Final Report

2015–2018
Construction Work Plan
KENTUCKY 61 CARTER

Grayson Rural Electric Cooperative Corporation
Grayson, Kentucky

September 2014

leidos

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NEW CONSTRUCTION (Code 100)

740c Code	General Description	Number	Miles	2015	2016	2017	2018	Estimated Cost	Loan Funds
101	New Underground Lines	108	3.84	$102,195	$107,298	$112,671	$118,287	$440,451	$440,451
102	New Overhead Lines	780	65.23	$654,615	$687,375	$721,695	$757,770	$2,821,455	$2,821,455
100 TOTAL NEW CONSTRUCTION		888	69.07	$756,810	$794,673	$834,366	$876,057	$3,261,906	$3,261,906

DISTRIBUTION LINE CONVERSIONS (Code 300)

740c Code	General Description	Miles	2015	2016	2017	2018	Estimated Cost	Loan Funds
301	**AIRPORT ROAD Circuit 3-Rattlesnake Ridge**							
	Multi-phase 1-ph to 2-ph 1/0 ACSR	0.37	$24,480				$24,480	$24,480
	Add (1) single-phase 50-4H		$5,250				$5,250	$5,250
371	**AIRPORT ROAD Circuit 2-Dudley (Modified Carry-Over)**							
	Multi-phase 1-ph 6 ACWC to 3-ph 1/0 ACSR	3.20	$225,120				$225,120	$225,120
	Add (3) single-phase 70-4H		$13,650				$13,650	$13,650
316	**AIRPORT ROAD Circuit 1-Bruin**							
	Multi-phase 1-ph 6 ACWC to 3-ph 3/0 ACSR	1.38	$120,270				$120,270	$120,270
	Remove (1) recloser		$3,150				$3,150	$3,150
302	**ARGENTUM Circuit 1-Schultz Road**							
	Multi-phase 1-ph to 3-ph 1/0 ACSR	1.90		$140,350			$140,350	$140,350
	Add (1) single-phase 70-4H			$5,510			$5,510	$5,510
303	**ARGENTUM Circuit 1-Schultz Road to Sheep Hollow**							
	Multi-phase and reconductor 1-ph to 2-ph 1/0 ACSR	0.08			$6,130		$6,130	$6,130
	Add (1) single-phase 50-4H				$5,790		$5,790	$5,790
305	**ARGENTUM Circuit 1-Rt. 7**							
	Multi-phase Reconductor 1-ph to 3-ph 1/0 ACSR	1.38	$97,080				$97,080	$97,080
	Add (2) single-phase 70-4H		$10,500				$10,500	$10,500
306	**ARGENTUM Circuit 3-Timberlake Meadows**							
	Multi-phase and Reconductor 1-ph 6 ACWC to 3-ph 1/0 ACSR	0.27	$18,990				$18,990	$18,990
375	**Carter City Circuit 4-Lost Creek (Modified Carry-Over)**							
	Multi-phase 1-ph 1/0 ACSR to 3-ph 1/0 ACSR	2.00			$155,120		$155,120	$155,120
	Add (2) 1-ph 35-4H				$11,580		$11,580	$11,580
378	**ELLIOTTVILLE Circuit 1-Rt. 173 (Modified Carry-Over)**							
	Multi-phase and Reconductor 1-ph 6 ACWC to 3-ph 1/0 ACSR	3.00		$221,600			$221,600	$221,600
	Add (3) 1-ph Triple-Single			$34,180			$34,180	$34,180
	Add (1) 1-ph 25-4H							
	Add (1) 1-ph 35-4H							
	Add (1) 1-ph 55-4H							
	Remove (1) 1-ph 70L							
307	**LOW GAP Circuit 2-Alcorn Road**							
	Multi-phase and Reconductor 1-ph 6 ACWC to 3-ph 1/0 ACSR	2.10		$155,120			$155,120	$155,120
	Remove (1) 3-ph 70-4H			$19,850			$19,850	$19,850
	Install (1) 1-ph 35-4H							
	Install (2) 1-ph 25-4H							
309	**MAZIE Circuit 2-Cains Creek**							
	Multi-phase and Reconductor 1-ph to 3-ph 1/0 ACSR	2.56				$208,480	$208,480	$208,480
	Add (2) 1-ph 50-4H					$24,310	$24,310	$24,310
	Install (2) 1-ph 25-4H							

DISTRIBUTION LINE CONVERSIONS (Code 300 continued)

740c Code	General Description	Miles	2015	2016	2017	2018	Estimated Cost	Loan Funds
385	**MAZIE Circuit 2-Route 201 South at Blaine (Modified Carry-Over)**							
	Multi-phase 1-ph 1/0 ACSR to 2-ph 1/0 ACSR	1.50			$109,400		$109,400	$109,400
	Add (2) 1-ph 35-4H				$11,580		$11,580	$11,580
310	**NEWFOUNDLAND Circuit 1-Stark Ridge Road**							
	Multi-phase and Reconductor 1-ph 4 ACWC to 3-ph 1/0 ACSR	8.20	$576,870				$576,870	$576,870
	Add (2) 1-ph 50-4H		$29,400				$29,400	$29,400
	Add (3) 1-ph 50-4H							
	Remove (1) 1-ph 25-4H							
311	**PACTOLUS Circuit 1-Rt. 7 at Iron Hill**							
	Multi-phase and Reconductor 1-ph 3/0 ACSR to 3-ph 1/0 ACSR	1.00		$73,870			$73,870	$73,870
	Relocate (1) 1-ph 50-4H			$6,620			$6,620	$6,620
312	**PACTOLUS Circuit 4-Campbell Lane Estate**							
	Multi-phase 1-ph to 3-ph 1/0 ACSR	1.30		$96,030			$96,030	$96,030
	Add (2) 1-ph 70L			$11,030			$11,030	$11,030
313	**PELFREY Circuit 1-Prater Road**							
	Reconductor 3-ph 4 ACSR to 3-ph 1/0 ACSR	0.07				$6,760	$6,760	$6,760
314	**PELFREY Circuit 2-US 60 at Bailey Hollow**							
	Multi-phase and Reconductor 1-ph 4 ACSR to 3-ph 1/0 ACSR	0.60				$48,860	$48,860	$48,860
	Install (3) 1-ph 50-4H					$19,450	$19,450	$19,450
	Remove (1) 1-ph 35-4H							
315	**WARNOCK Circuit 4-Montgomery Road**							
	Reconductor 1-ph to 3-ph 1/0 ACSR	5.00	$351,750				$351,750	$351,750
	Add (1) 1-ph 70-4H		$5,250				$5,250	$5,250
300	**TOTAL DISTRIBUTION LINE CONVERSIONS**	35.91	$ 1,483,775	$ 766,176	$ 301,617	$ 309,878	$2,853,380	$2,853,380

MISCELLANEOUS DISTRIBUTION ITEMS (Code 600)

740c Code	General Description	Number	2015	2016	2017	2018	Estimated Cost	Loan Funds
601	TRANSFORMERS FOR NEW MEMBERS							
	Padmount	8	$9,922	$10,418	$10,940	$11,486	$42,766	$42,766
	Pole Mount	780	$339,300	$367,185	$385,710	$405,015	$1,497,210	$1,497,210
601	TRANSFORMERS REPLACEMENTS							
	Padmount	0	$0	$0	$0	$0	$0	$0
	Pole Mount	400	$174,000	$182,700	$191,900	$201,500	$750,100	$750,100
601	METERS FOR NEW MEMBERS	888	$33,078	$34,632	$36,408	$38,184	$142,302	$142,302
601	METER REPLACEMENTS	12,408	$462,198	$483,912	$508,728	$533,544	$1,988,382	$1,988,382
602	SERVICE UPGRADES FOR EXISTING MEMBERS							
	Padmount	96	$54,168	$56,880	$59,712	$62,712	$233,472	$233,472
	Pole Mount	124	$48,918	$51,367	$53,909	$56,606	$210,800	$210,800
603	SECTIONALIZING EQUIPMENT		$392,438	$412,065	$432,665	$454,295	$1,691,463	$1,691,463

MISCELLANEOUS DISTRIBUTION ITEMS (Code 600-Continued)

740c Code	General Description	Number	2015	2016	2017	2018	Estimated Cost	Loan Funds
604	**LINE REGULATORS**	17	$355,950	$73,870	$0	$164,100	$593,920	$593,920
604-4	**ARGENTUM Circuit 1-Schultz Road**							
	Install a 3-ph 100 Amp regulator	1	$44,100				$44,100	$44,100
604-15	**ARGENTUM Circuit 1-Jacob's Lane**							
	Remove a 1ph 100 Amp regulator	1	$3,150				$3,150	$3,150
604-1	**ARGENTUM Circuit 3-East Tygart**							
	Install a 3-ph 219 Amp regulator	1	$55,650				$55,650	$55,650
604-2	**ELLIOTTVILLE Cicuit 3-CCC Trail**							
	Change a 1-ph regulator into 100 Amp regulator	3				$98,460	$98,460	$98,460
	Install a 3-ph regulator 219 Amp regulator							
	Remove a 3-ph regulator							
604-3	**ELLIOTTVILLE Cicuit 4-Macabee Creek**							
	Install a 1-ph 100 Amp regulator	1	$26,250				$26,250	$26,250
604-5	**MAZIE Circuit 1-Peter's Hill**							
	Install a 1-ph 50 Amp regulator	1	$12,600				$12,600	$12,600
604-7	**NEWFOUNDLAND Circuit 1-Bruin Road**							
	Install a 3-ph 100 Amp regulator	1				$51,050	$51,050	$51,050
604-8	**NEWFOUNDLAND Circuit 2-North Ruin**							
	Install a 1-ph 100 Amp regulator	1	$26,250				$26,250	$26,250
604-9	**PACTOLUS Circuit 1-Iron Hill**							
	Install a 1-ph 50 Amp regulator	1				$14,590	$14,590	$14,590
604-10	**PACTOLUS Circuit 4-Route 1 at Lost Creek**							
	Install a 3-ph100 Amp regulator	1	$44,100				$44,100	$44,100
604-11	**PELFREY Circuit 1-Prater Road**							
	Install a 1-ph 100 Amp regulator	2		$73,870			$73,870	$73,870
	Install a 3-ph 100 Amp regulator							
604-12	**SANDY HOOK Circuit 1-Route 7 at Wells Creek**							
	Install a 3-ph 219 Amp regulator	1	$55,650				$55,650	$55,650
604-13	**WARNOCK Circuit 1-Big White Oak**							
	Install a 3-ph 100 Amp regulator	1	$44,100				$44,100	$44,100
604-14	**WARNOCK Circuit 4-Leatherwood**							
	Install a 3-ph 100 Amp regulator	1	$44,100				$44,100	$44,100
606	POLE REPLACEMENTS	1,688	$1,409,480	$1,479,954	$1,553,804	$1,631,452	$6,074,690	$6,074,690
600 TOTAL MISC. DISTRIBUTION ITEMS			$3,279,452	$3,152,983	$3,233,776	$3,558,894	$13,225,105	$13,225,105

OTHER DISTRIBUTION ITEMS (Code 700)

740c Code	General Description	Number	2015	2016	2017	2018	Estimated Cost	Loan Funds
701	SECURITY LIGHTS	888	$130,758	$137,418	$144,300	$151,404	$563,880	$563,880
700 TOTAL OTHER DISTRIBUTION ITEMS			$130,758	$137,418	$144,300	$151,404	$563,880	$563,880

MAPPING (Code 1500)

740c Code	General Description	Number	2015	2016	2017	2018	Estimated Cost	Loan Funds
1501	GPS & GIS	1			$390,700	$410,230	$800,930	$800,930
1500 TOTAL MAPPING			$0	$0	$390,700	$410,230	$800,930	$800,930
TOTAL (740c)			**$5,650,795**	**$4,851,250**	**$4,904,759**	**$5,306,463**	**$20,705,201**	**$20,705,201**

Purpose of Report

This 2015–2018 Construction Work Plan (CWP) documents the engineering analysis and proposed system improvements required for Grayson Rural Electric Cooperative Corporation (GRECC) to provide satisfactory and reliable service to its customers through the winter peak of 2018–2019. Leidos Engineering, LLC (Leidos) was retained to assist GRECC in the preparation of the CWP. Included within is engineering support for a loan application to RUS to finance the proposed construction program. The engineering support includes descriptions, estimated costs, and justification of required new facilities and facility improvements.

Service Area and Power Supply

GRECC provides service to approximately 15,400 customers located in all or parts of Carter, Rowan, Lawrence, Greenup, Lewis, and Elliot Counties in northeastern Kentucky. GRECC purchases power from the East Kentucky Power Cooperative (EKPC) at all thirteen delivery points. GRECC distributes power at a primary voltage of 12.47/7.2 kV over approximately 2,478 miles of distribution lines. The distribution system consists of 2,439 miles of overhead distribution lines and 39 miles of underground distribution lines.

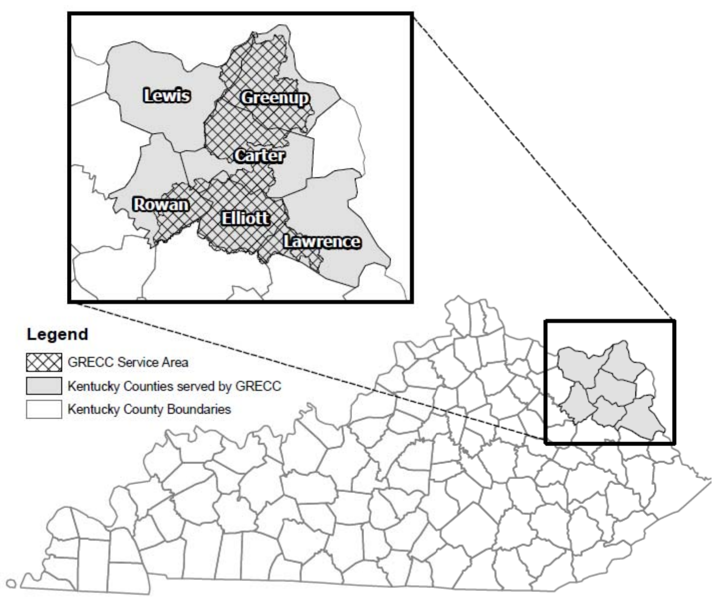

Figure ES-1. Location Map

GRECC distributes power from thirteen 69-12.47 kV substations throughout the service area. All of the substations are owned, operated, and maintained by EKPC. From the EKPC substations, all 42 distribution circuits are constructed for and operated at 12.47/7.2 kV. Installed overhead conductor sizes range from #6A CWC to 336 kcmil ACSR and 1/0 AL for underground primary. A tabulation of general operating statistics for the calendar years 2012 and 2013 from RUS Form 7 are shown in Table ES-1.

Table ES-1
General System Operating Statistics

	2012	2013
Miles of Distribution Line	2,485	2,440
Year-End consumers per Month Served	15,389	15,391
Consumers per Mile	6.2	6.3
Average Residential Consumption (kWh/mo)	1,016	1,074
Total MWh Purchased	260,204	269,549
Total MWh Sold (1)	244,734	257,599
Percent System Losses	5.9%	4.4%

Note: Does not include own use.

Results of Proposed Construction

On completion of the proposed construction program, the system will adequately serve the 2018–2019 winter peak load of 88 MW as projected in the 2012 Load Forecast (LF) prepared by EKPC. The CWP was prepared to provide adequate and dependable service to 15,877 residential, commercial, and industrial customers with total annual sales of 276,916 MWh.

A detailed description of the proposed system improvements is given in Section 2. This CWP includes carryovers from the previous 2009–2012 CWP. The proposed system improvements are identified in the 740c Detail following the RUS 740c Form and are summarized in Table ES-2.

Table ES-2
System Improvements and Additions Summary

RUS Code	Item	Estimated Cost
100	New Construction	$3,261,906
200	New Tie Lines	$0
300	Line Conversions	$2,853,380
400	New Substations	$0
500	Substation Improvements	$0
600	Miscellaneous Distribution Equipment	$13,225,105
700	Other Distribution Equipment	$563,880
1500	GIS Mapping	$800,930
Total CWP Improvements		$20,705,201

General Basis of Study

The projected 2018–2019 winter system peak load and number of customers served used in this report were based on the 2012 LF prepared by EKPC. GRECC's load projections and recommendations were reviewed and generally found to be adequate for the CWP planning period. All of the construction proposed herein is consistent with the LF unless otherwise noted and explained.

GRECC's 2014 operations and maintenance review (Review Rating Summary, RUS Form 300) was used to determine construction required to replace physically deteriorated equipment and material, upgrade portions of the system to conform with code or safety requirements, and/or improve reliability or quality of service.

New distribution and power supply construction requirements were considered simultaneously as a "one system" approach for the orderly and economical development of the total system. All of the proposed construction and recommendations herein, relative to power supply and delivery, were discussed with the cooperative's power supplier, EKPC.

Details and estimated costs of the line and equipment changes and the additional requirements to serve 888 new residential, commercial, and industrial customers during the work plan period are included in Section 2. An estimated cost of necessary service upgrades to existing customers is also included in Section 2.

An analysis, using as a basis RUS guidelines and the design criteria herein of thermal loading, voltages, physical conditions, and reliability, was performed on all of the substations, distribution lines, and major equipment of the existing system. Milsoft Integrated Solutions, Inc.'s WindMil™ software was used to analyze the distribution circuits for the projected 2018–2019 winter peak load of 88 MW. A sample printout from the software is given in Appendix G. The economic conductor selection is given in Section 3. When applicable, alternate solutions were investigated and economically evaluated so the most cost effective construction could be proposed.

In the preparation of this Report, including the opinions contained herein, the Consultant has made certain assumptions and used certain considerations with respect to conditions which may occur in the future. While the Consultant believes these considerations and assumptions are reasonable and reasonably attainable based upon conditions known to us as of the date of this Report, they are dependent upon future events and actual conditions may differ from those assumed. In addition, the Consultant has used and relied upon certain information provided by others. To the extent actual future conditions differ from those assumed herein or from the assumptions provided by others, the actual results will vary from those estimated. In addition, field conditions encountered during design will impact some of the projects.

1.1 Design Criteria

Construction proposed herein is required to meet the following minimum standards of adequacy for voltages, thermal loading, safety, and reliability on the system.

- The maximum voltage drop on primary distribution lines is not to exceed 8 volts after regulation to 126 volts on a 120-volt base.
- The following equipment is not to be thermally loaded by more than the percentage shown of its nameplate rating:
  - 100% Substation Transformer of EKPC's calculated rating
  - 100% Line Voltage Regulators
  - 100% Oil Circuit Reclosers
  - 100% Line Fuses
- The calculated winter and summer capacity for power transformers are based on EKPC data. The ratings are given in Appendix A.
- Primary conductors were reviewed and recommended for reconductoring if loaded over 80% of their calculated thermal rating.
- Primary distribution lines are to be reconductored from single phase to three phase if loading exceeds 50 amps on single-phase lines. This is due to the limited fuse size that can be used on downstream taps for proper coordination with reclosers.
- Poles and/or crossarms are to be replaced if found to be physically deteriorated by visual inspection and/or tests.
- Overhead conductors, associated poles, and hardware as required, are to be replaced if conductor is old and in poor condition.
- Primary distribution lines are to be rebuilt and/or relocated if they are found to be unsafe or in violation of the National Electrical Safety Code or other applicable code clearances when originally constructed.
- New lines and line conversions are to be built according to the standard primary voltage level as recommended in the Long Range Plan.
- New primary conductor sizes to be determined on a case-by-case basis using the economic conductor sizing and presently known constants and variables. The final proposed conductor may be modified to conform with the cooperative's standard sizes.

- All new primary construction is to be overhead except where underground is required to comply with governmental or environmental regulations, local restrictions, favorable economics, or by consumer's request with an aid to construction contribution.
- All new distribution lines to be designed and built according to RUS standard construction specifications and guidelines.
- Three-phase and single-phase copperweld copper lines are to be replaced on a systematic basis based on past reliability factors and future voltage and current requirements.

1.2 Distribution Line and Equipment Costs

The distribution line and equipment costs are given in Tables 1-1 and 1-2. The costs were estimated based on recent trends in the escalation of the cost of materials and labor. They include material, installation, engineering, and overheads.

Table 1-1
Distribution Line (Installed Cost)

Distribution Lines	2014 Estimated Cost ($/mile)
New Lines	
3ϕ 397 kcmil ACSR	$170,000
3ϕ 336 kcmil ACSR	$155,000
3ϕ #3/0 kcmil ACSR	$112,000
3ϕ #1/0 ACSR	$86,000
1ϕ #1/0 ACSR	$57,000
1ϕ #2 ACSR	$53,000
Line Reconductor	
3ϕ 397 kcmil ACSR	$122,000
3ϕ 336 kcmil ACSR	$110,000
3ϕ 3/0 ACSR	$83,000
3ϕ #1/0 ACSR	$67,000
Vϕ #1/0 ACSR	$63,000
1ϕ #3/0 ACSR	$53,000
1ϕ #1/0 ACSR	$40,000
1ϕ #2 ACSR	$38,000

Table 1-2
Distribution Equipment (Installed Cost)

Distribution Equipment	2014 Estimated Cost
Line Regulators	
Line Regulator – 50 amp, 1ϕ	$12,000
Line Regulator – 100 amp, 1ϕ	$25,000
Line Regulator – 150 amp, 1ϕ	$35,000
Line Regulator – 100 amp, 3ϕ	$42,000
Line Regulator – 219 amp, 3ϕ	$53,000
Line Regulator – 328 amp, 3ϕ	$77,000
Relocate Regulator Bank	$5,000
Remove Regulator Bank	$3,000
Reclosers	
(1) 1ϕ recloser	$5,000
(3) 1ϕ recloser	$13,000
(1) 3ϕ recloser	$38,000
Relocate (1) recloser	$6,000
Remove (1) recloser	$3,000

1.3 Status of Previous CWP Items

The previous work plan was prepared for the 2009–2012 construction period. Approximately 68% of the projects in this plan were completed, and 11% were cancelled based on amendments or the issues identified did not materialize. Approximately 16% of the previous CWP projects will be designated as a carry-over for the 2015–2018 CWP. The status of each project is summarized in Appendix B based on the following:

- Carry-Over — Project will be a carry-over in the 2015–2018 CWP
- Complete — Project has been completed
- Cancelled — Project was cancelled

1.4 Analysis of Current System Studies

1.4.1 2012 Load Forecast

EKPC prepared the 2012 Load Forecast (LF), which details the forecasted system coincident peak loads through 2032. The 2012 LF was based on the 2011–2012 winter non-coincident peak load of 60 MW, an average annual customer growth of 0.5%, and a growth of energy sales of 1.4%.

From discussions with GRECC and the RUS representative, the EKPC's extreme projections for the 1 in 5 year scenario appeared to be realistic for the service territory, and is the basis for project development in the 2015–2018 CWP. Figure 1-1 presents the revised winter projections with comparisons to the normal load forecast and extreme load forecast from the 2012 LF.

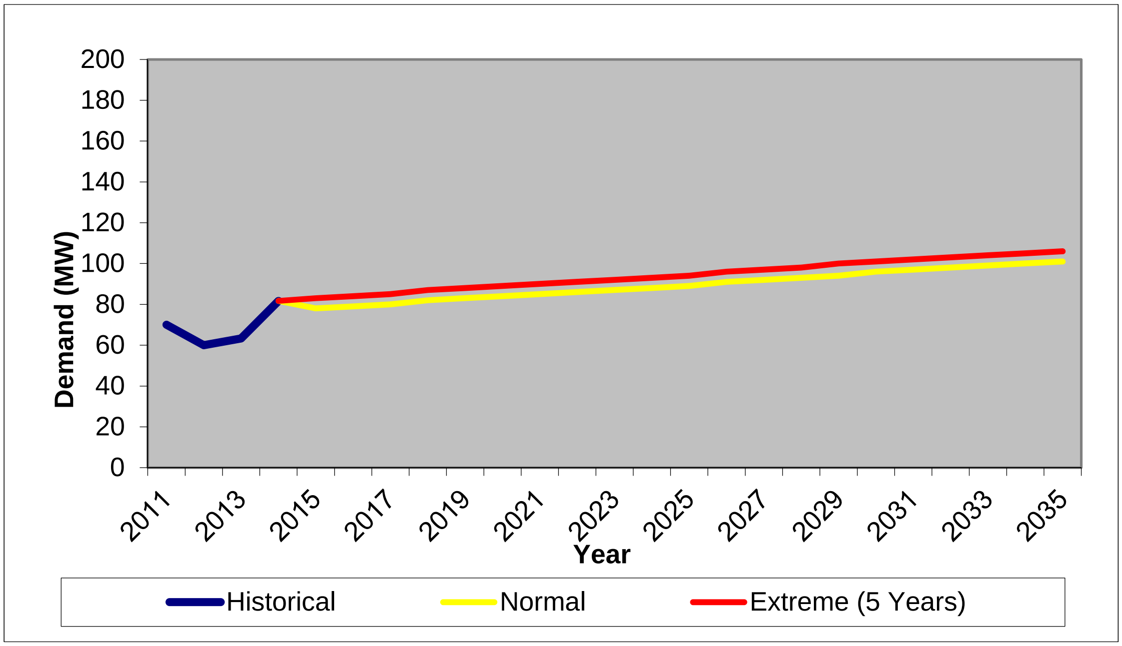

Figure 1-1. Historical and Projected System Peak Demands

1.4.2 Long Range Plan

The 2008 Long Range Plan (LRP) was prepared in conjunction with the 2009-2012 Construction Work Plan (CWP). The purpose of the LRP is to provide general guidance for system expansion. Periodic reviews of the LRP will be required to examine the applicability of the preferred plan considering actual system developments. Detailed construction work plans should be prepared for necessary construction, and the LRP should be reevaluated as each work plan is prepared. A review of the 2008 LRP was conducted to ensure the 2015-2018 CWP and the 2008 LRP were in alignment.

1.4.3 2014 Operations and Maintenance Survey

The Form 300 operations and maintenance review was performed by GRECC and the RUS field representative in April 2014. RUS Form 300 is located in Appendix D. The review indicated a satisfactory rating in all areas except the following, which received an acceptable rating. Additional comments and corrective measures included in the Form 300 for each area receiving an acceptable rating are also given below.

- *Distribution Lines – Overhead: Compliance with Safety Codes (Foreign Structures, Attachments).* Poles with telephone attachments should be removed if they are close to an electric pole, and poles with cable TV attachments need to be monitored constantly to ensure reaching code requirements.

- *Distribution Lines – Overhead: Observed Physical Condition from Field Checking (Right-of-Way).* Policies for protecting the system from trees in rural areas are recommended.
- *Line Maintenance and Work Order Procedures: Retirement of Idle Services.* Billing records and adjustments will reconcile the report of idle services.
- *Maps and Plant Records: Operating Maps, Circuit Diagrams, and Staking Sheets.* The mapping system will be more accurate with GPS and newer technology.

1.4.4 Sectionalizing Studies

The 2014 Distribution System Coordination Study was recently completed to the GRECC system. The study included the development and application of a standard protection scheme, as well as collaboration with EKPC to satisfy their new requirements for substation transformer fuse coordination. The Coordination Study also included system-wide recommendations for line recloser and fuse additions, replacements, and removals.

The findings and recommendations of the 2014 Distribution System Coordination Study were reviewed with all new or significantly changed circuits resulting from each project included in this CWP. Upon completion of the analyses, the reclosers, fuses, and other devices required to adequately protect the circuits were included in the RUS Code 300 projects. The remaining protection equipment additions and changes recommended in the Coordination Study and its estimated installed cost are included in RUS Code 603 in Section 2 of this report.

1.5 Historical and Projected System Data

1.5.1 Annual Energy, Load, and Consumer Data

A summary of the annual energy, demand, and consumer information is given in Table 1-3. The historical data provided was taken from GRECC data. Projections for the 2018–2018 CWP winter design load of 88 MW were based on the 2012 Load Forecast Report from EKPC. The total projected system load was allocated to individual substations and feeders based on GRECC's knowledge of the system, historical loading, and known future development. The load forecast for the GRECC substations and feeders is given in Appendix C.

Table 1-3
Historical and Projected Annual Energy, Demand, and Consumer Data[1]

Calendar Year	Energy Purchased (MWh)	Energy Sold[2]		Energy Loss		Non-Coincident Peak Demand[3]		Percent Increase	Annual Load Factor	Number of Customers[4]	
		(MWh)	Percent Increase	(MWh)	Percent of Purchases	Season	(MW)			Average[5]	Percent Increase
2011	269,142	251,055		18,087	6.7%	Winter	70.0		43.9%	15,470	
2012	260,204	244,734	-2.5%	15,470	5.9%	Winter	60.0	-14.3%	49.5%	15,389	-0.5%
2013	269,549	257,599	5.3%	11,950	4.4%	Winter	63.3	5.5%	48.6%	15,391	0.0%
2014	274,843	258,246	0.3%	16,597	6.0%	Winter	81.7	29.1%	38.4%	15,506	0.7%
2015	279,534	262,654	1.7%	16,880	6.0%	Winter	83.0	1.6%	38.4%	15,576	0.5%
2016	285,597	268,351	2.2%	17,246	6.0%	Winter	84.0	1.2%	38.8%	15,682	0.7%
2017	289,871	272,367	1.5%	17,504	6.0%	Winter	85.0	1.2%	38.9%	15,776	0.6%
2018	294,789	276,988	1.7%	17,801	6.0%	Winter	87.0	2.4%	38.7%	15,879	0.7%
2019	299,310	281,236	1.5%	18,074	6.0%	Winter	88.0	1.1%	38.8%	15,992	0.7%

Notes:
1. Historical and projected data based on the 2012 LF from EKPC.
2. Does not include own use.
3. Non-coincident peak for the system is the sum of the metered substation coincident peaks.
4. Average number of customers for projected CWP period was based on LF projections.
5. Includes residential, small commercial, and large commercial customers.

1.6 Substation Load Data

GRECC distributes power from thirteen 69-12.47 kV substations owned, operated, and maintained by EKPC. Table 1-4 summarizes the existing GRECC substations, configuration, voltage, and capacity. Historical winter substation demands and power factor are shown in Table 1-5. The substations are listed in Table 1-7 with the calculated capacity and projected substation peak demands. During the existing and projected winter, none of the substation transformers or regulators exceeded their ratings.

The total installed substation transformer calculated capacity for the GRECC system is approximately 177.6 MVA based on the current configuration and location of the transformers. The calculated transformer capacity is 217% greater than the winter coincident system peak of 81.7 MW.

Table 1-4
Substation Voltages and Capacities

Substation	Voltage (kV)	Total Transformer Capacity (MVA)	Cal. Winter Transformer Capacity[1] (MVA)	Cal. Winter Regulator Capacity[1,2] (MVA)
Airport Road	69-12.47	5.60	8.34	*7.50*
Argentum	69-12.47	14.00	*18.14*	23.40
Carter City	69-12.47	14.00	18.14	*15.10*
Elliottville	69-12.47	11.20	18.14	*15.10*
Leon	69-12.47	6.44	18.14	23.40
Low Gap	69-12.47	5.75	*7.45*	15.10
Mazie	69-12.47	5.60	*8.34*	15.10
Newfoundland	69-12.47	11.20	18.14	*15.10*
Pactolus	69-12.47	14.00	*18.14*	23.40
Pelfrey	69-12.47	5.60	*8.34*	15.10
Prison	69-12.47	11.20	*18.14*	23.40
Sandy Hook	69-12.47	6.44	*8.34*	15.10
Warnock	69-12.47	11.20	18.14	*15.10*

Notes:
1. Ratings provided by EKPC as shown in Appendix A.
2. In some cases, the available calculated regulator capacity is less than the transformer calculated capacity, limiting the capacity of the substation.

Table 1-5
Historical Winter Substation Demands

Substation	Cal. Winter Capacity[1] (MVA)	Non-Coincident Peak[2] (MW)	Power Factor @ Peak[2]	Percent Loaded[3]
Airport Road	7.50	4.10	99%	55.2%
Argentum	18.14	6.57	100%	36.2%
Carter City	15.10	5.71	100%	37.8%
Elliottville	15.10	10.22	100%	67.7%
Leon	18.14	3.70	99%	20.6%
Low Gap	7.45	6.04	100%	81.1%
Mazie	8.34	4.68	100%	56.1%
Newfoundland	15.10	6.98	99%	46.7%
Pactolus	18.14	12.49	98%	70.3%
Pelfrey	8.34	5.71	99%	69.2%
Prison	18.14	2.49	97%	14.2%
Sandy Hook	8.34	6.47	99%	78.4%
Warnock	15.10	6.58	99%	44.0%

Notes:
1. Based on ratings provided by EKPC and either the calculated substation transformer rating or the calculated regulator rating, depending on the capacity limiting factor.
2. Peak demand and power factor based on historical metered data provided by EKPC for January 2014.
3. Loading percentage stated as non-coincident peak and power factor to the calculated rating.

1.7 Circuit Loads

The distribution system is served through forty-two 12.47/7.2 kV substation reclosers. The recloser continuous current rating and the conductor capacity of the backbone conductors on the feeder are compared to the winter peak feeder loads in Table 1-6. The winter peak feeder loads were calculated based on the engineering model load flow results for the metered substation peak allocation. Based on the existing peak loads from the distribution system model, none of the substation reclosers exceeded the rated capacity. None of the first line sections exceeded the rated capacity.

Table 1-6
Recloser and Feeder Capacity at 2014 Winter Peak

Substation /Feeder	Load[1] (MW)	Power Factor @ Peak[2]	Recloser Rating (MVA)	Percent Recloser Loading	Backbone Conductor[3]	Percent Conductor Loading[3]
Airport Road						
1	1.65	99%	12.9	12.9%	3/0 ACSR	25.8%
2	2.41	99%	12.9	18.9%	3/0 ACSR	37.6%
3	0.62	99%	12.9	4.9%	3/0 ACSR	9.7%

Substation /Feeder	Load[1] (MW)	Power Factor @ Peak[2]	Recloser Rating (MVA)	Percent Recloser Loading	Backbone Conductor[3]	Percent Conductor Loading[3]
Argentum						
1	2.57	100%	12.9	19.9%	1/0 ACSR	51.7%
2	1.40	100%	12.9	10.9%	1/0 ACSR	28.1%
3	3.04	100%	12.9	23.6%	1/0 ACSR	61.3%
Carter City						
1	1.80	100%	12.9	14.0%	3/0 ACSR	27.8%
2	1.58	100%	12.9	12.2%	3/0 ACSR	24.4%
3	0.90	100%	12.9	7.0%	336 ACSR	7.9%
4	2.51	100%	12.9	19.5%	3/0 ACSR	50.6%
Elliottville						
1	2.33	100%	12.9	18.1%	1/0 ACSR	46.8%
2	2.97	100%	12.9	23.0%	1/0 ACSR	59.9%
3	4.10	100%	12.9	31.8%	3/0 ACSR	63.2%
4	1.94	100%	12.9	15.0%	3/0 ACSR	29.9%
Leon						
1	1.27	99%	12.9	9.9%	1/0 HD CU	14.8%
2	1.17	99%	12.9	9.2%	3/0 ACSR	13.7%
3	1.60	99%	12.9	12.5%	3/0 ACSR	24.9%
Low Gap						
1	0.53	100%	12.9	4.1%	3/0 ACSR	8.1%
2	2.38	100%	12.9	18.4%	3/0 ACSR	36.7%
3	3.48	100%	12.9	27.0%	3/0 ACSR	53.7%
Mazie						
1	1.67	100%	12.9	12.9%	3/0 ACSR	25.8%
2	3.07	100%	12.9	23.8%	397 ACSR	24.1%
3	0.56	100%	12.9	4.3%	3/0 ACSR	8.7%
Newfoundland						
1	3.26	99%	12.9	25.5%	3/0 ACSR	50.9%
2	1.14	99%	12.9	8.9%	1/0 ACSR	23.2%
3	1.40	99%	12.9	11.0%	3/0 ACSR	21.9%
4	1.73	99%	12.9	13.5%	3/0 ACSR	27.0%
Pactolus						
1	3.79	99%	12.9	29.7%	1/0 HD CU	31.1%
2	2.46	99%	12.9	19.3%	397 ACSR	20.2%
3	3.14	99%	12.9	24.6%	397 ACSR	25.8%
4	4.21	99%	12.9	33.0%	397 ACSR	34.6%
Pelfrey						
1	3.86	99%	12.9	30.2%	3/0 ACSR	60.1%
2	2.37	99%	12.9	18.6%	3/0 ACSR	37.0%
3	0.04	99%	12.9	0.3%	3/0 ACSR	0.7%

Substation /Feeder	Load[1] (MW)	Power Factor @ Peak[2]	Recloser Rating (MVA)	Percent Recloser Loading	Backbone Conductor[3]	Percent Conductor Loading[3]
Prison						
1	2.49	100%	12.9	19.3%	500 AL UG	29.7%
Sandy Hook						
1	3.21	99%	12.9	25.1%	3/0 ACSR	50.0%
2	2.48	99%	12.9	19.4%	3/0 ACSR	38.7%
3	1.27	99%	12.9	9.9%	3/0 ACSR	19.8%
Warnock						
1	2.19	99%	12.9	17.1%	1/0 HD Cu	33.0%
2	0.05	99%	12.9	0.4%	3/0 ACSR	0.8%
3	2.02	99%	12.9	15.8%	3/0 ACSR	31.4%
4	2.20	99%	12.9	17.2%	336 ACSR	34.3%

Notes:
1. Calculated based on the metered peak substation loads from EKPC for January 2014 and the engineering model.
2. Power factor based on historical metered data provided by EKPC for January 2014 for each substation.
3. Based on the engineering model.

A review of Table 1-7 provides an overview of the existing transformer or regulator capacity compared to the projected CWP design load for the 2018–2019 winter. At the 2018–2019 projected peak, none of the transformers or regulators exceeds the 100% loading planning criteria.

Table 1-7
Existing Substation Capacity and Loading

Substation/Feeder	Peak Load (MW)			
	Cal. Winter Capacity[1] (MVA)	Projected 2018-2019[2]	Power Factor @Peak[3]	Percent Loaded[4]
Airport Road	7.50	4.47	99%	60.2%
Argentum	18.14	7.16	100%	39.5%
Carter City	15.10	6.23	100%	41.3%
Elliottville	15.10	11.15	100%	73.8%
Leon	18.14	4.03	99%	22.4%
Low Gap	7.45	6.58	100%	88.3%
Mazie	8.34	5.11	100%	61.3%
Newfoundland	15.10	7.61	99%	50.9%
Pactolus	18.14	13.61	98%	76.6%
Pelfrey	8.34	6.23	99%	75.5%
Prison	18.14	2.49	97%	14.2%

Substation/Feeder	Peak Load (MW)			
	Cal. Winter Capacity[1] (MVA)	Projected 2018-2019[2]	Power Factor @Peak[3]	Percent Loaded[4]
Sandy Hook	8.34	7.05	99%	85.4%
Warnock	15.10	7.18	99%	48.0%

Notes:
1. Based on ratings provided by EKPC and either the calculated substation transformer rating or the calculated regulator rating, depending on the capacity limiting factor.
2. Projected demand based on the 2012 LF projections.
3. Power factor based on historical metered data provided by EKPC for January 2014.

The GRECC electric system was modeled on Milsoft Integrated Solutions, Inc.'s WindMil™ software. Load data were obtained from the GRECC member billing information. Load-flows were prepared to provide information such as the percent conductor loading to its capacity, calculated line losses, and voltage drop along line sections. The load-flow information from the computer model was compared to the criteria outlined in this report. Recommendations were then based on these results.

Each of the 42 circuits was analyzed with respect to adequate voltage and loading conditions. The computer analysis of the 2014 winter system peak indicated the following deficiencies:

- Voltage levels less than 118 volts in line sections in all of the substations, with the exception of Leon and Elliott County Prison
- Conductor loading greater than 80% in line sections in Elliottville, Low Gap, and Pelfrey substations
- Greater than 50 amps on single-phase line sections in all of the substations, with the exception of Carter City, Elliott County Prison, Leon, and Sandy Hook

Computer analysis of the projected 2018–2019 winter system peak revealed:

- No additional substations with voltage levels lower than 118 volts
- No additional substations with conductor loading greater than 80%
- No additional substations with greater than 50 amps on single phase

1.8 System Outages

A summary of the outages experienced by GRECC for the last five years is given in Table 1-8. Excluding the years of 2009 and 2012 due to extreme snow storms, the five-year average annual outage hours per customer is 349 minutes. RUS suggests a system goal for outages of no more than an average of 300 consumer outage minutes, per customer, per year, excluding outages caused by major storms or the power supplier, for the last five consecutive years in any specific area. GRECC's goal is to improve system reliability and keep the average outage hours per customer below the recommended guideline.

Table 1-8
Service Interruption Summary
Average Minutes per Consumer by Cause

Year	Power Supplier	Extreme Storm	Prearranged	Others	Total
2009	0.00	1,941.10	19.40	182.10	2,142.60
2010	1.40	79.90	20.40	181.00	282.70
2011	7.30	132.20	16.40	284.70	440.60
2012	0.00	914.50	27.70	323.90	1,266.10
2013	1.20	56.00	35.00	232.60	324.80
5-Yr. Avg.	3.30	624.74	23.78	240.86	891.36

Note: From RUS Form 300.

Section 2
REQUIRED CONSTRUCTION ITEMS

The required 2015–2018 CWP items are discussed in this section. The design criteria as given in Section 1 were used as a guide to identify potential CWP items for evaluation. Load-flow, voltage drop, and where appropriate, economic analysis was performed to support the recommended CWP items.

2.1 Service to New Members

Historical information was reviewed for a 24-month period from calendar years 2012 and 2013 to project new member service requirements for the CWP period. The historical number of members was not increased for the 2015–2018 CWP period. However, the historical costs were inflated by 5% per year.

Table 2-1
Construction Required to Serve New Members

Estimated 48-Month Work Plan Period						
New Members - System Wide	Average 2012-2013	2015	2016	2017	2018	TOTAL
Number of New Services						
Underground	27	27	27	27	27	108
Overhead	182	195	195	195	195	780
Total New Services	209	222	222	222	222	888
Linear Feet of New Underground Line						
Primary	553	553	553	553	553	2,212
Secondary	0	0	0	0	0	0
Service Drop	4,511	4,511	4,511	4,511	4,511	18,044
Subtotal	5,064	5,064	5,064	5,064	5,064	20,256
Average Length in Feet/UG Member	187.6	187.6	187.6	187.6	187.6	187.6
Linear Feet of New Overhead Line						
Primary	60,993	60,993	60,993	60,993	60,993	243,972
Secondary	275	275	275	275	275	1,100
Service Drop	24,840	24,840	24,840	24,840	24,840	99,360
Subtotal	86,108	86,108	86,108	86,108	86,108	344,432
Average Length in Feet/OH Member	473.1	441.6	441.6	441.6	441.6	441.6
Total New Line (Linear Feet)	91,172	91,172	91,172	91,172	91,172	364,688

Estimated 48-Month Work Plan Period						
New Members - System Wide	Average 2012-2013	2015	2016	2017	2018	TOTAL
Cost of New Line						
Underground	$90,973	$102,195	$107,298	$112,671	$118,287	$440,451
Average Cost/UG Member	$3,433	$3,785	$3,974	$4,173	$4,381	$4,078
Overhead	$554,141	$654,615	$687,375	$721,695	$757,770	$2,821,455
Average Cost/OH Member	$3,045	$3,357	$3,525	$3,701	$3,886	$3,617
Total Cost of New Line	$645,114	$756,810	$794,673	$834,366	$876,057	$3,261,906
Number of New Transformers						
Padmount	1	2	2	2	2	8
Pole Mount	199	195	195	195	195	780
Total New Transformers	200	197	197	197	197	788
Average Installed Cost/Transformer						
Padmount	$4,500	$4,961	$5,209	$5,470	$5,743	$5,346
Pole Mount	$1,627	$1,740	$1,883	$1,978	$2,077	$1,920
Cost of Transformers						
Padmount	$4,500	$9,922	$10,418	$10,940	$11,486	$42,766
Pole Mount	$323,773	$339,300	$367,185	$385,710	$405,015	$1,497,210
Total Cost Of New Transformers	$328,273	$349,222	$377,603	$396,650	$416,501	$1,539,976
Number of New Meters						
Underground	$0	$0	$0	$0	$0	$0
Overhead	1,446	222	222	222	222	888
Total New Meters	1,446	222	222	222	222	888
Average Installed Cost/Meter						
Underground	$0	$0	$0	$0	$0	$0
Overhead	$135	$149	$156	$164	$172	$160
Cost of Meters						
Underground	$0	$0	$0	$0	$0	$0
Overhead	$195,210	$33,078	$34,632	$36,408	$38,184	$142,302
Total Cost Of New Meters	$195,210	$33,078	$34,632	$36,408	$38,184	$142,302
TOTAL COST OF NEW SERVICES	$1,168,597	$1,139,110	$1,206,908	$1,267,424	$1,330,742	$4,944,184

Table 2-2
Summary of Costs to Serve a New Member

RUS Code	Category Description	2015	2016	2017	2018	TOTAL
101	UG Lines - New Members	$102,195	$107,298	$112,671	$118,287	$440,451
102	OH Lines - New Members	$654,615	$687,375	$721,695	$757,770	$2,821,455
100	Total New Lines	$756,810	$794,673	$834,366	$876,057	$3,261,906
601	UG Transformers - New Members	$9,922	$10,418	$10,940	$11,486	$42,766
601	OH Transformers - New Members	$339,300	$367,185	$385,710	$405,015	$1,497,210
601	Meters - New Meters	$33,078	$34,632	$36,408	$38,184	$142,302
601	Total Transformers and Meters	$382,300	$412,235	$433,058	$454,685	$1,682,278

2.2 Service Changes to Existing Members

Historical information was reviewed for a 24-month period from calendar years 2012 and 2013 to project service drop upgrades to existing members for the CWP period. The historical number of services was not increased for the 2015–2018 CWP period.

GRECC is also actively removing idle transformers from across the system and adding those transformers with sufficient useful life back to stock. As a result, it was estimated that only 50% of the transformers projected for replacement during the 2015–2018 CWP period would need to be purchased.

In addition, GRECC will need to replace approximately 12,408 of their existing AMI meters during the 2015–2018 CWP period, because the manufacturer has discontinued the production and support of this model.

The historical costs for the projected service drops, transformers and meter replacements were inflated by 5% per year.

Table 2-3
Construction Required for Service Changes to Existing Members

Estimated 48-Month Work Period						
Service Charges to Existing Members	Average 2012-2013	2015	2016	2017	2018	TOTAL
Service Drop Upgrades						
Number of Service Drop Upgrades						
Underground	24	24	24	24	24	96
Overhead	31	31	31	31	31	124
TOTAL SERVICE UPGRADES	55	55	55	55	55	220

Estimated 48-Month Work Period						
Service Charges to Existing Members	Average 2012-2013	2015	2016	2017	2018	TOTAL
Average Cost/Service Drop Upgrade						
Underground	$2,123	$2,257	$2,370	$2,488	$2,613	$2,432
Overhead	$1,450	$1,578	$1,657	$1,739	$1,826	$1,700
Cost of Service Drop Upgrades						
Underground	$50,952	$54,168	$56,880	$59,712	$62,712	$233,472
Overhead	$44,950	$48,918	$51,367	$53,909	$56,606	$210,800
TOTAL COST OF SERVICE UPGRADES	$95,902	$103,086	$108,247	$113,621	$119,318	$444,272
Number of Transformer Replacements						
Underground	0	0	0	0	0	0
Overhead	199	100	100	100	100	400
Total Transformer Replacements	199	100	100	100	100	400
Average Cost/Transformer Replacement						
Underground	$0	$0	$0	$0	$0	$0
Overhead	$1,619	$1,740	$1,827	$1,919	$2,015	$1,875
Cost of Transformers						
Underground	$0	$0	$0	$0	$0	$0
Overhead	$322,181	$174,000	$182,700	$191,900	$201,500	$750,100
TOTAL COST OF TRANSFORMER REPLACEMENTS	$322,181	$174,000	$182,700	$191,900	$201,500	$750,100
Number of Meter Replacements						
Underground	0	0	0	0	0	0
Overhead	0	3,102	3,102	3,102	3,102	12,408
Total –Meter Replacements	3,102	3,102	3,102	3,102	3,102	12,408
Average Cost/Meter Replacement						
Underground	$0	$0	$0	$0	$0	$0
Overhead	$149	$156	$164	$172	$160	$149
Cost of Meters						
Underground	$0	$0	$0	$0	$0	$0
Overhead	$0	$462,198	$483,912	$508,728	$533,544	$1,988,382
TOTAL COST OF METER REPLACEMENTS	$0	$462,198	$483,912	$508,728	$533,544	$1,988,382

Table 2-4
Summary of Costs for Service Changes

RUS Code	Category Description	2015	2016	2017	2018	TOTAL
602	UG Service Drops	$54,168	$56,880	$59,712	$62,712	$233,472
602	OH Service Drops	$48,918	$51,367	$53,909	$56,606	$210,800
602	Total Service Drops	$103,086	$108,247	$113,621	$119,318	$444,272
601	UG Transformer Replacements	$0	$0	$0	$0	$0
601	OH Transformer Replacements	$174,000	$182,700	$191,900	$201,500	$750,100
601	Meters – Replacements	$462,198	$483,912	$508,728	$533,544	$1,988,382
601	Total Transformer & Meter Replacements	$636,198	$666,612	$700,628	$735,044	$2,738,482

2.3 Poles

GRECC replaces all poles found to be physically deteriorated by inspection. An average of 422 poles per year required replacement during the 24-month period from calendar years 2012 and 2013. For the CWP period, shown in Table 2-5, it was estimated that a total of 1,688 poles will be replaced due to poor physical condition.

Table 2-6 shows a summary of pole replacement cost for the 2015–2018 CWP period. The historical number of poles was not increased, but the costs were inflated by 5% per year.

Table 2-5
Poles

	Estimated 48-Month Work Period					
	Average 2012-2013	2015	2016	2017	2018	TOTAL
Pole Replacements						
Number of Pole Replacements	422	422	422	422	422	1,688
Average Cost/Pole Replacement	$3,134	$3,340	$3,507	$3,682	$3,866	$3,599
TOTAL COST OF POLES	$1,322,548	$1,409,480	$1,479,954	$1,553,804	$1,631,452	$6,074,690

Table 2-6
Summary of Costs for Pole Replacements

RUS Code	Category Description	2015	2016	2017	2018	TOTAL
606	Total Pole Replacements	$1,409,480	$1,479,954	$1,553,804	$1,631,452	$6,074,690

2.4 Security Lights

For the 24-month period from calendar years 2012 and 2013, GRECC has installed an average of 222 security lights per year at an average cost of $529 each. GRECC estimates that the cost will increase 5% a year during the CWP period, shown in Table 2-7. A summary of the security light costs for the CWP period is given in Table 2-8.

Table 2-7
Miscellaneous Construction

Estimated 48-Month Work Period						
	Average 2012-2013	2015	2016	2017	2018	TOTAL
Security Lights						
Number of Security Lights	222	222	222	222	222	888
Average Cost/Security Lights	$529	$589	$619	$650	$682	$635
TOTAL COST OF SECURITY LIGHTS	$117,438	$130,758	$137,418	$144,300	$151,404	$563,880

Table 2-8
Summary of Costs for Miscellaneous Construction

RUS Code	Category Description	2015	2016	2017	2018	TOTAL
701	Security Lights	$130,758	$137,418	$144,300	$151,404	$563,880

2.5 Conversion and Line Changes

Conversion and line changes to existing lines were recommended to reduce voltage drop or relieve conductor loading. Switching load to other feeders was also evaluated when appropriate. Line regulators were considered as an alternative to improve voltage drop problems; however, no more than two line regulators were used in series.

Line and equipment costs were inflated by 5% per year based on the anticipated year of construction. Costs of carry-over projects were updated based on the existing line and equipment costs. The following conversions and line changes were recommended for the 2015–2018 CWP.

Airport Road – Circuit 2

RUS funds are not requested **LL1**

Description: Transfer the following single-phase taps:

Element Name	From	To
OH7113	A	B
OH7111	A	C
OH4306	A	B
OH3876_12	A	B

This project is recommended to finalize a recently completed multi-phase project and improve voltage less than 118 V in winter peak loading conditions. Before improvements, voltage sections on Airport Road Circuit 2 were as low as 114.9 V by the end of the work plan. With the recommended improvements, the voltage was improved to 118.5 V.

Sectionalizing: Device coordination was reviewed based on the recommended changes, and no improvements are required.

Alternatives: No alternative available.

Airport Road – Circuit 1

RUS CODE – 316 **$123,420 in LL1**

PROJECT NAME – Bruin

Description: Multi-phase and reconductor from single-phase 6 ACWC into three-phase 1/0 ACSR on line sections OH7127 to OH5601 and OH1660 to OH1688_3 for 1.38 miles. Open at line section OH1583 and transfer line section OH1688_3 to OH5601. This project is recommended to improve system reliability by creating a new tie between Airport Road Circuit 1 and Newfoundland Circuit 1.

Sectionalizing: Remove (1) 25-4H recloser OCD7128

Alternatives: No alternative available.

Airport Road – Circuit 2

RUS CODE – 371 (Modified Carry-Over) $238,770 in LL1

PROJECT NAME – Dudley

Description: Multi-phase and reconductor from single-phase 6 ACWC into three-phase 1/0 ACSR between overhead line sections OH3990_12 to OH4993_12 for 3.20 miles. This project is recommended to replace aging conductor and improve system reliability.

Sectionalizing: Add (3) 70-4H reclosers at line section OH3991_12 on the upgraded three-phase tap

Alternatives: No alternative available.

Airport Road – Circuit 3

RUS CODE – 301 $29,730 in LL1

PROJECT NAME – Rattlesnake Ridge

Description: Multi-phase from single-phase 4 ACSR into two-phase 1/0 ACSR on line section OH4896 with A and C phases for 0.37 miles. Transfer the following single-phase tap:

Element Name	From	To
OH4970_12	A	C

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Airport Road Circuit 3 were loaded up to 75 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing.

Sectionalizing: Add (1) 50-4H at recloser OCR-MaddixTrail

Alternatives: No alternative available.

Argentum – Circuit 1

RUS CODE – 302 **$145,860 in LL2**

PROJECT NAME – Schultz Road

Description: Multi-phase from single-phase to three-phase 1/0 ACSR from line section OH1388 to OH1699 on B and C phases for 1.9 miles. Transfer the following single-phase taps:

Element Name	From	To
OH7102	C	B
OH1633	B	C
OH1613	B	C

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Argentum Circuit 1 were loaded up to 90.8 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is strengthening a potential tie to Argentum Circuit 2.

Sectionalizing: Add (1) 70-4H at recloser OCD7028

Alternatives: No alternative available.

Argentum – Circuit 1

RUS CODE – 303 **$11,920 in LL3**

PROJECT NAME – Schultz Road to Sheep Hollow

Description: Multi-phase and reconductor from single-phase 4 ACSR to two-phase 1/0 ACSR from line section OH1456 to OH1509 with A and C phases for 800 feet. Transfer the following single-phase taps:

Element Name	From	To
OH1510	A	C

The project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Argentum Circuit 1 were loaded up to 90.8 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing.

Sectionalizing: Add (1) 50-4H at recloser OCD3668

Alternatives: No alternative available.

Argentum – Circuit 1

RUS CODE – 305 **$107,580 in LL1**

PROJECT NAME – Route 7

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR from line section OH1363 to OH928 for 1.38 miles. Transfer the following single-phase tap:

Element Name	From	To
OH457	B	A

The project is recommended to reduce single-phase loading, upgrade a single-phase tap for a proposed three-phase customer, and increase voltage on distribution that has been identified to have had low voltage. With the recommended improvements, the single-phase loading and voltage violation issues were alleviated through multi-phasing.

Sectionalizing and Regulation: Add (2) 70-4H reclosers at line section OCD7099 OH1329. Remove regulator "REG-Jacob's Lane" (See RUS Code 604-15).

Alternatives: No alternative available.

Argentum – Circuit 2

RUS funds are not requested **LL1**

Description: Transfer the following single-phase taps:

Element Name	From	To
OCD7046	A	B
MISAdd-195	B	C
MISAdd-233	B	C

This project is recommended to improve voltage less than 118 V in winter peak loading conditions. Before improvements, voltage sections on Argentum Circuit 2 were as low as 117.4 V by the end of the work plan. With the recommended improvements, the voltage was improved to 120.3 V.

Sectionalizing: Device coordination was reviewed based on the recommended changes, and no improvements are required.

Alternatives: No alternative available.

Argentum – Circuit 3

RUS CODE – 306 **$18,990in LL1**

PROJECT NAME – Timberlake Meadows

Description: Multi-phase and reconductor from single-phase 6 ACWC to three-phase 1/0 ACSR from line section OH686 to OH581 for 0.27 miles. Transfer the following single-phase taps:

Element Name	From	To
OH629	C	A
OH584	C	B

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Argentum Circuit 3 were loaded up to 72.8 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing.

Sectionalizing: Device coordination was reviewed based on the recommended changes, and no improvements are required.

Alternatives: No alternative available.

Argentum – Circuit 3

RUS funds are not requested **LL1**

Description: Transfer the following single-phase taps:

Element Name	From	To
MISAdd-118	B	C

This project is recommended to improve voltage less than 118 V in winter peak loading conditions. Before improvements, voltage sections on Argentum Circuit 3 were as low as 108.8 V by the end of the work plan. With the recommended improvements, the voltage was improved to 118 V.

Regulation: Install a three-phase, 219 amp regulator at the source end of section OH375 to improve voltage on downstream line sections. (See RUS CODE 604-1).

Alternatives: No alternative available.

Carter City – Circuit 4

RUS CODE – 375 **$166,700 in LL3**

PROJECT NAME – Lost Creek (Modified Carry-Over)

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR for 2.0 miles between overhead line sections OH1445_10 and OH1252_10. Transfer the following single-phase taps:

Element Name	From	To
OH1413_10	C	A
OCR-0000530000048003	C	B

The minimum voltage was calculated to be 118.5 V. With the recommended improvements, the voltage improves to 118.8 V.

Sectionalizing: Add (2) 35-4H reclosers at OCR-LostCK2 on the upgraded three-phase tap along with the recommended multi-phasing.

Alternatives: No alternative available.

Elliottville – Circuit 1

RUS CODE – 378 **$255,780 in LL2**

PROJECT NAME – Route 173 (Modified Carry-Over)

Description: Multi-phase and reconductor from single-phase 6 ACWC to three-phase 1/0 ACSR from line section OH1073_7 to OH971_7 for 3.0 miles. Transfer the following single-phase taps:

Element Name	From	To
OH1108_7 (Rt. 32 feed)	B	A
OH1080_7	B	A
OH2120_7	B	A
OH972_7	B	C

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Elliottville Circuit 1 were loaded up to 107 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing.

Sectionalizing: Change 70L recloser into a triple single recloser at section MISADD-493. Add a 25-4H recloser at section OH1108_7. Add a 50 4H recloser at section OH972_7. Add a 35 4H OCR at section OH2120_7.

Alternatives: No alternative available.

Elliottville – Circuit 2

RUS funds are not requested **LL2**

Description: Transfer the following single-phase taps:

Element Name	From	To
OCR-1371	A	B
MISAdd-585	C	A

This project is recommended to relieve conductor loading greater than 80% in winter peak loading conditions. Before improvements, sections on Elliottville Circuit 3 were loaded up to 86.0%. With the recommended improvements, the conductor loading issue was reduced to 72.9%.

Sectionalizing: Device coordination was reviewed based on the recommended changes, and no improvements are required.

Alternatives: No alternative available.

Elliottville – Circuit 3

RUS funds are not requested **LL1**

Description: Transfer the following single-phase taps:

Element Name	From	To
MISAdd-371	A	C
OCD7597	C	A
MISAdd-1149	C	A
OCD7212	B	C
OCD10018	A	B
OCD10107	A	B
MISAdd-548	A	B
MISAdd-597	B	A

This project is recommended to relieve conductor loading greater than 80% in winter peak loading conditions. Before improvements, sections on Elliottville Circuit 3 were loaded up to 83.5%. With the recommended improvements, the conductor loading issue was reduced to 71.6%.

Sectionalizing: Device coordination was reviewed based on the recommended changes, and no improvements are required.

Alternatives: No alternative available.

Low Gap – Circuit 2

RUS CODE – 307 **$174,970 in LL2**

PROJECT NAME – Alcorn Road

Description: Multi-phase and reconductor single-phase 6 ACWC with three-phase 1/0 ACSR from line section OH504_11 to OH194_11 for 2.1 miles. Transfer the following single-phase taps:

Element Name	From	To
OH318_11	C	A
OH387_11	C	B

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Low Gap Circuit 2 were loaded up to 78.5 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is recommended to replace aging overhead lines.

Sectionalizing: Remove 70-4H recloser at section OCD7030. Add a 35-4H recloser at section OH387_11. Add a 25-4H recloser at OH372_11 and OH319_11.

Alternatives: No alternative available.

Mazie – Circuit 2

RUS CODE – 309 **$232,790 in LL4**

PROJECT NAME – Cains Creek

Description: Multi-phase and reconductor from single-phase 1/0 ACSR to three-phase 1/0 ACSR from line section OH7168 to OH1055 for 2.56 miles. Transfer the following single-phase taps:

Element Name	From	To
OCD7172	A	C
MISAdd-935	A	C
OH1096	C	B
MISAdd-946	B	A
MISAdd-947	B	A
OH1094_4	C	A

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Mazie Circuit 2 were loaded up to 61.3 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is recommended to replace aging overhead lines.

Sectionalizing: Add (2) 50-4H recloser at OCD7169. Add a 25-4H recloser at OH1096 and OH1094_4.

Alternatives: No alternative available.

Mazie – Circuit 2

RUS CODE – 385 **$120,980 in LL3**

PROJECT NAME – Route 201 South at Blaine (Modified Carry-Over)

Description: Multi-phase from single-phase 1/0 ACSR to two-phase 1/0 ACSR for 1.5 miles between overhead line sections OH2560_4 and OH2886_4. Single-phase tap OH2872_4 remains on B phase while all other load is moved to A phase. The project is recommended to relieve single-phase loading greater than 50 amps and voltage as low as 116.8 V in winter peak loading conditions. With the recommended improvements, the single-phase loading is relieved and the voltage improves to 118.5 V.

Sectionalizing: Add (2) 35-4H reclosers on the upgraded two-phase tap along with the recommended multi-phasing

Alternatives: No load transfers are available on this radial circuit.

Newfoundland – Circuit 1

RUS CODE – 310 **$606,270 in LL1**

PROJECT NAME – Stark Ridge Road

Description: Multi-phase and reconductor from single-phase 4 ACWC to three-phase 1/0 ACSR from line section OH2601_3 to OH3264_7 for 8.2 miles. Transfer the following single-phase taps:

Element Name	From	To
MISAdd-1067	C	A
MISAdd-1019	A	C
OH2786_3	B	A

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Newfoundland Circuit 3 were loaded up to 54.2 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is recommended to replace aging overhead lines and strengthen the tie between Newfoundland Circuit 1 and Elliottville Circuit 4.

Sectionalizing: Add (2) 50-4H reclosers at OCD11032. Replace fuses at MISAdd-463 with (3) 50-4H reclosers to match the recloser on the adjoining tap. Remove recloser at OCD7121, and open circuit. Close switch SW004-A.

Alternatives: No alternative available.

Newfoundland – Circuit 2

RUS funds are not requested **LL1**

Description: Transfer the following single-phase taps:

Element Name	From	To
OH1347	C	B

This project is recommended improve voltage less than 118 V in winter peak loading conditions. Before improvements, voltage sections on Newfoundland Circuit 2 were as low as 117.3 V by the end of the work plan. With the recommended improvements, the voltage was improved to 120.2 V.

Sectionalizing: Device coordination was reviewed based on the recommended changes, and no improvements are required.

Alternatives: No alternative available.

Pactolus – Circuit 1

RUS CODE – 311 **$80,490 in LL2**

PROJECT NAME – Route 7 at Iron Hill

Description: Multi-phase and reconductor from single-phase 3/0 ACSR to three-phase 1/0 ACSR from line section OH2052_8 to OH2062_8 for 1.0 miles. Transfer the following single-phase taps:

Element Name	From	To
OCR-0000530205077045	C	B
OH6973	C	A

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Newfoundland Circuit 3 were loaded up to 124.0 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is recommended to replace aging overhead lines.

Sectionalizing: Move 50-4H recloser form node OCR-0000530205077042 to line section OH6709.

Alternatives: No alternative available.

Pactolus – Circuit 4

RUS CODE – 312 **$107,060 in LL2**

PROJECT NAME – Campbell Lane Estates

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR from line section OH217_8 to OH199 for 1.3 miles. Transfer the following single-phase taps:

Element Name	From	To
OH29849	B	C

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Pactolous Circuit 4 were loaded up to 86.5 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is recommended to replace aging overhead lines.

Sectionalizing: Add (2) 70L reclosers at section OCR-0000631303015043.

Alternatives: No alternative available.

Pelfrey – Circuit 1

RUS CODE – 313 **$6,760 in LL4**

PROJECT NAME – Prater Road

Description: Reconductor from three-phase 4 ACSR to three-phase 3/0 ACSR on line section OH4697 for 520 feet. Transfer the following single-phase taps:

Element Name	From	To
MISAdd-1441	A	B
OH9504	A	B
MISAdd-1417	B	A
MISAdd-1410	C	A
MISAdd-1432	A	C

This project is recommended to relieve conductor loading greater than 80% in winter peak loading conditions. Before improvements, single-phase sections on Pelfrey Circuit 1 were loaded up to 97.4%. With the recommended improvements, the conductor loading issue was reduced to 80.6%.

Sectionalizing: Device coordination was reviewed based on the recommended changes, and no improvements are required.

Alternatives: No alternative available.

Pelfrey – Circuit 2

RUS CODE – 314 **$68,310 in LL4**

PROJECT NAME – US 60 at Bailey Hollow

Description: Multi-phase and reconductor from single phase 4 ACSR to three-phase 1/0 ACSR from line section OH5638 to OH5471 for 0.6 miles. Transfer the following single-phase taps:

Element Name	From	To
OH5474	A	B
OH5527	A	C

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Pelfrey Circuit 2 were loaded up to 69.5 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is recommended to replace aging overhead lines.

Sectionalizing: Replace single 35-4H with (3) 50-4H reclosers at recloser OCD7091.

Alternatives: No alternative available.

Sandy Hook – Circuit 1

RUS funds are not requested **LL1**

Description: Transfer the following single-phase taps:

Element Name	From	To
MISAdd-1533	A	C
MISAdd-1513	C	A

This project is recommended to improve voltage less than 118 V in winter peak loading conditions. Before improvements, voltage on sections Sandy Hook Circuit 1 were as low as 113.4 V. With the recommended improvements, the voltage was improved to 118 V.

Regulation: Install a three-phase, 219 amp regulator REG10463 at the source end of section OH167_9 to improve voltage on downstream line sections. (See RUS Code 604-12)

Alternatives: No alternative available.

Warnock – Circuit 1

RUS funds are not requested **LL1**

Description: Transfer the following single-phase taps:

Element Name	From	To
OCD7048	B	C
MISAdd-1647	C	B
OCD7118	C	A

This project is recommended to improve voltage less than 118 V in winter peak loading conditions. Before improvements, voltage on sections Sandy Hook Circuit 1 were as low as 105.4 V. With the recommended improvements, the voltage was improved to 119.1 V.

Regulation: Install a three-phase 100 amp regulator REG10464 at the source end of section OH663_6 to improve voltage on downstream line sections. (See RUS Code 604-13)

Alternatives: No alternative available.

Warnock – Circuit 4

RUS CODE – 315 **$357,000 in LL1**

PROJECT NAME – Montgomery Road

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR from line section OH2589_6 to OH15820 for 5.0 miles. Transfer the following single-phase taps:

Element Name	From	To
OCD7047	C	A
OCD10097	C	A
OH2904_6	C	A
OH2640_6	C	A
OCR-0000625101012001	A	C
MISAdd-1797	A	C
OCR-0000530105009001	A	B
MISAdd-1804	A	B

This project is recommended to relieve single-phase loading greater than 50 amps in winter peak loading conditions. Before improvements, single-phase sections on Warnock Circuit 4 were loaded up to 96.1 amps. With the recommended improvements, the single-phase loading issue was alleviated through multi-phasing. Also, the project is recommended to replace aging overhead lines.

Sectionalizing: Add one 70-4H to existing recloser OCR-0000524000074010.

Alternatives: No alternative available.

Total RUS Code 300 $2,853,380

2.6 Sectionalizing Equipment

The findings and recommendations of the 2014 Distribution System Coordination Study were reviewed during the development of each project included in this CWP, and the reclosers, fuses, and other devices required were included in the RUS Code 300 projects. The remaining device additions and upgrades recommended in the 2014 Distribution System Coordination Study and the estimated installed cost are summarized below:

Modification	Estimated Cost (2014 $'s)	Quantity	Total Cost (2014 $'s)
Install (1) 1ϕ recloser	$5,000	135	$675,000
Install (3) 1ϕ recloser	$13,000	26	$338,000
Install (1) 3ϕ recloser	$38,000	7	$266,000
Relocate (1) recloser	$6,000	21	$126,000
Remove (1) recloser	$3,000	30	$90,000
Totals		219	$1,495,000

The cost of the sectionalizing equipment was equally spread over the 2015–2018 CWP period and inflated 5% per year.

Table 2-9
Sectionalizing Equipment

RUS Code	Category Description	2015	2016	2017	2018	TOTAL
603	Sectionalizing Equipment	$392,438	$412,065	$432,665	$454,295	$1,691,463

Total RUS Code 603 $1,691,463

2.7 Line Regulators

Specific locations for line regulators were identified to correct voltage drop problems as an alternative solution when switching was not feasible or reconductoring was more expensive and not necessary due to lightly loaded circuits. The total estimated cost was inflated 5% per year to the recommended year of the 2015–2018 CWP.

Argentum – Circuit 1

RUS CODE – 604-4 **$44,100 in LL1**

PROJECT NAME – Schultz Road

Description: Install a three-phase 100 amp regulator at the source end of section OH1454 to improve voltage on downstream line sections. Before improvements, the voltage in line section OH1827 was calculated to be 109.8 volts. With the recommended improvements, the voltage was improved to 121.6 volts. Results include the improvements associated with RUS Code 300 projects.

Argentum – Circuit 1

RUS CODE – 604-15 **$3,150 in LL1**

PROJECT NAME – Jacob's Lane

Description: Remove the single-phase, 100 amp regulator "REG-Jacob's Lane" from end of overhead line section OH1356. (See RUS Code 305)

Argentum – Circuit 3

RUS CODE – 604-1 **$55,650 in LL1**

PROJECT NAME – East Tygart

Description: Install a three-phase, 219 amp regulator at the source end of section OH375 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 108.8 V. With the recommended improvements, the voltage was improved to 118 V. Results include the improvements associated with RUS Code 300 projects.

Elliottville – Circuit 3

RUS CODE – 604-2 **$98,460 in LL4**

PROJECT NAME – CCC Trail

Description: Change regulator REG5756 into 100 amp size and remove regulator REG59. Install 3-phase, 219 amp regulator at line section OH174_7. All the improvements improve voltage on downstream line sections and regulator capacity percentage. Before improvements, the voltage was calculated to be 111.6 V. With the recommended improvements, the voltage was improved to 123.3 V. Also, the capacity percentage was improved from 103.0% to 74.3% and from 123% to 84.3%. Results include the improvements associated with RUS Code 300 projects.

Elliottville – Circuit 4

RUS CODE – 604-3 **$26,250 in LL1**

PROJECT NAME – Macabee Creek

Description: Install a single-phase, 100 amp regulator at the source end of section OH3355_7 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 115.6 V. With the recommended improvements, the voltage was improved to 123.4 V.

Mazie – Circuit 1

RUS CODE – 604-5 **$12,600 in LL1**

PROJECT NAME – Peter's Hill

Description: Install a single-phase, 50 amp regulator at the source end of section OH7167 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 115.1 V. With the recommended improvements, the voltage was improved to 120.8 V.

Newfoundland – Circuit 1

RUS CODE – 604-7 **$51,050 in LL4**

PROJECT NAME – Bruin Road

Description: Install a three-phase, 100 amp regulator at the source end of section OH1806 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 114.1 V. With the recommended improvements, the voltage was improved to 119.3 V. Results include the improvements associated with RUS Code 310.

Newfoundland – Circuit 4

RUS CODE – 604-8 **$26,250 in LL1**

PROJECT NAME – North Ruin

Description: Install a single-phase, 100 amp regulator at the source end of section OH843_3 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 114.9 V. With the recommended improvements, the voltage was improved to 120.7 V.

Pactolus – Circuit 1

RUS CODE – 604-9 **$14,590 in LL4**

PROJECT NAME – Iron Hill

Description: Install a single-phase, 50 amp regulator at the source end of section OH6709 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 106.9 V. With the recommended improvements, the voltage was improved to 123.9 V. Results include the improvements associated with RUS Code 311.

Pactolus – Circuit 4

RUS CODE – 604-10 **$44,100 in LL1**

PROJECT NAME – Route 1 at Lost Creek

Description: Install a three-phase, 100 amp regulator at the source end of section OH1219_8 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 115.4 V. With the recommended improvements, the voltage was improved to 123.5 V. Results include the improvements associated with RUS Code 312.

Pelfrey – Circuit 1

RUS CODE – 604-11 **$73,870 in LL2**

PROJECT NAME – Prater Road

Description: Install a single-phase, 100 amp regulator at the source end of section OH29982 and a three-phase, 100 amp regulator at the source end of section OH5928 to improve voltage on downstream line sections. Before improvements, the was calculated to be 110.1 V. With the recommended improvements, the voltage was improved to 120.1 V. Results include the improvements associated with RUS Code 313.

Sandy Hook – Circuit 1

RUS CODE – 604-12 **$55,650 in LL1**

PROJECT NAME – Route 7 at Wells Creek

Description: Install a three-phase, 219 amp regulator at the source end of section OH167_9 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 113.4 V. With the recommended improvements, the voltage was improved to 118.0 V. Results include the improvements associated with RUS Code 300 projects.

Warnock– Circuit 1

RUS CODE – 604-13 **$44,100 in LL1**

PROJECT NAME – Big White Oak

Description: Install a three-phase, 100 amp regulator REG10464 at the source end of section OH663_6 to improve voltage on downstream line sections. Before improvements, the voltage in line section OH1658_6 was calculated to be 105.4 V. With the recommended improvements, the voltage was improved to 119.1 V. Results include the improvements associated with RUS Code 300 projects.

Warnock– Circuit 4

RUS CODE – 604-14 **$44,100 in LL1**

PROJECT NAME – Leatherwood

Description: Install a three-phase, 100 amp regulator at the source end of section OH2117_6 to improve voltage on downstream line sections. Before improvements, the voltage was calculated to be 101.7 V. With the recommended improvements, the voltage was improved to 122.7 V. Results include the improvements associated with RUS Code 315.

Total RUS Code 604 $593,920

2.8 Geographic Information Systems

The current mapping system is adequate; but improvements are needed to upgrade the system's accuracy and transition to a newer technology. An estimate for the GPS inventory and GIS implementation was prepared jointly with GRECC, based on 16,258 meters, 36,696 poles, 16,258 service poles, and 2,446 miles of line. The estimate includes the software, hardware, installation and training for a new GIS mapping system from Milsoft Integrated Solutions, Inc., and a GPS inventory of the existing electric system assets. The RUS Guide for GIS and the project estimate is given in Appendix F of this report.

GPS Inventory & GIS Implementation

RUS CODE – 1501 **$800,930 total in LL3 / LL4**

Description: GPS inventory of the existing electric system assets and the implementation of WindMilMap. The total cost for the project was estimated between $717,000 and $1,000,000 in 2014 dollars. The RUS funds requested are based on the average of this estimated range. Since the project is anticipated to require two years to complete, the cost was split between years 1 and 2, with the appropriate inflation.

Total RUS Code 1501 $800,930

Section 3
ECONOMIC CONDUCTOR SELECTION

The data contained in this section details the assumptions that were used in the economic analysis of alternatives and economic conductor sections of this report.

3.1 Interest Rates

Based on discussions between GRECC staff and Leidos and recent electric facility construction cost trends, for the study period, an inflation rate of 5.0% was chosen for distribution upgrades.

3.2 Annual Fixed Charge Rates

Annual fixed charge rates were developed based on GRECC's 2011–2013 operation and maintenance expense of the installed plant and an interest rate as previously developed. The annual fixed charge rates used are summarized in Table 3-1.

Table 3-1
Summary of Assumed Annual Fixed Charge Rates

Item	Plant[1]		
	Transmission	Substation	Distribution
Cost of Capital	2.50%	2.50%	2.50%
Depreciation	2.50%	2.00%	3.00%
Operation and Maintenance[2]	2.00%	3.00%	7.07%
Taxes	0.05%	0.05%	0.05%
Insurance	0.05%	0.05%	0.05%
TOTAL	7.11%	7.61%	12.68%

Notes:
1. Rates expressed as a percent of original installed cost.
2. Transmission and substation O & M cost are assumed values.

3.3 Cost of Power

The cost of power in 2013 was $0.073 per kWh, based on information provided by GRECC. It is anticipated that trends for the current market will increase power costs during the planning period; therefore, power costs were assumed to increase at a rate of 5%.

3.4 Cost of Losses

The cost of losses was calculated based on the wholesale power cost of $0.073 per kWh. The wholesale power costs were obtained from the Form 7 2013. The calculated cost of losses was based on an average of the 2011, 2012, and 2013 monthly billing demands and an average annual load factor of 49.81%. The cost of losses to carry 1 kW of loss at peak is $184.22. The calculation is given in Exhibit 5.

3.5 Economic Conductor Selection

Economic conductor selection 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 at which the fixed costs associated with the construction plus the variable costs related to line losses are equal for the two alternatives. For loads less than the equal cost load, the smaller conductor should be selected, and for loads greater than such load, the larger conductor would be selected. There are many choices of conductor sizes, but as part of system operation, standard conductor sizes for overhead construction of #2 ACSR, 1/0 ACSR, 3/0 ACSR, 336 ACSR, and 397 ACSR have been selected by GRECC.

Since a distribution line is used for many years, economic conductor selection should include the consideration of the initial load, load growth, cost of losses, increases in power cost, the annual fixed cost, and the present worth of the dollars spent.

The load on the distribution line considered was expressed as the current annual peak load and was assumed to grow over the life cycle analyzed. The cost of power was assumed to remain constant and a thirty-year present-worth factor was developed for the cost of losses and for the annual fixed cost.

Two basic conditions arise as alternatives are compared. The first, and most often encountered alternative, is the timing of the conversion of an existing distribution line. The question is simply a comparison of which is more economical for the next year. Thus, based on economics alone, the existing distribution line should remain as long as the annual cost of the losses on the existing line is less than the annual cost of the losses, plus fixed costs on the new line. Generally, voltage-drop problems require conversion prior to economics.

The second alternative arises when a new line is to be constructed or an existing line must be changed for reasons other than economic conductor selection. Such conditions include voltage drop, system changes, and reliability. Economic conductor selection analyses were performed and a summary for new construction and change-out was prepared.

General guidelines were developed based on the following assumptions.

- Compound annual load growth 1.23%
- Annual cost of peak kW losses $184.22/kW
- Compound annual power cost increase 5.0%

- Fixed cost factor 12.68%
- Present-worth discount factor 5.0%
- Distribution line cost estimates in Table 1-2

3.5.1 12.47/7.2 kV Operating Voltage

The following general guidelines were developed based upon the analysis described previously for overhead conductors at an operating voltage of 12.47/7.2 kV.

New single-phase distribution lines should generally be constructed with #1/0 ACSR if the load on the line will potentially grow to require conversion to three phase. If the load will not grow requiring conversion to three phase, #2 ACSR is adequate for single-phase construction for loads less than 275 kW.

The single-phase #1/0 ACSR lines should be converted to three-phase #1/0 ACSR based upon operating conditions and voltage drop.

Existing three-phase distribution lines should be reconductored based on the following:

- For loads less than 1,375 kW: 1/0 ACSR
- For loads greater than 1,375 kW and less than 1,875 kW: 3/0 ACSR
- For loads greater than 1,875 kW and less than 3,250 kW: 336 ACSR
- For loads greater than 3,250kW: 397 ACSR

New three-phase 12.47 kV distribution lines should be constructed with the following conductors at the initial load given as follows:

- For loads less than 1,625 kW: 1/0 ACSR
- For loads greater than 1,625 kW and less than 2,375 kW: 3/0 ACSR
- For loads greater than 2,375 kW and less than 3,500 kW: 336 ACSR
- For loads greater than 3,500 kW: 397 ACSR

Economic conductor selection curves for overhead conductors are graphically presented in Figures 3-1 through 3-4. The economic conductor selection curves and guides should be updated periodically based on changes in construction cost, power cost, or fixed operating cost.

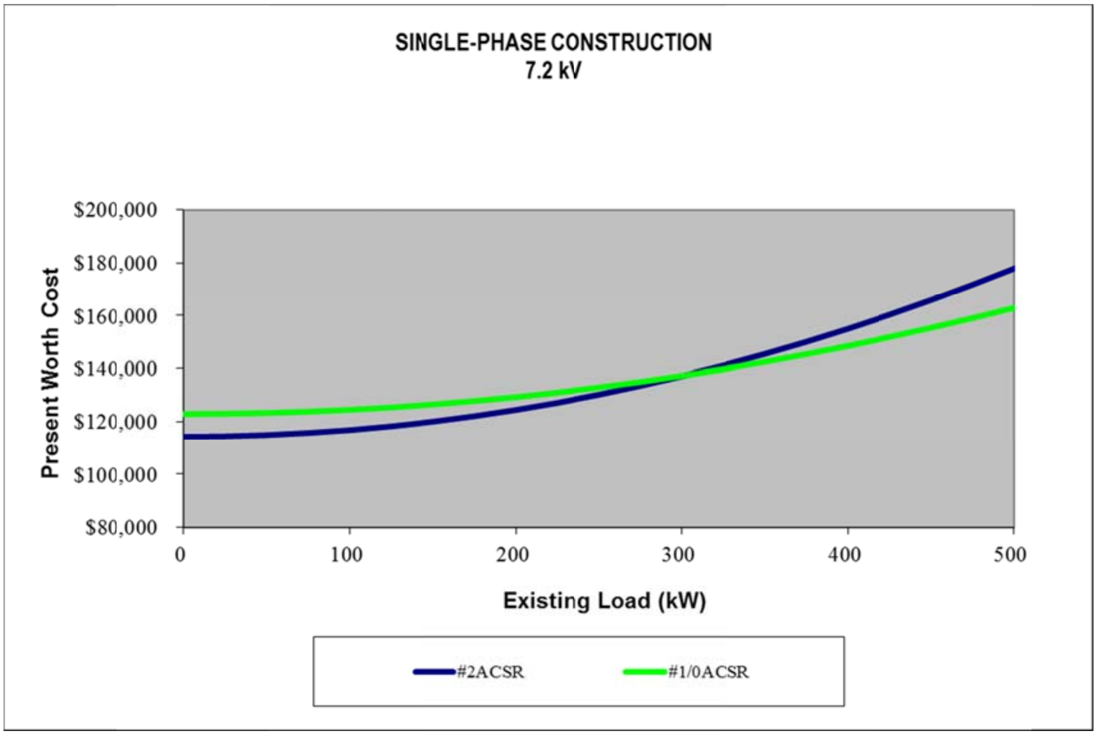

Figure 3-1. Single-Phase Construction 7.2 kV

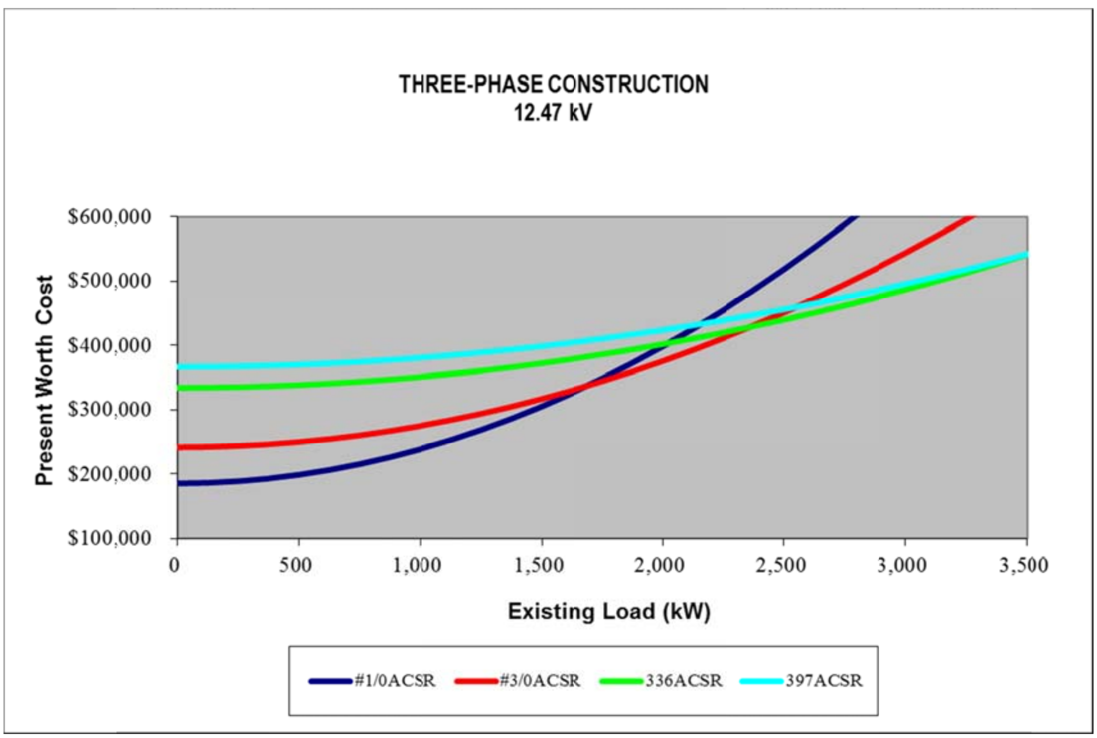

Figure 3-2. Three-Phase Construction 12.47 kV

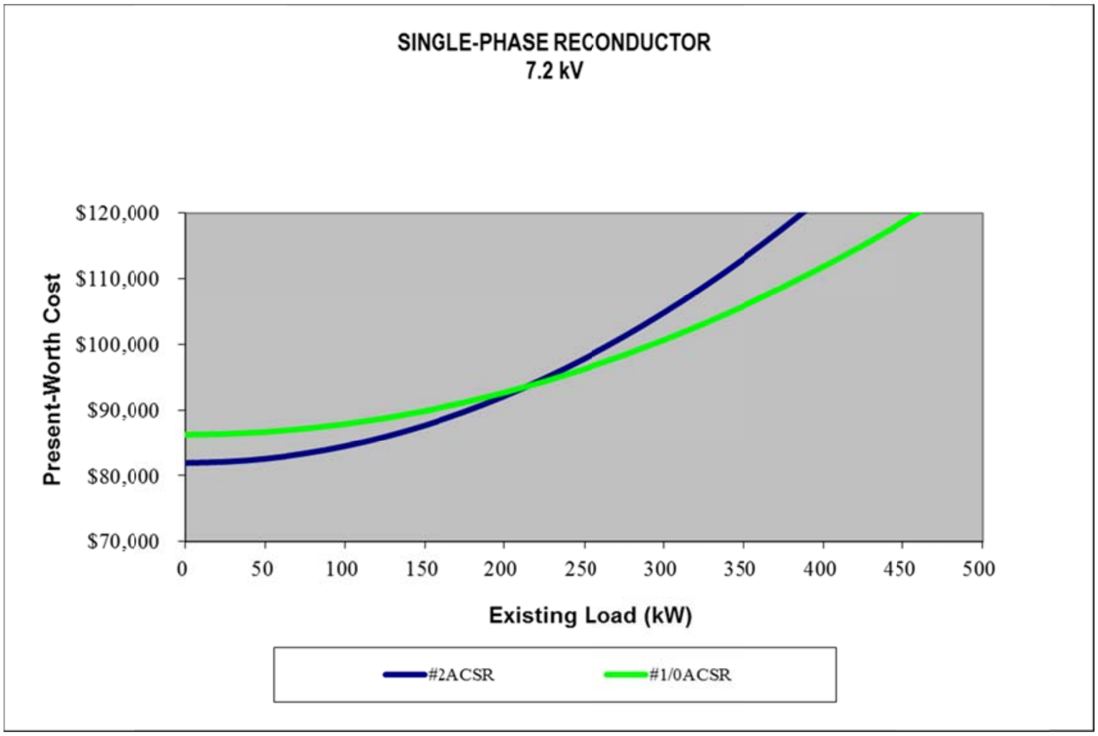

Figure 3-3. Single-Phase Reconductor 7.2 kV

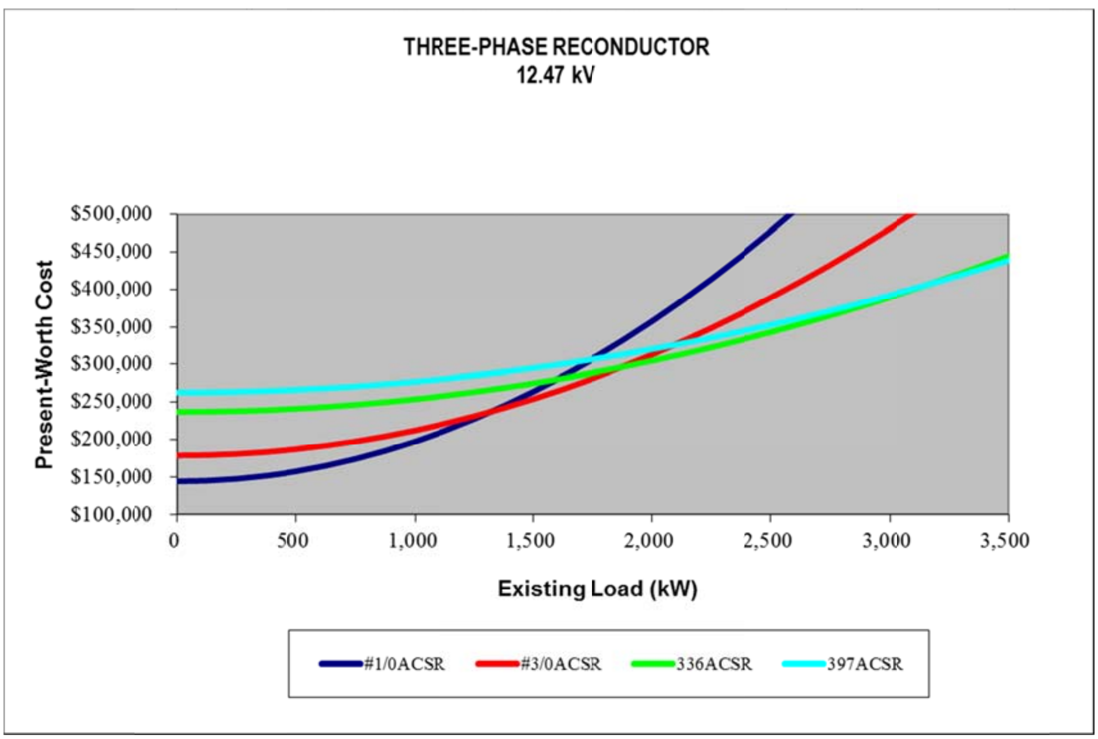

Figure 3-4. Three-Phase Reconductor 12.47 kV

Appendix A
2012 EKPC CALCULATED SUBSTATION RATINGS

Substation Information

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	Station ID	Substation	Top Nameplate Transformer Rating		MVA Peaks				MVA Forecast					Power Factor Correction		Voltage Concerns (Based on 2011 Data)								Phase Imbalance**		Billing Exception	
2			Summer (MVA)	Winter (MVA)	2011S		2011/12 W		2012S		2012/13 W		Overload*	2011S PF	Proposed Correction	Hours Above 110% Nominal Voltage		Hours Leading		Hours Below 0.95 Lagging		Hours Below 0.9 Lagging		Winter	Summer	Billing Rating	Forecasted to Change?
3	61E097	AIRPORT ROAD	6.26	8.34	3.02	48%	3.02	36%	2.98	48%	4.37	52%	NONE	0.958	NONE	0	0%	0	0%	305	3%	3	0%	No Data	No Data	N/A	N/A
4	61E033	ARGENTUM	13.62	18.14	4.87	36%	4.72	26%	4.97	36%	6.91	38%	NONE	0.973	NONE	0	0%	2604	30%	1	0%	0	0%	No Data	No Data	N/A	N/A
5	61E080	CARTER CITY	13.62	18.14	5.32	39%	4.36	24%	5.45	40%	6.32	35%	NONE	0.907	NONE	0	0%	6038	69%	1267	14%	513	6%	No Data	No Data	N/A	N/A
6	61E105	ELLIOTT CO.	13.62	18.14	1.85	14%	2.36	13%	2.05	15%	2.57	14%	NONE	0.911	NONE	0	0%	0	0%	7037	80%	1861	21%	No Data	No Data	N/A	N/A
7	61E054	ELLIOTTVILLE	13.62	18.14	6.66	49%	7.08	39%	6.76	50%	10.12	56%	NONE	0.974	NONE	247	3%	5031	57%	0	0%	0	0%	No Data	No Data	N/A	N/A
8	61E032	LEON	13.62	18.14	2.32	17%	3.39	19%	2.34	17%	4.97	27%	NONE	0.939	NONE	176	2%	29	0%	3047	35%	524	6%	No Data	No Data	N/A	N/A
9	61E096	LOW GAP	5.59	7.45	4.34	78%	4.17	56%	4.45	80%	5.47	73%	NONE	0.962	NONE	2	0%	95	1%	14	0%	0	0%	No Data	No Data	N/A	N/A
10	61E029	MAZIE	6.26	8.34	3.75	60%	4.99	60%	3.86	62%	5.17	62%	NONE	0.966	NONE	8	0%	10	0%	1	0%	1	0%	No Data	No Data	N/A	N/A
11	61E031	NEWFOUNDLAND	13.62	18.14	4.21	31%	4.33	24%	4.29	31%	6.30	35%	NONE	0.947	NONE	0	0%	0	0%	855	10%	1	0%	No Data	No Data	N/A	N/A
12	61E074	PACTOLUS	13.62	18.14	9.02	66%	8.32	46%	10.71	79%	13.35	74%	NONE	0.912	NONE	0	0%	0	0%	6556	75%	4447	51%	4.25%	4.82%	N/A	N/A
13	61E043	PELFREY	6.26	8.34	3.88	62%	4.30	52%	3.99	64%	5.71	68%	NONE	0.936	NONE	96	1%	31	0%	901	10%	7	0%	No Data	No Data	N/A	N/A
14	61E078	SANDY HOOK	6.26	8.34	4.74	76%	5.46	66%	4.94	79%	7.47	90%	2022	0.933	NONE	0	0%	0	0%	3330	38%	102	1%	No Data	No Data	N/A	N/A
15	61E044	WARNOCK	13.62	18.14	4.70	35%	4.35	24%	4.69	34%	6.37	35%	NONE	0.959	NONE	3	0%	469	5%	1	0%	0	0%	No Data	No Data	N/A	N/A

16

17 *Year transformer overloads top nameplate rating.

18 **Highest loaded phase divided by average per phase loading.

19

20

21 Issues to Address

22 1)

Date Created: 10/01/2012
Date Revised: 10/11/2012

Appendix B
STATUS OF PREVIOUS CWP PROJECTS

Status of Previous CWP Projects

Code	Job Name	CWP Length	CWP Estimate	Actual Length	Actual Cost	Completed Date	Status
304	Ben's Run	3.50	$223,810		$370,014	2/22/2010	Complete
334/335	Big White Oak	5.00	$319,730		$240,425	2/26/2010	Complete
321	Brushy - Greenup Co.	2.60	$183,300			In Progress	To be Completed
371	Dudley	3.20	$225,600			In Progress	In Progress
373	Three Prong	2.20	$147,710			4/22/2013	Complete
374	Lower Grassy	3.20	$204,620		$230,790	4/19/2010	Complete
375	Lost Creek	2.00	$148,050				Carryover
376	Jordan Fork	1.80	$136,950			In Progress	To be Completed
377	Porter Creek	3.00	$201,430		$205,439	2/14/2011	Complete
378	Route 173	3.00	$211,500				Carryover
379	New Elliottville Circuit 4	1.70	$275,510		$205,047	1/18/2010	Complete
380	Rt. 519	5.00	$319,730		$434,181	12/31/2010	Complete
381	Riddle Fork	2.00	$134,280				Delete
383	Culp Creek	1.60	$101,130		$124,526	4/3/2011	Complete
384	Mills Branch	1.20	$89,640		$0		Delete
385	Route 201 South at Blaine	1.50	$94,810		$0		Carryover
386	Evermans Creek		$217,500		$191,980	7/9/2012	Amendment
387	Middle Fork (Right Fork)		$175,000		$142,229	1/6/2014	Amendment
606	Leon-Carter City (H-Structure)		$517,000		$405,085	10/11/2012	Amendment

Appendix C
SUBSTATION FORECAST

GRECC
(Winter) Substation Load Forecast

SUBSTATION / FEEDER NAME	TOTAL CAPACITY XFMR (MVA)	TOTAL CAPACITY REG (MVA)	RELATIVE GROWTH FACTOR	POWER FACTOR AT PEAK	2014 PEAK (MW)	PROJECTED LOADS (kW) LL1 2016	LL2 2017	LL3 2018	LL4 2019	LL5 2020	LL6 2021	LL7 2022	LL8 2023	LL9 2024	LL10 2025	LL11 2026	LL12 2027	LL13 2028	LL14 2029	LL15 2030	LL16 2031	LL17 2032	LL18 2033	LL19 2034	LL20 2035	COMP. ANNUAL GROWTH
PROJECTED SYSTEM NON-COINCIDENT PEAK					81.72	84.00	85.00	87.00	88.00	89.00	90.00	91.00	92.00	93.00	94.00	96.00	97.00	98.00	100.00	101.00	102.00	103.00	104.00	105.00	106.00	1.23%
Airport Road [3]	7.8	7.5	1.00	99%	4.10	4.21	4.26	4.37	4.42	4.47	4.52	4.57	4.63	4.68	4.73	4.83	4.88	4.94	5.04	5.09	5.14	5.19	5.25	5.30	5.35	1.27%
Feeder #1	3/0 ACSR	6.5	1.00	99%	1.65	1.70	1.72	1.76	1.78	1.80	1.83	1.85	1.87	1.89	1.91	1.95	1.97	1.99	2.03	2.05	2.08	2.10	2.12	2.14	2.16	1.27%
Feeder #2	3/0 ACSR	6.5	1.00	99%	2.41	2.48	2.51	2.57	2.60	2.63	2.66	2.69	2.72	2.75	2.78	2.84	2.87	2.90	2.96	2.99	3.02	3.05	3.08	3.12	3.15	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	99%	0.62	0.64	0.65	0.66	0.67	0.68	0.68	0.69	0.70	0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.79	0.80	0.81	1.27%
Total Feeder Load					4.68	4.81	4.87	4.99	5.05	5.11	5.17	5.23	5.29	5.35	5.41	5.52	5.58	5.64	5.76	5.82	5.88	5.94	6.00	6.05	6.11	-----
Substation Growth Factors						0.028	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					87.45%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	87.50%	-----
Argentum	18.3	23.4	1.00	100%	6.57	6.76	6.84	7.01	7.09	7.17	7.26	7.34	7.42	7.50	7.59	7.75	7.84	7.92	8.08	8.17	8.25	8.33	8.42	8.50	8.58	1.27%
Feeder #1	1/0 ACSR	5.0	1.00	100%	2.57	2.65	2.68	2.75	2.78	2.81	2.84	2.88	2.91	2.94	2.97	3.04	3.07	3.10	3.17	3.20	3.23	3.27	3.30	3.33	3.36	1.27%
Feeder #2	1/0 ACSR	5.0	1.00	100%	1.40	1.44	1.46	1.49	1.51	1.53	1.55	1.56	1.58	1.60	1.62	1.65	1.67	1.69	1.72	1.74	1.76	1.78	1.79	1.81	1.83	1.27%
Feeder #3	1/0 ACSR	5.0	1.00	100%	3.04	3.14	3.18	3.25	3.29	3.33	3.37	3.41	3.45	3.49	3.52	3.60	3.64	3.68	3.75	3.79	3.83	3.87	3.91	3.95	3.99	1.27%
Total Feeder Load					7.01	7.23	7.32	7.49	7.58	7.67	7.76	7.85	7.94	8.03	8.11	8.29	8.38	8.47	8.65	8.74	8.82	8.91	9.00	9.09	9.18	-----
Substation Growth Factors						0.031	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					93.70%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	93.50%	-----
Carter City [3]	18.3	15.1	1.00	100%	5.71	5.88	5.95	6.09	6.16	6.24	6.31	6.38	6.45	6.52	6.60	6.74	6.81	6.88	7.03	7.10	7.17	7.24	7.32	7.39	7.46	1.27%
Feeder #1	3/0 ACSR	6.5	1.00	100%	1.80	1.85	1.88	1.92	1.94	1.97	1.99	2.01	2.03	2.06	2.08	2.12	2.15	2.17	2.22	2.24	2.26	2.28	2.31	2.33	2.35	1.27%
Feeder #2	3/0 ACSR	6.5	1.00	100%	1.58	1.63	1.65	1.69	1.71	1.73	1.75	1.77	1.79	1.81	1.83	1.87	1.89	1.91	1.95	1.97	1.99	2.01	2.03	2.05	2.07	1.27%
Feeder #3	336 ACSR	11.4	1.00	100%	0.90	0.93	0.94	0.96	0.97	0.98	0.99	1.01	1.02	1.03	1.04	1.06	1.07	1.09	1.11	1.12	1.13	1.14	1.15	1.16	1.18	1.27%
Feeder #4	1/0 ACSR	5.0	1.00	100%	2.51	2.59	2.62	2.68	2.71	2.74	2.78	2.81	2.84	2.87	2.90	2.97	3.00	3.03	3.09	3.13	3.16	3.19	3.22	3.25	3.28	1.27%
Total Feeder Load					6.80	6.99	7.08	7.25	7.34	7.42	7.51	7.59	7.68	7.77	7.85	8.02	8.11	8.20	8.37	8.45	8.54	8.62	8.71	8.80	8.88	-----
Substation Growth Factors						0.029	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					84.03%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	84.00%	-----
Elliottville [3]	15.7	15.1	1.00	100%	10.22	10.51	10.64	10.90	11.03	11.16	11.29	11.42	11.55	11.68	11.80	12.06	12.19	12.32	12.58	12.71	12.84	12.97	13.09	13.22	13.35	1.27%
Feeder #1	1/0 ACSR	5.0	1.00	100%	2.33	2.40	2.43	2.49	2.52	2.54	2.57	2.60	2.63	2.66	2.69	2.75	2.78	2.81	2.87	2.90	2.93	2.96	2.99	3.02	3.04	1.27%
Feeder #2	1/0 ACSR	5.0	1.00	100%	2.97	3.07	3.10	3.18	3.22	3.25	3.29	3.33	3.37	3.40	3.44	3.52	3.55	3.59	3.67	3.70	3.74	3.78	3.82	3.86	3.89	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	100%	4.10	4.22	4.28	4.38	4.43	4.48	4.53	4.59	4.64	4.69	4.74	4.85	4.90	4.95	5.05	5.10	5.16	5.21	5.26	5.31	5.36	1.27%
Feeder #4	3/0 ACSR	6.5	1.00	100%	1.94	2.00	2.02	2.07	2.09	2.12	2.14	2.17	2.19	2.22	2.24	2.29	2.32	2.34	2.39	2.41	2.44	2.46	2.49	2.51	2.54	1.27%
Total Feeder Load					11.33	11.68	11.83	12.11	12.26	12.40	12.54	12.69	12.83	12.97	13.12	13.40	13.55	13.69	13.98	14.12	14.26	14.41	14.55	14.69	14.84	-----
Substation Growth Factors						0.031	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					90.20%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	-----
Leon	8.4	23.4	1.00	99%	3.70	3.80	3.85	3.94	3.99	4.04	4.08	4.13	4.18	4.22	4.27	4.36	4.41	4.46	4.55	4.60	4.64	4.69	4.74	4.78	4.83	1.27%
Feeder #1	500 MCM UG	8.6	1.00	99%	1.27	1.30	1.32	1.35	1.36	1.38	1.40	1.41	1.43	1.44	1.46	1.49	1.51	1.52	1.56	1.57	1.59	1.60	1.62	1.64	1.65	1.27%
Feeder #2	500 MCM UG	8.6	1.00	99%	1.17	1.20	1.21	1.24	1.26	1.27	1.29	1.30	1.32	1.33	1.35	1.37	1.39	1.40	1.43	1.45	1.46	1.48	1.49	1.51	1.52	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	99%	1.60	1.64	1.66	1.70	1.72	1.74	1.76	1.78	1.80	1.82	1.84	1.88	1.90	1.92	1.96	1.98	2.00	2.02	2.04	2.06	2.08	1.27%
Total Feeder Load					4.03	4.14	4.19	4.29	4.34	4.39	4.44	4.49	4.54	4.59	4.64	4.74	4.79	4.85	4.95	5.00	5.05	5.10	5.15	5.20	5.25	-----
Substation Growth Factors						0.025	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					91.67%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	-----
Low Gap	7.5	15.1	1.00	100%	6.04	6.21	6.28	6.44	6.51	6.59	6.67	6.74	6.82	6.89	6.97	7.12	7.20	7.27	7.43	7.50	7.58	7.66	7.73	7.81	7.88	1.27%
Feeder #1	3/0 ACSR	6.5	1.00	100%	0.53	0.54	0.55	0.56	0.57	0.58	0.58	0.59	0.60	0.60	0.61	0.62	0.63	0.64	0.65	0.66	0.66	0.67	0.68	0.68	0.69	1.27%
Feeder #2	3/0 ACSR	6.5	1.00	100%	2.38	2.45	2.48	2.54	2.57	2.60	2.63	2.66	2.69	2.72	2.75	2.81	2.84	2.87	2.93	2.96	2.99	3.02	3.05	3.08	3.11	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	100%	3.48	3.58	3.62	3.71	3.76	3.80	3.84	3.89	3.93	3.97	4.02	4.11	4.15	4.19	4.28	4.33	4.37	4.41	4.46	4.50	4.55	1.27%
Total Feeder Load					6.39	6.57	6.65	6.81	6.89	6.97	7.05	7.13	7.21	7.30	7.38	7.54	7.62	7.70	7.86	7.94	8.02	8.10	8.18	8.26	8.34	-----
Substation Growth Factors						0.029	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					94.48%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	94.50%	-----
Mazie	7.8	15.1	1.00	100%	4.68	4.82	4.88	4.99	5.05	5.11	5.17	5.23	5.29	5.35	5.41	5.53	5.59	5.65	5.76	5.82	5.88	5.94	6.00	6.06	6.12	1.27%
Feeder #1	3/0 ACSR	6.5	1.00	100%	1.67	1.73	1.75	1.79	1.81	1.83	1.85	1.87	1.90	1.92	1.94	1.98	2.00	2.02	2.06	2.09	2.11	2.13	2.15	2.17	2.19	1.27%
Feeder #2	397 ACSR	12.7	1.00	100%	3.07	3.17	3.21	3.29	3.32	3.36	3.40	3.44	3.48	3.52	3.56	3.64	3.67	3.71	3.79	3.83	3.87	3.91	3.95	3.99	4.02	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	100%	0.56	0.58	0.59	0.60	0.61	0.62	0.62	0.63	0.64	0.64	0.65	0.67	0.67	0.68	0.69	0.70	0.71	0.72	0.72	0.73	0.74	1.27%
Total Feeder Load					5.30	5.47	5.54	5.68	5.74	5.81	5.88	5.94	6.01	6.08	6.15	6.28	6.35	6.41	6.55	6.62	6.68	6.75	6.82	6.89	6.95	-----
Substation Growth Factors						0.033	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					88.38%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	88.00%	-----

GRECC
(Winter) Substation Load Forecast

SUBSTATION / FEEDER NAME	TOTAL CAPACITY XFMR (MVA)	TOTAL CAPACITY REG (MVA)	RELATIVE GROWTH FACTOR	POWER FACTOR AT PEAK	2014 PEAK (MW)	PROJECTED LOADS (kW) LL1 2016	LL2 2017	LL3 2018	LL4 2019	LL5 2020	LL6 2021	LL7 2022	LL8 2023	LL9 2024	LL10 2025	LL11 2026	LL12 2027	LL13 2028	LL14 2029	LL15 2030	LL16 2031	LL17 2032	LL18 2033	LL19 2034	LL20 2035	COMP. ANNUAL GROWTH
PROJECTED SYSTEM NON-COINCIDENT PEAK					81.72	84.00	85.00	87.00	88.00	89.00	90.00	91.00	92.00	93.00	94.00	96.00	97.00	98.00	100.00	101.00	102.00	103.00	104.00	105.00	106.00	1.23%
Newfoundland (3)	15.7	15.1	1.00	99%	6.98	7.18	7.26	7.44	7.53	7.62	7.70	7.79	7.88	7.97	8.06	8.23	8.32	8.41	8.58	8.67	8.76	8.85	8.94	9.02	9.11	1.27%
Feeder #1	3/0 ACSR	6.5	1.00	99%	3.26	3.36	3.40	3.48	3.52	3.56	3.61	3.65	3.69	3.73	3.77	3.85	3.89	3.93	4.02	4.06	4.10	4.14	4.18	4.22	4.26	1.27%
Feeder #2	1/0 ACSR	5.0	1.00	99%	1.14	1.17	1.19	1.22	1.23	1.25	1.26	1.27	1.29	1.30	1.32	1.35	1.36	1.37	1.40	1.42	1.43	1.45	1.46	1.48	1.49	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	99%	1.40	1.44	1.46	1.50	1.52	1.53	1.55	1.57	1.59	1.60	1.62	1.66	1.67	1.69	1.73	1.75	1.76	1.78	1.80	1.82	1.83	1.27%
Feeder #4	3/0 ACSR	6.5	1.00	99%	1.73	1.78	1.80	1.85	1.87	1.89	1.91	1.93	1.96	1.98	2.00	2.04	2.07	2.09	2.13	2.15	2.18	2.20	2.22	2.24	2.26	1.27%
Total Feeder Load					7.54	7.76	7.85	8.04	8.14	8.23	8.33	8.42	8.52	8.61	8.71	8.90	8.99	9.09	9.28	9.38	9.47	9.57	9.66	9.76	9.85	-----
Substation Growth Factors						0.029	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					92.49%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	92.50%	-----
Pactolus	18.3	23.4	1.00	98%	12.49	12.84	13.00	13.32	13.47	13.63	13.79	13.95	14.10	14.26	14.42	14.73	14.89	15.05	15.37	15.52	15.68	15.84	16.00	16.15	16.31	1.27%
Feeder #1	397 Hendrix	12.4	1.00	98%	3.79	3.89	3.94	4.03	4.08	4.13	4.18	4.23	4.27	4.32	4.37	4.46	4.51	4.56	4.65	4.70	4.75	4.80	4.85	4.89	4.94	1.27%
Feeder #2	397 Hendrix	12.4	1.00	98%	2.46	2.53	2.56	2.62	2.65	2.68	2.71	2.74	2.77	2.81	2.84	2.90	2.93	2.96	3.02	3.05	3.08	3.12	3.15	3.18	3.21	1.27%
Feeder #3	397 Hendrix	12.4	1.00	98%	3.14	3.22	3.26	3.34	3.38	3.42	3.46	3.50	3.54	3.58	3.62	3.70	3.74	3.77	3.85	3.89	3.93	3.97	4.01	4.05	4.09	1.27%
Feeder #4	397 Hendrix	12.4	1.00	98%	4.21	4.32	4.37	4.48	4.53	4.59	4.64	4.69	4.75	4.80	4.85	4.96	5.01	5.06	5.17	5.22	5.28	5.33	5.38	5.43	5.49	1.27%
Total Feeder Load					13.61	13.96	14.13	14.47	14.65	14.82	14.99	15.16	15.33	15.50	15.67	16.02	16.19	16.36	16.70	16.87	17.04	17.22	17.39	17.56	17.73	-----
Substation Growth Factors						0.026	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					91.72%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	92.00%	-----
Pelfrey	7.8	15.1	1.00	99%	5.71	5.88	5.95	6.09	6.16	6.24	6.31	6.38	6.45	6.52	6.60	6.74	6.81	6.88	7.03	7.10	7.17	7.24	7.32	7.39	7.46	1.27%
Feeder #1	3/0 ACSR	6.5	1.00	99%	3.86	3.97	4.02	4.12	4.16	4.21	4.26	4.31	4.36	4.41	4.46	4.55	4.60	4.65	4.75	4.80	4.85	4.89	4.94	4.99	5.04	1.27%
Feeder #2	3/0 ACSR	6.5	1.00	99%	2.37	2.44	2.47	2.53	2.56	2.59	2.62	2.65	2.68	2.71	2.74	2.80	2.83	2.86	2.92	2.95	2.98	3.01	3.04	3.07	3.10	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	99%	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	1.27%
Total Feeder Load					6.27	6.46	6.54	6.69	6.77	6.85	6.93	7.01	7.09	7.17	7.25	7.41	7.49	7.57	7.72	7.80	7.88	7.96	8.04	8.12	8.20	-----
Substation Growth Factors						0.029	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					91.05%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	91.00%	-----
Prison	15.7	23.4	0.00	97%	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	0.00%
Feeder #1	500 AL UG	8.6	1.00	97%	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	0.00%
Total Feeder Load					2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	-----
Substation Growth Factors						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-----
Substation Coincident Factor					100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	-----
Sandy Hook	8.4	15.1	1.00	99%	6.47	6.65	6.73	6.90	6.98	7.06	7.14	7.22	7.31	7.39	7.47	7.63	7.71	7.80	7.96	8.04	8.12	8.20	8.29	8.37	8.45	1.27%
Feeder #1	3/0 ACSR	6.5	1.00	99%	3.21	3.30	3.34	3.42	3.46	3.50	3.54	3.58	3.62	3.66	3.70	3.78	3.82	3.86	3.95	3.99	4.03	4.07	4.11	4.15	4.19	1.27%
Feeder #2	3/0 ACSR	6.5	1.00	99%	2.48	2.55	2.58	2.64	2.68	2.71	2.74	2.77	2.80	2.83	2.86	2.93	2.96	2.99	3.05	3.08	3.11	3.15	3.18	3.21	3.24	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	99%	1.27	1.30	1.32	1.35	1.37	1.38	1.40	1.42	1.43	1.45	1.46	1.50	1.51	1.53	1.56	1.58	1.59	1.61	1.62	1.64	1.66	1.27%
Feeder #4	----	----	1.00	99%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
Total Feeder Load					6.96	7.15	7.24	7.42	7.50	7.59	7.68	7.77	7.86	7.94	8.03	8.21	8.29	8.38	8.56	8.65	8.73	8.82	8.91	9.00	9.08	-----
Substation Growth Factors						0.028	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					92.96%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	93.00%	-----
Warnock (3)	15.7	15.1	1.00	99%	6.58	6.77	6.86	7.02	7.11	7.19	7.27	7.35	7.44	7.52	7.60	7.77	7.85	7.94	8.10	8.19	8.27	8.35	8.44	8.52	8.60	1.27%
Feeder #1	1/0 HD Cu	6.7	1.00	99%	2.19	2.30	2.32	2.38	2.41	2.44	2.46	2.49	2.52	2.55	2.58	2.63	2.66	2.69	2.75	2.77	2.80	2.83	2.86	2.89	2.92	1.27%
Feeder #2	3/0 ACSR	6.5	1.00	99%	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	1.27%
Feeder #3	3/0 ACSR	6.5	1.00	99%	2.02	2.12	2.14	2.19	2.22	2.25	2.27	2.30	2.32	2.35	2.38	2.43	2.45	2.48	2.53	2.56	2.58	2.61	2.64	2.66	2.69	1.27%
Feeder #4	3/0 ACSR	6.5	1.00	99%	2.20	2.31	2.34	2.39	2.42	2.45	2.48	2.51	2.54	2.56	2.59	2.65	2.68	2.71	2.76	2.79	2.82	2.85	2.88	2.90	2.93	1.27%
Total Feeder Load					6.45	6.77	6.86	7.02	7.11	7.19	7.27	7.35	7.44	7.52	7.60	7.77	7.85	7.94	8.10	8.19	8.27	8.35	8.44	8.52	8.60	-----
Substation Growth Factors						0.049	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
Substation Coincident Factor					102.01%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	-----
TOT. NON-COINCIDENT SUB. PEAK					81.72	84.00	85.00	87.00	88.00	89.00	90.00	91.00	92.00	93.00	94.00	96.00	97.00	98.00	100.00	101.00	102.00	103.00	104.00	105.00	106.00	-----
SYSTEM GROWTH FACTORS						0.029	0.012	0.024	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.022	0.011	0.011	0.021	0.010	0.010	0.010	0.010	0.010	0.010	-----
SYSTEM COINCIDENT FACTOR					100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	-----

Notes: (1) Historical system coincident and substation non-coincident peak loads provided by GRECC
(2) Projected coincident system peak based in the 1 in 5 year Winter Extreme case from the 2012 EKPC Load Forecast
(3) The available regulator capacity is less than the transformer capacity, limiting the capacity of the substation.

Appendix D
RUS FORM 300

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL UTILITIES SERVICE

REVIEW RATING SUMMARY

BORROWER DESIGNATION: KY 61

DATE PREPARED: April 16, 2014

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)
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	2
	Other	

4. Distribution - Underground Cable	(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	
e. Kilowatt-hour and Demand Meter Reading and Testing	3

PART II. OPERATIONS and MAINTENANCE

6. Line Maintenance and Work Order Procedures		(Rating)
a. Work Planning & Scheduling		3
b. Work Backlogs:	Right-of-Way Maintenance	3
	Poles	3
10 The mapping system is a	Retirement of Idle Services	2
	Other	

7. Service Interruptions

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

PREVIOUS 5 YEARS (Year)	POWER SUPPLIER a.	MAJOR STORM b.	SCHEDULED c.	ALL OTHER d.	TOTAL e.	(Rating)
2009		1,941.10	19.40	182.10	2,142.60	2
2010	1.40	79.90	20.40	181.00	282.70	3
2011	7.30	132.20	16.40	284.70	440.60	3
2012		914.50	27.70	323.90	1,266.10	2
2013	1.20	56.00	35.00	232.60	324.80	3

b. Emergency Restoration Plan: 3

8. Power Quality	(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	2
b. Circuit Diagrams	2
c. Staking Sheets	2

PART III. ENGINEERING

11. System Load Conditions and Losses		(Rating)
a. Annual System Losses	4.43%	3
b. Annual Load Factor	48.6%	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)
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						
	For Previous 2 Years		**For Present Year**	**For Future 3 Years**		
YEAR	2012	2013	2014	2015	2016	2017
	Actual $ Thousands	Actual $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands
Normal Operation	1,122	1,107	1,200	1,236	1,273	1,311
Normal Maintenance	3,347	2,888	3,148	3,242	3,340	3,440
Additional (Deferred) Maintenance						
Total	4,469	3,995	4,348	4,478	4,613	4,751

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

15. Date Discussed with Board of Directors 4/29/2014 *(Date)*

EXPLANATORY NOTES

ITEM NO.	COMMENTS
3b.	Poles with telephone attachments left standing close to the electric pole should be removed. Cable TV attachments require constant monitoring and follow-up to ensure code requirements are met.
3c.	Several problem trees were observed in rural areas. A more aggressive policy is recommended.
6b.	The report of idle services should be reconciled with billing records and adjusted.
10	The mapping system is adequate but needs to be GPS'ed for accuracy and upgraded with newer technology.

		TITLE	DATE
RATED BY:		MANAGER OF TECHNICAL SERVICES	
REVIEWED BY:		PRESIDENT & CEO	
REVIEWED BY:		RUS GFR	

Appendix E
COST OF LOSSES

All information in BLUE text requires input data.

LOAD LOSS CALCULATION

ANNUAL COST OF LOSS PER kW:

Cost for Demand:	1kW*DR*DF	$0.00 /kW
Cost for Energy:	(.84(LF^2) + .16(LF))*1kW*(ER)*8760 hours	$184.22 /kW

DR = Existing Power Demand Rate (1)
= $0.00 /kW
LF = Three Year Average Annual Load Factor
= 49.81%
ER = Existing Power Energy Rate (1)
= $0.07300 /kWh
DF = Three Year Average Annual Demand Factor
= 8.46

ANNUAL COST FOR 1kW OF PEAK LOSSES: $184.22 /kW

CORE LOSS CALCULATION

ANNUAL COST OF LOSS PER kW:

Cost for Demand:	1kW*DR*12 months	$0.00 /kW
Cost for Energy	1kW*ER*8760 hours	$639.48 /kW

DR = Existing Power Demand Rate (1)
= $0.00 /kW
ER = Existing Power Energy Rate (1)
= $0.07300 /kWh

ANNUAL COST FOR 1kW OF PEAK LOSSES: $639.48 /kW

LOAD FACTOR CALCULATION (2)

Month	Peak Load (kW) 2011	2012	2013	Three Year Average	Percent of Peak	Percent of Peak Squared
January	65,733	53,950	59,782	59,822	99.17%	0.98
February	67,963	56,317	56,684	60,321	100.00%	1.00
March	46,455	48,650	55,626	50,244	83.29%	0.69
April	42,737	38,929	46,505	42,724	70.83%	0.50
May	47,413	45,329	41,751	44,831	74.32%	0.55
June	48,854	56,001	45,886	50,247	83.30%	0.69
July	52,856	55,624	49,934	52,805	87.54%	0.77
August	50,995	49,919	47,722	49,545	82.14%	0.67
September	51,080	44,355	46,699	47,378	78.54%	0.62
October	41,971	38,838	37,388	39,399	65.32%	0.43
November	50,263	51,042	55,135	52,147	86.45%	0.75
December	54,168	51,336	56,323	53,942	89.42%	0.80
System Peak	67,963	56,317	59,782	60,321	100.00%	8.46
Ann. MWh Purch.	269,142	260,204	269,549	266,298		
Ann. Load Factor	45.21%	52.74%	51.47%	49.81%		

Notes : (1) Based on the annual energy purchases and power cost for 2013 from the 2013 Form 7.
(2) MWh Purch. and Peak Loading was provided by GRECC.

Appendix F
RUS GUIDELINES for GIS and ESTIMATE

Grayson Rural Electric Cooperative Corporation

September 4, 2014

Outline of Information to Support GIS Financing
for Inclusion in 2015-2018 Construction Work Plan

1) Describe the planning process that was utilized in determining to proceed with a GIS implementation, including use of any pilot program, investigation of process used by other utilities, studies issued by CRN or others, use of consultants, etc.

   GRECC has made the initial investment to convert their legacy paper maps to digital format and develop a geo-referenced connectivity model of the electric system in Milsoft Utility Solutions, Inc.'s (Milsoft's) engineering analysis software (Windmil). GRECC has been using Windmil, along with Partner's field staking solution (Field Designer), to maintain the mapping database to-date. However, the electric system connectivity model is not GPS accurate and does not contain critical information for distribution poles, construction units, equipment and joint-use attachments. As indicated in the 2014 RUS Form 300, GRECC needs to obtain detailed asset information with GPS accuracy and transition to a modern, fully-integrated GIS. The addition of GPS accuracy in the model would also increase the accuracy and simplify the integration of daily Field Designer updates. GRECC is developing a plan to use contractors and consultants to perform a GPS inventory of the system and develop/implement a new geo-database in Milsoft's mapping solution (WindMilMap).

2) List of GIS applications intended to be implemented, broken into the following general categories: traditional mapping, engineering, operations, planning and environmental, business and marketing, management, and shared services. This list will assist in understanding system priorities, by identifying when the individual applications will be implemented (i.e. immediate, near-term, or long-term).

   - GPS accurate mapping (immediate)
   - Staking (existing)
   - Engineering analysis models (existing)
   - R/W & joint-use maintenance (short term)
   - Asset accounting (short term)
   - Outage Management (long term)
   - Member-facing applications (long-term)

3) Describe the data design standards and metadata that will ensure interoperability of GIS data with other borrower systems and systems of other parties (power supplier, transmission provider, government entities or PUC) with which the borrower may be required to share data.

   The GPS inventory collected will be used to populate an industry standard Esri geo-database, which should be compatible with the systems used by GRECC's power and transmission provider, East Kentucky Power Cooperative, as well as the Kentucky Public Service Commission, the US Forest Service, 911, etc..

4) List of both tangible and intangible benefits expected to be generated through GIS implementation.

- The GPS-accurate maps and asset inventory will support enhanced facilities management, correct plant asset records, streamline regulatory inspections and FEMA reporting, aide in R/W maintenance, etc.
- The GIS would provide more accurate information for customer service, system planning and operations through interfaces with EA, CIS, AMI, and future OMS.
- The asset inventory can be used to reconcile joint-use attachment records and charges/payments
- The GPS-accurate maps would facilitate information sharing with other utilities and developers

5) Details concerning the following GIS component elements requested for financing:

a) Hardware: desk top or hand held computers, GPS units, etc, including the number of units to be procured which will be devoted to GIS use.

  - One GIS server for the new enterprise software.
  - Will use the existing workstation for GIS editing

b) Software: automated mapping/facilities management (AM/FM) software, geographic information system software (GIS), data viewer software, computer aided drafting software, business geographic software, including the specific software packages being utilized, if possible, as well as the number of software licenses being procured.

  - Server based GIS – WindMilMap

c) Field Inventory: list of specific information that will be gathered and resources used to do so.

  Resources

  - A contractor will be selected through a RFP process and used to perform field inventory functions.
  - Consulting services will be used to develop and evaluate a field inventory services RFP, select a contractor, and manage the GPS inventory and GIS implementation

  General Inventory Requirements

  - GPS coordinates of substations, poles, meters, pad transformers, pedestals and junction boxes
  - Pole size, class and year along with inspection dates

- Attachments to poles and anchors of third parties
- Primary, secondary and service wire sizes
- Conductor phasing
- Pole top assembly units
- Equipment types and sizes – transformers, reclosers, sectionalizers, regulators, capacitors, fuses and security lights

6) Budgeted costs for each GIS component. Due to the importance of this information, provide specific elements of cost within the categories of hardware, software, field inventory, conversion of existing data, training, etc. Indicate whether a GIS consultant was utilized in developing this information.

   Leidos Engineering, LLC (Leidos) assisted in the development of the cost estimate for this project, which is given at the end of this support document. The estimate includes: hardware, software, field inventory, conversion of existing data, training, program management, etc. No quotes have been requested by GRECC to-date for the inventory or the GIS hardware/software.

   The inventory estimate was based on the existing meter count and recorded miles of distribution line in-service. The number of primary and service poles were assumed based on these know values. An "Upper" and "Lower" estimate per point for the GPS inventory was assumed, based on values provided to Leidos for similar work. The RUS funds requested for the GPS inventory is based on the average of this estimated range.

7) Time-lines for GIS implementation including the extent to which GIS costs have been included in the current year's budget as well as costs to be incurred in coming years. If a portion of the GIS implementation has been completed in prior years, list what activities and their associated costs have already been performed and over what time period.

   The estimated cost of the GPS inventory and GIS implementation was spread over the first two years of the CWP period. It is anticipated that the conversion of the existing mapping information, the purchase and installation of the new GIS hardware and software, and GIS training will be the initial investments required during the first year. GRECC will also work with a consultant to develop and evaluate a field inventory services RFP within first year to select a contractor for the GPS inventory. The preliminary estimates are that the GPS inventory will take 1 to 1.5 years to complete, including a pilot.

8) Staff and outside resources to be utilized in establishing the GIS system as well as for on-going maintenance of data collection and entry. Indicate the number and position of new employees required, whether existing employees will be utilized on a part-time basis, as well as any consulting assistance or contractors to be utilized in the process.

   A consultant will be used by GRECC to manage the GPS inventory and GIS implementation. Training on the GIS software will be provided by the vendor. The existing staking engineers will provide the field asset information to maintain the GIS database through use of the existing GPS equipment and field staking software. It is expected that editing and system maintenance would require a full time GIS administrator/technician, but the existing staff has multiple responsibilities. It is likely existing resources, roles and responsibilities may need to be revaluated to support and maintenance the new GIS, or consider outside resources.

9) Training that will be provided to ensure a successful deployment, including specifics of training being provided and by what parties, number of employees to be trained, and over what time period this training will be offered.

Training on the GIS software will be provided by Milsoft for the engineering staff and GIS administrator/technician. Training will take place immediately after the GIS hardware/software is successfully implemented and tested. The schedule for the GIS software installation and training will need to be coordinated with Milsoft. Training will include:

- Map editing/maintenance
- Importing GPS field staking designs and as-builts
- Interfaces with existing and proposed information systems

10) Describe the processes to be used for collecting field data as well as the conversion of existing mapping data, to ensure a successful integration into the overall GIS system. What external GIS data sets are planned to be used.

The GPS inventory will be performed by a field services contractor, with an emphasis on asset information accuracy and proven QA/QC processes. The contractor will be required to deliver the GPS inventory data in a format compatible with WindMilMap. Programs management for the field inventory and GIS implementation will be provided by GRECC's consultant to ensure the project's success.

External data sets that may be used include, but not necessarily limited to:

- Google Earth imagery or Department of Agriculture imagery
- County property tax office parcel records
- Kentucky Public Service Commission territorial boundary data
- G&T transmission line and switch location data
- Publicly available land base data such as county, hydrology, highway, rail line, incorporated city, school tax and fire department data
- FEMA flood map data

11) Extent to which the mapping system will be integrated with other computerized applications, including engineering analysis, customer information system, work order tracking and outage analysis.

The selected mapping solution, WindMilMap, is part of the Milsoft software suite and will be fully integrated upon installation with GRECC's existing EA and field staking systems. WindMilMap is also MultiSpeak compliant, as is all of Milsoft's products, which will interface with the remaining information systems at GRECC.

12) Board action to authorize the overall plan for implementing the GIS system including recognition of the time-lines, costs, and overall resources to be utilized. Include the board resolution as well as the information that was provided to them for their review.

The GRECC board of directors will be presented with the 2015-2018 CWP on October 20, 2014. This GIS project is included in the proposed plan. A copy of their resolution to adopt the CWP is attached hereto.

GPS Inventory GIS Implementation Estimate

Meters	**16,258**			
Estimated Primary Poles	**36,696**			
Estimated Service Poles	**16,258**			
Miles of Line	**2,446**			
Est. Poles per Mile	**15**			
	Lower	**Upper**	**RUS Loan Funds**	**Percent RUS Funding**
Field Inventory of Meters	$121,935	$162,580	$106,693	75%
Field Inventory of Poles	$311,916	$477,048	$295,862	75%
Field Inventory of service poles	$138,193	$211,354	$131,080	75%
Conversion of Data by Milsoft	$40,000	$40,000	$40,000	100%
Windmilmap (1 seat)	$25,000	$25,000	$25,000	100%
GIS server	$6,500	$6,500	$6,500	100%
Training (on-site)	$8,500	$8,500	$8,500	100%
Program Management	$65,204	$93,098	$61,363.48	100%
Initial Estimated Cost	**$717,248**	**$1,024,080**	**$674,998**	**(2014 Dollars)**
Maintenance	$25,000	5 years at 20%		
Estimated Cost per Meter	$7.50	$10.00		
Estimated Cost per Pole	$8.50	$13.00		
Avg Customers per mile	6.646			
Estimated Service Poles	16,258			

Appendix G
SAMPLE LOAD FLOWS

BEFORE IMPROVEMENTS

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
	Mazie-#4		A	Mazie	7.56Y	126.0	0.00	0.00	288.11	44	2178	0	100	0.00	0.0	0.000	0.000	0	0	0	357	
			B		7.56Y	126.0	0.00	0.00	235.50	36	1780	0	100					0	0	0	219	
			C		7.56Y	126.0	0.00	0.00	282.59	44	2136	0	-100					0	0	0	480	

----------- Feeder No. 401 (Mazie 1 (10-11-12)) Beginning with Device Mazie_D1 -----------

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
	Mazie_D1	Mazie-#4	A	MAZ_D1	7.56Y	126.0	0.00	0.00	89.80	16	679	0	100	0.00	0.0	0.000	0.000	0	0	0	135	
			B		7.56Y	126.0	0.00	0.00	73.40	13	555	0	100					0	0	0	19	
			C		7.56Y	126.0	0.00	0.00	90.89	16	687	0	-100					0	0	0	135	

----------- Feeder No. 402 (Mazie 2 (4-5-6)) Beginning with Device Mazie_D2 -----------

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
	Mazie_D2	Mazie-#4	A	MAZ_D2	7.56Y	126.0	0.00	0.00	187.31	33	1416	0	100	0.00	0.0	0.000	0.000	0	0	0	201	
			B		7.56Y	126.0	0.00	0.00	139.09	25	1052	0	-100					0	0	0	178	
			C		7.56Y	126.0	0.00	0.00	140.20	25	1060	0	-100					0	0	0	243	
C	XFMR75	OH65_4	B	Transforme	0.15Y	126.0	-0.01	0.02	2.68	77	20	-2	-100	0.07	0.4	0.211	0.000	0	0	0	2	C
H	XFMR68_4	OH67	B	Transforme	0.15Y	126.0	-0.02	-0.01	1.33	38	10	-1	-100	0.02	0.2	0.098	0.000	0	0	0	1	H
H	643303073008	XFMR68_4	B	Consumer	0.15Y	126.0	0.00	-0.01	0.00	0	0	0	100	0.00	0.0	0.098	0.000	0	0	0	0	H
H	643303073009	XFMR68_4	B	Consumer	0.15Y	126.0	0.00	-0.01	69.15	0	10	-1	-100	0.00	0.0	0.098	0.000	10	-1	1	1	H
H	XFMR93_4	OH86	A	Transforme	0.15Y	126.2	-0.37	-0.19	2.08	60	15	-3	-98	0.04	0.3	0.276	0.000	0	0	0	2	H
H	643303073013	XFMR93_4	A	Consumer	0.15Y	126.2	0.00	-0.19	33.93	0	5	-1	-98	0.00	0.0	0.276	0.000	5	-1	1	1	H
H	643303073020	XFMR93_4	A	Consumer	0.15Y	126.2	0.00	-0.19	74.15	0	11	-2	-98	0.00	0.0	0.276	0.000	11	-2	1	1	H
H	643303073022	XFMR93_4	A	Consumer	0.15Y	126.2	0.00	-0.19	0.00	0	0	0	100	0.00	0.0	0.276	0.000	0	0	0	0	H
C	XFMR1440_4	OH1429_4	C	Transforme	0.14Y	122.7	0.55	3.33	2.65	76	20	1	100	0.07	0.4	4.331	0.000	0	0	0	3	C
C	XFMR1627_4	OH1603_4	C	Transforme	0.14Y	124.4	0.56	1.64	2.69	77	20	1	100	0.07	0.4	1.609	0.000	0	0	0	5	C
C	XFMR332	OH330	B	Transforme	0.15Y	125.9	-0.00	0.10	2.79	80	21	-2	-100	0.08	0.4	0.660	0.000	0	0	0	2	C
C	XFMR349	OH347	B	Transforme	0.15Y	125.7	0.12	0.25	4.95	143	37	-2	-100	0.25	0.7	0.971	0.000	0	0	0	2	C
C	XFMR29995	OH29994	A	Transforme	0.14Y	118.7	5.40	7.28	5.66	163	37	21	87	0.33	0.9	2.169	0.000	0	0	0	2	C
C	MISAdd-963	OH429	B	10T FUSE	7.54Y	125.7	0.00	0.30	19.99	209	147	33	98	0.00	0.0	3.361	0.000	0	0	0	18	C
C	OCD7167	OH7166	B	25-4H OCR	7.54Y	125.7	0.00	0.33	19.69	79	145	33	98	0.00	0.0	3.392	0.000	0	0	0	17	C
C	XFMR434_4	OH432_4	B	Transforme	0.14Y	118.8	6.86	7.21	9.35	269	65	27	92	0.90	1.4	3.417	0.000	0	0	0	3	C
C	OCR-0000643...	OH6666	A	70-4H OCR	7.22Y	120.4	0.00	5.60	172.00	246	1235	-136	-99	0.00	0.0	4.929	0.000	0	0	0	184	C
C			B		7.52Y	125.3	0.00	0.69	103.48	148	775	-73	-100					0	0	0	148	C
C			C		7.32Y	121.9	0.00	4.07	93.11	133	680	-43	-100					0	0	0	146	C
L	OH532	OH538_4	A	4 ACSR 7/1	7.05Y	117.5	0.19	8.51	17.24	12	120	-22	-98	0.22	0.2	7.795	0.305	0	0	0	21	L
L	OH531	OH532	A	4 ACSR 7/1	7.04Y	117.3	0.15	8.66	17.24	12	119	-22	-98	0.18	0.1	8.038	0.242	0	0	0	21	L
L	OH2256_4	OH531	A	4 ACSR 7/1	7.04Y	117.3	0.01	8.67	0.94	1	6	-1	-99	0.00	0.0	8.234	0.196	0	0	0	1	L
L	OH2243_4	OH2256_4	A	4 ACSR 7/1	7.04Y	117.3	0.00	8.67	0.00	0	0	0	100	0.00	0.0	8.764	0.530	0	0	0	0	L
L	XFMR2244_4	OH2243_4	A	Transforme	0.14Y	117.3	0.00	8.67	0.00	0	0	0	100	0.00	0.0	8.764	0.000	0	0	0	0	L
L	1401000007001	XFMR2244_4	A	Consumer	0.14Y	117.3	0.00	8.67	0.00	0	0	0	100	0.00	0.0	8.764	0.000	0	0	0	0	L
L	OH2265	OH531	A	4 ACSR 7/1	7.03Y	117.2	0.10	8.76	16.30	12	113	-21	-98	0.11	0.1	8.211	0.173	0	0	0	20	L
L	OH2253_4	OH2265	A	4 ACSR 7/1	7.03Y	117.2	0.00	8.76	0.00	0	0	0	100	0.00	0.0	8.430	0.220	0	0	0	0	L
L	OH2241_4	OH2253_4	A	4 ACSR 7/1	7.03Y	117.2	0.00	8.76	0.00	0	0	0	100	0.00	0.0	8.549	0.118	0	0	0	0	L
L	OH2236_4	OH2241_4	A	4 ACSR 7/1	7.03Y	117.2	0.00	8.76	0.00	0	0	0	100	0.00	0.0	8.754	0.206	0	0	0	0	L
L	XFMR2247_4	OH2236_4	A	Transforme	0.14Y	117.2	0.00	8.76	0.00	0	0	0	100	0.00	0.0	8.754	0.000	0	0	0	0	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	-----Element----- KW	KVAR	Cons On	Cons Thru	
L	OH2242_4	OH2241_4	A	4 ACSR 7/1	7.03Y	117.2	0.00	8.76	0.00	0	0	0	100	0.00	0.0	8.803	0.255	0	0	0	0	L
L	XFMR2249_4	OH2242_4	A	Transforme	0.14Y	117.2	0.00	8.76	0.00	0	0	0	100	0.00	0.0	8.803	0.000	0	0	0	0	L
L	XFMR2254_4	OH2253_4	A	Transforme	0.14Y	117.2	0.00	8.76	0.00	0	0	0	100	0.00	0.0	8.430	0.000	0	0	0	0	L
L	OH2268	OH2265	A	4 ACSR 7/1	7.01Y	116.9	0.36	9.12	16.30	12	113	-21	-98	0.40	0.4	8.821	0.610	0	0	0	20	L
L	OH2318_4	OH2268	A	4 ACSR 7/1	7.01Y	116.9	0.02	9.13	4.16	3	29	-6	-98	0.00	0.0	8.924	0.103	0	0	0	5	L
L	OH2271	OH2318_4	A	4 ACSR 7/1	7.01Y	116.9	0.01	9.14	2.09	1	14	-3	-98	0.00	0.0	9.011	0.087	0	0	0	3	L
L	OH2267_4	OH2271	A	4 ACSR 7/1	7.01Y	116.9	0.00	9.14	0.76	1	5	-1	-98	0.00	0.0	9.072	0.061	0	0	0	1	L
L	XFMR2278_4	OH2267_4	A	Transforme	0.14Y	117.0	-0.15	9.00	0.76	22	5	-1	-98	0.01	0.0	9.072	0.000	0	0	0	1	L
L	1401000009002	XFMR2278_4	A	Consumer	0.14Y	117.0	0.00	9.00	39.24	0	5	-1	-98	0.00	0.0	9.072	0.000	5	-1	1	1	L
L	OH2273_4	OH2271	A	4 ACSR 7/1	7.01Y	116.9	0.01	9.15	1.33	1	9	-2	-98	0.00	0.0	9.124	0.113	0	0	0	2	L
L	OH9672	OH2273_4	A	2 ACSR 6/1	7.01Y	116.9	0.00	9.15	0.96	1	7	-1	-99	0.00	0.0	9.198	0.074	0	0	0	1	L
L	XFMR9673	OH9672	A	Transforme	0.12Y	117.0	-0.17	8.98	0.96	28	7	-1	-99	0.01	0.0	9.198	0.000	0	0	0	1	L
L	OH9674	XFMR9673	A	4 TPX	0.12Y	116.7	0.27	9.26	57.80	68	7	-1	-99	0.03	0.5	9.215	0.017	0	0	0	1	L
L	1401000009040	OH9674	A	Consumer	0.12Y	116.7	0.00	9.26	57.80	0	7	-1	-99	0.00	0.0	9.215	0.000	7	-1	1	1	L
L	OH9671	OH2273_4	A	4 ACSR 7/1	7.01Y	116.9	0.00	9.15	0.37	0	3	-1	-95	0.00	0.0	9.239	0.115	0	0	0	1	L
L	OH2272	OH9671	A	4 ACSR 7/1	7.01Y	116.9	0.00	9.15	0.00	0	0	0	100	0.00	0.0	9.587	0.348	0	0	0	0	L
L	XFMR2274_4	OH2272	A	Transforme	0.13Y	116.9	0.00	9.15	0.00	0	0	0	100	0.00	0.0	9.587	0.000	0	0	0	0	L
L	XFMR2276_4	OH9671	A	Transforme	0.14Y	116.9	-0.07	9.07	0.37	11	3	-1	-95	0.00	0.0	9.239	0.000	0	0	0	1	L
L	1401000009031	XFMR2276_4	A	Consumer	0.14Y	116.9	0.00	9.07	19.16	0	3	-1	-95	0.00	0.0	9.239	0.000	3	-1	1	1	L
L	XFMR2319_4	OH2318_4	A	Transforme	0.14Y	117.2	-0.37	8.77	2.07	60	14	-3	-98	0.04	0.3	8.924	0.000	0	0	0	2	L
L	1401000008020	XFMR2319_4	A	Consumer	0.14Y	117.2	0.00	8.77	0.00	0	0	0	100	0.00	0.0	8.924	0.000	0	0	1	1	L
L	1401000008002	XFMR2319_4	A	Consumer	0.14Y	117.2	0.00	8.77	107.77	0	14	-3	-98	0.00	0.0	8.924	0.000	14	-3	1	1	L
L	OH2322_4	OH2268	A	4 ACSR 7/1	7.01Y	116.9	0.03	9.15	9.63	7	66	-13	-98	0.02	0.0	8.896	0.075	0	0	0	14	L
L	OH2323_4	OH2322_4	A	4 ACSR 7/1	7.01Y	116.8	0.02	9.16	8.58	6	59	-11	-98	0.01	0.0	8.955	0.059	0	0	0	13	L
L	OH2300_4	OH2323_4	A	4 ACSR 7/1	7.01Y	116.8	0.01	9.18	8.58	6	59	-11	-98	0.01	0.0	9.000	0.045	0	0	0	13	L
L	OH2329	OH2300_4	A	4 ACSR 7/1	7.01Y	116.8	0.01	9.19	5.35	4	37	-7	-98	0.00	0.0	9.049	0.050	0	0	0	9	L
L	OH2280_4	OH2329	A	4 ACSR 7/1	7.01Y	116.8	0.01	9.20	5.35	4	37	-7	-98	0.01	0.0	9.102	0.053	0	0	0	9	L
L	OH6634	OH2280_4	A	4 ACSR 7/1	7.01Y	116.8	0.03	9.22	5.00	4	34	-7	-98	0.01	0.0	9.249	0.147	0	0	0	6	L
L	XFMR6636	OH6634	A	Transforme	0.14Y	117.2	-0.40	8.82	2.32	67	16	-3	-98	0.06	0.3	9.249	0.000	0	0	0	3	L
L	1401000009024	XFMR6636	A	Consumer	0.14Y	117.2	0.00	8.82	28.04	0	4	-1	-97	0.00	0.0	9.249	0.000	4	-1	1	1	L
L	1401000009019	XFMR6636	A	Consumer	0.14Y	117.2	0.00	8.82	29.71	0	4	-1	-97	0.00	0.0	9.249	0.000	4	-1	1	1	L
L	1401000009023	XFMR6636	A	Consumer	0.14Y	117.2	0.00	8.82	62.74	0	8	-2	-97	0.00	0.0	9.249	0.000	8	-2	1	1	L
L	OH2293	OH6634	A	4 ACSR 7/1	7.01Y	116.8	0.01	9.23	2.68	2	18	-4	-98	0.00	0.0	9.357	0.108	0	0	0	3	L
L	OH2283	OH2293	A	4 ACSR 7/1	7.01Y	116.8	0.00	9.24	1.28	1	9	-2	-98	0.00	0.0	9.439	0.082	0	0	0	1	L
L	XFMR2292	OH2283	A	Transforme	0.14Y	117.0	-0.24	9.00	1.28	37	9	-2	-98	0.02	0.2	9.439	0.000	0	0	0	1	L
L	1401000009026	XFMR2292	A	Consumer	0.14Y	117.0	0.00	9.00	66.66	0	9	-2	-98	0.00	0.0	9.439	0.000	9	-2	1	1	L
L	XFMR2294	OH2293	A	Transforme	0.14Y	117.0	-0.26	8.97	1.40	40	10	-2	-98	0.02	0.2	9.357	0.000	0	0	0	2	L
L	1401000009022	XFMR2294	A	Consumer	0.14Y	117.0	0.00	8.97	55.91	0	7	-2	-96	0.00	0.0	9.357	0.000	7	-2	1	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
L	1401000009025	XFMR2294	A	Consumer	0.14Y	117.0	0.00	8.97	16.64	0	2	0	100	0.00	0.0	9.357	0.000	2	0	1	1	L
L	OH2281_4	OH2280_4	A	4 ACSR 7/1	7.01Y	116.8	0.00	9.20	0.00	0	0	0	100	0.00	0.0	9.197	0.095	0	0	0	1	L
L	OH29776	OH2281_4	A	4 ACSR 7/1	7.01Y	116.8	0.00	9.20	0.00	0	0	0	100	0.00	0.0	9.378	0.181	0	0	0	1	L
L	XFMR29777	OH29776	A	Transforme	0.13Y	116.8	0.00	9.20	0.00	0	0	0	100	0.00	0.0	9.378	0.000	0	0	0	1	L
L	1401000009035	XFMR29777	A	Consumer	0.13Y	116.8	0.00	9.20	0.00	0	0	0	100	0.00	0.0	9.378	0.000	0	0	1	1	L
L	XFMR2297_4	OH2281_4	A	Transforme	0.13Y	116.8	0.00	9.20	0.00	0	0	0	100	0.00	0.0	9.197	0.000	0	0	0	0	L
L	OH2284_4	OH2280_4	A	4 ACSR 7/1	7.01Y	116.8	0.00	9.20	0.31	0	2	0	100	0.00	0.0	9.470	0.368	0	0	0	1	L
L	OH2287	OH2284_4	A	4 ACSR 7/1	7.01Y	116.8	0.00	9.20	0.00	0	0	0	100	0.00	0.0	9.608	0.137	0	0	0	0	L
L	XFMR2288	OH2287	A	Transforme	0.13Y	116.8	0.00	9.20	0.00	0	0	0	100	0.00	0.0	9.608	0.000	0	0	0	0	L
L	XFMR2290_4	OH2284_4	A	Transforme	0.13Y	116.9	-0.06	9.14	0.31	9	2	0	100	0.00	0.0	9.470	0.000	0	0	0	1	L
L	1401000009021	XFMR2290_4	A	Consumer	0.13Y	116.9	0.00	9.14	16.18	0	2	0	100	0.00	0.0	9.470	0.000	2	0	1	1	L
L	XFMR2345_4	OH2280_4	A	Transforme	0.13Y	116.8	0.04	9.24	0.05	1	0	0	100	0.00	0.0	9.102	0.000	0	0	0	1	L
L	1401000009029	XFMR2345_4	A	Consumer	0.13Y	116.8	0.00	9.24	2.46	0	0	0	100	0.00	0.0	9.102	0.000	0	0	1	1	L
L	OH2330	OH2329	A	4 ACSR 7/1	7.01Y	116.8	0.00	9.19	0.00	0	0	0	100	0.00	0.0	9.145	0.096	0	0	0	0	L
L	XFMR2331	OH2330	A	Transforme	0.13Y	116.8	0.00	9.19	0.00	0	0	0	100	0.00	0.0	9.145	0.000	0	0	0	0	L
L	OH28910	OH2300_4	A	4 ACSR 7/1	7.01Y	116.8	0.02	9.19	2.29	2	16	-3	-98	0.00	0.0	9.195	0.195	0	0	0	1	L
L	XFMR28911	OH28910	A	Transforme	0.14Y	117.2	-0.40	8.79	2.29	66	16	-3	-98	0.05	0.3	9.195	0.000	0	0	0	1	L
L	1401000008014	XFMR28911	A	Consumer	0.14Y	117.2	0.00	8.79	119.00	0	16	-3	-98	0.00	0.0	9.195	0.000	16	-3	1	1	L
L	XFMR2327_4	OH2300_4	A	Transforme	0.14Y	117.0	-0.18	9.00	0.94	27	6	-1	-99	0.01	0.0	9.000	0.000	0	0	0	3	L
L	1401000009030	XFMR2327_4	A	Consumer	0.14Y	117.0	0.00	9.00	15.15	0	2	0	100	0.00	0.0	9.000	0.000	2	0	1	1	L
L	1401000008001	XFMR2327_4	A	Consumer	0.14Y	117.0	0.00	9.00	19.32	0	3	-1	-95	0.00	0.0	9.000	0.000	3	-1	1	1	L
L	1401000009013	XFMR2327_4	A	Consumer	0.14Y	117.0	0.00	9.00	14.32	0	2	0	100	0.00	0.0	9.000	0.000	2	0	1	1	L
L	XFMR2325_4	OH2323_4	A	Transforme	0.13Y	116.8	0.00	9.16	0.00	0	0	0	100	0.00	0.0	8.955	0.000	0	0	0	0	L
L	1401000008007	XFMR2325_4	A	Consumer	0.13Y	116.8	0.00	9.16	0.00	0	0	0	100	0.00	0.0	8.955	0.000	0	0	0	0	L
L	XFMR2324_4	OH2322_4	A	Transforme	0.14Y	117.1	-0.20	8.94	1.06	30	7	-1	-99	0.01	0.2	8.896	0.000	0	0	0	1	L
L	1401000008006	XFMR2324_4	A	Consumer	0.14Y	117.1	0.00	8.94	54.92	0	7	-2	-96	0.00	0.0	8.896	0.000	7	-2	1	1	L
L	XFMR2306	OH2268	A	Transforme	0.14Y	117.3	-0.43	8.69	2.51	72	17	-3	-98	0.06	0.4	8.821	0.000	0	0	0	1	L
L	1401000008011	XFMR2306	A	Consumer	0.14Y	117.3	0.00	8.69	130.26	0	17	-4	-97	0.00	0.0	8.821	0.000	17	-4	1	1	L
L	OH534_4	OH532	A	4 ACSR 7/1	7.05Y	117.5	0.00	8.51	0.00	0	0	0	100	0.00	0.0	7.968	0.173	0	0	0	0	L
L	XFMR535	OH534_4	A	Transforme	0.14Y	117.5	0.00	8.51	0.00	0	0	0	100	0.00	0.0	7.968	0.000	0	0	0	0	L
C	MISAdd-955	OH486_4	B	10T FUSE	7.51Y	125.1	0.00	0.91	8.68	91	65	-6	-100	0.00	0.0	6.167	0.000	0	0	0	7	C
C	XFMR489_4	OH488_4	B	Transforme	0.14Y	125.1	0.01	0.93	3.15	91	24	-2	-100	0.10	0.4	6.212	0.000	0	0	0	2	C
L	OH695_4	OH676_4	A	3/0 ACSR 6	7.05Y	117.4	0.14	8.56	141.90	47	990	-149	-99	2.42	0.1	7.038	0.120	0	0	0	145	L
			B		7.50Y	124.9	0.02	1.08	88.64	30	659	-83	-99					0	0	0	134	
			C		7.18Y	119.7	0.11	6.27	85.79	29	615	-52	-100					0	0	0	130	
L	OH428_4	OH695_4	A	3/0 ACSR 6	7.03Y	117.1	0.34	8.90	140.96	47	982	-150	-99	5.89	0.3	7.331	0.293	0	0	0	144	L
			B		7.49Y	124.9	0.06	1.14	88.64	30	659	-83	-99					0	0	0	134	
			C		7.17Y	119.5	0.28	6.55	85.79	29	614	-52	-100					0	0	0	130	
C	REG2945	OH428_4	A	Regulator	7.54Y	125.7	-8.64	0.26	140.96	141	978	-156	-99	percent Boost= 6.88 Tap=11.0							144	C
H			B		7.59Y	126.4	-1.58	-0.44	88.64	89	659	-85	-99	percent Boost= 1.25 Tap= 2.0							134	H
H			C		7.59Y	126.6	-7.12	-0.57	85.79	86	613	-54	-100	percent Boost= 5.62 Tap= 9.0							130	H

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru
H OH7168	REG2945	C	6A CWC 3 S	7.58Y	126.3	0.29	-0.29	61.31	44	465	25	100	1.02	0.2	7.442	0.111	0	0	0	103 H
H OCD7169	OH7168	C	50-4H OCR	7.58Y	126.3	0.00	-0.29	61.31	123	464	25	100	0.00	0.0	7.442	0.000	0	0	0	103 H
H OH718_4	OCD7169	C	6A CWC 3 S	7.56Y	126.1	0.21	-0.08	61.31	44	464	25	100	0.75	0.2	7.524	0.081	0	0	0	103 H
H OH720_4	OH718_4	C	6A CWC 3 S	7.56Y	126.1	0.00	-0.08	0.80	1	6	0	100	0.00	0.0	7.546	0.023	0	0	0	2 H
H OH719_4	OH720_4	C	6A CWC 3 S	7.56Y	126.1	0.00	-0.07	0.15	0	1	0	100	0.00	0.0	7.610	0.064	0	0	0	1 H
H XFMR723_4	OH719_4	C	Transforme	0.15Y	126.0	0.03	-0.05	0.15	4	1	0	100	0.00	0.0	7.610	0.000	0	0	0	1 H
H 643404078003	XFMR723_4	C	Consumer	0.15Y	126.0	0.00	-0.05	7.91	0	1	0	100	0.00	0.0	7.610	0.000	1	0	1	1 H
H OH721_4	OH720_4	C	6A CWC 3 S	7.56Y	126.1	0.00	-0.07	0.65	0	5	0	100	0.00	0.0	7.641	0.094	0	0	0	1 H
C XFMR1041	OH1040	C	Transforme	0.14Y	120.6	0.78	5.41	3.55	102	26	1	100	0.13	0.5	10.060	0.000	0	0	0	4 C
L OH13101	OH13099	C	2 TPX	0.12Y	117.5	0.57	8.54	102.25	89	12	0	100	0.06	0.5	12.852	0.015	0	0	0	1 L
L 643000055018	OH13101	C	Consumer	0.12Y	117.5	0.00	8.54	102.25	0	12	0	100	0.00	0.0	12.852	0.000	12	0	1	1 L
C XFMR1271_4	OH1217_4	C	Transforme	0.14Y	118.8	0.59	7.24	2.79	80	20	1	100	0.08	0.4	12.581	0.000	0	0	0	4 C
OH710_4	REG2945	A	3/0 ACSR 6	7.53Y	125.5	0.26	0.52	131.27	44	978	-156	-99	2.62	0.1	7.495	0.164	0	0	0	144
H		B		7.59Y	126.5	-0.01	-0.45	87.53	29	659	-85	-99					0	0	0	134 H
H		C		7.59Y	126.6	0.00	-0.57	22.03	7	148	-79	-88					0	0	0	27 H
OH702_4	OH710_4	A	3/0 ACSR 6	7.52Y	125.3	0.19	0.71	131.27	44	976	-159	-99	1.94	0.1	7.617	0.122	0	0	0	144
H		B		7.59Y	126.5	-0.01	-0.46	87.53	29	658	-87	-99					0	0	0	134 H
H		C		7.59Y	126.6	0.00	-0.57	22.03	7	148	-79	-88					0	0	0	27 H
H MISAdd-918	OH702_4	B	10T FUSE	7.59Y	126.5	0.00	-0.46	0.02	0	0	0	100	0.00	0.0	7.617	0.000	0	0	0	1 H
H OH703_4	MISAdd-918	B	6A CWC 3 S	7.59Y	126.5	0.00	-0.46	0.02	0	0	0	100	0.00	0.0	7.733	0.116	0	0	0	1 H
H OH29752	OH703_4	B	6A CWC 3 S	7.59Y	126.5	0.00	-0.46	0.02	0	0	0	100	0.00	0.0	7.878	0.145	0	0	0	1 H
H XFMR29753	OH29752	B	Transforme	0.15Y	126.5	-0.00	-0.46	0.02	1	0	0	100	0.00	0.0	7.878	0.000	0	0	0	1 H
H 643404078019	XFMR29753	B	Consumer	0.15Y	126.5	0.00	-0.46	1.05	0	0	0	100	0.00	0.0	7.878	0.000	0	0	1	1 H
H XFMR704	OH703_4	B	Transforme	0.15Y	126.5	0.00	-0.46	0.00	0	0	0	100	0.00	0.0	7.733	0.000	0	0	0	0 H
H 643404078001	XFMR704	B	Consumer	0.15Y	126.5	0.00	-0.46	0.00	0	0	0	100	0.00	0.0	7.733	0.000	0	0	0	0 H
H 643404078009	XFMR704	B	Consumer	0.15Y	126.5	0.00	-0.46	0.00	0	0	0	100	0.00	0.0	7.733	0.000	0	0	0	0 H
OH28949	OH702_4	A	3/0 ACSR 6	7.52Y	125.3	0.00	0.71	0.60	0	4	2	89	0.00	0.0	7.770	0.154	0	0	0	1
H		B		7.59Y	126.5	-0.00	-0.46	0.00	0	0	0	100					0	0	0	0 H
H		C		7.59Y	126.6	0.00	-0.57	0.00	0	0	0	100					0	0	0	0 H
OH901_4	OH702_4	A	3/0 ACSR 6	7.51Y	125.2	0.08	0.79	130.78	44	970	-163	-99	0.85	0.0	7.670	0.054	0	0	0	143
H		B		7.59Y	126.5	-0.00	-0.46	87.07	29	655	-87	-99					0	0	0	132 H
H		C		7.59Y	126.6	0.00	-0.57	22.03	7	148	-79	-88					0	0	0	27 H
XFMR11188	OH901_4	A	Transforme	0.13Y	125.2	0.00	0.79	0.00	0	0	0	100	0.00	0.0	7.670	0.000	0	0	0	0
H		B		0.13Y	126.5	-0.00	-0.46	0.00	0	0	0	100					0	0	0	0 H
H		C		0.13Y	126.6	0.00	-0.57	0.00	0	0	0	100					0	0	0	0 H
H OH8781	XFMR11188	B	1/0 TPX	0.13Y	126.5	0.00	-0.46	0.00	0	0	0	100	0.00	0.0	7.707	0.037	0	0	0	0 H
H OH8782	OH8781	B	4 TPX	0.13Y	126.5	0.00	-0.46	0.00	0	0	0	100	0.00	0.0	7.719	0.012	0	0	0	0 H
H 643404079095	OH8782	B	Consumer	0.13Y	126.5	0.00	-0.46	0.00	0	0	0	100	0.00	0.0	7.719	0.000	0	0	0	0 H
OH8787	OH901_4	A	3/0 ACSR 6	7.50Y	125.0	0.24	1.03	130.78	44	969	-163	-99	2.45	0.1	7.825	0.155	0	0	0	143
H		B		7.59Y	126.5	-0.01	-0.47	87.07	29	655	-88	-99					0	0	0	132 H
H		C		7.59Y	126.6	0.00	-0.56	22.03	7	148	-78	-88					0	0	0	27 H
OH897_4	OH8787	A	3/0 ACSR 6	7.49Y	124.8	0.14	1.17	129.79	43	959	-164	-99	1.39	0.1	7.914	0.089	0	0	0	141
H		B		7.59Y	126.5	-0.01	-0.48	87.07	29	655	-89	-99					0	0	0	132 H
H		C		7.59Y	126.6	0.00	-0.56	22.03	7	148	-78	-88					0	0	0	27 H
H MISAdd-920	OH897_4	C	10T FUSE	7.59Y	126.6	0.00	-0.56	3.90	41	30	1	100	0.00	0.0	7.914	0.000	0	0	0	6 H

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
H	OH913	MISAdd-920	C	6A CWC 3 S	7.59Y	126.5	0.02	-0.54	3.90	3	30	1	100	0.01	0.0	8.053	0.138	0	0	0	6	H
H	OH914_4	OH913	C	6A CWC 3 S	7.59Y	126.5	0.00	-0.54	3.54	3	27	1	100	0.00	0.0	8.073	0.021	0	0	0	4	H
C	XFMR8794	OH914_4	C	Transforme	0.13Y	125.8	0.75	0.22	1.23	88	9	1	99	0.04	0.4	8.073	0.000	0	0	0	1	C
H	OH7808	OH914_4	C	6A CWC 3 S	7.59Y	126.5	0.01	-0.53	2.31	2	18	0	100	0.00	0.0	8.169	0.096	0	0	0	3	H
H	OH916_4	OH7808	C	6A CWC 3 S	7.59Y	126.5	0.00	-0.52	1.04	1	8	0	100	0.00	0.0	8.228	0.059	0	0	0	1	H
H	XFMR917_4	OH916_4	C	Transforme	0.15Y	126.3	0.20	-0.33	1.04	30	8	0	100	0.01	0.1	8.228	0.000	0	0	0	1	H
H	643404079089	XFMR917_4	C	Consumer	0.15Y	126.3	0.00	-0.33	54.06	0	8	0	100	0.00	0.0	8.228	0.000	8	0	1	1	H
H	XFMR919	OH7808	C	Transforme	0.15Y	126.3	0.24	-0.28	1.27	37	10	0	100	0.02	0.2	8.169	0.000	0	0	0	2	H
H	643404079015	XFMR919	C	Consumer	0.15Y	126.3	0.00	-0.28	13.63	0	2	0	100	0.00	0.0	8.169	0.000	2	0	1	1	H
H	643404079022	XFMR919	C	Consumer	0.15Y	126.3	0.00	-0.28	52.51	0	8	0	100	0.00	0.0	8.169	0.000	8	0	1	1	H
H	OH924_4	OH913	C	6A CWC 3 S	7.59Y	126.5	0.00	-0.54	0.36	0	3	0	100	0.00	0.0	8.154	0.102	0	0	0	2	H
H	XFMR925_4	OH924_4	C	Transforme	0.15Y	126.5	0.07	-0.47	0.36	10	3	0	100	0.00	0.0	8.154	0.000	0	0	0	2	H
H	643404079007	XFMR925_4	C	Consumer	0.15Y	126.5	0.00	-0.47	10.65	0	2	0	100	0.00	0.0	8.154	0.000	2	0	1	1	H
H	643404079012	XFMR925_4	C	Consumer	0.15Y	126.5	0.00	-0.47	8.21	0	1	0	100	0.00	0.0	8.154	0.000	1	0	1	1	H
H	XFMR928	OH913	C	Transforme	0.15Y	126.5	0.00	-0.54	0.00	0	0	0	100	0.00	0.0	8.053	0.000	0	0	0	0	H
H	643404079014	XFMR928	C	Consumer	0.15Y	126.5	0.00	-0.54	0.00	0	0	0	100	0.00	0.0	8.053	0.000	0	0	0	0	H
H	643404079013	XFMR928	C	Consumer	0.15Y	126.5	0.00	-0.54	0.00	0	0	0	100	0.00	0.0	8.053	0.000	0	0	0	0	H
	OH931_4	OH897_4	A	3/0 ACSR 6	7.47Y	124.6	0.25	1.42	129.79	43	958	-166	-99	2.51	0.1	8.074	0.160	0	0	0	141	
H			B		7.59Y	126.5	-0.01	-0.49	87.07	29	655	-90	-99					0	0	0	132	H
H			C		7.59Y	126.6	-0.01	-0.57	18.74	6	118	-79	-83					0	0	0	21	H
	OH1001	OH931_4	A	3/0 ACSR 6	7.45Y	124.2	0.35	1.77	124.01	41	923	-83	-100	2.91	0.2	8.276	0.202	0	0	0	140	
H			B		7.59Y	126.5	0.00	-0.49	82.00	27	622	-2	-100					0	0	0	131	H
H			C		7.59Y	126.6	0.00	-0.57	5.68	2	42	9	98					0	0	0	10	H
	OH1011_4	OH1001	A	3/0 ACSR 6	7.45Y	124.2	0.01	1.78	122.14	41	907	-83	-100	0.11	0.0	8.284	0.008	0	0	0	136	
H			B		7.59Y	126.5	0.00	-0.49	82.00	27	622	-4	-100					0	0	0	131	H
H			C		7.59Y	126.6	0.00	-0.57	5.68	2	42	9	98					0	0	0	10	H
	OH1000_4	OH1011_4	A	3/0 ACSR 6	7.45Y	124.2	0.05	1.83	122.14	41	907	-83	-100	0.43	0.0	8.315	0.031	0	0	0	136	
H			B		7.59Y	126.5	0.00	-0.49	82.00	27	622	-4	-100					0	0	0	131	H
H			C		7.59Y	126.6	-0.00	-0.57	5.68	2	42	9	98					0	0	0	10	H
	OH1004	OH1000_4	A	1/0 ACSR	7.44Y	124.1	0.09	1.92	74.02	32	551	-23	-100	0.40	0.1	8.383	0.068	0	0	0	82	
H			C		7.59Y	126.5	0.02	-0.55	0.00	0	0	0	100					0	0	0	0	H
	OH1025_4	OH1004	A	1/0 ACSR	7.44Y	124.0	0.04	1.96	73.26	32	545	-22	-100	0.17	0.0	8.413	0.030	0	0	0	80	
H			C		7.59Y	126.5	0.01	-0.54	0.00	0	0	0	100					0	0	0	0	H
C	OCD7038	OH1025_4	A	50-H OCR	7.44Y	124.0	0.00	1.96	73.26	147	545	-22	-100	0.00	0.0	8.413	0.000	0	0	0	80	C
H			C		7.59Y	126.5	0.00	-0.54	0.00	0	0	0	100					0	0	0	0	H
	OH1029_4	OCD7038	A	1/0 ACSR	7.44Y	124.0	0.01	1.97	66.91	29	495	-51	-99	0.05	0.0	8.423	0.010	0	0	0	77	
H			C		7.59Y	126.5	0.00	-0.54	0.00	0	0	0	100					0	0	0	0	H
C	XFMR1039	OH1038_4	A	Transforme	0.14Y	121.1	2.89	4.87	3.24	93	22	11	89	0.11	0.5	8.467	0.000	0	0	0	2	C
	OH1045_4	OH1029_4	A	1/0 ACSR	7.44Y	124.0	0.07	2.04	63.27	28	466	-66	-99	0.34	0.1	8.503	0.080	0	0	0	72	
H			C		7.59Y	126.5	0.02	-0.51	0.00	0	0	0	100					0	0	0	0	H
	OH1053_4	OH1045_4	A	1/0 ACSR	7.43Y	123.9	0.07	2.11	62.57	27	461	-65	-99	0.30	0.1	8.574	0.072	0	0	0	71	
H			C		7.59Y	126.5	0.02	-0.49	0.00	0	0	0	100					0	0	0	0	H
	OH1057_4	OH1053_4	A	1/0 ACSR	7.42Y	123.7	0.15	2.26	60.90	26	448	-63	-99	0.66	0.1	8.739	0.165	0	0	0	69	
H			C		7.59Y	126.4	0.04	-0.45	0.00	0	0	0	100					0	0	0	0	H
	OH1080_4	OH1057_4	A	1/0 ACSR	7.42Y	123.7	0.06	2.32	55.27	24	407	-56	-99	0.26	0.1	8.818	0.079	0	0	0	59	
H			C		7.59Y	126.4	0.02	-0.43	0.00	0	0	0	100					0	0	0	0	H

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
	OH1081	OH1080_4	A	1/0 ACSR	7.42Y	123.6	0.05	2.37	55.27	24	406	-56	-99	0.19	0.0	8.875	0.058	0	0	0	59	
H			C		7.59Y	126.4	0.01	-0.42	0.00	0	0	0	100					0	0	0	0	H
	OH1100	OH1081	A	1/0 ACSR	7.42Y	123.6	0.04	2.41	54.30	24	399	-55	-99	0.17	0.0	8.928	0.052	0	0	0	56	
H			C		7.58Y	126.4	0.01	-0.40	0.00	0	0	0	100					0	0	0	0	H
	OH1092_4	OH1100	A	1/0 ACSR	7.41Y	123.6	0.04	2.44	49.39	21	363	-48	-99	0.13	0.0	8.977	0.049	0	0	0	53	
H			C		7.58Y	126.4	0.01	-0.39	0.00	0	0	0	100					0	0	0	0	H
	OH1082	OH1092_4	A	1/0 ACSR	7.41Y	123.5	0.03	2.47	47.85	21	352	-46	-99	0.09	0.0	9.013	0.036	0	0	0	52	
H			C		7.58Y	126.4	0.01	-0.39	0.00	0	0	0	100					0	0	0	0	H
	OH1083_4	OH1082	A	1/0 ACSR	7.41Y	123.5	0.05	2.52	43.04	19	316	-41	-99	0.15	0.0	9.089	0.076	0	0	0	50	
H			C		7.58Y	126.4	0.01	-0.37	0.00	0	0	0	100					0	0	0	0	H
	OH833_4	OH1083_4	A	1/0 ACSR	7.41Y	123.5	0.03	2.55	41.61	18	306	-39	-99	0.09	0.0	9.137	0.048	0	0	0	49	
H			C		7.58Y	126.4	0.01	-0.36	0.00	0	0	0	100					0	0	0	0	H
	OH831_4	OH833_4	A	1/0 ACSR	7.40Y	123.4	0.07	2.61	39.54	17	291	-36	-99	0.18	0.1	9.247	0.110	0	0	0	48	
H			C		7.58Y	126.3	0.02	-0.35	0.00	0	0	0	100					0	0	0	0	H
C	MISAdd-929	OH831_4	A	10T FUSE	7.40Y	123.4	0.00	2.61	7.64	80	56	-10	-98	0.00	0.0	9.247	0.000	0	0	0	6	C
	OH876	OH831_4	A	1/0 ACSR	7.40Y	123.3	0.08	2.69	31.92	14	235	-26	-99	0.18	0.1	9.406	0.160	0	0	0	42	
H			C		7.58Y	126.3	0.02	-0.32	0.00	0	0	0	100					0	0	0	0	H
	OH877	OH876	A	1/0 ACSR	7.40Y	123.3	0.02	2.72	31.92	14	235	-26	-99	0.05	0.0	9.453	0.046	0	0	0	42	
H			C		7.58Y	126.3	0.01	-0.32	0.00	0	0	0	100					0	0	0	0	H
	OH878	OH877	A	1/0 ACSR	7.40Y	123.3	0.03	2.75	31.75	14	233	-26	-99	0.07	0.0	9.513	0.060	0	0	0	41	
H			C		7.58Y	126.3	0.01	-0.31	0.00	0	0	0	100					0	0	0	0	H
	OH891_4	OH878	A	1/0 ACSR	7.39Y	123.2	0.07	2.81	31.75	14	233	-26	-99	0.15	0.1	9.654	0.141	0	0	0	41	
H			C		7.58Y	126.3	0.02	-0.29	0.00	0	0	0	100					0	0	0	0	H
	OH885	OH891_4	A	1/0 ACSR	7.39Y	123.2	0.03	2.84	31.75	14	233	-26	-99	0.06	0.0	9.710	0.056	0	0	0	41	
H			C		7.58Y	126.3	0.01	-0.28	0.00	0	0	0	100					0	0	0	0	H
	OH899_4	OH885	A	1/0 ACSR	7.39Y	123.1	0.04	2.89	31.75	14	233	-27	-99	0.10	0.0	9.801	0.091	0	0	0	41	
H			C		7.58Y	126.3	0.01	-0.27	0.00	0	0	0	100					0	0	0	0	H
	OH917	OH899_4	A	1/0 ACSR	7.38Y	123.0	0.07	2.95	30.41	13	223	-25	-99	0.14	0.1	9.944	0.143	0	0	0	38	
H			C		7.58Y	126.3	0.02	-0.25	0.00	0	0	0	100					0	0	0	0	H
	OH929_4	OH917	A	1/0 ACSR	7.38Y	123.0	0.03	2.99	29.77	13	218	-24	-99	0.07	0.0	10.015	0.072	0	0	0	36	
H			C		7.57Y	126.2	0.01	-0.25	0.00	0	0	0	100					0	0	0	0	H
	OH934_4	OH929_4	A	1/0 ACSR	7.38Y	123.0	0.06	3.04	29.27	13	215	-23	-99	0.12	0.1	10.145	0.130	0	0	0	35	
H			C		7.57Y	126.2	0.02	-0.23	0.00	0	0	0	100					0	0	0	0	H
C	MISAdd-935	OH934_4	A	10T FUSE	7.38Y	123.0	0.00	3.04	19.33	202	142	-9	-100	0.00	0.0	10.145	0.000	0	0	0	19	C
C	XFMR953_4	OH951_4	A	Transforme	0.14Y	121.9	1.03	4.14	2.82	81	21	3	99	0.08	0.4	10.491	0.000	0	0	0	3	C
C	XFMR17366	OH2863_4	A	Transforme	0.12Y	123.2	-0.41	2.81	2.64	76	19	-3	-99	0.07	0.4	10.993	0.000	0	0	0	2	C
C	OH17368	XFMR17366	A	2 TPX	0.12Y	123.0	0.14	2.95	128.83	112	16	-3	-98	0.06	0.4	11.003	0.010	0	0	0	1	C
C	XFMR2911_4	OH2910_4	A	Transforme	0.14Y	121.4	1.42	4.62	3.56	103	26	4	99	0.13	0.5	10.743	0.000	0	0	0	3	C
C	XFMR2880_4	OH2877	A	Transforme	0.14Y	123.2	-0.47	2.76	2.74	79	20	-4	-98	0.08	0.4	11.168	0.000	0	0	0	1	C
C	MISAdd-934	OH934_4	A	10T FUSE	7.38Y	123.0	0.00	3.04	10.00	104	72	-14	-98	0.00	0.0	10.145	0.000	0	0	0	16	C
C	XFMR1088	OH1082	A	Transforme	0.14Y	124.2	-0.70	1.77	4.81	138	35	-5	-99	0.24	0.7	9.013	0.000	0	0	0	2	C
C	XFMR1101_4	OH1100	A	Transforme	0.14Y	124.1	-0.56	1.85	3.42	99	25	-4	-99	0.12	0.5	8.928	0.000	0	0	0	2	C
L	XFMR1026	OCD7038	A	Transforme	0.13Y	116.7	7.29	9.25	7.68	221	49	29	86	0.61	1.2	8.413	0.000	0	0	0	3	L
L	643200079037	XFMR1026	A	Consumer	0.13Y	116.7	0.00	9.25	352.58	0	43	21	90	0.00	0.0	8.413	0.000	43	21	1	1	L
L	643200079038	XFMR1026	A	Consumer	0.13Y	116.7	0.00	9.25	10.07	0	1	0	100	0.00	0.0	8.413	0.000	1	0	1	1	L
L	643200079135	XFMR1026	A	Consumer	0.13Y	116.7	0.00	9.25	38.58	0	5	2	93	0.00	0.0	8.413	0.000	5	2	1	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
	OH980	OH1000_4	A	3/0 ACSR 6	7.44Y	124.0	0.12	1.95	48.36	16	355	-61	-99	0.83	0.1	8.458	0.143	0	0	0	54	
H			B		7.58Y	126.4	0.09	-0.39	82.00	27	622	-4	-100					0	0	0	131	H
H			C		7.60Y	126.6	-0.05	-0.61	5.68	2	42	9	98					0	0	0	10	H
H	MISAdd-951	OH980	C	10T FUSE	7.60Y	126.6	0.00	-0.61	1.97	21	15	0	100	0.00	0.0	8.458	0.000	0	0	0	5	H
H	OH992_4	MISAdd-951	C	6A CWC 3 S	7.60Y	126.6	0.00	-0.61	1.97	1	15	0	100	0.00	0.0	8.509	0.051	0	0	0	5	H
H	OH993_4	OH992_4	C	6A CWC 3 S	7.60Y	126.6	0.00	-0.60	1.97	1	15	0	100	0.00	0.0	8.566	0.057	0	0	0	5	H
H	OH989_4	OH993_4	C	6A CWC 3 S	7.60Y	126.6	0.01	-0.59	1.97	1	15	0	100	0.00	0.0	8.742	0.176	0	0	0	4	H
H	OH984	OH989_4	C	6A CWC 3 S	7.60Y	126.6	0.01	-0.58	0.91	1	7	0	100	0.00	0.0	8.909	0.168	0	0	0	3	H
H	OH981	OH984	C	6A CWC 3 S	7.59Y	126.6	0.00	-0.58	0.54	0	4	0	100	0.00	0.0	8.995	0.086	0	0	0	1	H
H	XFMR982_4	OH981	C	Transforme	0.15Y	126.5	0.10	-0.48	0.54	16	4	0	100	0.00	0.0	8.995	0.000	0	0	0	1	H
H	643404069019	XFMR982_4	C	Consumer	0.15Y	126.5	0.00	-0.48	28.08	0	4	0	100	0.00	0.0	8.995	0.000	4	0	1	1	H
H	XFMR985_4	OH984	C	Transforme	0.15Y	126.5	0.07	-0.52	0.37	11	3	0	100	0.00	0.0	8.909	0.000	0	0	0	2	H
H	643404069007	XFMR985_4	C	Consumer	0.15Y	126.5	0.00	-0.52	15.07	0	2	0	100	0.00	0.0	8.909	0.000	2	0	1	1	H
H	643404069025	XFMR985_4	C	Consumer	0.15Y	126.5	0.00	-0.52	4.21	0	1	0	100	0.00	0.0	8.909	0.000	1	0	1	1	H
H	643404069028	XFMR985_4	C	Consumer	0.15Y	126.5	0.00	-0.52	0.00	0	0	0	100	0.00	0.0	8.909	0.000	0	0	0	0	H
H	XFMR990	OH989_4	C	Transforme	0.15Y	126.4	0.20	-0.39	1.05	30	8	0	100	0.01	0.1	8.742	0.000	0	0	0	1	H
H	643200079113	XFMR990	C	Consumer	0.15Y	126.4	0.00	-0.39	54.75	0	8	0	100	0.00	0.0	8.742	0.000	8	0	1	1	H
H	XFMR994_4	OH993_4	C	Transforme	0.15Y	126.6	0.00	-0.60	0.00	0	0	0	100	0.00	0.0	8.566	0.000	0	0	0	1	H
H	643200079145	XFMR994_4	C	Consumer	0.15Y	126.6	0.00	-0.60	0.00	0	0	0	100	0.00	0.0	8.566	0.000	0	0	1	1	H
H	643200079090	XFMR994_4	C	Consumer	0.15Y	126.6	0.00	-0.60	0.00	0	0	0	100	0.00	0.0	8.566	0.000	0	0	0	0	H
H	643200079091	XFMR994_4	C	Consumer	0.15Y	126.6	0.00	-0.60	0.00	0	0	0	100	0.00	0.0	8.566	0.000	0	0	0	0	H
H	643200079093	XFMR994_4	C	Consumer	0.15Y	126.6	0.00	-0.60	0.00	0	0	0	100	0.00	0.0	8.566	0.000	0	0	0	0	H
H	XFMR998_4	OH992_4	C	Transforme	0.15Y	126.6	0.00	-0.61	0.00	0	0	0	100	0.00	0.0	8.509	0.000	0	0	0	0	H
H	643200079088	XFMR998_4	C	Consumer	0.15Y	126.6	0.00	-0.61	0.00	0	0	0	100	0.00	0.0	8.509	0.000	0	0	0	0	H
H	OH1128	OH980	C	4 ACSR 7/1	7.60Y	126.6	0.00	-0.61	3.01	2	21	9	92	0.00	0.0	8.475	0.017	0	0	0	3	H
H	OH1121_4	OH1128	C	4 ACSR 7/1	7.60Y	126.6	0.01	-0.61	3.01	2	21	9	92	0.00	0.0	8.511	0.036	0	0	0	3	H
H	OH1110_4	OH1121_4	C	4 ACSR 7/1	7.60Y	126.6	0.00	-0.60	2.95	2	20	9	91	0.00	0.0	8.519	0.008	0	0	0	2	H
C	XFMR1112_4	OH1110_4	C	Transforme	0.14Y	124.1	2.47	1.86	2.95	85	20	9	91	0.09	0.4	8.519	0.000	0	0	0	2	C
H	XFMR1122_4	OH1121_4	C	Transforme	0.15Y	126.6	0.00	-0.61	0.00	0	0	0	100	0.00	0.0	8.511	0.000	0	0	0	0	H
H	XFMR1124_4	OH1121_4	C	Transforme	0.15Y	126.6	0.01	-0.59	0.07	2	0	0	100	0.00	0.0	8.511	0.000	0	0	0	1	H
H	643200079048	XFMR1124_4	C	Consumer	0.15Y	126.6	0.00	-0.59	3.40	0	0	0	100	0.00	0.0	8.511	0.000	0	0	1	1	H
H	XFMR1126	OH1121_4	C	Transforme	0.15Y	126.6	0.00	-0.61	0.00	0	0	0	100	0.00	0.0	8.511	0.000	0	0	0	0	H
H	XFMR1129	OH1128	C	Transforme	0.15Y	126.6	0.00	-0.61	0.00	0	0	0	100	0.00	0.0	8.475	0.000	0	0	0	0	H
	OH1142_4	OH980	A	3/0 ACSR 6	7.44Y	124.0	0.04	2.00	48.36	16	355	-61	-99	0.28	0.0	8.505	0.047	0	0	0	54	
H			B		7.58Y	126.4	0.03	-0.37	81.52	27	618	-5	-100					0	0	0	130	H
H			C		7.60Y	126.6	-0.02	-0.63	0.82	0	6	0	100					0	0	0	2	H
	OH1133_4	OH1142_4	A	3/0 ACSR 6	7.44Y	124.0	0.01	2.01	48.36	16	355	-61	-99	0.10	0.0	8.523	0.017	0	0	0	54	
H			B		7.58Y	126.4	0.01	-0.36	81.52	27	618	-5	-100					0	0	0	130	H
H			C		7.60Y	126.6	-0.01	-0.64	0.82	0	6	0	100					0	0	0	2	H
H	MISAdd-942	OH1133_4	B	10T FUSE	7.58Y	126.4	0.00	-0.36	0.00	0	0	0	100	0.00	0.0	8.523	0.000	0	0	0	0	H
H	OH1145_4	MISAdd-942	B	6A CWC 3 S	7.58Y	126.4	0.00	-0.36	0.00	0	0	0	100	0.00	0.0	8.571	0.049	0	0	0	0	H

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
H	XFMR1146	OH1145_4	B	Transforme	0.15Y	126.4	0.00	-0.36	0.00	0	0	0	100	0.00	0.0	8.571	0.000	0	0	0	0	H
H	643200079073	XFMR1146	B	Consumer	0.15Y	126.4	0.00	-0.36	0.00	0	0	0	100	0.00	0.0	8.571	0.000	0	0	0	0	H
H	643200079075	XFMR1146	B	Consumer	0.15Y	126.4	0.00	-0.36	0.00	0	0	0	100	0.00	0.0	8.571	0.000	0	0	0	0	H
H	MISAdd-941	OH1133_4	B	10T FUSE	7.58Y	126.4	0.00	-0.36	0.35	4	3	0	100	0.00	0.0	8.523	0.000	0	0	0	2	H
H	OH1137_4	MISAdd-941	B	6A CWC 3 S	7.58Y	126.4	0.00	-0.35	0.35	0	3	0	100	0.00	0.0	8.550	0.028	0	0	0	2	H
H	XFMR1138_4	OH1137_4	B	Transforme	0.15Y	126.4	-0.01	-0.37	0.35	10	3	0	100	0.00	0.0	8.550	0.000	0	0	0	2	H
H	643200079052	XFMR1138_4	B	Consumer	0.15Y	126.4	0.00	-0.37	17.65	0	3	0	100	0.00	0.0	8.550	0.000	3	0	1	1	H
H	643200079053	XFMR1138_4	B	Consumer	0.15Y	126.4	0.00	-0.37	0.41	0	0	0	100	0.00	0.0	8.550	0.000	0	0	1	1	H
H	MISAdd-940	OH1133_4	B	10T FUSE	7.58Y	126.4	0.00	-0.36	0.32	3	2	0	100	0.00	0.0	8.523	0.000	0	0	0	1	H
H	OH1134_4	MISAdd-940	B	6A CWC 3 S	7.58Y	126.4	0.00	-0.35	0.32	0	2	0	100	0.00	0.0	8.620	0.097	0	0	0	1	H
H	XFMR1135	OH1134_4	B	Transforme	0.15Y	126.4	-0.01	-0.36	0.32	9	2	0	100	0.00	0.0	8.620	0.000	0	0	0	1	H
H	643200079132	XFMR1135	B	Consumer	0.15Y	126.4	0.00	-0.36	16.69	0	2	0	100	0.00	0.0	8.620	0.000	2	0	1	1	H
	OH1151_4	OH1133_4	A	3/0 ACSR 6	7.44Y	123.9	0.07	2.08	48.36	16	355	-61	-99	0.44	0.0	8.598	0.076	0	0	0	54	
H			B		7.58Y	126.3	0.05	-0.31	80.86	27	613	-5	-100					0	0	0	127	H
H			C		7.60Y	126.7	-0.03	-0.67	0.82	0	6	0	100					0	0	0	2	H
C	XFMR1153_4	OH1152_4	A	Transforme	0.14Y	124.6	-0.64	1.45	4.18	120	31	-5	-99	0.18	0.6	8.712	0.000	0	0	0	5	C
	OH1166_4	OH1151_4	A	3/0 ACSR 6	7.43Y	123.9	0.02	2.09	43.99	15	322	-56	-99	0.11	0.0	8.620	0.022	0	0	0	48	
H			B		7.58Y	126.3	0.01	-0.30	78.04	26	591	-3	-100					0	0	0	125	H
H			C		7.60Y	126.7	-0.01	-0.68	0.82	0	6	0	100					0	0	0	2	H
	OH1167_4	OH1166_4	A	4 ACSR 7/1	7.43Y	123.8	0.13	2.22	43.99	31	322	-56	-99	1.09	0.1	8.678	0.058	0	0	0	48	
H			B		7.57Y	126.1	0.16	-0.14	78.04	56	591	-4	-100					0	0	0	125	H
H			C		7.60Y	126.7	-0.03	-0.71	0.82	1	6	0	100					0	0	0	2	H
	OH1174	OH1167_4	A	4 ACSR 7/1	7.42Y	123.7	0.13	2.35	43.99	31	322	-56	-99	1.06	0.1	8.736	0.058	0	0	0	48	
			B		7.56Y	126.0	0.16	0.02	76.37	55	578	-3	-100					0	0	0	124	
H			C		7.60Y	126.7	-0.03	-0.74	0.82	1	6	0	100					0	0	0	2	H
C	OCD7040	OH1174	A	50-4H OCR	7.42Y	123.7	0.00	2.35	43.71	87	320	-55	-99	0.00	0.0	8.736	0.000	0	0	0	47	C
C			B		7.56Y	126.0	0.00	0.02	76.37	153	577	-3	-100					0	0	0	124	C
H			C		7.60Y	126.7	0.00	-0.74	0.82	2	6	0	100					0	0	0	2	H
	OH1180_4	OCD7040	A	4 ACSR 7/1	7.42Y	123.6	0.05	2.39	43.71	31	320	-55	-99	0.41	0.0	8.758	0.022	0	0	0	47	
			B		7.56Y	125.9	0.06	0.08	76.37	55	577	-3	-100					0	0	0	124	
H			C		7.60Y	126.7	-0.01	-0.75	0.82	1	6	0	100					0	0	0	2	H
	OH1185_4	OH1180_4	A	4 ACSR 7/1	7.41Y	123.5	0.09	2.49	43.71	31	319	-56	-98	0.75	0.1	8.802	0.044	0	0	0	47	
			B		7.55Y	125.8	0.11	0.19	73.10	52	552	-2	-100					0	0	0	121	
H			C		7.61Y	126.8	-0.02	-0.77	0.82	1	6	0	100					0	0	0	2	H
	OH1190_4	OH1185_4	A	4 ACSR 7/1	7.41Y	123.5	0.06	2.55	43.71	31	319	-56	-98	0.47	0.1	8.829	0.028	0	0	0	47	
			B		7.54Y	125.7	0.07	0.26	73.08	52	552	-2	-100					0	0	0	118	
H			C		7.61Y	126.8	-0.01	-0.78	0.82	1	6	0	100					0	0	0	2	H
	OH29761	OH1190_4	A	4 ACSR 7/1	7.41Y	123.4	0.02	2.56	43.71	31	319	-56	-98	0.13	0.0	8.837	0.008	0	0	0	47	
			B		7.54Y	125.7	0.02	0.28	72.92	52	550	-2	-100					0	0	0	117	
H			C		7.61Y	126.8	-0.00	-0.78	0.82	1	6	0	100					0	0	0	2	H
C	XFMR29765	OH29762	A	Transforme	0.14Y	124.0	-0.61	1.97	3.85	111	28	-5	-98	0.15	0.5	8.906	0.000	0	0	0	2	C
	OH1195_4	OH29761	A	4 ACSR 7/1	7.41Y	123.4	0.02	2.58	38.93	28	284	-50	-98	0.14	0.0	8.846	0.009	0	0	0	44	
			B		7.54Y	125.7	0.02	0.30	72.92	52	550	-2	-100					0	0	0	117	
H			C		7.61Y	126.8	-0.00	-0.79	0.82	1	6	0	100					0	0	0	2	H
	OH701_4	OH1195_4	A	4 ACSR 7/1	7.40Y	123.4	0.03	2.61	38.00	27	277	-48	-99	0.22	0.0	8.860	0.014	0	0	0	43	
			B		7.54Y	125.7	0.04	0.34	72.92	52	550	-2	-100					0	0	0	117	
H			C		7.61Y	126.8	-0.01	-0.79	0.82	1	6	0	100					0	0	0	2	H
	OH2389_4	OH701_4	A	4 ACSR 7/1	7.40Y	123.3	0.07	2.68	37.37	27	273	-47	-99	0.58	0.1	8.896	0.037	0	0	0	42	
			B		7.53Y	125.6	0.10	0.44	72.92	52	550	-2	-100					0	0	0	117	
H			C		7.61Y	126.8	-0.02	-0.81	0.82	1	6	0	100					0	0	0	2	H

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

Flag	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	Flag
	OH7954	OH2389_4	A	4 ACSR 7/1	7.36Y	122.7	0.62	3.30	37.37	27	272	-47	-99	5.17	0.6	9.222	0.325	0	0	0	42	
			B		7.48Y	124.7	0.85	1.29	72.92	52	549	-3	-100					0	0	0	117	
H			C		7.62Y	127.0	-0.16	-0.97	0.82	1	6	0	100					0	0	0	2	H
	OH2388_4	OH7954	A	4 ACSR 7/1	7.36Y	122.6	0.08	3.38	35.53	25	258	-45	-99	0.71	0.1	9.267	0.045	0	0	0	40	
			B		7.48Y	124.6	0.12	1.40	72.92	52	546	-5	-100					0	0	0	117	
H			C		7.62Y	127.0	-0.02	-0.99	0.82	1	6	0	100					0	0	0	2	H
	OH2387_4	OH2388_4	A	4 ACSR 7/1	7.34Y	122.3	0.35	3.73	35.53	25	258	-45	-99	2.94	0.4	9.456	0.189	0	0	0	40	
			B		7.45Y	124.1	0.50	1.90	72.92	52	545	-5	-100					0	0	0	117	
H			C		7.63Y	127.1	-0.10	-1.09	0.82	1	6	0	100					0	0	0	2	H
	OH2386_4	OH2387_4	A	4 ACSR 7/1	7.32Y	122.1	0.22	3.94	34.98	25	253	-44	-99	1.87	0.2	9.577	0.121	0	0	0	38	
			B		7.43Y	123.8	0.32	2.22	72.92	52	543	-7	-100					0	0	0	117	
H			C		7.63Y	127.2	-0.06	-1.15	0.82	1	6	0	100					0	0	0	2	H
	OH2385_4	OH2386_4	A	4 ACSR 7/1	7.30Y	121.7	0.35	4.30	34.98	25	252	-44	-99	2.87	0.4	9.773	0.196	0	0	0	38	
			B		7.40Y	123.3	0.49	2.71	70.31	50	522	-11	-100					0	0	0	110	
H			C		7.63Y	127.2	-0.09	-1.25	0.82	1	6	0	100					0	0	0	2	H
	OH2384_4	OH2385_4	A	4 ACSR 7/1	7.28Y	121.3	0.44	4.74	34.98	25	252	-45	-98	3.57	0.5	10.018	0.245	0	0	0	38	
			B		7.36Y	122.7	0.61	3.32	70.31	50	520	-13	-100					0	0	0	110	
H			C		7.64Y	127.4	-0.12	-1.36	0.82	1	6	0	100					0	0	0	2	H
	OH2383	OH2384_4	A	4 ACSR 7/1	7.24Y	120.7	0.60	5.34	32.99	24	236	-42	-98	4.99	0.7	10.366	0.348	0	0	0	34	
			B		7.31Y	121.8	0.88	4.19	70.31	50	517	-14	-100					0	0	0	110	
H			C		7.65Y	127.5	-0.17	-1.54	0.82	1	6	0	100					0	0	0	2	H
H	MISAdd-944	OH2383	C	10T FUSE	7.65Y	127.5	0.00	-1.54	0.82	9	6	0	100	0.00	0.0	10.366	0.000	0	0	0	2	H
H	OH2512_4	MISAdd-944	C	4 ACSR 7/1	7.65Y	127.5	0.01	-1.52	0.82	1	6	0	100	0.00	0.0	10.697	0.331	0	0	0	2	H
H	OH2511_4	OH2512_4	C	4 ACSR 7/1	7.65Y	127.5	0.00	-1.52	0.00	0	0	0	100	0.00	0.0	10.845	0.148	0	0	0	0	H
H	XFMR2515	OH2511_4	C	Transforme	0.15Y	127.5	0.00	-1.52	0.00	0	0	0	100	0.00	0.0	10.845	0.000	0	0	0	0	H
H	644101072013	XFMR2515	C	Consumer	0.15Y	127.5	0.00	-1.52	0.00	0	0	0	100	0.00	0.0	10.845	0.000	0	0	0	0	H
H	XFMR2513_4	OH2512_4	C	Transforme	0.15Y	127.4	0.15	-1.37	0.82	24	6	0	100	0.01	0.0	10.697	0.000	0	0	0	2	H
H	644101072045	XFMR2513_4	C	Consumer	0.15Y	127.4	0.00	-1.37	15.20	0	2	0	100	0.00	0.0	10.697	0.000	2	0	1	1	H
H	644101072009	XFMR2513_4	C	Consumer	0.15Y	127.4	0.00	-1.37	27.56	0	4	0	100	0.00	0.0	10.697	0.000	4	0	1	1	H
	OH2517_4	OH2383	A	4 ACSR 7/1	7.23Y	120.5	0.18	5.52	32.99	24	235	-42	-98	1.51	0.2	10.471	0.105	0	0	0	34	
			B		7.29Y	121.5	0.26	4.46	70.31	50	514	-17	-100					0	0	0	110	
H			C		7.66Y	127.6	-0.06	-1.59	0.00	0	0	0	100					0	0	0	0	H
	OH2518	OH2517_4	A	4 ACSR 7/1	7.22Y	120.3	0.14	5.67	32.99	24	235	-42	-98	1.19	0.2	10.555	0.083	0	0	0	34	
			B		7.28Y	121.3	0.21	4.67	70.31	50	512	-17	-100					0	0	0	110	
H			C		7.66Y	127.6	-0.04	-1.64	0.00	0	0	0	100					0	0	0	0	H
C	XFMR2553	OH2552_4	B	Transforme	0.14Y	121.3	-0.00	4.67	2.70	78	20	-2	-100	0.08	0.4	10.653	0.000	0	0	0	2	C
C	MISAdd-946	OH2518	B	10T FUSE	7.28Y	121.3	0.00	4.67	7.46	78	54	-4	-100	0.00	0.0	10.555	0.000	0	0	0	7	C
C	XFMR10914	OH2525	B	Transforme	0.14Y	121.1	0.18	4.92	3.44	99	25	-1	-100	0.12	0.5	10.818	0.000	0	0	0	1	C
C	OH10916	XFMR10914	B	1/0 TPX	0.14Y	120.9	0.21	5.14	178.54	120	25	-2	-100	0.08	0.3	10.830	0.012	0	0	0	1	C
C	OH10918	OH10916	B	1/0 TPX	0.14Y	120.8	0.11	5.25	178.54	120	25	-3	-99	0.05	0.2	10.836	0.007	0	0	0	1	C
	OH2380_4	OH2518	A	4 ACSR 7/1	7.21Y	120.2	0.18	5.85	32.66	23	232	-41	-98	1.21	0.2	10.664	0.109	0	0	0	33	
			B		7.27Y	121.1	0.23	4.89	60.17	43	438	-12	-100					0	0	0	101	
H			C		7.66Y	127.7	-0.05	-1.68	0.00	0	0	0	100					0	0	0	0	H
C	MISAdd-945	OH2380_4	B	10T FUSE	7.27Y	121.1	0.00	4.89	60.17	628	437	-13	-100	0.00	0.0	10.664	0.000	0	0	0	101	C
C	XFMR2568_4	OH2554_4	B	Transforme	0.14Y	117.7	-0.00	8.25	2.62	75	18	-1	-100	0.07	0.4	14.069	0.000	0	0	0	1	C
L	OH2587_4	OH2586_4	B	4 ACSR 7/1	7.05Y	117.5	0.06	8.55	33.39	24	235	-21	-100	0.12	0.1	13.673	0.044	0	0	0	51	L
L	OH2856_4	OH2587_4	B	4 ACSR 7/1	7.04Y	117.3	0.20	8.74	33.39	24	234	-21	-100	0.42	0.2	13.824	0.151	0	0	0	51	L
L	OH7176	OH2856_4	B	4 ACSR 7/1	7.03Y	117.2	0.03	8.78	29.30	21	205	-18	-100	0.06	0.0	13.851	0.027	0	0	0	44	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
L	OCD7177	OH7176	B	15-H OCR	7.03Y	117.2	0.00	8.78	29.30	195	205	-18	-100	0.00	0.0	13.851	0.000	0	0	0	44	L
L	OH2636	OCD7177	B	4 ACSR 7/1	7.02Y	117.1	0.15	8.92	29.30	21	205	-18	-100	0.27	0.1	13.980	0.129	0	0	0	44	L
L	OH4426	OH2636	B	4 ACSR 7/1	7.02Y	117.1	0.00	8.92	0.86	1	6	0	100	0.00	0.0	14.011	0.032	0	0	0	3	L
L	OH4428	OH4426	B	4 ACSR 7/1	7.02Y	117.1	0.00	8.93	0.53	0	4	0	100	0.00	0.0	14.069	0.058	0	0	0	2	L
L	XFMR4429	OH4428	B	Transforme	0.14Y	117.0	0.12	9.04	0.53	15	4	0	100	0.00	0.0	14.069	0.000	0	0	0	2	L
L	1402000014001	XFMR4429	B	Consumer	0.14Y	117.0	0.00	9.04	21.28	0	3	0	100	0.00	0.0	14.069	0.000	3	0	1	1	L
L	1402000014020	XFMR4429	B	Consumer	0.14Y	117.0	0.00	9.04	7.21	0	1	0	100	0.00	0.0	14.069	0.000	1	0	1	1	L
L	OH2640_4	OH4426	B	4 ACSR 7/1	7.02Y	117.1	0.00	8.92	0.33	0	2	0	100	0.00	0.0	14.084	0.072	0	0	0	1	L
L	XFMR2641_4	OH2640_4	B	Transforme	0.14Y	117.1	-0.01	8.91	0.33	9	2	0	100	0.00	0.0	14.084	0.000	0	0	0	1	L
L	1402000014006	XFMR2641_4	B	Consumer	0.14Y	117.1	0.00	8.91	17.00	0	2	0	100	0.00	0.0	14.084	0.000	2	0	1	1	L
L	1402000014011	XFMR2641_4	B	Consumer	0.14Y	117.1	0.00	8.91	0.00	0	0	0	100	0.00	0.0	14.084	0.000	0	0	0	0	L
L	OH2637	OH2636	B	4 ACSR 7/1	7.02Y	117.0	0.11	9.03	28.44	20	199	-18	-100	0.20	0.1	14.080	0.101	0	0	0	41	L
L	OH2638	OH2637	B	4 ACSR 7/1	7.01Y	116.8	0.12	9.15	28.44	20	199	-18	-100	0.22	0.1	14.188	0.108	0	0	0	41	L
L	OH2648_4	OH2638	B	4 ACSR 7/1	7.01Y	116.8	0.00	9.16	0.56	0	4	0	100	0.00	0.0	14.328	0.140	0	0	0	2	L
L	OH2665_4	OH2648_4	B	4 ACSR 7/1	7.01Y	116.8	0.00	9.16	0.56	0	4	0	100	0.00	0.0	14.385	0.057	0	0	0	1	L
L	XFMR2666_4	OH2665_4	B	Transforme	0.13Y	116.9	-0.02	9.14	0.56	16	4	0	100	0.00	0.0	14.385	0.000	0	0	0	1	L
L	1402000014019	XFMR2666_4	B	Consumer	0.13Y	116.9	0.00	9.14	29.08	0	4	0	100	0.00	0.0	14.385	0.000	4	0	1	1	L
L	XFMR2650_4	OH2648_4	B	Transforme	0.13Y	116.8	0.00	9.16	0.00	0	0	0	100	0.00	0.0	14.328	0.000	0	0	0	1	L
L	1402000014009	XFMR2650_4	B	Consumer	0.13Y	116.8	0.00	9.16	0.00	0	0	0	100	0.00	0.0	14.328	0.000	0	0	1	1	L
L	OH29788	OH2638	B	4 ACSR 7/1	7.01Y	116.8	0.07	9.23	27.88	20	195	-18	-100	0.13	0.1	14.255	0.067	0	0	0	39	L
L	OH2639_4	OH29788	B	4 ACSR 7/1	7.00Y	116.7	0.04	9.26	27.48	20	192	-18	-100	0.06	0.0	14.288	0.033	0	0	0	38	L
L	OH2651_4	OH2639_4	B	4 ACSR 7/1	7.00Y	116.7	0.00	9.26	0.03	0	0	0	100	0.00	0.0	14.360	0.072	0	0	0	1	L
L	XFMR2658	OH2651_4	B	Transforme	0.13Y	116.7	-0.00	9.26	0.03	1	0	0	100	0.00	0.0	14.360	0.000	0	0	0	1	L
L	OH13719	XFMR2658	B	4/0 TPX UG	0.13Y	116.7	0.00	9.26	1.36	1	0	0	100	0.00	0.0	14.367	0.007	0	0	0	1	L
L	1402000014017	OH13719	B	Consumer	0.13Y	116.7	0.00	9.26	1.36	0	0	0	100	0.00	0.0	14.367	0.000	0	0	1	1	L
L	1402000014003	XFMR2658	B	Consumer	0.13Y	116.7	0.00	9.26	0.00	0	0	0	100	0.00	0.0	14.360	0.000	0	0	0	0	L
L	OH2860_4	OH2639_4	B	4 ACSR 7/1	7.00Y	116.7	0.08	9.34	27.45	20	191	-18	-100	0.14	0.1	14.364	0.076	0	0	0	37	L
L	OH2660	OH2860_4	B	4 ACSR 7/1	7.00Y	116.6	0.06	9.41	6.64	5	46	-4	-100	0.03	0.1	14.614	0.250	0	0	0	8	L
L	OH2661_4	OH2660	B	4 ACSR 7/1	6.99Y	116.6	0.02	9.43	4.87	3	34	-3	-100	0.01	0.0	14.711	0.098	0	0	0	7	L
L	OH6739	OH2661_4	B	4 ACSR 7/1	6.99Y	116.5	0.03	9.46	4.87	3	34	-3	-100	0.01	0.0	14.872	0.161	0	0	0	7	L
L	OH6742	OH6739	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.46	1.56	1	11	-1	-100	0.00	0.0	14.921	0.049	0	0	0	1	L
L	XFMR6743	OH6742	B	Transforme	0.13Y	116.6	-0.02	9.44	1.56	45	11	-1	-100	0.03	0.2	14.921	0.000	0	0	0	1	L
L	1402000014035	XFMR6743	B	Consumer	0.13Y	116.6	0.00	9.44	81.18	0	11	-1	-100	0.00	0.0	14.921	0.000	11	-1	1	1	L
L	OH2680	OH6739	B	4 ACSR 7/1	6.99Y	116.5	0.03	9.49	3.31	2	23	-2	-100	0.01	0.0	15.135	0.263	0	0	0	6	L
L	OH2711_4	OH2680	B	4 ACSR 7/1	6.99Y	116.5	0.01	9.50	1.69	1	12	-1	-100	0.00	0.0	15.346	0.211	0	0	0	2	L
L	XFMR2712_4	OH2711_4	B	Transforme	0.13Y	116.5	-0.02	9.48	1.69	49	12	-1	-100	0.03	0.3	15.346	0.000	0	0	0	2	L
L	1402000024009	XFMR2712_4	B	Consumer	0.13Y	116.5	0.00	9.48	6.28	0	1	0	100	0.00	0.0	15.346	0.000	1	0	1	1	L
L	1402000024010	XFMR2712_4	B	Consumer	0.13Y	116.5	0.00	9.48	81.75	0	11	-1	-100	0.00	0.0	15.346	0.000	11	-1	1	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
L	OH29782	OH2680	B	4 ACSR 7/1	6.99Y	116.5	0.01	9.50	1.62	1	11	-1	-100	0.00	0.0	15.325	0.190	0	0	0	4	L
L	OH2681	OH29782	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.44	0	3	0	100	0.00	0.0	15.393	0.068	0	0	0	3	L
L	OH2682	OH2681	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.44	0	3	0	100	0.00	0.0	15.427	0.034	0	0	0	2	L
L	OH2683	OH2682	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.01	0	0	0	100	0.00	0.0	15.486	0.058	0	0	0	1	L
L	OH2688_4	OH2683	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.01	0	0	0	100	0.00	0.0	15.776	0.291	0	0	0	1	L
L	OH2721_4	OH2688_4	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.088	0.312	0	0	0	0	L
L	OH2861_4	OH2721_4	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.308	0.220	0	0	0	0	L
L	OH29779	OH2861_4	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.805	0.497	0	0	0	0	L
L	XFMR29780	OH29779	B	Transforme	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.805	0.000	0	0	0	0	L
L	1402000025005	XFMR29780	B	Consumer	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.805	0.000	0	0	0	0	L
L	XFMR2725_4	OH2861_4	B	Transforme	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.308	0.000	0	0	0	0	L
L	1402000025003	XFMR2725_4	B	Consumer	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.308	0.000	0	0	0	0	L
L	XFMR2722_4	OH2721_4	B	Transforme	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.088	0.000	0	0	0	0	L
L	XFMR2689	OH2688_4	B	Transforme	0.13Y	116.5	-0.00	9.50	0.01	0	0	0	100	0.00	0.0	15.776	0.000	0	0	0	1	L
L	1402000025001	XFMR2689	B	Consumer	0.13Y	116.5	0.00	9.50	0.29	0	0	0	100	0.00	0.0	15.776	0.000	0	0	1	1	L
L	1402000025004	XFMR2689	B	Consumer	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.776	0.000	0	0	0	0	L
L	OH2706_4	OH2682	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.43	0	3	0	100	0.00	0.0	15.503	0.076	0	0	0	1	L
L	XFMR2707	OH2706_4	B	Transforme	0.13Y	116.5	-0.01	9.49	0.43	12	3	0	100	0.00	0.0	15.503	0.000	0	0	0	1	L
L	1402000024005	XFMR2707	B	Consumer	0.13Y	116.5	0.00	9.49	22.54	0	3	0	100	0.00	0.0	15.503	0.000	3	0	1	1	L
L	OH2701_4	OH2681	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.513	0.120	0	0	0	1	L
L	OH2693_4	OH2701_4	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.527	0.014	0	0	0	0	L
L	OH2694	OH2693_4	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.707	0.180	0	0	0	0	L
L	OH2695_4	OH2694	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.073	0.366	0	0	0	0	L
L	XFMR2696_4	OH2695_4	B	Transforme	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	16.073	0.000	0	0	0	0	L
L	OH2698_4	OH2694	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.876	0.170	0	0	0	0	L
L	XFMR2699	OH2698_4	B	Transforme	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.876	0.000	0	0	0	0	L
L	XFMR2702	OH2701_4	B	Transforme	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.513	0.000	0	0	0	1	L
L	1402000024002	XFMR2702	B	Consumer	0.13Y	116.5	0.00	9.50	0.00	0	0	0	100	0.00	0.0	15.513	0.000	0	0	1	1	L
L	XFMR29783	OH29782	B	Transforme	0.13Y	116.5	-0.02	9.48	1.18	34	8	-1	-99	0.01	0.2	15.325	0.000	0	0	0	1	L
L	1402000024015	XFMR29783	B	Consumer	0.13Y	116.5	0.00	9.48	61.24	0	8	-1	-99	0.00	0.0	15.325	0.000	8	-1	1	1	L
L	XFMR2663_4	OH2661_4	B	Transforme	0.13Y	116.6	0.00	9.43	0.00	0	0	0	100	0.00	0.0	14.711	0.000	0	0	0	0	L
L	XFMR2662_4	OH2660	B	Transforme	0.13Y	116.6	-0.02	9.39	1.76	51	12	-1	-100	0.03	0.3	14.614	0.000	0	0	0	1	L
L	1402000014004	XFMR2662_4	B	Consumer	0.13Y	116.6	0.00	9.39	91.66	0	12	-1	-100	0.00	0.0	14.614	0.000	12	-1	1	1	L
L	OH2845_4	OH2860_4	B	4 ACSR 7/1	6.99Y	116.5	0.16	9.51	20.82	15	145	-13	-100	0.22	0.2	14.567	0.203	0	0	0	29	L
L	OH2827_4	OH2845_4	B	4 ACSR 7/1	6.98Y	116.4	0.09	9.60	15.45	11	108	-10	-100	0.09	0.1	14.720	0.153	0	0	0	25	L
L	OH2826_4	OH2827_4	B	4 ACSR 7/1	6.98Y	116.3	0.10	9.70	14.10	10	98	-9	-100	0.09	0.1	14.902	0.182	0	0	0	24	L
L	OH2825_4	OH2826_4	B	4 ACSR 7/1	6.98Y	116.3	0.01	9.71	11.78	8	82	-8	-100	0.01	0.0	14.932	0.030	0	0	0	22	L
L	OH2824_4	OH2825_4	B	4 ACSR 7/1	6.98Y	116.3	0.03	9.74	11.78	8	82	-8	-100	0.02	0.0	15.002	0.069	0	0	0	22	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru
L OH2795_4	OH2824_4	B	4 ACSR 7/1	6.97Y	116.1	0.11	9.85	11.36	8	79	-8	-99	0.08	0.1	15.245	0.243	0	0	0	21 L
L OH2794	OH2795_4	B	4 ACSR 7/1	6.96Y	116.0	0.10	9.95	11.36	8	79	-8	-99	0.07	0.1	15.478	0.234	0	0	0	21 L
L OH2793	OH2794	B	4 ACSR 7/1	6.96Y	116.0	0.03	9.98	10.18	7	71	-7	-100	0.02	0.0	15.551	0.073	0	0	0	20 L
L OH2792_4	OH2793	B	4 ACSR 7/1	6.96Y	116.0	0.03	10.01	9.90	7	69	-7	-99	0.02	0.0	15.619	0.067	0	0	0	19 L
L OH2773_4	OH2792_4	B	4 ACSR 7/1	6.96Y	115.9	0.07	10.07	9.21	7	64	-6	-100	0.04	0.1	15.801	0.182	0	0	0	17 L
L OH2776_4	OH2773_4	B	4 ACSR 7/1	6.95Y	115.9	0.03	10.10	9.11	7	63	-6	-100	0.02	0.0	15.876	0.075	0	0	0	16 L
L OH2772_4	OH2776_4	B	4 ACSR 7/1	6.95Y	115.9	0.01	10.11	8.48	6	59	-6	-99	0.01	0.0	15.905	0.029	0	0	0	14 L
L OH28928	OH2772_4	B	4 ACSR 7/1	6.95Y	115.8	0.04	10.15	8.44	6	58	-6	-99	0.02	0.0	16.032	0.127	0	0	0	13 L
L OH2763_4	OH28928	B	4 ACSR 7/1	6.95Y	115.8	0.05	10.20	7.09	5	49	-5	-99	0.02	0.0	16.215	0.183	0	0	0	12 L
L OH2764_4	OH2763_4	B	4 ACSR 7/1	6.95Y	115.8	0.02	10.23	5.17	4	36	-3	-100	0.01	0.0	16.329	0.114	0	0	0	10 L
L OH2735_4	OH2764_4	B	4 ACSR 7/1	6.95Y	115.8	0.02	10.24	3.28	2	23	-2	-100	0.00	0.0	16.463	0.135	0	0	0	9 L
L OH2736_4	OH2735_4	B	4 ACSR 7/1	6.95Y	115.8	0.00	10.24	0.00	0	0	0	100	0.00	0.0	16.603	0.140	0	0	0	1 L
L XFMR2755	OH2736_4	B	Transforme	0.13Y	115.8	0.00	10.24	0.00	0	0	0	100	0.00	0.0	16.603	0.000	0	0	0	1 L
L 1402000034001	XFMR2755	B	Consumer	0.13Y	115.8	0.00	10.24	0.00	0	0	0	100	0.00	0.0	16.603	0.000	0	0	1	1 L
L OH2737_4	OH2735_4	B	4 ACSR 7/1	6.94Y	115.7	0.01	10.25	3.28	2	23	-2	-100	0.00	0.0	16.537	0.073	0	0	0	8 L
L OH2738_4	OH2737_4	B	4 ACSR 7/1	6.94Y	115.7	0.00	10.25	2.00	1	14	-1	-100	0.00	0.0	16.570	0.033	0	0	0	6 L
L OH2739_4	OH2738_4	B	4 ACSR 7/1	6.94Y	115.7	0.00	10.26	2.00	1	14	-1	-100	0.00	0.0	16.631	0.061	0	0	0	5 L
L OH2734_4	OH2739_4	B	4 ACSR 7/1	6.94Y	115.7	0.01	10.27	1.46	1	10	-1	-100	0.00	0.0	16.731	0.100	0	0	0	4 L
L XFMR11189	OH2734_4	B	Transforme	0.12Y	115.8	-0.02	10.24	1.46	42	10	-1	-100	0.02	0.2	16.731	0.000	0	0	0	4 L
L 1402000034004	XFMR11189	B	Consumer	0.12Y	115.8	0.00	10.24	6.23	0	1	0	100	0.00	0.0	16.731	0.000	1	0	1	1 L
L 1402000034005	XFMR11189	B	Consumer	0.12Y	115.8	0.00	10.24	0.41	0	0	0	100	0.00	0.0	16.731	0.000	0	0	1	1 L
L 1402000034007	XFMR11189	B	Consumer	0.12Y	115.8	0.00	10.24	0.00	0	0	0	100	0.00	0.0	16.731	0.000	0	0	1	1 L
L 1402000034009	XFMR11189	B	Consumer	0.12Y	115.8	0.00	10.24	81.02	0	9	-1	-99	0.00	0.0	16.731	0.000	9	-1	1	1 L
L XFMR2746	OH2739_4	B	Transforme	0.13Y	115.8	-0.01	10.25	0.54	15	4	0	100	0.00	0.0	16.631	0.000	0	0	0	1 L
L 1402000034003	XFMR2746	B	Consumer	0.13Y	115.8	0.00	10.25	27.95	0	4	0	100	0.00	0.0	16.631	0.000	4	0	1	1 L
L XFMR2753	OH2738_4	B	Transforme	0.13Y	115.7	0.00	10.25	0.00	0	0	0	100	0.00	0.0	16.570	0.000	0	0	0	1 L
L 1402000034008	XFMR2753	B	Consumer	0.13Y	115.7	0.00	10.25	0.00	0	0	0	100	0.00	0.0	16.570	0.000	0	0	1	1 L
L OH2748_4	OH2737_4	B	4 ACSR 7/1	6.94Y	115.7	0.01	10.26	1.28	1	9	-1	-99	0.00	0.0	16.652	0.115	0	0	0	2 L
L XFMR2749	OH2748_4	B	Transforme	0.13Y	115.8	-0.02	10.24	1.28	37	9	-1	-99	0.02	0.2	16.652	0.000	0	0	0	2 L
L OH7975	XFMR2749	B	2 TPX	0.13Y	115.8	0.00	10.24	2.20	2	0	0	100	0.00	0.0	16.656	0.005	0	0	0	1 L
L 1402000034002	OH7975	B	Consumer	0.13Y	115.8	0.00	10.24	2.20	0	0	0	100	0.00	0.0	16.656	0.000	0	0	1	1 L
L 1402000034006	XFMR2749	B	Consumer	0.13Y	115.8	0.00	10.24	64.45	0	9	-1	-99	0.00	0.0	16.652	0.000	9	-1	1	1 L
L XFMR2768_4	OH2764_4	B	Transforme	0.13Y	115.8	-0.02	10.21	1.88	54	13	-1	-100	0.04	0.3	16.329	0.000	0	0	0	1 L
L 1402000034012	XFMR2768_4	B	Consumer	0.13Y	115.8	0.00	10.21	97.90	0	13	-2	-99	0.00	0.0	16.329	0.000	13	-2	1	1 L
L XFMR2766	OH2763_4	B	Transforme	0.13Y	115.8	-0.02	10.19	1.92	55	13	-1	-100	0.04	0.3	16.215	0.000	0	0	0	2 L
L 1402000034013	XFMR2766	B	Consumer	0.13Y	115.8	0.00	10.19	99.92	0	13	-2	-99	0.00	0.0	16.215	0.000	13	-2	1	1 L
L 1402000034011	XFMR2766	B	Consumer	0.13Y	115.8	0.00	10.19	0.00	0	0	0	100	0.00	0.0	16.215	0.000	0	0	1	1 L
L OH28929	OH28928	B	4 ACSR 7/1	6.95Y	115.8	0.01	10.17	1.36	1	9	-1	-99	0.00	0.0	16.270	0.238	0	0	0	1 L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
L	XFMR28930	OH28929	B	Transforme	0.13Y	115.9	-0.02	10.14	1.36	39	9	-1	-99	0.02	0.2	16.270	0.000	0	0	0	1	L
L	1402000024014	XFMR28930	B	Consumer	0.13Y	115.9	0.00	10.14	70.46	0	9	-1	-99	0.00	0.0	16.270	0.000	9	-1	1	1	L
L	XFMR2775_4	OH2772_4	B	Transforme	0.13Y	115.9	-0.00	10.11	0.04	1	0	0	100	0.00	0.0	15.905	0.000	0	0	0	1	L
L	1402000024008	XFMR2775_4	B	Consumer	0.13Y	115.9	0.00	10.11	2.10	0	0	0	100	0.00	0.0	15.905	0.000	0	0	1	1	L
L	OH2777_4	OH2776_4	B	4 ACSR 7/1	6.95Y	115.9	0.00	10.11	0.62	0	4	0	100	0.00	0.0	16.066	0.190	0	0	0	2	L
L	XFMR2778_4	OH2777_4	B	Transforme	0.13Y	115.9	-0.02	10.09	0.62	18	4	0	100	0.00	0.0	16.066	0.000	0	0	0	2	L
L	1402000023001	XFMR2778_4	B	Consumer	0.13Y	115.9	0.00	10.09	0.00	0	0	0	100	0.00	0.0	16.066	0.000	0	0	0	0	L
L	1402000023002	XFMR2778_4	B	Consumer	0.13Y	115.9	0.00	10.09	0.00	0	0	0	100	0.00	0.0	16.066	0.000	0	0	1	1	L
L	1402000023004	XFMR2778_4	B	Consumer	0.13Y	115.9	0.00	10.09	32.31	0	4	-1	-97	0.00	0.0	16.066	0.000	4	-1	1	1	L
L	XFMR2781_4	OH2773_4	B	Transforme	0.13Y	115.9	-0.00	10.07	0.11	3	1	0	100	0.00	0.0	15.801	0.000	0	0	0	1	L
L	1402000024013	XFMR2781_4	B	Consumer	0.13Y	115.9	0.00	10.07	5.61	0	1	0	100	0.00	0.0	15.801	0.000	1	0	1	1	L
L	XFMR2812	OH2792_4	B	Transforme	0.13Y	116.0	-0.02	9.99	0.69	20	5	-1	-98	0.00	0.0	15.619	0.000	0	0	0	2	L
L	1402000024006	XFMR2812	B	Consumer	0.13Y	116.0	0.00	9.99	10.54	0	1	0	100	0.00	0.0	15.619	0.000	1	0	1	1	L
L	1402000024012	XFMR2812	B	Consumer	0.13Y	116.0	0.00	9.99	25.15	0	3	0	100	0.00	0.0	15.619	0.000	3	0	1	1	L
L	OH2807_4	OH2793	B	4 ACSR 7/1	6.96Y	116.0	0.00	9.98	0.28	0	2	0	100	0.00	0.0	15.609	0.058	0	0	0	1	L
L	XFMR2809	OH2807_4	B	Transforme	0.13Y	116.0	-0.01	9.98	0.28	8	2	0	100	0.00	0.0	15.609	0.000	0	0	0	1	L
L	1402000024004	XFMR2809	B	Consumer	0.13Y	116.0	0.00	9.98	14.68	0	2	0	100	0.00	0.0	15.609	0.000	2	0	1	1	L
L	OH2803_4	OH2794	B	4 ACSR 7/1	6.96Y	116.0	0.01	9.96	1.17	1	8	-1	-99	0.00	0.0	15.645	0.167	0	0	0	1	L
L	XFMR2804_4	OH2803_4	B	Transforme	0.13Y	116.1	-0.02	9.94	1.17	34	8	-1	-99	0.01	0.2	15.645	0.000	0	0	0	1	L
L	1402000023003	XFMR2804_4	B	Consumer	0.13Y	116.1	0.00	9.94	0.00	0	0	0	100	0.00	0.0	15.645	0.000	0	0	0	0	L
L	1402000024011	XFMR2804_4	B	Consumer	0.13Y	116.1	0.00	9.94	60.94	0	8	-1	-99	0.00	0.0	15.645	0.000	8	-1	1	1	L
L	XFMR2797_4	OH2795_4	B	Transforme	0.13Y	116.1	0.00	9.85	0.00	0	0	0	100	0.00	0.0	15.245	0.000	0	0	0	0	L
L	XFMR2834_4	OH2824_4	B	Transforme	0.13Y	116.3	-0.01	9.73	0.42	12	3	0	100	0.00	0.0	15.002	0.000	0	0	0	1	L
L	1402000013004	XFMR2834_4	B	Consumer	0.13Y	116.3	0.00	9.73	22.05	0	3	0	100	0.00	0.0	15.002	0.000	3	0	1	1	L
L	XFMR2832_4	OH2825_4	B	Transforme	0.13Y	116.3	0.00	9.71	0.00	0	0	0	100	0.00	0.0	14.932	0.000	0	0	0	0	L
L	1402000013003	XFMR2832_4	B	Consumer	0.13Y	116.3	0.00	9.71	0.00	0	0	0	100	0.00	0.0	14.932	0.000	0	0	0	0	L
L	OH2828_4	OH2826_4	B	4 ACSR 7/1	6.98Y	116.3	0.01	9.71	2.04	1	14	-1	-100	0.00	0.0	15.010	0.108	0	0	0	1	L
L	XFMR2829_4	OH2828_4	B	Transforme	0.13Y	116.3	-0.02	9.69	2.04	59	14	-1	-100	0.04	0.3	15.010	0.000	0	0	0	1	L
L	1402000014015	XFMR2829_4	B	Consumer	0.13Y	116.3	0.00	9.69	0.00	0	0	0	100	0.00	0.0	15.010	0.000	0	0	0	0	L
L	1402000014023	XFMR2829_4	B	Consumer	0.13Y	116.3	0.00	9.69	106.07	0	14	-2	-99	0.00	0.0	15.010	0.000	14	-2	1	1	L
L	XFMR2830	OH2826_4	B	Transforme	0.13Y	116.3	-0.01	9.69	0.28	8	2	0	100	0.00	0.0	14.902	0.000	0	0	0	1	L
L	1402000013002	XFMR2830	B	Consumer	0.13Y	116.3	0.00	9.69	14.51	0	2	0	100	0.00	0.0	14.902	0.000	2	0	1	1	L
L	OH2841_4	OH2827_4	B	4 ACSR 7/1	6.98Y	116.4	0.01	9.61	1.35	1	9	-1	-99	0.00	0.0	14.903	0.183	0	0	0	1	L
L	XFMR2842	OH2841_4	B	Transforme	0.13Y	116.4	-0.02	9.59	1.35	39	9	-1	-99	0.02	0.2	14.903	0.000	0	0	0	1	L
L	1402000013005	XFMR2842	B	Consumer	0.13Y	116.4	0.00	9.59	70.15	0	9	-1	-99	0.00	0.0	14.903	0.000	9	-1	1	1	L
L	OH2847_4	OH2845_4	B	4 ACSR 7/1	6.99Y	116.5	0.01	9.51	3.66	3	26	-2	-100	0.00	0.0	14.615	0.048	0	0	0	3	L
L	OH2846_4	OH2847_4	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.52	2.79	2	19	-2	-99	0.00	0.0	14.657	0.042	0	0	0	2	L
L	XFMR2849_4	OH2846_4	B	Transforme	0.13Y	116.5	0.00	9.52	2.79	80	19	-2	-99	0.08	0.4	14.657	0.000	0	0	0	2	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
L	1402000014008	XFMR2849_4	B	Consumer	0.13Y	116.5	0.00	9.52	104.71	0	14	-2	-99	0.00	0.0	14.657	0.000	14	-2	1	1	L
L	1402000014022	XFMR2849_4	B	Consumer	0.13Y	116.5	0.00	9.52	40.27	0	5	-1	-98	0.00	0.0	14.657	0.000	5	-1	1	1	L
L	XFMR2848_4	OH2847_4	B	Transforme	0.13Y	116.5	-0.02	9.49	0.87	25	6	-1	-99	0.01	0.0	14.615	0.000	0	0	0	1	L
L	1402000014016	XFMR2848_4	B	Consumer	0.13Y	116.5	0.00	9.49	0.00	0	0	0	100	0.00	0.0	14.615	0.000	0	0	0	0	L
L	1402000014021	XFMR2848_4	B	Consumer	0.13Y	116.5	0.00	9.49	0.00	0	0	0	100	0.00	0.0	14.615	0.000	0	0	0	0	L
L	1402000014025	XFMR2848_4	B	Consumer	0.13Y	116.5	0.00	9.49	45.43	0	6	-1	-99	0.00	0.0	14.615	0.000	6	-1	1	1	L
L	OH2850_4	OH2845_4	B	4 ACSR 7/1	6.99Y	116.5	0.00	9.51	1.70	1	12	-1	-100	0.00	0.0	14.623	0.056	0	0	0	1	L
L	XFMR2852_4	OH2850_4	B	Transforme	0.13Y	116.5	-0.02	9.49	1.70	49	12	-1	-100	0.03	0.3	14.623	0.000	0	0	0	1	L
L	1402000014024	XFMR2852_4	B	Consumer	0.13Y	116.5	0.00	9.49	88.32	0	12	-1	-100	0.00	0.0	14.623	0.000	12	-1	1	1	L
L	OH28923	OH2639_4	B	4 ACSR 7/1	7.00Y	116.7	0.00	9.26	0.00	0	0	0	100	0.00	0.0	14.497	0.209	0	0	0	0	L
L	XFMR28924	OH28923	B	Transforme	0.13Y	116.7	0.00	9.26	0.00	0	0	0	100	0.00	0.0	14.497	0.000	0	0	0	0	L
L	1402000014018	XFMR28924	B	Consumer	0.13Y	116.7	0.00	9.26	0.00	0	0	0	100	0.00	0.0	14.497	0.000	0	0	0	0	L
L	OH29790	OH29788	B	4 ACSR 7/1	7.01Y	116.8	0.00	9.23	0.40	0	3	0	100	0.00	0.0	14.532	0.276	0	0	0	1	L
L	OH6359	OH29790	B	2 ACSR 6/1	7.01Y	116.8	0.00	9.23	0.00	0	0	0	100	0.00	0.0	14.597	0.065	0	0	0	0	L
L	OH6360	OH6359	B	2 ACSR 6/1	7.01Y	116.8	0.00	9.23	0.00	0	0	0	100	0.00	0.0	14.661	0.065	0	0	0	0	L
L	XFMR6365	OH6360	B	Transforme	0.13Y	116.8	0.00	9.23	0.00	0	0	0	100	0.00	0.0	14.661	0.000	0	0	0	0	L
L	1402000014030	XFMR6365	B	Consumer	0.13Y	116.8	0.00	9.23	0.00	0	0	0	100	0.00	0.0	14.661	0.000	0	0	0	0	L
L	XFMR29791	OH29790	B	Transforme	0.13Y	116.8	-0.01	9.22	0.40	12	3	0	100	0.00	0.0	14.532	0.000	0	0	0	1	L
L	1402000014026	XFMR29791	B	Consumer	0.13Y	116.8	0.00	9.22	20.97	0	3	0	100	0.00	0.0	14.532	0.000	3	0	1	1	L
L	XFMR2657_4	OH2638	B	Transforme	0.13Y	116.8	-0.00	9.15	0.00	0	0	0	100	0.00	0.0	14.188	0.000	0	0	0	0	L
L	1402000014010	XFMR2657_4	B	Consumer	0.13Y	116.8	0.00	9.15	0.00	0	0	0	100	0.00	0.0	14.188	0.000	0	0	0	0	L
L	OH2642	OH2637	B	4 ACSR 7/1	7.02Y	117.0	0.00	9.03	0.00	0	0	0	100	0.00	0.0	14.171	0.091	0	0	0	0	L
L	XFMR2643_4	OH2642	B	Transforme	0.14Y	117.0	0.00	9.03	0.00	0	0	0	100	0.00	0.0	14.171	0.000	0	0	0	0	L
L	OH2857_4	OH2856_4	B	4 ACSR 7/1	7.03Y	117.2	0.02	8.77	4.10	3	29	-3	-99	0.01	0.0	13.974	0.150	0	0	0	7	L
L	OH2588_4	OH2857_4	B	4 ACSR 7/1	7.03Y	117.2	0.02	8.79	4.10	3	29	-3	-99	0.00	0.0	14.092	0.117	0	0	0	7	L
L	OH2589_4	OH2588_4	B	4 ACSR 7/1	7.03Y	117.2	0.01	8.80	3.88	3	27	-3	-99	0.00	0.0	14.177	0.085	0	0	0	6	L
L	OH2591_4	OH2589_4	B	4 ACSR 7/1	7.03Y	117.2	0.01	8.81	1.57	1	11	-1	-100	0.00	0.0	14.327	0.150	0	0	0	4	L
L	OH2592_4	OH2591_4	B	4 ACSR 7/1	7.03Y	117.2	0.01	8.82	0.91	1	6	-1	-99	0.00	0.0	14.507	0.180	0	0	0	2	L
L	XFMR2594_4	OH2592_4	B	Transforme	0.14Y	117.2	-0.00	8.81	0.91	26	6	-1	-99	0.01	0.0	14.507	0.000	0	0	0	2	L
L	OH7315	XFMR2594_4	B	2 TPX	0.14Y	117.0	0.22	9.04	47.23	41	6	-1	-99	0.02	0.3	14.531	0.024	0	0	0	1	L
L	OH7317	OH7315	B	2 TPX	0.13Y	116.9	0.06	9.09	47.23	41	6	-1	-99	0.01	0.0	14.537	0.006	0	0	0	1	L
L	1402000004019	OH7317	B	Consumer	0.13Y	116.9	0.00	9.09	47.23	0	6	-1	-99	0.00	0.0	14.537	0.000	6	-1	1	1	L
L	1402000004014	XFMR2594_4	B	Consumer	0.14Y	117.2	0.00	8.81	0.00	0	0	0	100	0.00	0.0	14.507	0.000	0	0	1	1	L
L	OH2858_4	OH2591_4	B	4 ACSR 7/1	7.03Y	117.2	0.00	8.81	0.42	0	3	0	100	0.00	0.0	14.436	0.109	0	0	0	1	L
L	XFMR2598	OH2858_4	B	Transforme	0.14Y	117.2	-0.01	8.80	0.42	12	3	0	100	0.00	0.0	14.436	0.000	0	0	0	1	L
L	1402000004016	XFMR2598	B	Consumer	0.14Y	117.2	0.00	8.80	21.59	0	3	0	100	0.00	0.0	14.436	0.000	3	0	1	1	L
L	XFMR2603	OH2591_4	B	Transforme	0.14Y	117.2	-0.01	8.80	0.25	7	2	0	100	0.00	0.0	14.327	0.000	0	0	0	1	L
L	1402000004012	XFMR2603	B	Consumer	0.14Y	117.2	0.00	8.80	12.98	0	2	0	100	0.00	0.0	14.327	0.000	2	0	1	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

																mi		-----------Element-----------				
	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	From Src	Length (mi)	KW	KVAR	Cons On	Cons Thru	
L	OH28917	OH2589_4	B	4 ACSR 7/1	7.03Y	117.2	0.01	8.81	2.31	2	16	-1	-100	0.00	0.0	14.275	0.098	0	0	0	2	L
L	XFMR28918	OH28917	B	Transforme	0.14Y	117.2	-0.01	8.80	2.31	66	16	-1	-100	0.05	0.3	14.275	0.000	0	0	0	2	L
L	1402000004015	XFMR28918	B	Consumer	0.14Y	117.2	0.00	8.80	29.37	0	4	0	100	0.00	0.0	14.275	0.000	4	0	1	1	L
L	1402000004017	XFMR28918	B	Consumer	0.14Y	117.2	0.00	8.80	90.57	0	12	-1	-100	0.00	0.0	14.275	0.000	12	-1	1	1	L
L	XFMR2606	OH2589_4	B	Transforme	0.14Y	117.2	0.00	8.80	0.00	0	0	0	100	0.00	0.0	14.177	0.000	0	0	0	0	L
L	1402000004005	XFMR2606	B	Consumer	0.14Y	117.2	0.00	8.80	0.00	0	0	0	100	0.00	0.0	14.177	0.000	0	0	0	0	L
L	XFMR2608_4	OH2588_4	B	Transforme	0.14Y	117.2	-0.01	8.78	0.21	6	1	0	100	0.00	0.0	14.092	0.000	0	0	0	1	L
L	1402000004010	XFMR2608_4	B	Consumer	0.14Y	117.2	0.00	8.78	11.09	0	1	0	100	0.00	0.0	14.092	0.000	1	0	1	1	L
L	XFMR2613_4	OH2857_4	B	Transforme	0.14Y	117.2	0.00	8.77	0.00	0	0	0	100	0.00	0.0	13.974	0.000	0	0	0	0	L
L	1402000004004	XFMR2613_4	B	Consumer	0.14Y	117.2	0.00	8.77	0.00	0	0	0	100	0.00	0.0	13.974	0.000	0	0	0	0	L
L	1402000004007	XFMR2613_4	B	Consumer	0.14Y	117.2	0.00	8.77	0.00	0	0	0	100	0.00	0.0	13.974	0.000	0	0	0	0	L
L	1402000004008	XFMR2613_4	B	Consumer	0.14Y	117.2	0.00	8.77	0.00	0	0	0	100	0.00	0.0	13.974	0.000	0	0	0	0	L
L	1402000004011	XFMR2613_4	B	Consumer	0.14Y	117.2	0.00	8.77	0.00	0	0	0	100	0.00	0.0	13.974	0.000	0	0	0	0	L
L	XFMR2620_4	OH2587_4	B	Transforme	0.14Y	117.5	0.00	8.55	0.00	0	0	0	100	0.00	0.0	13.673	0.000	0	0	0	0	L
L	XFMR2924_4	OH2923_4	B	Transforme	0.13Y	115.2	4.13	10.81	4.62	133	29	15	89	0.22	0.7	12.552	0.000	0	0	0	3	L
L	644000083021	XFMR2924_4	B	Consumer	0.13Y	115.2	0.00	10.81	0.00	0	0	0	100	0.00	0.0	12.552	0.000	0	0	1	1	L
L	644000083009	XFMR2924_4	B	Consumer	0.13Y	115.2	0.00	10.81	16.16	0	2	0	100	0.00	0.0	12.552	0.000	2	0	1	1	L
L	644000083010	XFMR2924_4	B	Consumer	0.13Y	115.2	0.00	10.81	226.36	0	27	13	90	0.00	0.0	12.552	0.000	27	13	1	1	L
L	644000083011	XFMR2924_4	B	Consumer	0.13Y	115.2	0.00	10.81	0.00	0	0	0	100	0.00	0.0	12.552	0.000	0	0	0	0	L
C	OCD7172	OH2380_4	A	25-H OCR	7.21Y	120.2	0.00	5.85	32.66	131	232	-42	-98	0.00	0.0	10.664	0.000	0	0	0	33	C
C	OCD7171	OH7170	A	15-4H	7.10Y	118.4	0.00	7.64	17.29	115	121	-22	-98	0.00	0.0	12.666	0.000	0	0	0	16	C
C	XFMR2774	OH2759_4	A	Transforme	0.14Y	118.6	-0.61	7.37	3.97	114	28	-4	-99	0.16	0.6	13.220	0.000	0	0	0	2	C
C	XFMR1181	OH1180_4	B	Transforme	0.15Y	125.9	0.02	0.09	3.28	95	25	-2	-100	0.11	0.4	8.758	0.000	0	0	0	3	C
H	XFMR1171_4	OH1167_4	B	Transforme	0.15Y	126.2	-0.02	-0.16	1.68	48	13	-1	-100	0.03	0.2	8.678	0.000	0	0	0	1	H
H	643200079062	XFMR1171_4	B	Consumer	0.15Y	126.2	0.00	-0.16	87.22	0	13	-2	-99	0.00	0.0	8.678	0.000	13	-2	1	1	H
H	XFMR1163_4	OH1151_4	B	Transforme	0.15Y	126.3	-0.00	-0.31	2.82	81	21	-2	-100	0.08	0.4	8.598	0.000	0	0	0	2	H
H	643200079058	XFMR1163_4	B	Consumer	0.15Y	126.3	0.00	-0.31	37.31	0	5	-1	-98	0.00	0.0	8.598	0.000	5	-1	1	1	H
H	643200079059	XFMR1163_4	B	Consumer	0.15Y	126.3	0.00	-0.31	109.34	0	16	-2	-99	0.00	0.0	8.598	0.000	16	-2	1	1	H
H	XFMR1131	OH980	B	Transforme	0.15Y	126.4	-0.01	-0.41	0.48	14	4	0	100	0.00	0.0	8.458	0.000	0	0	0	1	H
H	643200079051	XFMR1131	B	Consumer	0.15Y	126.4	0.00	-0.41	25.04	0	4	0	100	0.00	0.0	8.458	0.000	4	0	1	1	H
H	XFMR1012_4	OH1011_4	B	Transforme	0.15Y	126.5	0.00	-0.49	0.00	0	0	0	100	0.00	0.0	8.284	0.000	0	0	0	0	H
H	643200079097	XFMR1012_4	B	Consumer	0.15Y	126.5	0.00	-0.49	0.00	0	0	0	100	0.00	0.0	8.284	0.000	0	0	0	0	H
P	OH933_4	OH931_4	A	6A CWC 3 S	7.48Y	124.6	-0.01	1.41	-12.29	9	32	-86	-35	0.24	0.2	8.275	0.200	0	0	0	1	P
H			B		7.59Y	126.5	0.00	-0.49	-12.52	9	32	-89	-34					0	0	0	1	H
H			C		7.59Y	126.5	0.05	-0.52	-15.38	11	76	-89	-65					0	0	0	11	H
P	OH5591	OH933_4	A	6A CWC 3 S	7.48Y	124.6	-0.00	1.41	-12.29	9	32	-86	-35	0.10	0.1	8.356	0.082	0	0	0	1	P
H			B		7.59Y	126.5	0.00	-0.49	-12.52	9	32	-89	-34					0	0	0	1	H
H			C		7.59Y	126.5	0.02	-0.50	-15.38	11	76	-89	-65					0	0	0	11	H
P	CAP-Rt.32Blaine	OH5591	A	Cap (300)	7.48Y	124.6	0.00	1.41	-14.42	0	0	-108	0	0.00	0.0	8.356	0.000	0	0	0	0	P
H			B		7.59Y	126.5	0.00	-0.49	-14.64	0	0	-111	0					0	0	0	0	H
H			C		7.59Y	126.5	0.00	-0.50	-14.64	0	0	-111	0					0	0	0	0	H

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru
OH936	OH5591	A	6A CWC 3 S	7.47Y	124.6	0.01	1.42	5.18	4	32	22	82	0.03	0.0	8.440	0.084	0	0	0	1
H		B		7.59Y	126.5	0.02	-0.47	5.09	4	32	22	83					0	0	0	1 H
H		C		7.59Y	126.5	0.04	-0.47	10.44	7	76	22	96					0	0	0	11 H
H MISAdd-953	OH936	C	10T FUSE	7.59Y	126.5	0.00	-0.47	5.79	60	44	1	100	0.00	0.0	8.440	0.000	0	0	0	9 H
H OH975	MISAdd-953	C	6A CWC 3 S	7.59Y	126.4	0.03	-0.44	5.79	4	44	1	100	0.01	0.0	8.570	0.130	0	0	0	9 H
H OH969_4	OH975	C	6A CWC 3 S	7.58Y	126.4	0.04	-0.40	5.19	4	39	1	100	0.01	0.0	8.759	0.189	0	0	0	7 H
H OH968_4	OH969_4	C	6A CWC 3 S	7.58Y	126.4	0.01	-0.38	4.41	3	33	1	100	0.00	0.0	8.839	0.080	0	0	0	6 H
H OH961_4	OH968_4	C	6A CWC 3 S	7.58Y	126.4	0.01	-0.37	3.18	2	24	0	100	0.00	0.0	8.920	0.081	0	0	0	5 H
H OH960_4	OH961_4	C	6A CWC 3 S	7.58Y	126.4	0.00	-0.37	2.81	2	21	0	100	0.00	0.0	8.962	0.042	0	0	0	3 H
H OH957_4	OH960_4	C	6A CWC 3 S	7.58Y	126.4	0.01	-0.36	2.81	2	21	0	100	0.00	0.0	9.031	0.069	0	0	0	3 H
H OH5589	OH957_4	C	6A CWC 3 S	7.58Y	126.4	0.01	-0.35	1.33	1	10	0	100	0.00	0.0	9.171	0.140	0	0	0	1 H
H OH948_4	OH5589	C	6A CWC 3 S	7.58Y	126.3	0.01	-0.34	1.33	1	10	0	100	0.00	0.0	9.283	0.112	0	0	0	1 H
H OH932_4	OH948_4	C	6A CWC 3 S	7.58Y	126.3	0.00	-0.34	0.00	0	0	0	100	0.00	0.0	9.376	0.093	0	0	0	0 H
H XFMR955	OH932_4	C	Transforme	0.15Y	126.3	0.00	-0.34	0.00	0	0	0	100	0.00	0.0	9.376	0.000	0	0	0	0 H
H 643404069021	XFMR955	C	Consumer	0.15Y	126.3	0.00	-0.34	0.00	0	0	0	100	0.00	0.0	9.376	0.000	0	0	0	0 H
H OH949	OH948_4	C	6A CWC 3 S	7.58Y	126.3	0.02	-0.33	1.33	1	10	0	100	0.00	0.0	9.565	0.282	0	0	0	1 H
H OH6747	OH949	C	2 ACSR 6/1	7.58Y	126.3	0.00	-0.33	1.33	1	10	0	100	0.00	0.0	9.637	0.072	0	0	0	1 H
H XFMR6748	OH6747	C	Transforme	0.15Y	126.1	0.25	-0.07	1.33	38	10	0	100	0.02	0.2	9.637	0.000	0	0	0	1 H
H 643404069030	XFMR6748	C	Consumer	0.15Y	126.1	0.00	-0.07	68.96	0	10	0	100	0.00	0.0	9.637	0.000	10	0	1	1 H
H XFMR950	OH949	C	Transforme	0.15Y	126.3	0.00	-0.33	0.00	0	0	0	100	0.00	0.0	9.565	0.000	0	0	0	0 H
H XFMR952	OH948_4	C	Transforme	0.15Y	126.3	0.00	-0.34	0.00	0	0	0	100	0.00	0.0	9.283	0.000	0	0	0	0 H
H 643404069022	XFMR952	C	Consumer	0.15Y	126.3	0.00	-0.34	0.00	0	0	0	100	0.00	0.0	9.283	0.000	0	0	0	0 H
H XFMR958	OH957_4	C	Transforme	0.15Y	126.1	0.29	-0.07	1.48	43	11	0	100	0.02	0.2	9.031	0.000	0	0	0	2 H
H 643404069035	XFMR958	C	Consumer	0.15Y	126.1	0.00	-0.07	49.58	0	7	0	100	0.00	0.0	9.031	0.000	7	0	1	1 H
H 643404069002	XFMR958	C	Consumer	0.15Y	126.1	0.00	-0.07	27.32	0	4	0	100	0.00	0.0	9.031	0.000	4	0	1	1 H
H XFMR965_4	OH960_4	C	Transforme	0.15Y	126.4	0.00	-0.37	0.00	0	0	0	100	0.00	0.0	8.962	0.000	0	0	0	0 H
H 643404069018	XFMR965_4	C	Consumer	0.15Y	126.4	0.00	-0.37	0.00	0	0	0	100	0.00	0.0	8.962	0.000	0	0	0	0 H
H 643404069024	XFMR965_4	C	Consumer	0.15Y	126.4	0.00	-0.37	0.00	0	0	0	100	0.00	0.0	8.962	0.000	0	0	0	0 H
H XFMR962_4	OH961_4	C	Transforme	0.15Y	126.3	0.07	-0.30	0.37	11	3	0	100	0.00	0.0	8.920	0.000	0	0	0	2 H
H 643404069001	XFMR962_4	C	Consumer	0.15Y	126.3	0.00	-0.30	1.43	0	0	0	100	0.00	0.0	8.920	0.000	0	0	1	1 H
H 643404069010	XFMR962_4	C	Consumer	0.15Y	126.3	0.00	-0.30	17.96	0	3	0	100	0.00	0.0	8.920	0.000	3	0	1	1 H
H XFMR971_4	OH968_4	C	Transforme	0.15Y	126.1	0.24	-0.15	1.23	36	9	0	100	0.02	0.2	8.839	0.000	0	0	0	1 H
H 643404069026	XFMR971_4	C	Consumer	0.15Y	126.1	0.00	-0.15	64.12	0	9	0	100	0.00	0.0	8.839	0.000	9	0	1	1 H
H XFMR970_4	OH969_4	C	Transforme	0.15Y	126.3	0.14	-0.25	0.77	22	6	0	100	0.01	0.0	8.759	0.000	0	0	0	1 H
H 643404069014	XFMR970_4	C	Consumer	0.15Y	126.3	0.00	-0.25	40.10	0	6	0	100	0.00	0.0	8.759	0.000	6	0	1	1 H
H XFMR976_4	OH975	C	Transforme	0.15Y	126.3	0.11	-0.33	0.60	17	5	0	100	0.00	0.0	8.570	0.000	0	0	0	2 H
H 643404079018	XFMR976_4	C	Consumer	0.15Y	126.3	0.00	-0.33	0.00	0	0	0	100	0.00	0.0	8.570	0.000	0	0	1	1 H
H 643404079087	XFMR976_4	C	Consumer	0.15Y	126.3	0.00	-0.33	31.35	0	5	0	100	0.00	0.0	8.570	0.000	5	0	1	1 H

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (EXISING SYSTEM).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
	OH939_4	OH936	A	6A CWC 3 S	7.47Y	124.5	0.06	1.48	5.18	4	32	22	82	0.05	0.1	8.743	0.303	0	0	0	1	
H			B		7.58Y	126.4	0.06	-0.41	5.09	4	32	22	83					0	0	0	1	H
H			C		7.58Y	126.4	0.06	-0.41	5.09	4	32	22	83					0	0	0	2	H
	MISAdd-952	OH939_4	A	10T FUSE	7.47Y	124.5	0.00	1.48	0.86	9	5	3	86	0.00	0.0	8.743	0.000	0	0	0	0	
H			B		7.58Y	126.4	0.00	-0.41	0.84	9	5	3	85					0	0	0	0	H
H			C		7.58Y	126.4	0.00	-0.41	0.84	9	5	3	85					0	0	0	0	H
	OH944	MISAdd-952	A	6A CWC 3 S	7.47Y	124.5	0.00	1.48	0.86	1	5	3	86	0.00	0.0	8.820	0.077	0	0	0	0	
H			B		7.58Y	126.4	0.00	-0.40	0.84	1	5	3	85					0	0	0	0	H
H			C		7.58Y	126.4	0.00	-0.41	0.84	1	5	3	85					0	0	0	0	H
C	XFMR940_4	OH939_4	A	Transforme	0.28Y	119.8	4.68	6.17	4.32	124	27	18	83	0.57	0.7	8.743	0.000	0	0	0	0	C
C			B		0.28Y	121.8	4.60	4.20	4.25	122	27	18	82					0	0	0	0	C
C			C		0.28Y	121.8	4.60	4.19	4.25	122	27	18	82					0	0	0	1	C
H	XFMR937	OH936	B	Transforme	0.15Y	126.5	0.00	-0.47	0.00	0	0	0	100	0.00	0.0	8.440	0.000	0	0	0	0	H
H	XFMR934_4	OH933_4	B	Transforme	0.15Y	126.5	0.00	-0.49	0.00	0	0	0	100	0.00	0.0	8.275	0.000	0	0	0	0	H
H	XFMR714	OH702_4	B	Transforme	0.15Y	126.5	-0.01	-0.47	0.44	13	3	0	100	0.00	0.0	7.617	0.000	0	0	0	1	H
H	643404078002	XFMR714	B	Consumer	0.15Y	126.5	0.00	-0.47	22.72	0	3	0	100	0.00	0.0	7.617	0.000	3	0	1	1	H

----------- Feeder No. 403 (Mazie 3 (7-8-9)) Beginning with Device Mazie_D3 -----------

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru
	Mazie_D3	Mazie-#4	A	MAZ_D3	7.56Y	126.0	0.00	0.00	11.00	2	83	0	100	0.00	0.0	0.000	0.000	0	0	0	21
			B		7.56Y	126.0	0.00	0.00	23.00	4	174	0	-100					0	0	0	22
			C		7.56Y	126.0	0.00	0.00	51.50	9	389	0	-100					0	0	0	102

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

	Load	Adjustment	Capacitance	Charging	Gen&Motors	Loops&Metas	Losses	No Load Losses	Total
KW	3265	0	0	0	0	2567	262	0.00	6095
KVAR	-142	0	-330	0	0	0	473		0

	Lowest Voltage	Highest Accumulated Voltage Drop	Highest Element Voltage Drop
A-Phase ->	116.74 volts on OH9674	9.26 volts on OH9674	7.29 volts on XFMR1026
B-Phase ->	115.19 volts on XFMR2924_4	10.81 volts on XFMR2924_4	6.86 volts on XFMR434_4
C-Phase ->	117.46 volts on OH13101	8.54 volts on OH13101	4.60 volts on XFMR940_4

Substation Summary:

Substation	KW	KVAR	KVA	KW Losses	KVAR Losses	% Capacity	No Load Loss	Rated No Load Loss
Mazie-#4	6094.84	0.10	6094.84	262.00	473.00	44.46	0.00	0.00
Total:	6094.84	0.10	6094.84	262.00	473.00		0.00	0.00

AFTER IMPROVEMENTS

leidos

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (WITH PROJECTS).WM\
Title:
Case:

Units Displayed In Volts
-Base Voltage:120.0-

Key	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	Key
	Mazie-#4		A	Mazie	7.56Y	126.0	0.00	0.00	243.34	38	1838	-74	-100	0.00	0.0	0.000	0.000	0	0	0	324	
			B		7.56Y	126.0	0.00	0.00	252.50	39	1909	27	100					0	0	0	249	
			C		7.56Y	126.0	0.00	0.00	302.00	47	2283	-16	-100					0	0	0	483	

----------- Feeder No. 401 (Mazie 1 (10-11-12)) Beginning with Device Mazie_D1 -----------

Key	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	Key
	Mazie_D1	Mazie-#4	A	MAZ_D1	7.56Y	126.0	0.00	0.00	89.80	16	679	0	100	0.00	0.0	0.000	0.000	0	0	0	135	
			B		7.56Y	126.0	0.00	0.00	73.40	13	555	0	100					0	0	0	19	
			C		7.56Y	126.0	0.00	0.00	90.77	16	686	-1	-100					0	0	0	135	

----------- Feeder No. 402 (Mazie 2 (4-5-6)) Beginning with Device Mazie_D2 -----------

Key	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	Key
	Mazie_D2	Mazie-#4	A	MAZ_D2	7.56Y	126.0	0.00	0.00	142.68	25	1076	-74	-100	0.00	0.0	0.000	0.000	0	0	0	168	
			B		7.56Y	126.0	0.00	0.00	156.11	28	1180	27	100					0	0	0	208	
			C		7.56Y	126.0	0.00	0.00	159.73	29	1207	-14	-100					0	0	0	246	
H	XFMR93_4	OH86	A	Transforme	0.15Y	126.3	-0.37	-0.31	2.08	60	15	-3	-98	0.04	0.3	0.276	0.000	0	0	0	2	H
H	643303073013	XFMR93_4	A	Consumer	0.15Y	126.3	0.00	-0.31	33.90	0	5	-1	-98	0.00	0.0	0.276	0.000	5	-1	1	1	H
H	643303073020	XFMR93_4	A	Consumer	0.15Y	126.3	0.00	-0.31	74.08	0	11	-2	-98	0.00	0.0	0.276	0.000	11	-2	1	1	H
H	643303073022	XFMR93_4	A	Consumer	0.15Y	126.3	0.00	-0.31	0.00	0	0	0	100	0.00	0.0	0.276	0.000	0	0	0	0	H
H	XFMR338_4	OH336_4	A	Transforme	0.15Y	126.0	-0.30	-0.04	1.60	46	12	-2	-99	0.03	0.2	0.780	0.000	0	0	0	1	H
H	643304073014	XFMR338_4	A	Consumer	0.15Y	126.0	0.00	-0.04	83.30	0	12	-3	-97	0.00	0.0	0.780	0.000	12	-3	1	1	H
L	XFMR434_4	OH432_4	B	Transforme	0.13Y	116.6	7.02	9.44	9.53	274	65	28	92	0.94	1.4	3.417	0.000	0	0	0	3	L
L	643304085031	XFMR434_4	B	Consumer	0.13Y	116.6	0.00	9.44	94.71	0	13	-2	-99	0.00	0.0	3.417	0.000	13	-2	1	1	L
L	643304085004	XFMR434_4	B	Consumer	0.13Y	116.6	0.00	9.44	63.31	0	8	-1	-99	0.00	0.0	3.417	0.000	8	-1	1	1	L
L	643304085007	XFMR434_4	B	Consumer	0.13Y	116.6	0.00	9.44	354.71	0	43	21	90	0.00	0.0	3.417	0.000	43	21	1	1	L
C	OH17368	XFMR17366	C	2 TPX	0.12Y	124.4	0.14	1.55	127.38	111	16	-3	-98	0.06	0.4	11.003	0.010	0	0	0	1	C
L	XFMR1026	OCD7038	A	Transforme	0.14Y	117.4	7.25	8.64	7.64	220	49	29	86	0.60	1.2	8.413	0.000	0	0	0	3	L
L	643200079037	XFMR1026	A	Consumer	0.14Y	117.4	0.00	8.64	350.76	0	43	21	90	0.00	0.0	8.413	0.000	43	21	1	1	L
L	643200079038	XFMR1026	A	Consumer	0.14Y	117.4	0.00	8.64	10.01	0	1	0	100	0.00	0.0	8.413	0.000	1	0	1	1	L
L	643200079135	XFMR1026	A	Consumer	0.14Y	117.4	0.00	8.64	38.38	0	5	2	93	0.00	0.0	8.413	0.000	5	2	1	1	L
C	OH10916	XFMR10914	A	1/0 TPX	0.14Y	123.6	0.21	2.37	174.53	117	25	-2	-100	0.08	0.3	10.830	0.012	0	0	0	1	C
C	OH10918	OH10916	A	1/0 TPX	0.14Y	123.5	0.11	2.47	174.53	117	25	-3	-99	0.05	0.2	10.836	0.007	0	0	0	1	C
P	OH933_4	OH931_4	A	6A CWC 3 S	7.49Y	124.9	-0.01	1.11	-12.32	9	32	-87	-35	0.24	0.2	8.275	0.200	0	0	0	1	P
P			B		7.50Y	125.0	0.01	1.00	-12.34	9	32	-87	-35					0	0	0	1	P
P			C		7.51Y	125.2	0.05	0.77	-15.31	11	76	-86	-66					0	0	0	11	P
P	OH5591	OH933_4	A	6A CWC 3 S	7.49Y	124.9	-0.01	1.11	-12.32	9	32	-87	-35	0.10	0.1	8.356	0.082	0	0	0	1	P
P			B		7.50Y	125.0	0.00	1.00	-12.34	9	32	-87	-35					0	0	0	1	P
P			C		7.51Y	125.2	0.02	0.79	-15.31	11	76	-86	-66					0	0	0	11	P
P	CAP-Rt.32Blaine	OH5591	A	Cap (300)	7.49Y	124.9	0.00	1.11	-14.46	0	0	-108	0	0.00	0.0	8.356	0.000	0	0	0	0	P
P			B		7.50Y	125.0	0.00	1.00	-14.47	0	0	-109	0					0	0	0	0	P
P			C		7.51Y	125.2	0.00	0.79	-14.49	0	0	-109	0					0	0	0	0	P
H	XFMR102	OH99_4	A	Transforme	0.15Y	126.0	-0.10	-0.05	0.48	14	4	-1	-97	0.00	0.0	0.161	0.000	0	0	0	1	H
H	643303073006	XFMR102	A	Consumer	0.15Y	126.0	0.00	-0.05	25.10	0	4	-1	-97	0.00	0.0	0.161	0.000	4	-1	1	1	H
H	643303073021	XFMR102	A	Consumer	0.15Y	126.0	0.00	-0.05	0.00	0	0	0	100	0.00	0.0	0.161	0.000	0	0	0	0	H

----------- Feeder No. 403 (Mazie 3 (7-8-9)) Beginning with Device Mazie_D3 -----------

Key	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	Key
	Mazie_D3	Mazie-#4	A	MAZ_D3	7.56Y	126.0	0.00	0.00	11.00	2	83	0	100	0.00	0.0	0.000	0.000	0	0	0	21	
			B		7.56Y	126.0	0.00	0.00	23.00	4	174	0	-100					0	0	0	22	
			C		7.56Y	126.0	0.00	0.00	51.50	9	389	0	-100					0	0	0	102	

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: Mazie-#4

Database: P:\ESO\1795-HEN\003681\306257 CONSTRUCTION WORK PLAN\WORK PRODUCTS\MODEL\CWP (WITH PROJECTS).WM\
Title:
Case:

	Load	Adjustment	Capacitance	Charging	Gen&Motors	Loops&Metas	Losses	No Load Losses	Total
KW	3265	0	0	0	0	2566	198	0.00	6030
KVAR	-142	0	-326	0	0	-1	406		-63

Lowest Voltage	Highest Accumulated Voltage Drop	Highest Element Voltage Drop
A-Phase -> 117.36 volts on XFMR1026	8.64 volts on XFMR1026	7.25 volts on XFMR1026
B-Phase -> 116.56 volts on XFMR434_4	9.44 volts on XFMR434_4	7.02 volts on XFMR434_4
C-Phase -> 120.45 volts on XFMR940_4	5.55 volts on XFMR940_4	4.66 volts on XFMR940_4

Substation Summary:

Substation	KW	KVAR	KVA	KW Losses	KVAR Losses	% Capacity	No Load Loss	Rated No Load Loss
Mazie-#4	6029.88	-62.89	6030.21	198.00	406.00	46.60	0.00	0.00
Total:	6029.88	-62.89	6030.21	198.00	406.00		0.00	0.00

Appendix H
SYSTEM MAP