**
37	N057A	GALLATIN DIST.	138	24.94	20	OA/FA/FA-65C	19.20	24.84	484	OA-65C	18.5	24.3	480	20.7	20.7	-----	-----	-----	---	---	**18.50**	**R**	**20.70**	**TC**
37	N012	GRANTS LICK #1	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	119-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N012A	GRANTS LICK #2	69	24.94	20	OA/FA-65C	19.46	25.92	933	OA-65C	35.8	46.8	668	28.8	28.8	125	SMD1A	153-1	17.1	17.1	**17.10**	**F**	**17.10**	**F**
37	N029	GRIFFIN	69	12.47	11.2	OA-65C	11.07	15.72	416	OA-65C	15.9	20.8	668	14.4	14.4	100	SMD1A	119-1	13.7	13.7	**11.07**	**T**	**13.70**	**F**
37	N069	HEBRON	138	12.47	20	OA/FA/FA-65C	19.20	24.84	747	OA-65C	28.7	37.5	1093	23.6	23.6	100	SS	PMA	27.4	27.4	**19.20**	**T**	**23.60**	**TC**
37	N038	KEITH	69	12.47	10	OA-55C	8.82	14.94	333	OA-55C	9.8	15.1	668	14.4	14.4	100	SMD1A	119-1	13.7	13.7	**8.82**	**T**	**13.70**	**F**
37	N038A	Keith #2	69	24.94	11.2	OA-65C	11.07	15.72	432	OA-65C	16.6	21.6									**11.07**	**T**	**15.72**	**T**
37	N021	MUNK	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	900	19.4	19.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N067	OAKLEY NOEL	69	12.47	11.2	OA-65C	11.07	15.72	466	OA-65C	17.9	23.4	668	14.4	14.4	100	SMD2A	119-1	13.7	13.7	**11.07**	**T**	**13.70**	**F**
37	N008	PENN	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N058	RICHARDSON #1	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	900	19.4	19.4	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N058A	RICHARDSON #2	69	12.47	11.2	OA-65C	11.07	15.72	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	153-1	17.1	17.1	**11.07**	**T**	**14.40**	**TC**
37		Richwood																						
37	N078	STERLING	138	12.47	16	OA/FA-65C	15.56	20.73	466	OA-65C	17.9	23.4	668	14.4	14.4	100	SS	PMA	27.4	27.4	**14.40**	**TC**	**14.40**	**TC**
37	N031	TURKEY FOOT	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD2B	153-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N048	W.M. SMITH #1	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD2B	153-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N048A	W.M. SMITH #2	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD2B	153-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N052	W.R. SMOOT #1	69	24.94	14	OA/FA-65C	13.62	18.14	686	OA-65C	26.3	34.4	900	38.8	38.8	125	SMD1A	119-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**
37	N052A	W.R. SMOOT #2	69	12.47	14	OA/FA-65C	13.62	18.14	466	OA-65C	17.9	23.4	668	14.4	14.4	125	SMD1A	119-1	17.1	17.1	**13.62**	**T**	**14.40**	**TC**
37	N016	WILLIAMSTOWN	69	12.47	14	OA/FA-65C	13.62	18.14	747	OA-65C	28.7	37.5	1093	23.6	23.6	125	SMD1A	153-1	17.1	17.1	**13.62**	**T**	**17.10**	**F**

SERVICE RELIABILITY

The record of OEC's service interruptions for the past five years is shown in Table II-E-2. The five-year average outage hours per consumer is 7.61. This value is higher than typical because of the extreme winds produced by Hurricane Ike in the fall of 2008 and the ice storm of early 2009 which both caused widespread damage for utilities throughout the region. With this exception OEC's typical average outage hours are below the minimum level allowed by RUS. Ongoing system improvements and continued feeder sectionalizing studies will help to reduce this value even further.

TABLE II-E-2

	Power Supplier	Extreme Storm	Prearranged	All Other	Total
2006					
OUTAGE HR/CONS	**0.13**	**0.62**	**0.08**	**1.73**	**2.56**
2007					
OUTAGE HR/CONS	**0.46**	**1.26**	**0.14**	**1.77**	**3.63**
2008					
OUTAGE HR/CONS	**1.11**	**12.01**	**0.05**	**1.62**	**14.79**
2009					
OUTAGE HR/CONS	**0.30**	**12.20**	**0.12**	**2.11**	**14.73**
2010					
OUTAGE HR/CONS	**0.42**	**0.00**	**0.12**	**1.78**	**2.32**
FIVE YEAR AVE.					
OUTAGE HR/CONS	**0.48**	**5.22**	**0.10**	**1.80**	**7.61**

NON-FUNDED SYSTEM IMPROVEMENTS

The following recommendations are based upon the review of the projected winter and summer peak systems. These recommendations do not affect the total dollar projections for the CWP, but are recommended for the OEC system to meet the design criteria.

Load Balance

The following feeders would benefit from balancing to alleviate excessive voltage drop or rise due to phase imbalance. Included in the appendix of this report are phase balance recommendations that were generated using Windmil's Load Balance routine which calculates the optimum phase configuration for a feeder based on reducing losses. While all recommendations may not be possible due to field constraints it can be used as a starting point to begin plans for phase balancing.

Substation	Feeder	Issue	Summer	Winter
Banklick	0202	Voltage Rise		X
Bromley	0603	Voltage rise and drop	X	X
Burlington	2404	Voltage Rise	X	X
Gallatin	1802	Voltage Rise		X
Grantslick 1	0304	Voltage Rise and drop		X
Griffin	0904	Voltage Rise and drop	X	X
Keith	1301	Voltage Rise and drop	X	X
Keith	1303	Voltage Rise and drop	X	X
Munk	0405	Voltage Rise	X	X
Noel	2103	Voltage Drop	X	X
Noel	2104	Voltage Drop	X	X
Penn	0702	Voltage Drop	X	X
Penn	0703	Voltage Rise	X	X
Sterling	2503	Voltage Rise	X	X
Turkeyfoot	1002*	Voltage Rise	X	X
Williamstown	0501	Voltage Rise and drop	X	X

* This feeder will change when new feeder out of Turkeyfoot is added to serve as backfeed for SD1. Load balancing may change.

<u>Switching recommendations</u>

- Banklick: Backfeed 47849 from 47846 and open at 48037 to relieve loading on 47920. Switches not available. This tap is on Old Decoursey Road.

- **Banklick offload: Backfeed 65759 from 65758 and open at riser at LOC#72-439-21-1173. This will feed Troopers Crossing from Bristow II.**

- **Banklick offload: Close SW1267 (LOC#72-424-23-5418) and open at Banklick substation. This will feed all of feeder 0204 (Maher Rd.) from the Duro II transformer.**

- Bristow 1: Change the tap beginning with line section 30890 LOC#62-451-20-7033 from C-phase to either A-phase or B-phase to relieve undervoltage caused by imbalance.

- Keith/Bromley: Close SW1715 (LOC#11-073-23-2056) and open SW1684 (LOC#11-073-05-9909) to relieve voltage drop at the end of Bromley 603. This should only be done once the voltage regulators have been added to the mainline of Keith 1304 near 11-054-13-3739.

- Grantslick: Backfeed 52302 from 51949 (LOC#82-354-13-5017) and open at 51342 (LOC#82-353-17-0118) to relieve overload on tap along Aulick Road beginning at 67896 (LOC#82-338-02-5814). This area is planned for aged conductor replacement. The change in open point should accompany the conductor replacement.

- **Hebron offload: Add switch south of 62-499-14-1057. Close Bullittsville feeder 803 at the substation and open at new switch. This will offload Hebron until the substation upgrade. This should be done after load on Bullittsville has been switched to Belleview.**

- **Richardson offload: Switch Turkeyfoot Rd and Autumn Drive to Turkeyfoot substation to free up capacity on Richardson 1 for SD1 Narrows. Close switch SW1408 (LOC#72-452-11-5087) and open at new open point just west of SD1.**

- Sterling: Backfeed 14797 from 14817 (LOC#61-389-14-4627) and open at 14571 (LOC#61-373-02-3875) to relieve loading on 16945.

- Sterling: Change tap beginning with 11636 from C-phase to B-phase (LOC#41-343-22-6360.

- Sterling: Change tap beginning with 17213 from C-phase to B-phase (LOC#41-359-17-3353.

- Turkeyfoot: Backfeed 38550 from new 556Spacer on Sterling Dr. at LOC#72-452-23-9681 and open at LOC#72-453-12-3131 to relieve loading on 38459.

Additional Recommendations

- Bristow 1: Consider a 70L OCR at line section 37596, LOC#72-424-10-9780 on Hogreffee Rd.

- Carson 1102: Overvoltage conditions on the lighter phases due to the large amount of capacitance on this feeder which has been confirmed by field readings. Consider reducing the kVAR on this feeder. Carson appears to go leading in winter.

- Downing 1: Feeder 2001. Review coordination on this feeder. Possible heavy loading and low voltage on single phase tap 1/0 UG on Grandview Dr. Field verify.

- Grantslick: Feeder 0304. Take voltage field measurements during winter peak 31-302-20-0444, Brownfield Rd. Consider voltage regulator or changing phase of tap.

- Noel: Feeder 2102. Check voltage at consumer location 22-216-23-7094 during summer peak. May need to move the set of 3-219A voltage regulators at LOC#22-217-18-3041 upline for voltage support.

- Penn: Feeder 701 had low voltage readings at meter on C phase during peak summer 2011. The set of upline voltage regulators should be checked to see if they are online and operating properly.

- Penn: Appears to go leading during non-summer months. Consider removing or switching kVAR on this substation.

- Smith 1: Power factor 92% in summer. Consider capacitors.

- Smith 2: Power factor 89% in summer. According to the model there are several capacitor banks that are turned off. Consider adding on energizing capacitors.

- Smoot 2: Power factor 94% in summer. Consider capacitors.

- Sterling: Power factor 87% in summer. Consider capacitors.

- Turkeyfoot: Location 72-439-14-5614 Meadowglen Dr. is heavily loaded. Check loading in summer, and design coordination accordingly. If the back part of this subdivision develops extend the V-phase down Meadow Breeze Lane to break up the load on Meadowglen Dr.

<u>DATA RESOURCES</u>

The following is a list of the basic data used for this analysis and report.

1. Updated circuit diagram map that indicates substations with present feeder configurations.

2. Monthly substation non-coincident peak (NCP) demands.

3. Billing system kW and kWh sales for last winter and summer peaks.

4. 2010 East Kentucky Power *Load Forecast.*

5. Five Year Outage Summary.

6. RUS Form 7 data.

7. Substation transformer ratings.

8. Substation Data Sheets.

9. Computerized circuit model databases with voltage drop calculations for each primary line section.

BASIC DATA AND ASSUMPTIONS

Design Load – The construction program in the CWP covers a two-year period to serve the 306 MW, January 2014 winter peak and 310 MW, 2013 summer peak. The design load was derived after reviewing the *2010 Load Forecast* with the GFR.

Load Allocation – Individual areas of the system were grown as spot loads based on the potential for growth in that area. The total system design load was attained by allocating each substation's load to its consumers proportional to the kWh consumption of each residential consumer and billed demand for non-residential consumers. Peak summer and peak winter loading were modeled and analyzed. The system is generally summer peaking.

Voltage Drop – For the design load, an eight volt drop past one set of downline voltage regulators was assumed to be the maximum allowable end-of-line voltage drop.

Substation Voltage Regulation – Voltage regulation was assumed for each substation such that a 10% voltage drop could be experienced on the transmission system at peak load and 126 volts could still be supplied to the substation bus.

System Power Factor – System power factor values were assumed to coincide with the levels listed on the substation load data sheet.

Single-Phase Loading – On taps where more than 45 amps are served from a single-phase line, conversion to 3-phase was considered in order to provide greater system reliability and ease of coordination.

Inflation – An annual inflation rate of 4% was used in this CWP.

Construction Cost Estimates – Cost estimates for the various distribution equipment and conductor sizes are presented in Tables II-B-1 and II-B-2.

Computer Model of Distribution System – The system is modeled on Milsoft Integrated Solution's Windmil v. 7.3 analysis software. Downloading monthly billing computer data into the Windmil billing file directory was the framework for building the winter and summer models. Residential loads were allocated by the kWh Demand Table method. Commercial and industrial loads were allocated based on their billed kW demand. Projected models were analyzed for Design Criteria violations using an unbalanced voltage drop calculation.

Economic Conductor Analysis – Economic Conductor analysis includes the consideration of initial construction costs and the associated losses of the selected conductors. For two alternative conductors compared, there is generally a kW load level at which the fixed costs associated with construction plus the variable costs related to line losses are equal for both alternatives.

The following general recommendations were generated from the analysis:

1. New overhead single-phase line extensions will be constructed of #2 ACSR. New underground extensions will be constructed of 1/0 ALUG or #2 ALUG. New three-phase underground line extensions will be constructed of 1/0 ALUG or 500 MCM ALUG.
2. Replacements that are to remain single-phase should generally be constructed of #2 ACSR unless unacceptable voltage drop is likely, in which case 1/0 ACSR should be used.
3. Converted 12.5 kV three-phase construction should be of 1/0 ACSR for initial loads up to 2,000 kW except main feeders and major taps; and 336.4 ACSR for initial loads greater than 2,000 kW. Voltage drop and reliability considerations may lower the initial kW level for the use of 336.4 ACSR.

The data table preceding the analysis graph lists the assumptions that were made in the conductor analysis. This analysis appears in the Appendices of this report.

FINANCIAL DATA

- ***Cost of Capital = 5.0%***
- ***Inflation = 4.0%***
- ***Present Worth Discount Factor = 5.0%***
- ***Depreciation = 4.47%***
- ***O&M = 4.26%***
- ***Tax & Ins = 1.00%***
- ***TOTAL ANNUAL FIXED CHARGE RATE = 14.73%***

TABLE III-B-1 Inflation = 4%
COST SUMMARY DATA
(HISTORICAL DATA & PROJECTIONS - EXCLUDING CODES 300, 603, & 604)

DESCRIPTION	July'09- June'11	2012	2013	CWP TOTAL
New OH Construction (100)				
1. New services constructed	447	224	224	448
2. Cost per Customer	$4,116	$4,281	$4,452	
3. Cost of New Customers	$1,839,954	$958,917	$997,273	$1,956,190
4. Total Footage	129,204	64,747	64,747	129,493
New UG Construction (101)				
1. New services constructed	1270	635	635	1270
2. Cost per Customer	$1,821	$1,894	$1,969	
3. Cost of New Customers	$2,312,456	$1,202,477	$1,250,576	$2,453,053
4. Total Footage	170,288	85,144	85,144	170,288
New LP Construction (102)				
1. New services constructed	45	18	27	45
2. Cost per Customer	$9,453	$9,831	$10,224	
3. Cost of New Customers	$425,371	$176,954	$276,049	$453,003
Padmount Transformers (601)				
1. New transformers added	114	71	93	164
2. Cost per Transformer	$1,947	$2,025	$2,106	
3. Cost of New Transformers	$222,000	$143,794	$195,884	$339,678
3 PH Padmount Transformers (601)				
1. New transformers added	17	7	10	17
2. Cost per Transformer	$17,324	$18,017	$18,738	
3. Cost of New Transformers	$294,506	$126,118	$187,375	$313,493
New (OH) Transformers (601)				
1. New transformers added	1057	423	634	1057
2. Cost per Transformer	$969	$1,008	$1,048	
3. Cost of New Transformers	$1,024,428	$426,364	$664,603	$1,090,967
New Meters (601)				
1. New Meters added	960	75	75	150
2. Cost per Meter	$149	$250	$260	
3. Cost of New Meters	$142,598	$18,750	$19,500	$38,250
New Polyphase Meters (601)				
1. New Meters added	24	36	54	90
2. Cost per Meter	$275	$396	$412	
3. Cost of New Meters	$6,604	$14,256	$22,239	$36,495
Retrofit Polyphase Meters (601)				
1. Retrofit of LP Meters added		112	0	112
2. Cost per Retrofit		$310	$322	
3. Cost of Retrofit LP Meters		$34,720	$0	$34,720
Disconnect Collars (601)				
1. New Collars added		60	60	120
2. Cost per Collar	$225	$234	$243	
3. Cost of New Collar		$14,040	$14,602	$28,642
Instrument Transformers (601)*				
1. New instrument transformers added	198	79	119	198
2. Cost per instrument transformers	$413	$695	$723	
3. Cost of New instrument transformers	$81,831	$54,905	$86,013	$140,918

* Cost increase. Cost normalized based on number of CT versus PT/CT

TABLE III-B-1 Inflation = 4%
COST SUMMARY DATA CON'T
(HISTORICAL DATA & PROJECTIONS - EXCLUDING CODES 300, 603, & 604)

DESCRIPTION	July'09- June'11	2012	2013	CWP TOTAL
Service Upgrades (602)				
1. Number of Service Upgrades	230	115	115	230
2. Cost per Service Upgrade	$3,494	$3,634	$3,779	
3. Cost of Service Upgrades	$803,630	$417,888	$434,603	$852,491
Pole Changes - Replacement (606)				
1. Poles Changed	548	275	275	550
2. Cost per Pole Change	$4,457	$4,635	$4,821	
3. Cost of Pole Changes	$2,442,361	$1,274,663	$1,325,649	$2,600,312
Miscellaneous - Replacement (607)				
1. Total cost of Misc. Replacements	$1,030,277*	$650,000	$650,000	$1,300,000
Conductor Replacement OH (608)				
1. Miles of small conductor to be replaced		30	30	60
2. Cost per mile	$20,000	$20,800	$21,632	
3. Total cost of small conductor replacement	$3,313,583	$624,000	$648,960	$1,272,960
Conductor Replacement UG (608)				
1. Miles of small conductor to be replaced		4	4	8
2. Cost per mile	$150,000**	$239,550	$249,132	
3. Total cost of small conductor replacement		$958,200	$958,200	$1,916,400
Line Relocates (610) - Road				
1. Cost of line relocates		$0	$0	$0
Outdoor Lighting (701)				
1. New Outdoor Lights Added	255	128	128	256
2. Cost per Outdoor Light	$1,314	$1,366	$1,421	
3. Cost of Outdoor Lights	$334,997	$174,882	$181,877	$356,758
SCADA (704)				
1. SCADA Hardware & Communications		$590,125	$155,625	$745,750
AMI Equipment (705)				
1. Related Software and Hardware		$100,000	$100,000	$200,000
GIS (1500)				
1. Hardware/Software		$0	$174,000	$174,000
2. Field Inventory		$0	$1,000,000	$1,000,000

* From January 2010-July 2011
** Reflects single phase only replacement. Projected costs include anticipated single phase and three phase replacement. Therefore the per unit costs are higher.

NEW MEMBER EXTENSIONS – RUS CODE 100

A total of 1,763 new services are anticipated – 1,270 of which are underground, 448 are overhead construction, and 45 new services for large powers. The total projected cost for new service construction is $4,862,246.
The average length of service per overhead customer is 289 feet, and 134 feet for underground. The total projected length for the work plan period is approximately 57 miles excluding large power extensions.
Cost history and projections are shown in Table III-B-1.

SYSTEM IMPROVEMENTS – RUS CODE 300

LINE CONVERSION NARRATIVES

Banklick Substation

Code 327 Carryover
Estimated Cost: $139,194
Year: 2013

Description of Proposed Construction
Sections 45098 to 45414 – Convert 0.8 mile of single-phase #2 ACSR to three-phase 336 ACSR. These line sections begin at the intersection of Moffett and Rector Roads LOC#71-379-05-8142 and run along Moffett Road ending at LOC#71-380-12-8525. Although these converted line sections will be fed by 1/0 ACSR initially this line may become a mainline feeder for a new possible substation on Hwy177 between Kenton and Morning View. Before the design work begins a status update on this new substation should be reviewed as to the likelihood of that substation location. Otherwise 1/0 ACSR would be sufficient.

Reason For Proposed Construction
Design Criteria (DC) Item 7 is being violated.

Results of Proposed Construction
DC Item 7 will be met.

Alternative Corrective Plan Investigated
All possible backfeeds are either already heavily loaded, or have takeoffs far from the source whereby voltage could not be sustained.

SYSTEM IMPROVEMENTS – RUS CODE 300

Big Bone Substation

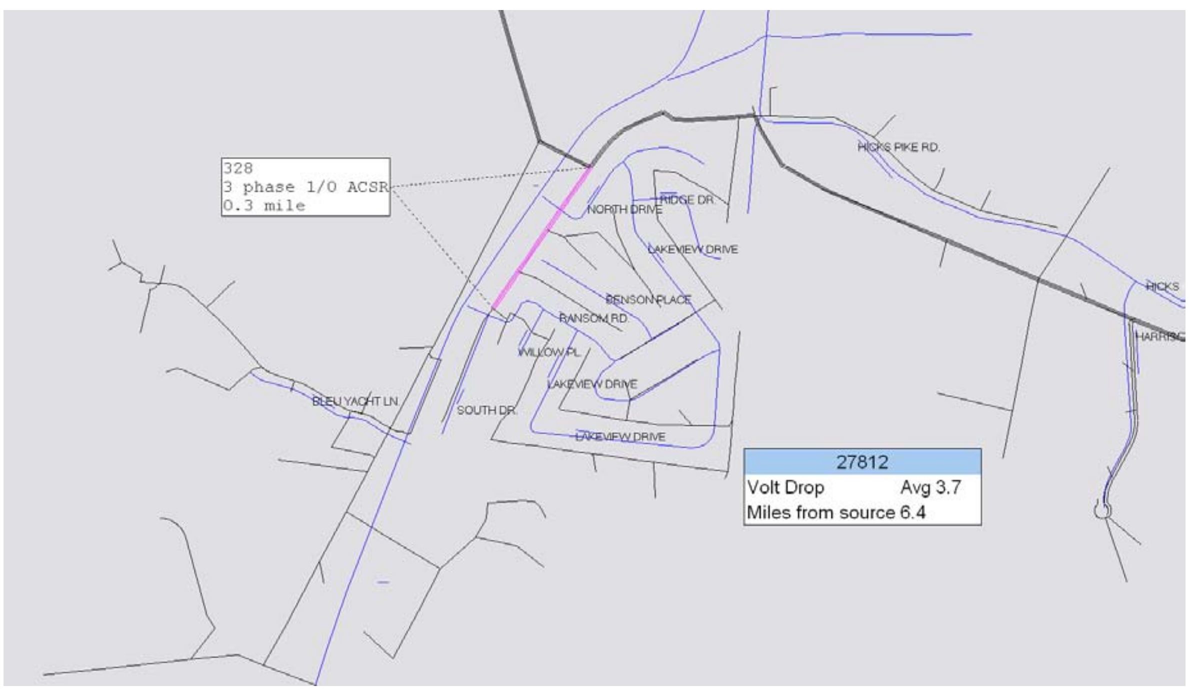
Code 328
Estimated Cost: $40,680
Year: 2012

Description of Proposed Construction
Sections 27348 to 27079 – Convert 0.3 mile of single-phase 6A CWC to three-phase 1/0 ACSR. These line sections begin LOC#61-407-16-3841 and end at LOC#61-407-15-9254 along RT42/127. This tap should have field verification of winter peak loading before initiating the design work.

Reason For Proposed Construction
Design Criteria (DC) Item 7 is being violated.

Results of Proposed Construction
DC Item 7 will be met.

Alternative Corrective Plan Investigated
This is a radial tap. Possible tie to nearby tap was investigated, but consists of small, older wire. Any backfeed would require large scale re-conductoring. Therefore the conversion was decided to be most cost-effective.



SYSTEM IMPROVEMENTS – RUS CODE 300

Carson Substation

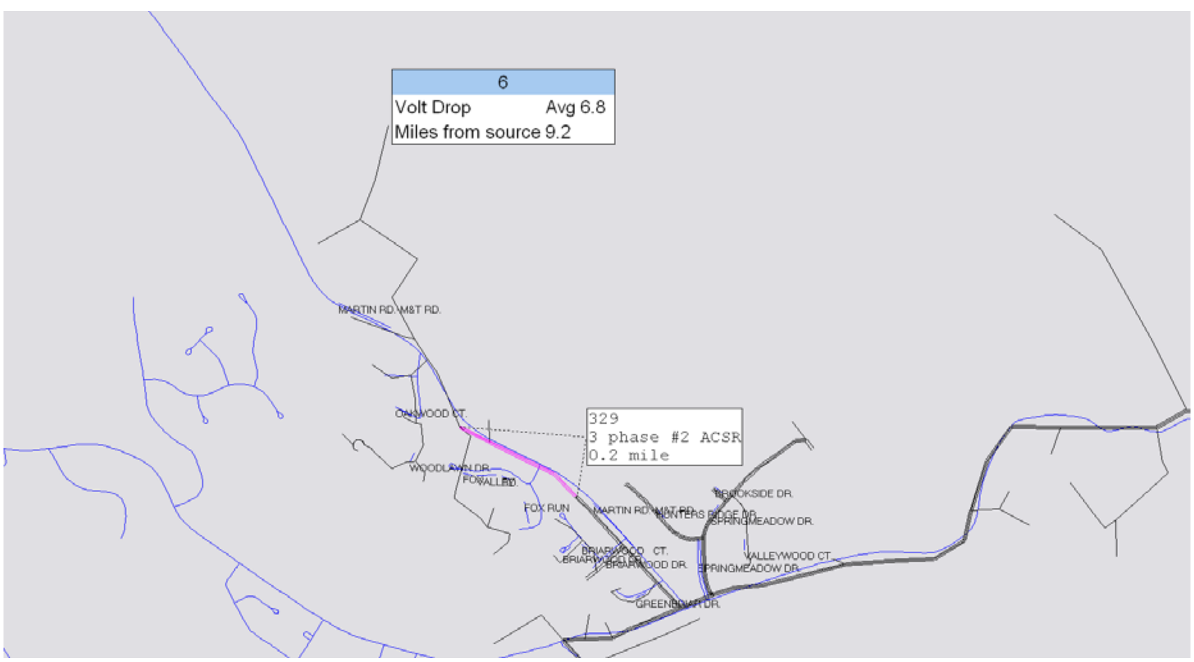
Code 329
Estimated Cost: $20,000
Year: 2012

Description of Proposed Construction
Sections 51 to 29 – Convert 0.2 mile of single-phase #2 ACSR to three-phase #2 ACSR. These line sections begin at LOC#91-207-06-6439 and run along Martin Road ending at LOC#91-207-06-0882. Change tap beginning at line section 24 (LOC#91-207-06-0882) from A-phase to C-phase if possible.

Reason For Proposed Construction
Design Criteria (DC) Item 1 is being violated.

Results of Proposed Construction
DC Item 1 will be met.

Alternative Corrective Plan Investigated
This is a radial line so no backfeed exists to relieve loading. A set of voltage regulators were considered to boost voltage; however this single phase line section was approaching overload and contributing to phase imbalance that was causing the undervoltage condition. Therefore the conversion alleviates imbalance and a potential future overload.



SYSTEM IMPROVEMENTS – RUS CODE 300

Hebron Substation

Code 330 Partial Carryover

Estimated Cost: $184,030
Year: 2012

Description of Proposed Construction

Sections 19954 to 19420 – Convert 1.1 mile of three-phase 1/0 ACSR to three-phase 336 ACSR. The converted line sections start at LOC#62-499-14-1057, run north on Williams Road to LOC#62-499-01-3600; and will feed into the back of the Thornwilde subdivision.

Reason For Proposed Construction

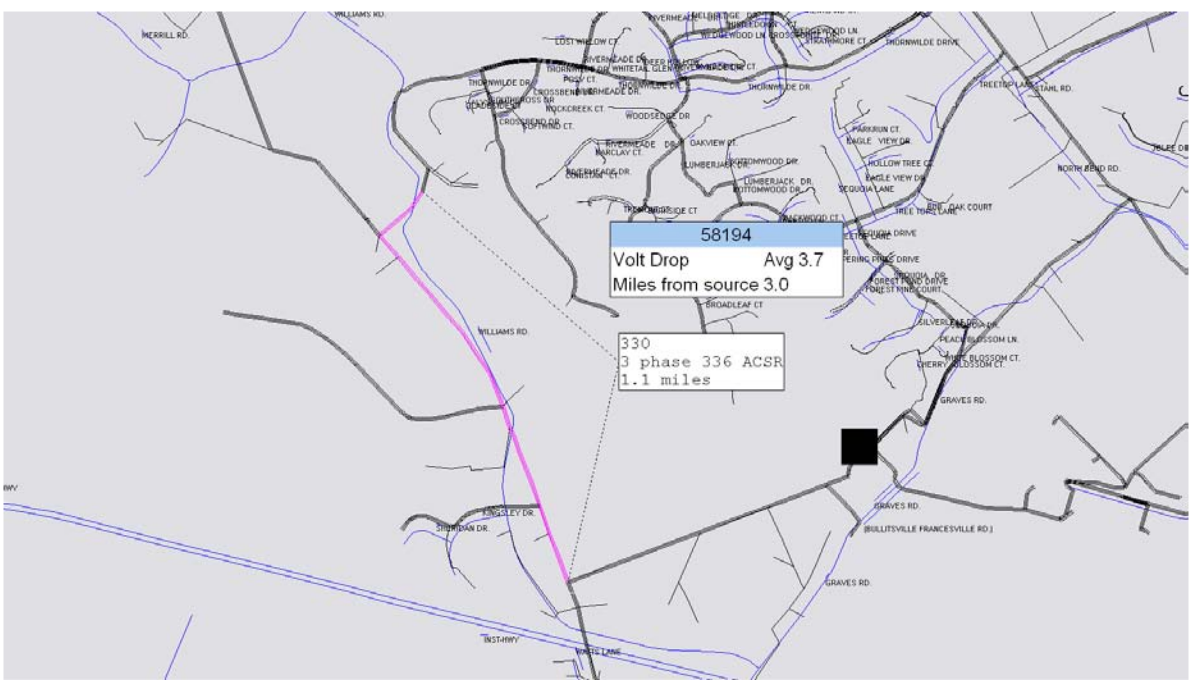
Design Criteria (DC) Item 2 is being violated.

Results of Proposed Construction

DC Item 2 will be met.

Alternative Corrective Plan Investigated

The 336 ACSR of feeder 3 out of Hebron is approaching overload; this proposed conversion will offload feeder 3 onto feeder 4. The other possible feed to the area, feeder 5, consists of 1/0URD which would not be able to handle the growing load of the Thornwilde area. The feeder 5 alternative would consist of an extensive upgrade of the existing feeders which would be costly.



SYSTEM IMPROVEMENTS – RUS CODE 300

Keith Substation

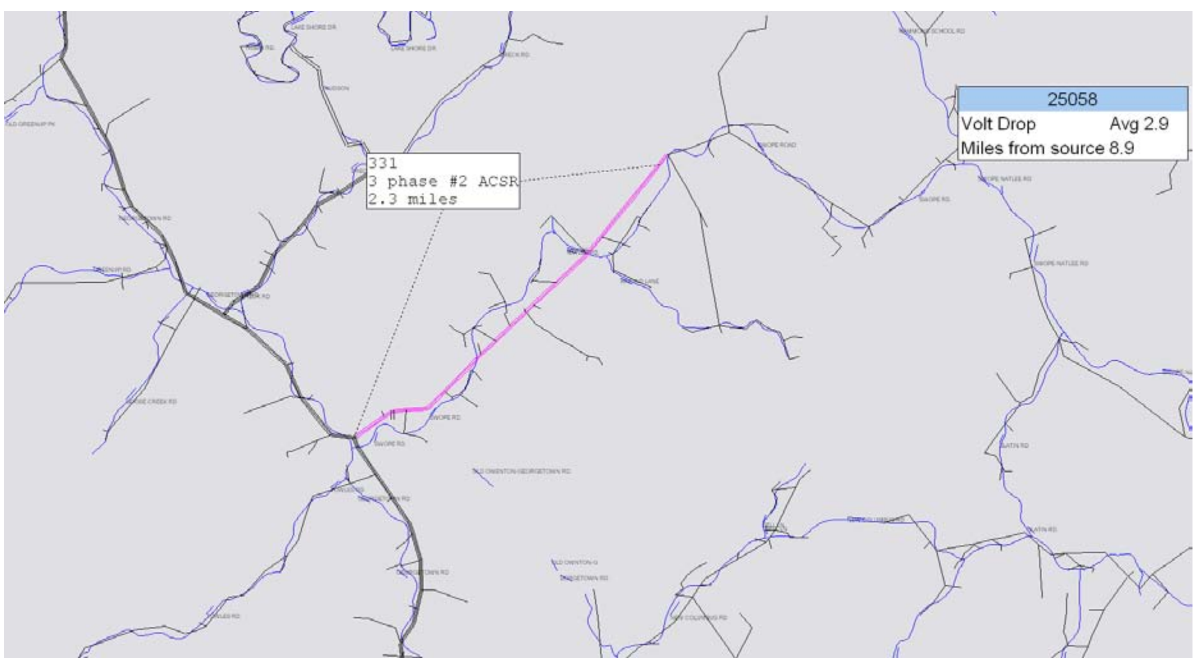
Code 331 Carryover
Estimated Cost: $230,000
Year: 2012

Description of Proposed Construction
Sections 17337 to 21023 – Convert 2.3 miles of single-phase and two-phase #2 ACSR to three-phase #2 ACSR. These line sections begin at LOC#11-066-17-1271 and end at LOC#12-078-15-5290 serving Swope Road.

Reason For Proposed Construction
Design Criteria (DC) Item 7 is being violated.

Results of Proposed Construction
DC Item 7 will be met.

Alternative Corrective Plan Investigated
This is a radial tap. Any possible backfeeds are aged conductor or too far from the substation to sustain the voltage if a tie line were considered.



SYSTEM IMPROVEMENTS – RUS CODE 300

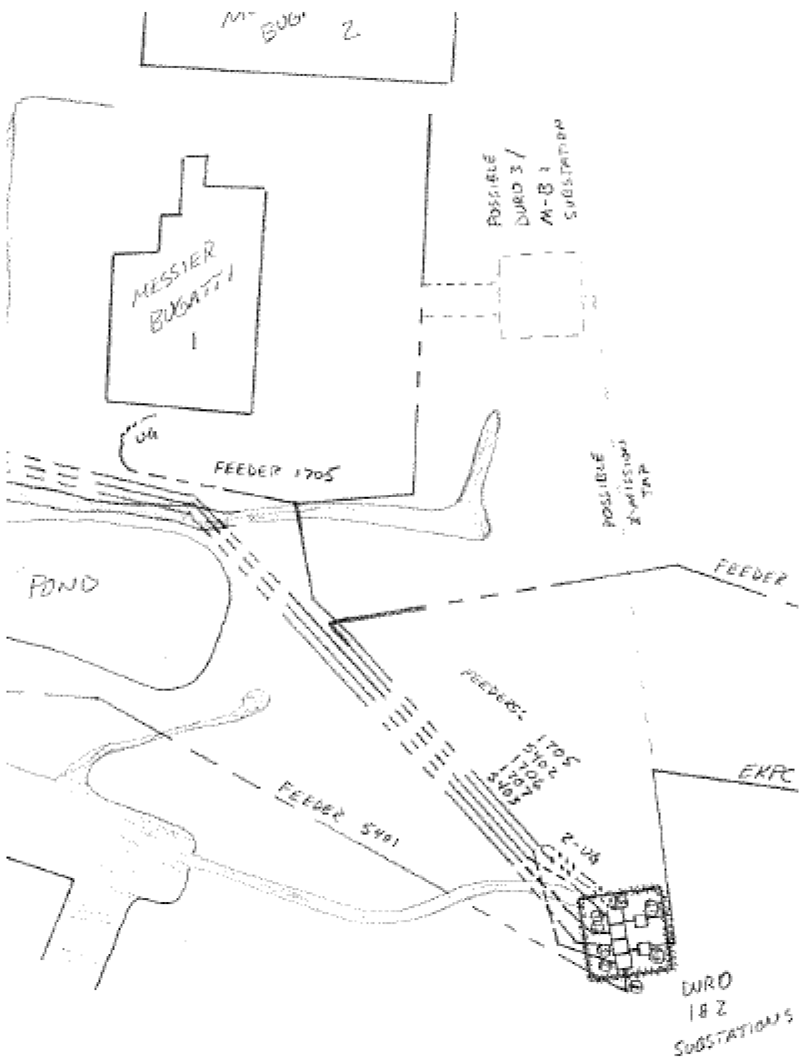
MBUSA Substation

Code 332
Estimated Cost: $200,000
Year: 2012

Description of Proposed Construction
Substation getaways

Reason For Proposed Construction
Getaways needed for new substation.

Alternative Corrective Plan Investigated
Large power expansion will overload existing substation and feeder conductors. No alternative exists.



SYSTEM IMPROVEMENTS – RUS CODE 300

Munk Substation

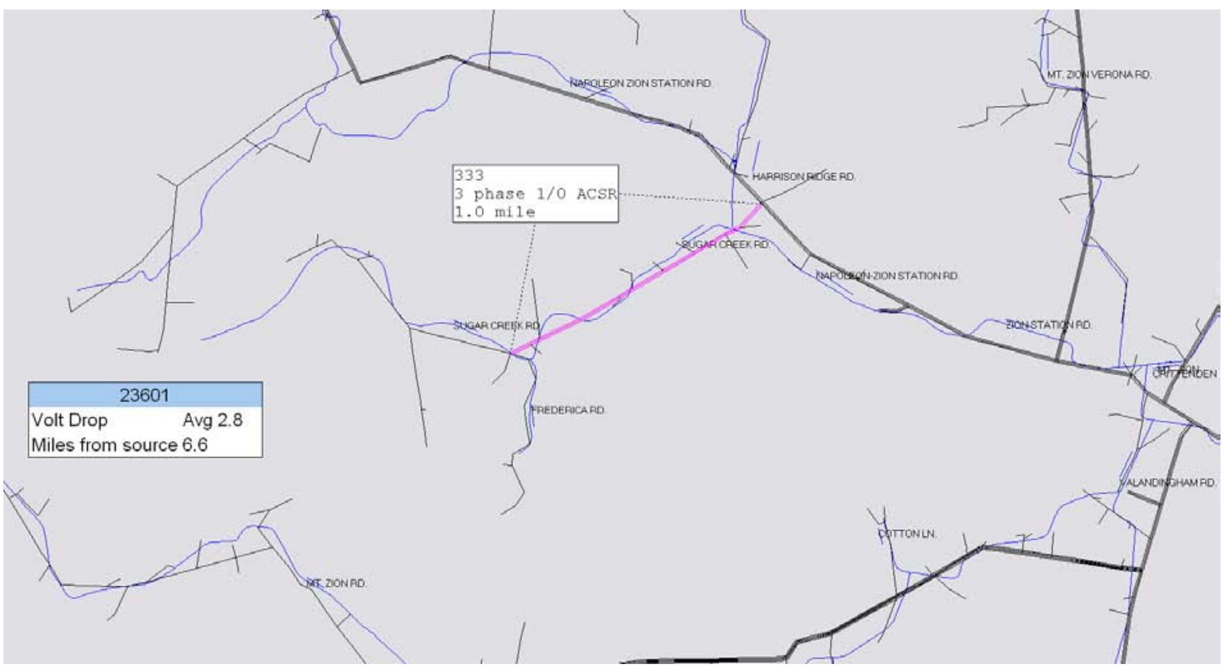
Code 333
Estimated Cost: $141,024
Year: 2013

Description of Proposed Construction
Sections 27260 to 25585 – Convert 1.0 mile of single-phase #2 ACSR to three-phase 1/0 ACSR. The converted line sections are on Sugar Creek Rd starting at LOC#22-277-04-3451 to LOC#22-277-08-2124.

Reason For Proposed Construction
Design Criteria (DC) Item 7 is being violated.

Results of Proposed Construction
DC Item 7 will be met.

Alternative Corrective Plan Investigated
This is a radial tap. No alternatives exist.



SYSTEM IMPROVEMENTS – RUS CODE 300

Penn Substation

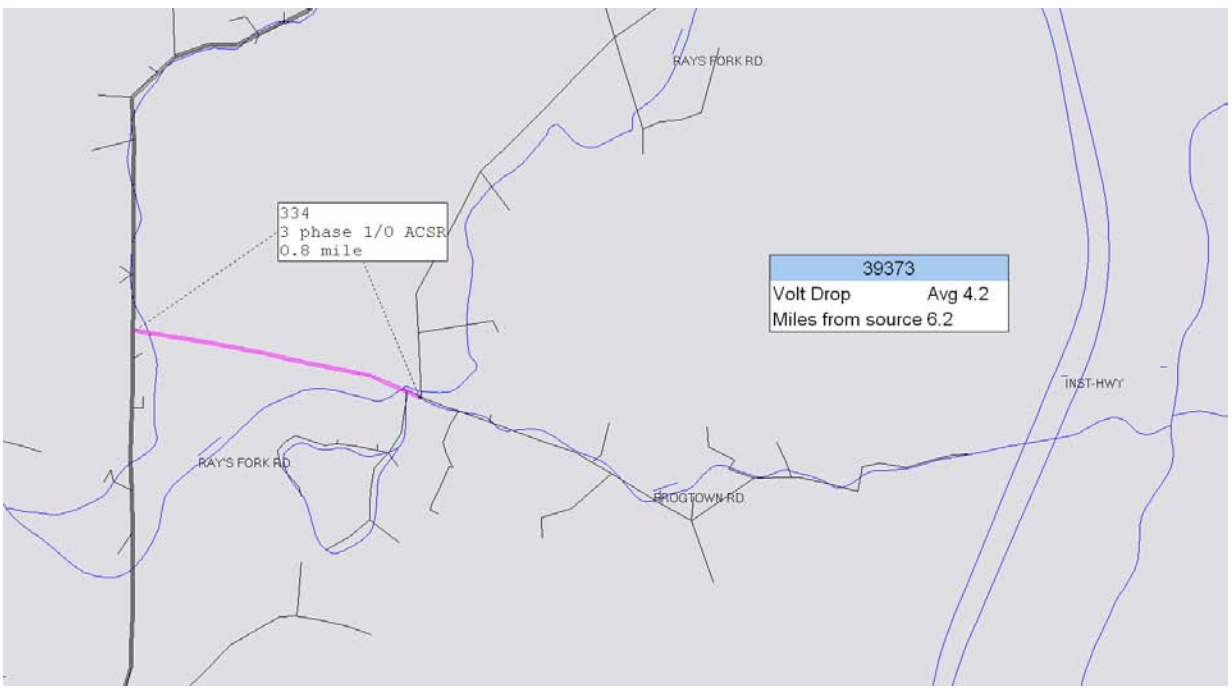
Code 334
Estimated Cost: $112,819
Year: 2013

Description of Proposed Construction
Sections 34875 to 67711 – Convert 0.8 mile of single-phase #2 ACSR to three-phase 1/0 ACSR. The converted line sections are in Right-of-Way behind Ray's Fork Rd starting at LOC#51-060-07-4623 and ending at LOC#51-060-09-4135. Check winter loading for field verification of load.

Reason For Proposed Construction
Design Criteria (DC) Item 7 is being violated.

Results of Proposed Construction
DC Item 7 will be met.

Alternative Corrective Plan Investigated
This is a radial tap. No alternatives exist.



SYSTEM IMPROVEMENTS – RUS CODE 300

Williamstown Substation

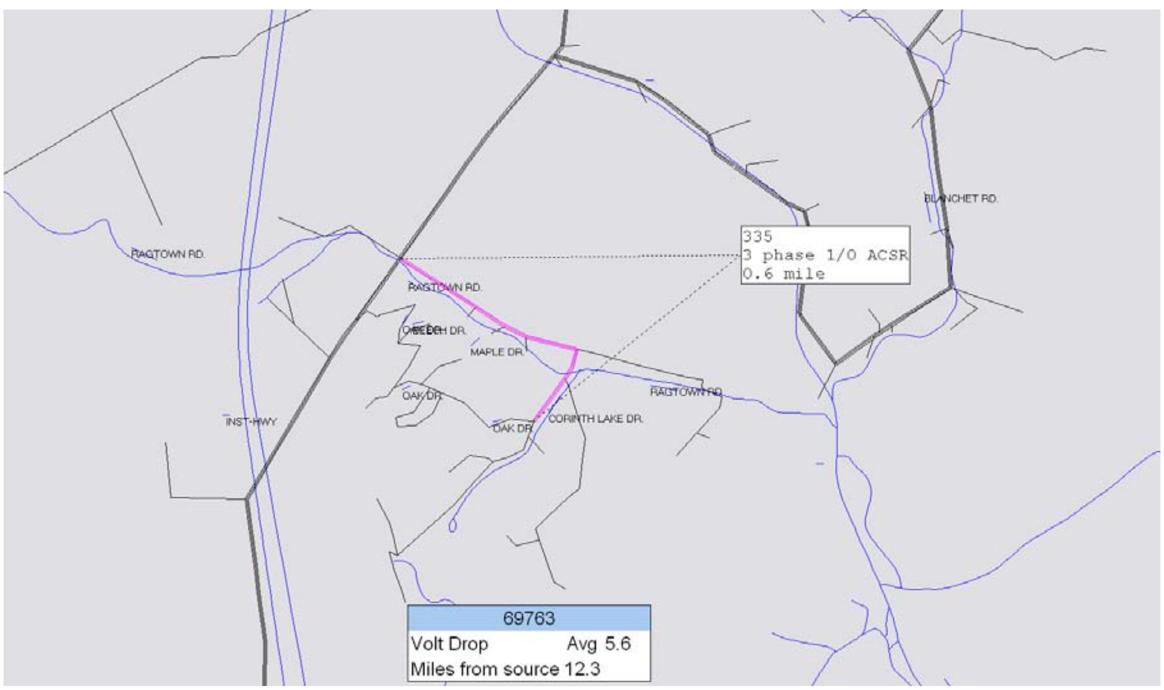
Code 335 Carryover
Estimated Cost: $81,360
Year: 2012

Description of Proposed Construction
Sections 67678 to 39269 – Convert 0.6 mile of single-phase #2 ACSR to three-phase 1/0 ACSR. These line sections begin at LOC#21-093-00-2690 on Ragtown Road and ends at LOC#21-093-07-0657 on Corinth Lake Drive.

Reason For Proposed Construction
Design Criteria (DC) Items 1 & 7 are being violated.

Results of Proposed Construction
DC Items 1 & 7 will be met.

Alternative Corrective Plan Investigated
There is a single phase backfeed for this line. Due to the nature and placement of the loading around Corinth Lake, the overload would be shifted to the backfed line and would not eliminate the design criteria violation. The only other alternative would be to build a new tie line over or around the lake which would be cost prohibitive.



SYSTEM IMPROVEMENTS – RUS CODE 300

Williamstown Substation

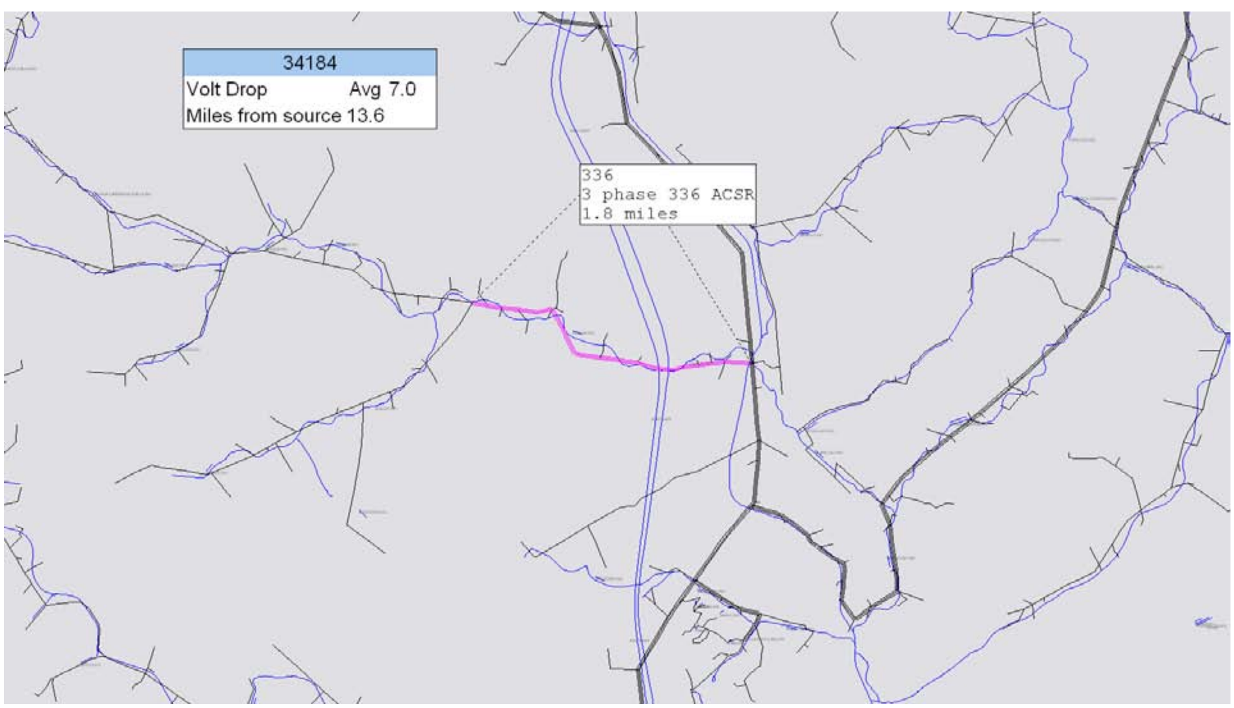
Code 336 Carryover
Estimated Cost: $313,186
Year: 2013

Description of Proposed Construction
Sections 38823 to 36268 – Convert 1.8 miles of single-phase 1/0 ACSR to three-phase 336 ACSR. Remove Voltage Regulator at LOC#21-105-04-4099. These line sections begin at RT 25 and Keefer Road (LOC#21-106-07-1986) and follow Keefer Road west to the split at Shiloh Road ending at LOC#21-105-02-8950. This line will serve as an eventual mainline tie between Keith and the future Blanchet substations. Backfeed 69753 from 29837 at LOC#21-118-01-4087 and open at 33122 (LOC#21-118-23-4649).

Reason For Proposed Construction
Design Criteria (DC) Item 7 is being violated.

Results of Proposed Construction
DC Item 7 will be met.

Alternative Corrective Plan Investigated
The only possible backfeed is already heavily loaded. Therefore no viable alternative exists.



MISCELLANEOUS DISTRIBUTION EQUIPMENT – RUS CODE 600's

Transformers – RUS Code 601

164 new underground transformers are projected at a cost of $339,678.

This includes:

- 114 units will be projected for new underground services.
- 50 units in this total are allocated for underground replacement projects.

1,057 new overhead transformers are projected at a cost of $1,090,967.

This includes:

- Approximately 450 will be used for new overhead services.
- The remaining 600 will be used for replacement of failed transformer. Over the past three years an average of 300 transformers per year have been brought in due to failure, or excessive age.

17 new 3-phase underground transformers are projected at a cost of $313,493.

Meters – RUS Code 601

150 new single-phase AMI meters are projected at a cost of $38,250 at a per unit cost of $250 per meter.

The 150 meters includes:

- 110 allocated to the Smart Home project. These meters have added capabilities from the standard AMI residential meters. The 110 meters include 100 meters for initial project installation and 10 meters held in inventory for replacement.
- 40 meters for new installation and replacement (failure/damage rate estimated at 1%) of specialty form meters (1S,3S, and 4S forms). The short supply in inventory and long lead times necessitate having additional meters on hand.
- 0 additional standard residential AMI meters. The existing inventory of standard AMI meters will be adequate to cover new installations, failed meter changeout and PSC meter testing changeout of our standard AMI meters.

112 three-phase AMI capable meters are projected at a cost of $34,720. This will complete the changeout to all AMI meters on three-phase accounts. Note: the retrofit kits are in stock for these installations. This cost covers only the meters.

90 new Polyphase AMI meters are projected at a cost of $36,495.

This includes:

- 45 new anticipated Large Power consumers (Code 102)
- 25 additional consumers that require a polyphase meter, but do not fall under Code 102. This number is based on the percent of polyphase meters without PT/CT to the total number of polyphase meters in the field (which is 50%) times the projected Large Power Consumers in the CWP. 50% of 45 = 22.5
- 20 units over the course of two years for meters in the field that will experience damage or failure (reflects a 1% failure rate of the approx. 1000 polyphase meters on the system by end of CWP).

An amount of $28,642 is projected for 120 meter disconnect collars for the CWP.

An amount of $140,918 is projected for instrument transformers for new poly-phase meters that do not have internal PT/CT's meters (i.e. self-contained). The cost of the instrument transformers is not included in the per unit cost of the meters.

Historical data was gathered for meters and transformers and is included in Table III-B-1.

Service Upgrades – RUS Code 602

There are 230 service upgrades projected at a total cost of $852,491. Historical data is included in Table III-B-1.

Sectionalizing – RUS Code 603

Overcurrent analysis is performed on an ongoing basis. Device changeouts, additional substation feeders, conductor multiphasing and load shifts require overcurrent device purchases.

Reclosers, fuses and switches are included in this category. A base cost of $500,000 for each of the two years has been allocated. Also two smart reclosers have been allocated for the Narrows Rd self-heal project at a base cost of $88,640. With a DOE contribution of 50% the OEC expense will be $44,320 in 2012. The total projected cost for sectionalizing is $1,044,320.

- Continued on next page

MISCELLANEOUS DISTRIBUTION EQUIPMENT – RUS CODE 600's - continued

Voltage Regulators – RUS Code 604

The total cost for voltage regulators projected for the CWP is $593,900.
This includes:

- Four voltage regulators are proposed for voltage design criteria violations. The total cost for these new voltage regulators is projected to be $205,200.
- Nine autoboosters will be replaced by three 3-150A voltage regulators due to aged deterioration. The total cost for replacement of autoboosters is $136,800.
- One autoboosters will be replaced with a 100A voltage regulator due to aged deterioration. The total cost for replacement of this autobooster is $27,500.
- Seventeen voltage regulators for the Volt Var Optimization program. The total cost for the VVO required regulators is projected to be $224,400.

Voltage Regulators for Design Criteria violations

CFR CODE	SUBSTATION	SECT/RATING	YEAR	COST
604-1	BULLITTSVILLE	LOC#62-481-07-3129 3-150A	2012	$45,600
604-2	KEITH	LOC#11-054-13-3739 3-150A	2013	$47,500
604-3	KEITH	LOC#12-086-19-6871 1-100A	2013	$27,500
604-4	GRIFFIN	LOC feeder 3 TBD 3-150A	2013	$47,500
604-5	NOEL	Feeder 2104 3-219A	2012	$64,600
604-6	PENN	LOC#51-013-03-9834 3-150A	2012	$45,600
604-7	WMTOWN	LOC#31-222-01-1530 3-150A	2012	$45,600
604-8	WMTOWN	LOC#21-221-07-7799 3-150A	2012	$45,600

- 604-1: Replace three-100A autoboosters with 3-150A voltage regulators on what will be the North feeder out of Belleview that feeds the aggregates. These may not be needed once Belleview substation is energized. Evaluate before changeout.
- 604-2: Add three 150A voltage regulators on the Keith 1304 circuit near LOC#11-054-13-3739 before the three-phase split tie to Bromley 603.
- 604-3: Add one 100A voltage regulator at LOC#12-086-19-6871 to replace an autobooster on Keith 1301 .
- 604-4: Add three 150A voltage regulators on Griffin 903. The optimum location is to be determined.

MISCELLANEOUS DISTRIBUTION EQUIPMENT – RUS CODE 600's – continued

- 604-5: Add three 219A voltage regulators on Noel 2104 circuit near LOC#22-237-04-1784. This set of regulators is needed for a backfeed possibility for the Dry Ridge exit off of Williamstown. NOTE: Further analysis will need to be done to determine optimal location.
- 604-6: Add three 150A bi-directional voltage regulators on Penn 0704 near LOC#51-013-03-9834. The location and size of the voltage regulators proposed for Penn 704 feeder may be modified based on future plans for Penn Self-Healing of feeder 701 from feeder 704.
- 604-7: Replace three-100A autoboosters with 3-150A voltage regulators on Williamstown 0505 at LOC#31-222-01-1530.
- 604-8: Replace three-100A autoboosters with 3-150A voltage regulators on Williamstown 0506 at LOC#21-221-07-7799.

Volt Var Optimization (VVO)
There are 17 voltage regulators anticipated for the VVO project in the CWP. See Smart Grid Initiatives, Appendix C, for a full description of the VVO project.

	2012	**2013**
17 total voltage regulators projected	$224,400	$224,400
Less 50% DOE contribution	($112,200)	($112,200)
Total OEC expense	$112,200	$112,200

Capacitor Banks – RUS Code 605

The total cost for capacitors projected for the CWP is $270,000.
This includes:

- Twenty switched capacitor banks are projected for ordinary capacitor addition, upgrade and replacement as needed An effort to reduce system losses by reducing VARs will be made over the next two years. The total cost for these capacitors is projected to be $200,000.
- Fourteen switched capacitors for the Volt Var Optimization program. The total cost for the VVO required capacitors is projected to be $70,000.

Volt Var Optimization
There are 14 switched capacitors anticipated for the VVO project in the CWP. See Smart Grid Initiatives, Appendix C, for a full description of the VVO project.

	2012	**2013**
14 total capacitors projected	$70,000	$70,000
Less 50% DOE contribution	($35,000)	($35,000)
Total OEC expense	$35,000	$35,000

<u>MISCELLANEOUS DISTRIBUTION EQUIPMENT – RUS CODE 600's</u> – continued

Pole Changes – RUS Code 606 Including Clearance Poles

There are 550 projected pole changes in the CWP. This includes all maintenance and clearance poles. The cost for the pole changes is projected to be $2,600,312. Historical cost data for pole changes may be found in Table III-B-1.

Miscellaneous Replacements – RUS Code 607

An amount of $1,300,000 is projected in the CWP for miscellaneous replacements.

The 607 category consists of two parts. The first part is for routine maintenance requiring replacement of cross arms, insulators, guys, etc. The second part of this category is based on a recent system hardening initiative at OEC that will serve to improve the overall reliability of the OEC system. This initiative includes inspecting and replacing, if needed, hardware and cross arms by pole beginning at the start of each feeder. Initially the first several spans of each feeder will be investigated gradually working out each pole line. Historical cost data for all miscellaneous replacements may be found in Table III-B-1.

Conductor Replacements – RUS Code 608

The total cost for aged conductor replacement projected for the CWP is $3,189,360. This includes replacement of conductor due to age, deterioration, and operation and maintenance recommendations.
This includes:

- $1,272,960 for ordinary overhead conductor replacement. This amount will cover a proposed 60 miles of overhead conductor replacement in the CWP.
- $1,916,400 for ordinary underground replacements is projected. This amount will cover approximately 8 miles total of underground conductor replacement in the CWP. This amount is higher than previous work plans. One of the main areas of emphasis in the 2012 CWP will be underground replacement.

Conductor replacement cost history and projections are shown in Table III-B-1.

Line Relocates – RUS Code 610

Two state highway projects will potentially occur during the CWP period. Both will be partially reimbursed by the state. The remaining contribution by OEC will be relatively small. Therefore these projects will be handled as small projects if they should occur.

RUS CODE 700

Outdoor Lighting – RUS Code 701
A total of 256 new outdoor lights are anticipated. The projected cost is $356,759.

Outdoor lighting cost history and projections are shown in Table III-B-1.

SCADA / DA - Hardware and Communication Equipment – RUS Code 704
The total projected cost for SCADA and communications in this CWP is $745,750.

$720,000 is allocated for the remaining 18 substations to have SCADA equipment upgrades.

$2500 is allocated for Fiber and field commissioning for self healing. ($5000 less 50% DOE contribution.)

$23,250 for extraneous VVO communication equipment not included in the device. ($46,500 less 50% DOE contribution.)

SCADA hardware and software cost projections are shown in Table III-B-1.

AMI Equipment – RUS Code 705
An amount of $200,000 is projected for this CWP for AMR equipment. This accounts for 20 new repeaters added for the two years at a cost of $100,000; and 20 replacement repeaters for the two years at a cost of $100,000.

AMR equipment cost projections are shown in Table III-B-1.

RUS CODE 1500

GIS Hardware/Software – RUS Code 1500

An amount of $174,000 is projected for GIS related hardware and software. This includes five GPS units each costing $13,000. An amount of $70,000 is projected for imagery, and an amount of $39,000 projected for any digital data that OEC will need to acquire.

Field Inventory – RUS Code 1500

Projected costs for conducting a field inventory in the second year of the CWP is $1,000,000. 75% of this amount can be financed. It is anticipated that half of the OEC field inventory will be covered in this CWP. The field inventory will be concluded in the following CWP.

A pilot field inventory on two substations was begun in 2011 as phase 1 of the Volt Var Optimization project. (See Appendix C: Smart Grid Initiatives) This pilot has been partially funded by the DOE.

APPENDIX A
Operation and Maintenance Survey

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL UTILITIES SERVICE

REVIEW RATING SUMMARY

BORROWER DESIGNATION: KY 37

DATE PREPARED: July 7, 2009

Ratings on form are:
- NA: Not Applicable
- 0: Unsatisfactory – No Records
- 1: Corrective Action Needed
- 2: Acceptable, but Should be Improved – See Attached Recommendations
- 3: Satisfactory – No Additional Action Required at this Time

PART I. TRANSMISSION and DISTRIBUTION FACILITIES

1. Substations (Transmission and Distribution) *(Rating)*

	Rating
a. Safety, Clearance, Code Compliance	NA
b. Physical Conditions: Structure, Major Equipment, Appearance	NA
c. Inspection Records - Each Substation	NA
d. Oil Spill Prevention	NA

2. Transmission Lines

	Rating
a. Right-of-Way: Clearing, Erosion, Appearance, Intrusions	NA
b. Physical Condition: Structure, Conductor, Guying	NA
c. Inspection Program and Records	NA

3. Distribution Lines - Overhead

	Rating
a. Inspection Program and Records	3
b. Compliance with Safety Codes: Clearances	3
Foreign Structures	2
Attachments	2
c. Observed Physical Condition from Field Checking: Right-of-Way	3
Other	NA

4. Distribution - Underground Cable *(Rating)*

	Rating
a. Grounding and Corrosion Control	3
b. Surface Grading, Appearance	3
c. Riser Pole: Hazards, Guying, Condition	3

5. Distribution Line Equipment: Conditions and Records

	Rating
a. Voltage Regulators	3
b. Sectionalizing Equipment	3
c. Distribution Transformers	3
d. Pad Mounted Equipment: Safety: Locking, Dead Front, Barriers	3
Appearance: Settlement, Condition	3
Other	NA
e. Kilowatt-hour and Demand Meter Reading and Testing	3

PART II. OPERATIONS and MAINTENANCE

6. Line Maintenance and Work Order Procedures *(Rating)*

	Rating
a. Work Planning & Scheduling	3
b. Work Backlogs: Right-of-Way Maintenance	3
Poles	3
Retirement of Idle Services	3
Other	NA

7. Service Interruptions

a. Average Annual Minutes/Consumer (Complete for each of the previous 5 years)

PREVIOUS 5 YEARS *(Year)*	POWER SUPPLIER a.	MAJOR STORM b.	PLANNED c.	ALL OTHER d.	TOTAL e.	*(Rating)*
2004	0.33	0.44	0.02	2.61	3.40	3
2005	0.14	0.18	0.06	1.91	2.29	3
2006	0.13	0.62	0.08	1.73	2.56	3
2007	0.46	1.26	0.14	1.77	3.63	3
2008	66.60	720.60	3.00	97.20	887.40	2

b. Emergency Restoration Plan: 3

8. Power Quality *(Rating)*

	Rating
a. General Freedom from Complaints	3

9. Loading and Load Balance

	Rating
a. Distribution Transformer Loading	3
b. Load Control Apparatus	NA
c. Substation and Feeder Loading	3

10. Maps and Plant Records

	Rating
a. Operating Maps: Accurate and Up-to-Date	3
b. Circuit Diagrams	3
c. Staking Sheets	3

PART III. ENGINEERING

11. System Load Conditions and Losses *(Rating)*

		Rating
a. Annual System Losses	2.31%	3
b. Annual Load Factor	57.4%	3
c. Power Factor at Monthly Peak	95+%	3
d. Ratios of Individual Substation Annual Peak kW to kVA		3

12. Voltage Conditions

	Rating
a. Voltage Surveys	3
b. Substation Transformer Output Voltage Spread	3

13. Load Studies and Planning *(Rating)*

	Rating
a. Long Range Engineering Plan	3
b. Construction Work Plan	3
c. Sectionalizing Study	3
d. Load Data for Engineering Studies	3
e. Load Forecasting Data	3

PART IV. OPERATION AND MAINTENANCE BUDGETS

YEAR	For Previous 2 Years		For Present Year	For Future 3 Years		
	2007	2008	2009	2010	2011	2012
	Actual $ Thousands	Actual $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands
Normal Operation	3,938	4,406	4,409	4,541	4,678	4,818
Normal Maintenance	3,214	3,700	3,829	3,944	4,062	4,184
Additional (Deferred) Maintenance						
Total	7,152	8,106	8,238	8,485	8,740	9,002

14. Budgeting: Adequacy of Budgets for Needed Work 3 *(Rating)*

15. Date Discussed with Board of Directors 7/30/2009 *(Date)*

EXPLANATORY NOTES

ITEM NO.	COMMENTS
3b.	Telephone poles left standing next to electric poles should be removed promptly following line changes. Telephone and cable TV attachments require frequent follow-up to ensure contract compliance

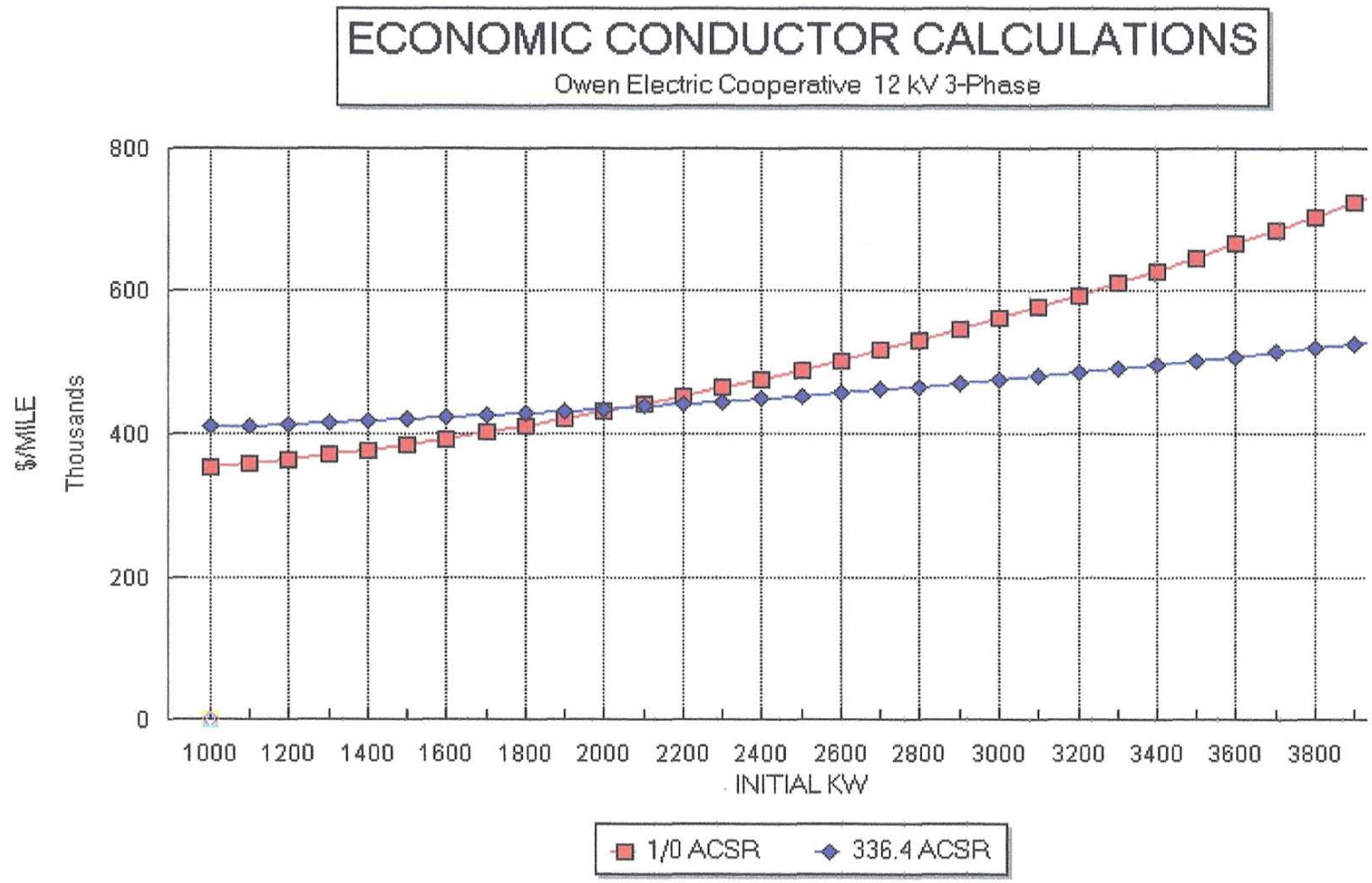
		TITLE	DATE
RATED BY:	[signature]	VP SYSTEM PLANNING & RELIABILITY	07/07/09
REVIEWED BY:	[signature]	PRESIDENT AND CEO	07/07/09
REVIEWED BY:	Mike [signature]	RUS GFR	07/07/09

APPENDIX B
Economic Conductor Analysis

Owen Electric Cooperative
12 kV 3-Phase
ECONOMIC CONDUCTOR ANALYSIS

O&M	TAX	INS	INT	$/KW	$/KWH	KW
4.26%	0.50%	0.50%	5.00%	7.99	0.060	1000
RMO	RAT	KWI	KWHI	LGR	INF	m
12	0.0%	3.50%	3.50%	2.00%	4.00%	30
LF	PF	CF	N	KV	P	
48.0%	96.0%	95.0%	0.64	7.2	3	

CONDUCTOR	1/0 ACSR	336.4 ACSR
COST/MI	$138,000	$170,000
OHMS/MI	0.885	0.278
TCOST/MI	$709,553	$828,560
PWCOST/MI	$352,389	$410,101


ECONOMIC CONDUCTOR CALCULATIONS
Owen Electric Cooperative 12 kV 3-Phase
$/MILE
Thousands
800
600
400
200
0
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
INITIAL KW
1/0 ACSR
336.4 ACSR

APPENDIX C
Smart Grid Initiatives

Owen Electric Cooperative (KY-37) Smart Grid Initiatives

Project	Total
AMI	$479,025
SCADA	$745,750
Volt Var Optimization	$635,300
Self-Healing	$93,640
Total:	$1,953,715

OEC has several Smart Grid Initiatives in the CWP. A brief description of each follows.

AMI System:

OEC presently has a fully-deployed AMI system of residential meters. Approximately 88% of the poly-phase meters have been converted to AMI. The remaining poly-phase meters will be changed out during the course of the CWP. The data collected from the AMI meters will be used for engineering studies such as line loss analysis and planning studies. Similarly the AMI meters can be configured to be used as point-of-interest meters useful for voltage validation at key points in the system. Another benefit of the AMI system is that it allows for outage verification and logging of "blinks". Other than the change out of the remaining poly-phase meters, the components covered in the CWP for AMI are for the maintenance and communication enhancements of the AMI system.

SCADA Upgrades:

OEC was one of the first electric cooperatives in the state to have a SCADA system. It was installed in the 1980's, and has been maintained throughout the years. The SCADA system is vital in the daily operation of the OEC system. Presently OEC is in the process of upgrading to fiber communications to all of its substations. During the CWP, the remaining eighteen substations will have fiber communication equipment installed, and upgrades to the RTU's and regulator controls. The substations will also have weather station equipment installed to transmit weather data such as temperature and wind speed.

Volt Var Optimization:

OEC is launching a Volt Var Optimization project in conjunction with the Department of Energy. There are four phases to the project. Only Phase 2 has components that fall under equipment costs in the CWP.

Phase 1 of the project is a "pilot" field inventory project where two of OEC's substation territories will be mapped by GPS. A full system inventory of the included feeders will be made during the pilot. This inventory will allow for field verification and recording of ratings and settings of all devices such as transformers, reclosers, etc. Another component of phase 1 will be to install field monitors to log data at key locations such as Amps, Volts, kW and VARs. This data will allow for engineering model verification.

Phase 2 will be the implementation of voltage regulators and switched capacitors on the two pilot substation feeders to optimize kVAR and the voltage profile. Also included in phase 2 will be additional sensors and communication equipment to send data back to headquarters. Phase 3 will be when OEC attempts to find the most economical voltage level to operate the system. This attempt may allow for an overall reduction in demand on the two pilot substations. Phase 4 will be the integrated volt-var control where, through the use of SCADA and automation based on the sensors and logic controls of downline devices, the entire fleet of "smart" devices installed on the feeder will make adjustments to maintain voltage levels within a type bandwidth along the feeder; and allow the substation bus voltage to respond accordingly.

Self-Healing

Another smart grid initiative that OEC is presently involved with, in conjunction with the DOE, is self-healing. Self-healing pertains to automated distribution control whereby intelligent electronic devices are automatically operated based on a set of logic criteria being met. OEC currently has one location at the southern portion of its system where a self-healing scheme is in place. In the next year there will be two additional locations where critical loads will require continuous power, and in the event of an outage, must have power restored within minutes. The components that make up a self-heal system include mainline reclosers with communication capability, logic controls, plus a central master control located at OEC headquarters. This intelligent scheme allows for switching between feeders in fewer than 5 minutes. The system can either be reset manually or through remote control.