2010-00110

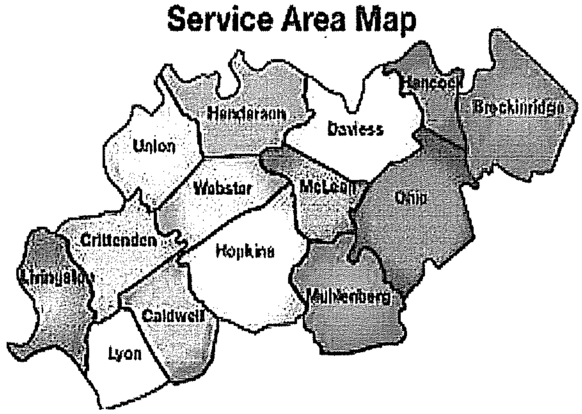
Final Report

KY 65
2010-2013
Construction Work Plan

Kenergy Corp
Henderson, Kentucky

Kenergy
Your Touchstone Energy® Cooperative

Service Area Map



February 2010

R·W·BECK
An SAIC Company

February 18, 2010

R·W·BECK
An SAIC Company

Mr. Rob Stumph, P.E.
Manager of Planning and Design
Kenergy Corp
6402 Old Corydon Road
Henderson, KY 42419

Subject: **2010-2013 Construction Work Plan**

Dear Mr. Stumph:

We have completed our work in connection with the preparation of a 2010-2013 Construction Work Plan for Kenergy Corp. The Executive Summary summarizes the results of our studies and sets forth our conclusions and opinions. The data, information, and results of the analysis, which support our conclusions and opinions, are described in detail in subsequent sections of the Report.

We wish to acknowledge the cooperation and assistance received from the management and staff of Kenergy Corp in the conduct of our studies and the preparation of the Report.

Sincerely,

R. W. BECK, INC.

Trishia Swayne
Trishia Swayne
Project Manager

TS/mw

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Kenergy Corp
Henderson, Kentucky
Kentucky 65

CONSTRUCTION WORK PLAN

I hereby certify that this 2010-2013 Construction Work Plan was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of Kentucky.

STATE OF KENTUCKY
PAUL KEITH MULLEN, JR.
22948
LICENSED
PROFESSIONAL ENGINEER

PAUL KEITH MULLEN, JR.

Keith Mullen, P.E.
Project Manager

Date: 2010-FEB-18

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740C DETAIL

NEW CONSTRUCTION (Code 100)

Project Code	General Description	Miles	2010-2011	2011-2012	2012-2013	Estimated Cost
101	New Underground Lines	36.8	$973,170	$1,157,862	$1,204,748	$3,335,780
102	New Overhead Lines	106.6	$2,036,484	$2,422,991	$2,521,056	$6,980,531
100	TOTAL NEW CONSTRUCTION	143.4	$3,009,654	$3,580,853	$3,725,804	$10,316,310

DISTRIBUTION LINE CONVERSIONS (Code 300)

RUS Code	General Description	Miles	2010-2011	2011-2012	2012-2013	Estimated Cost
304	**Dermont - Circuit 17-1**					
	New double circuit 336 ACSR	1.01			$204,900	$204,900
302	**Crossroads - Circuit 61-1**					
	Multi-phase to 3-ph 1/0 ACSR	2.79			$197,400	$197,400
303	**Crossroads - Circuit 61-3**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	7.73		$536,200		$536,200
308	**Marion - Circuit 70-2**					
	Extension of 1-ph 1/0 ACSR	0.24	$10,100			$10,100
309	**Marion - Circuit 70-3**					
	Multi-phase to 3-ph 2 ACSR	0.75			$45,300	$45,300
314	**Providence - Circuit 81-2**					
	Multi-phase to 3-ph 2 ACSR	2.69			$162,300	$162,300
315	**Providence - Circuit 81-2**					
	Multi-phase to 3-ph 2 ACSR	0.40	$23,200			$23,200
301	**Beda - Circuit 41-1**					
	Multi-phase to 3-ph 1/0 ACSR	1.33		$92,200		$92,200
	Extension of 3-ph 1/0 ACSR	0.13		$9,900		$9,900
305	**Hawesville - Circuit 13-2**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	1.97			$139,400	$139,400
306	**Hawesville - Circuit 13-4**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	1.99	$135,300			$135,300
	Extension of 3-ph 1/0 ACSR	0.38	$28,500			$28,500
	Multi-phase and reconductor to 3-ph 1/0 ACSR	1.05	$71,400			$71,400
	Extension of 3-ph 1/0 ACSR	1.29	$96,800			$96,800
307	**Lyon County - Circuit 69-3**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	0.41	$27,900			$27,900
310	**Nuckols - Circuit 42-3**					
	Multi-phase to 2-ph 2 ACSR	1.11		$50,900		$50,900
	Multi-phase to 3-ph 2 ACSR	0.30		$17,700		$17,700
311	**Onton - Circuit 52-1**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	1.09	$74,100			$74,100
	Extension of 1-ph 1/0 ACSR	0.15	$6,300			$6,300
312	**Pleasant Ridge - Circuit 26-3**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	1.31			$92,700	$92,700
313	**Pleasant Ridge - Circuit 26-3**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	0.69		$47,900		$47,900

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DISTRIBUTION LINE CONVERSIONS (Code 300 - Continued)

RUS Code	General Description	Miles	2010-2011	2011-2012	2012-2013	Estimated Cost
317	**Race Creek - Circuit 82-3**					
	Multi-phase and reconductor to 3-ph 2 ACSR	0.30		$17,700		$17,700
	Extension of 1-ph 1/0 ACSR	0.05		$2,100		$2,100
348	**South Dermont 2 - Circuit 18-3**					
Carry-Over	Multi-phase to 3-ph 2 ACSR	0.25	$14,500			$14,500
334	**South Hanson 1 - Circuit 53-1**					
	Multi-phase to 3-ph 1/0 ACSR	0.16	$10,900			$10,900
335	**South Hanson 1 - Circuit 53-1**					
	Multi-phase to 3-ph 2 ACSR	0.50		$29,600		$29,600
	Multi-phase to 3-ph 2 ACSR	0.25		$14,800		$14,800
350	**South Hanson 1 - Circuit 53-5**					
Modified						
Carry-Over	Conversion from 12.47 kV to 25 kV	2.92	$21,900			$21,900
336	**South Hanson 1 & 2 - Circuit 53-5 & 53-6**					
	Multi-phase to 3-ph 2 ACSR	0.73			$44,100	$44,100
	Extension of 1-ph 1/0 ACSR	0.47			$20,500	$20,500
337	**South Hanson 2 - Circuit 53-6**					
	Multi-phase and reconductor to 3-ph 1/0 ACSR	1.48			$104,700	$104,700
338	**South Hanson 2 - Circuit 53-6**					
	Multi-phase and reconductor to 3-ph 2 ACSR	0.17	$9,900			$9,900
	Extension of 3-ph 1/0 ACSR	0.10	$7,500			$7,500
318	**Sacramento - Circuit 50-1**					
	Extension of 1-ph 1/0 ACSR	0.36	$15,100			$15,100
331	**Sebree - Circuit 84-1**					
	Extension of 3-ph 1/0 ACSR	0.71	$53,300			$53,300
332	**Sebree - Circuit 84-3**					
	Multi-phase to 3-ph 1/0 ACSR	1.99	$135,300			$135,300
340	**Utica - Circuit 24-4**					
	Multi-phase to 3-ph 1/0 ACSR	1.64		$113,800		$113,800
341	**Weaverton - Circuit 64-2**					
	Extension of 3-ph 1/0 ACSR	0.77	$57,800			$57,800
342	**Weaverton - Circuit 64-2**					
	Multi-phase to 3-ph 2 ACSR	1.71			$103,200	$103,200
357	**Zion - Circuit 90-3**					
	Multi-phase to 3-ph 2 ACSR	1.10			$66,400	$66,400
345	**Whitesville - Circuit 15-3**					
	Extension of 1-ph 2 ACSR	0.08	$3,000			$3,000
346	**Whitesville - Circuit 15-3**					
	Multi-phase to 3-ph 1/0 ACSR	1.32	$89,800			$89,800

740C DETAIL

DISTRIBUTION LINE CONVERSIONS (Code 300 - Continued)

RUS Code	General Description	Miles	2010-2011	2011-2012	2012-2013	Estimated Cost
344	**Weberstown - Circuit 14-1**					
	Multi-phase to 3-ph 2 ACSR	2.50			$150,900	$150,900
	Extension of 1-ph 2 ACSR	0.29			$11,500	$11,500
343	**Weaverton - Circuit 64-2**					
	Multi-phase from 2-ph to 3-ph 2 ACSR	1.52	$88,200			$88,200
356	**Whitesville - Circuit 15-3**					
	Reconductor to 3-ph 4/0 ACSR	1.26	$94,500			$94,500
355 Modified Carry-Over	**Weaverton - Circuit 64-2**					
	Reconductor to double circuit 3-ph 336 ACSR	1.96	$382,700			$382,700
333	**South Dermont 1 - Circuit 18-4**					
	Construct double circuit 336 ACSR	0.07	$13,700			$13,700
354 Modified Carry-Over	**Thruston 1 - Circuit 11-2**					
	Reconductor to 3-ph 336 ACSR	2.12	$262,900			$262,900
371	Location: System Wide					
	Replace UG Cable with 25 kV 1/0 AL UG	2.00	$260,000			$260,000
		2.00		$265,200		$265,200
		2.00			$270,500	$270,500
372	Location: System Wide					
	Reconductor Cu w/ #2 ACSR	21.79	$999,900			$999,900
	and reconductor #4 ACSR to #1/0 ACSR	25.00		$1,170,200		$1,170,200
		21.55			$1,028,900	$1,028,900
300	**TOTAL DISTRIBUTION LINE CHANGES**	129.93	$2,994,500	$2,368,200	$2,642,700	**$8,005,400**

SUBSTATION ITEMS (Code 500)

RUS Code	General Description	Quantity	2010-2011	2011-2012	2012-2013	Estimated Cost
501	**Miscellaneous Substation Work** System Wide		$346,506	$346,506	$346,506	**$1,039,517**
502	**Dermont - Circuit 17-1** New Feeder Breaker & Equipment				$34,300	$34,300
500	**TOTAL DISTRIBUTION LINE CHANGES**		$346,506	$346,506	$380,806	**$1,073,817**

MISCELLANEOUS DISTRIBUTION ITEMS (Code 600)

RUS Code	General Description	Quantity	2010-2011	2011-2012	2012-2013	Estimated Cost
601	**METERS FOR NEW MEMBERS**					
	COST OF METERS FOR NEW MEMBERS	2,722	$128,949	$153,252	$159,225	$441,426
601	**TRANSFORMERS FOR NEW MEMBERS**					
	1-ph	2,178	$762,340	$907,403	$944,156	$2,613,899
	3-ph	27	$100,026	$102,024	$104,067	$306,117
	COST OF TRANSFORMERS FOR NEW MEMBERS	2,205	$862,366	$1,009,427	$1,048,223	$2,920,016
601	**TOTAL TRANSFORMERS & METERS**		$991,315	$1,162,679	$1,207,448	**$3,361,442**
602	**SERVICE UPGRADES FOR EXISTING MEMBERS**	377	$234,980	$243,432	$250,317	**$728,729**
603	**SECTIONALIZING EQUIPMENT**		$386,382	$394,110	$401,992	**$1,182,483**

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MISCELLANEOUS DISTRIBUTION ITEMS (Code 600 - Continued)

RUS Code	General Description	Quantity	2010-2011	2011-2012	2012-2013	Estimated Cost
604	LINE REGULATORS		$ 289,000	$ 30,600	$ 31,200	$350,800
604-03	**Geneva - Circuit 63-2** Install (3) 1-ph 100 A regulators				$31,200	$31,200
604-04	**Onton - Circuit 52-2** Remove regulator and upgrade to (3) 1-ph 150 A regulators		$38,500			$38,500
604-06	**Thruston 1 - Circuit 11-2** Install (3) 1-ph 100 A regulators		$30,000			$30,000
604-15	**Whitesville - Circuit 15-3** Relocate regulator bank Install (3) 1-ph 150 A regulators		$8,500 $35,000			$8,500 $35,000
604-09	**Guffie - Circuit 31-1** Relocate regulator bank		$8,500			$8,500
604-10	**Hawesville - Circuit 13-4** Remove regulator and upgrade to (3) 1-ph 150 A regulators		$38,500			$38,500
604-11	**Nuckols - Circuit 42-3** Install (3) 1-ph 150 A regulators		$35,000			$35,000
604-12	**St. Joe - Circuit 32-1** Install (3) 1-ph 150 A regulators		$35,000			$35,000
604-14	**Stanley - Circuit 21-1** Install (3) 1-ph 100 A regulators			$30,600		$30,600
604-16	**Sebree - Circuit 84-3** Install (3) 1-ph 100 A regulators		$30,000			$30,000
604-17	**Niagara - Circuit 80-1** Install (3) 1-ph 100 A regulators		$30,000			$30,000

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MISCELLANEOUS DISTRIBUTION ITEMS (Code 600 - Continued)

RUS Code	General Description	Quantity	2010-2011	2011-2012	2012-2013	Estimated Cost
606	**Pole Replacments**					
	Pole Replacements	1,747	$1,451,125	$1,376,264	$1,403,528	$4,230,917
	Clearance Pole	161	$87,930	$115,594	$117,914	$321,438
	COST OF POLE REPLACEMENTS	1,908	$1,539,055	$1,491,858	$1,521,442	**$4,552,355**
608	**Conductor Replacements**					
	System Wide		$1,621,231	$1,621,231	$1,621,231	$4,863,692
	COST OF MISCELLANEOUS CONDUCTOR REPLACEMENTS		$1,621,231	$1,621,231	$1,621,231	**$4,863,692**
600 TOTAL MISC. DISTRIBUTION ITEMS			$5,061,963	$4,943,909	$5,033,629	**$15,039,501**

RUS Code	General Description	Quantity	2010-2011	2011-2012	2012-2013	Estimated Cost
702	**SECURITY LIGHTS**	1,101	$284,229	$293,233	$302,365	$879,827
700 TOTAL OTHER DISTRIBUTION ITEMS			$284,229	$293,233	$302,365	$879,827

TOTAL (740c)	**$11,696,851**	**$11,532,701**	**$12,085,304**	**$35,314,855**

Purpose of Report

This 2010-2013 Construction Work Plan (CWP) documents the engineering analysis and proposed system improvements recommended for Kenergy Corp (Kenergy) to provide satisfactory and reliable service to its customers through the summer peak of 2012 and the winter peak of 2012-2013. R. W. Beck, Inc. (R. W. Beck) was retained to assist Kenergy 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 improvements.

Service Area and Power Supply

Kenergy provides service to approximately 54,736 customers located in all or parts of Caldwell, Crittenden, Henderson, Hopkins, Livingston, Lyon, Union, Breckinridge, Daviess, Hancock, McLean, Muhlenberg, Ohio, and Webster Counties in northwestern Kentucky.

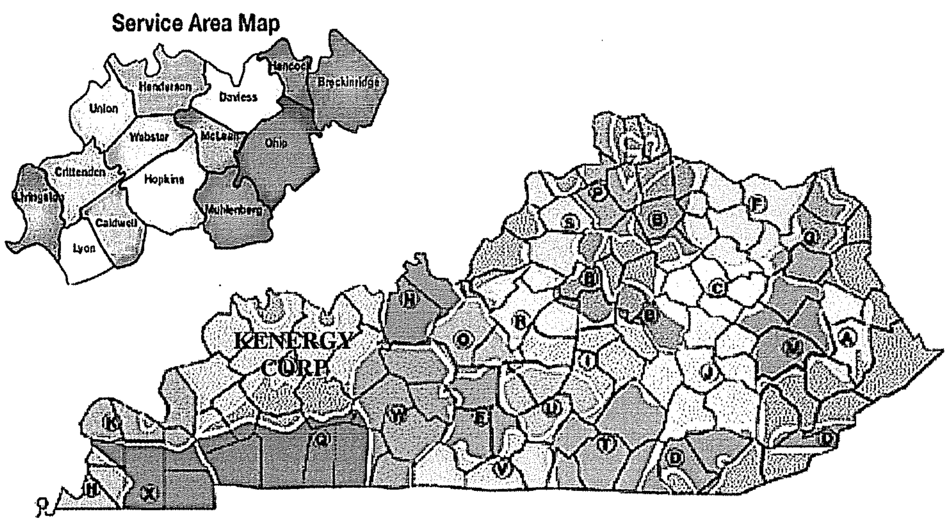

Figure ES-1: Location Map

Note: Map from the Kentucky Association of Electric Cooperatives, Inc.

Kenergy purchases power from Big Rivers Electric Corporation (BREC) pursuant to a contract covering the rural system and all commercial and industrial customers. A tabulation of general operating statistics for the calendar years 2007 and 2008 from RUS Form 7 are shown in Table ES-1.

Table ES-1
General Rural System Operating Statistics

	2007	2008
Miles of Distribution Line	6,974	6,997
Year-End Consumers per Month Served	54,337	54,736
Consumers per Mile	7.79	7.82
Average Residential Consumption (kWh/mo)	1,425	1,390
Total Rural System MWh Purchased (1)	1,235,849	1,218,628
Total Rural System MWh Sold (1) (2)	1,177,269	1,161,175
Percent System Losses for Rural System	4.74%	4.71%

Note:
(1) Rural System Sales and Purchases provided by Kenergy; excludes all direct served delivery points.
(2) Includes own use.

BREC constructs, owns, and operates the 69-kV transmission system supplying power to the 49 delivery points on the Kenergy system. Kenergy owns the substations serving the distribution system. The distribution system includes 188 circuits operated at 24.9/14.4 kV or 12.5/7.2 kV. The installed overhead conductor sizes range from #8 CWC to 795 kcmil ACSR, and the underground cable sizes range from #2 Al to 750 MCM Al.

Results of Proposed Construction

On completion of the proposed construction program, the system will adequately serve the 2012 summer peak load of 306.0 MW and the 2012-2013 winter peak load of 311.7 MW as projected in the 2010 Long Range Plan (LRP) Substation and Feeder Forecast, including Tyson and Valley Grain customer loads. The CWP was prepared to provide adequate and dependable service to 57,565 customers with total annual sales of 1,272,838 MWh in 2013.

A detailed description of the proposed system improvements is given in Section 2. This CWP includes carryovers from the previous 2007-2010 CWP. The proposed system improvements are identified in the 740c Detail following the RUS Form 740c and are summarized in Table ES-2.

Table ES-2
System Improvements and Additions Summary

RUS Code	Item	Estimated Cost
100	New Customer Extensions	$10,316,310
200	New Tie Lines	$0
300	Line Conversions	$8,005,400
400	New Substations	$0
500	Substation Improvements	$1,073,817
600	Miscellaneous Distribution Equipment	
	601 Transformers & Meters	$3,361,442
	602 Service Upgrades	$728,729
	603 Sectionalizing Equipment	$1,182,483
	604 Line Regulators	$350,800
	606 Pole Replacements	$4,552,355
	608 Miscellaneous Conductor Replacements	$4,863,692
700	Security Lights	$879,827
TOTAL CWP Improvements		**$35,314,855**

General Basis of Study

The projected system peak load and number of customers served used in this report were based on the 2010 LRP Substation and Feeder Forecast, developed by R. W. Beck and Kenergy, and the 2009 Load Forecast prepared by GDS Associates, Inc, in cooperation with BREC and Kenergy. The analyses are based on the economic evaluation of alternatives presented in the LRP. Recommendations for this CWP were based on these analyses.

Kenergy's current 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 Kenergy's power supplier, BREC.

Details and estimated costs of the line and equipment changes and the additional requirements to serve 2,722 new 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.

Using RUS guidelines as a basis and the design criteria herein, an analysis of thermal loading, service 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 summer 2012 peak load of 306.0 MW and the projected winter 2012-2013 peak load of 311.7 MW. Sample printout from the software are given in Appendices A and B to illustrate before and after improvement results. The criteria presented in Section 1 forms the rest of the basis of this analysis.

In the preparation of this Report, including the opinions contained herein, we have made certain assumptions and used certain considerations with respect to conditions which may occur in the future. While we believe 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. We have also relied upon certain information provided to us 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. Field conditions encountered during design will affect some of the projects.

Sample CWP Projects

For each identified project in the 2010-2013 Construction Work Plan, a description as well as a map of the area of interest is provided in Section 2 of this report. The following are examples of two different CWP projects.

Onton – Circuit 52-1

- **RUS CODE – 311** **$80,400 in Year 1**

Description: Multi-phase and reconductor from single-phase 8A to three-phase 1/0 ACSR on sections between 518916 and 518699 for 1.09 miles. Extend approximately 0.15 miles of single-phase 1/0 ACSR from section 518909 to section 518692. Transfer load between taps by opening at section 518892 and back feed to the new extension. The project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the taps were loaded to 49.2 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-12 for a geographic representation of the location of the project

Sectionalizing: Add two single-phase reclosers on section 518943. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: There are multiple single-phase taps in the area experiencing single-phase Design Criteria violations. This multi-phase and load transfer project alleviates the issue and improves reliability in an area with a large number of customers.

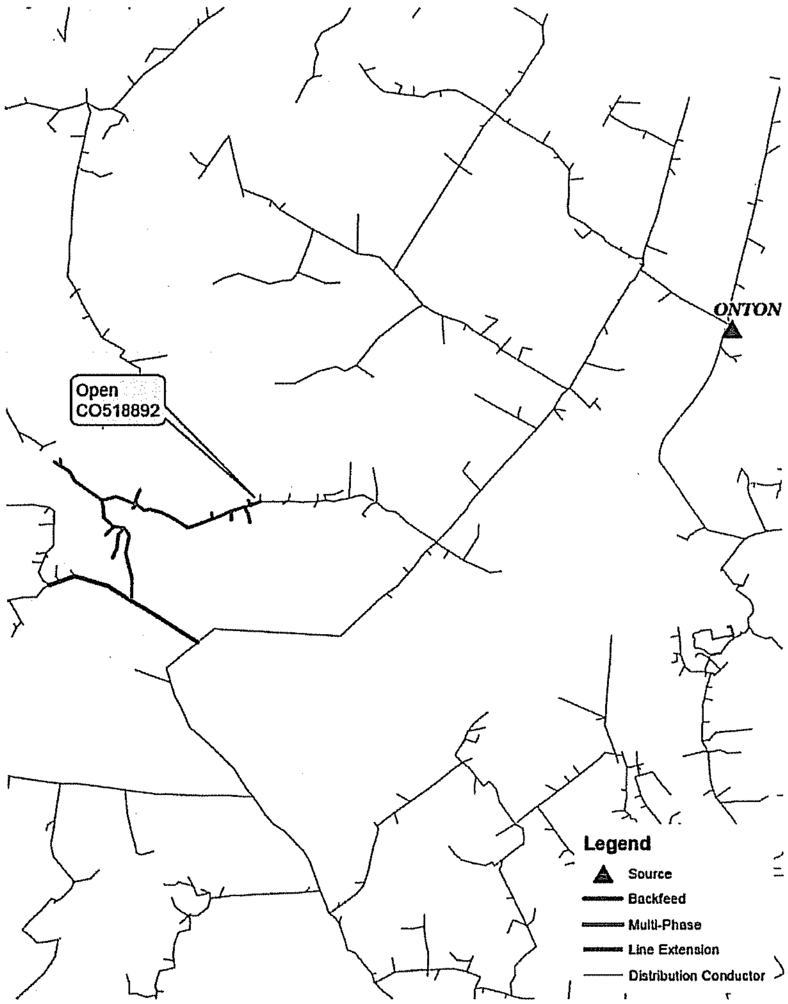

Figure ES-2: RUS CODE 311

South Hanson 1 – Circuit 53-1

- **RUS CODE – 335** **$44,400 in Year 2**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 103821 and 100876 for 0.50 miles and on sections between 100876 and 100765 for 0.25 miles. Transfer load from South Hanson 1 Circuit 53-1 to South Hanson Circuit 53-5 by opening at section 100897 and closing switch SW533838419. This project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 71.3 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure ES-3 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 103821. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

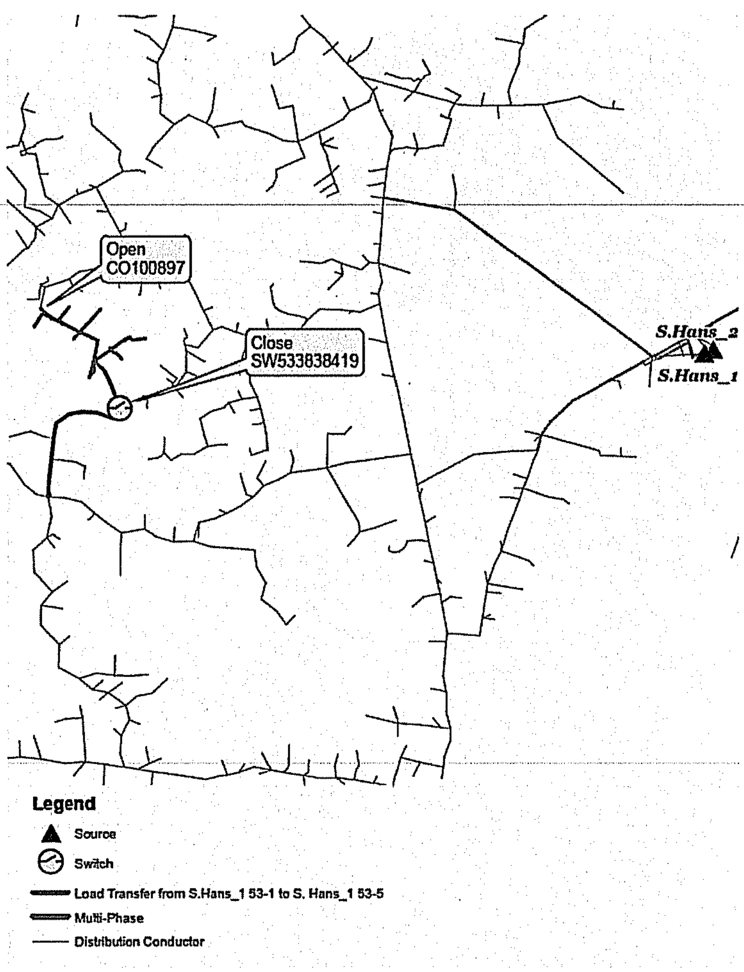

Figure ES-3: RUS CODE 335

1.1 Design Criteria

Construction proposed herein must meet the following minimum standards for voltage, thermal load, safety, and system reliability. Conditions may require actions that exceed the design criteria given below:

1. Corrective action is required for voltages less than 118 volts on a primary distribution line, assuming a system base of 120 volts. System improvements based on the voltage's calculated value shall be proven in the field before construction approval. (Extrapolation to peak is allowed). The following criteria will be used to evaluate the voltage on the distribution system:
   a. Substation regulation shall be set at 125 volts with a 2 volt bandwidth.
   b. Down-line regulators will be coordinated with substation regulators such that they operate within the range stipulated in Kenergy's Tariffs
   c. More than one line voltage regulator in series is intended as a temporary solution for voltage correction.
2. All single-phase lines should be reviewed if the peak load exceeds 288 kVA. Multi-phasing or load transfers should be considered if the peak load current exceeds 40 ampere (288 kVA) on the 7.2-kV system or 20 ampere (288 kVA) on the 14.4-kV system.
3. The following loading standards are recommended for thermal protection of Kenergy Corp's equipment. Loading of power transformers is calculated from the base (OA) nameplate rating at 55° C rise and metered power factor. If the actual power factor is not known, 90% will be assumed.
   - Power Transformer 130% winter; 100% summer (ANSI C57)
   - Regulators 120% at 7.5% rise
   - Reclosers 80%
   - Line Fuses 80%
   - Current Limiting Fuses 80%
4. System studies flag conductors loaded to 50% of capacity. Conductors used for primary lines loaded more than 70% of thermal rating will be evaluated for replacement or an alternative action.

5. Any deteriorated conductor is subject to replacement if:
   - A line section has more than two repairs/span/mile.
   - Records indicate the section of overhead conductor has experienced an outage more than three times in the last year for reasons other than right-of-way or storm.
   - Records indicate the section of underground cable has been repaired or spliced a total of three times.
   - The conductor is copper or steel wire. (Larger copper conductors will be evaluated on an individual basis.)
6. A primary distribution line will be rebuilt or relocated if a condition exists in which the line fails to meet applicable National Electric Safety Code requirements.
7. System improvements will be considered in specific areas where customers have experienced more than eight outage hours or five events per year for two of the last three years. This is excluding power supply, planned outages, major storm outage time, and outage time caused by the public.
8. Annual SAIDI, CAIDI, and SAIFI targets are used to identify the worst performing feeders. If improvements do not adequately address these sections, additional analysis may be performed.
9. New primary conductor shall be sized on a case by case basis using Economic Conductor Analysis. Kenergy Corp's system cost at the time of the study will be used in the program and their standard conductor sizes for primary follows:
   - #2 ACSR
   - #1/0 ACSR
   - #4/0 ACSR
   - 336.4 ACSR
   - 795 MCM ACSR
   - #2 Aluminum 15 KV URD Cable
   - #4/0 Aluminum 15 KV URD Cable
   - 500 MCM Aluminum 15 KV URD Cable
   - 750 MCM Aluminum 15 KV URD Cable
   - #1/0 Aluminum 25 KV URD Cable
   - #4/0 Aluminum 25 KV URD Cable
   - 500 MCM Aluminum 25 KV URD Cable
10. All new primary construction shall be overhead except new feeders exiting a substation, or in case of favorable conditions such as a subdivision, to meet government agency requirements or ordinances.

11. New substations or upgrades to existing substations will be coordinated with Big Rivers Electric.
12. All construction shall be designed and built according to NESC and RUS construction guidelines, as well as Kenergy Corp construction procedures.
13. With the exception of dedicated circuits, feeders with a peak load exceeding 5,000 kW will be evaluated for:
    - Load transfer to an adjacent feeder
    - New feeder constructed to serve a portion of load
14. Sectionalizing studies are completed on a rotating cycle. It is Kenergy's intent to study one-fifth of the substation service areas each year. Substation or feeder upgrades require interim studies.
15. Capacitors are placed on the system based on peak feeder reading from SCADA system. Summer and winter conditions are both studied. A power factor less than 90% is a flag to install a capacitor bank. The capacitor bank will be sized so that leading power factor will not fall below 95% at a load level of 60% of the winter peak loading condition.
16. Switching of load will be evaluated for conductor capacity problem correction.
17. Conversions of single-phase to multiphase can be implemented to correct voltage drop, balance, sectionalizing problem or a combination. Distribution lines are subject to Multi-Phasing if:
    - Voltage levels do not conform to Criteria #1.
    - The limit of Criteria #2 is exceeded and load transfer is not possible or advantageous.
18. The installation of a 10 MVA transformer at a new or existing substation shall be fused on the high side for overcurrent protection. If the installed transformer is 15 MVA, the high side overcurrent protection will be a breaker with relay controls.
19. Reliability of Kenergy system design shall consider single contingency planning. The system shall have the ability to maintain adequate service with loss of a major system element such as a substation transformer or three-phase feeder during non-extreme conditions. The following criteria shall be applied to evaluate system improvements for single contingency planning:
    a. Critical loads will have first priority.
    b. Non-extreme load conditions shall be defined as the average of the minimum and maximum monthly peaks, for each substation transformer during the calendar year.
    c. Each substation should have reserve transformer capacity available to support an adjacent substation (OA/FA capacity) equal to projected non-extreme load of both substations if distribution ties are available.

d. Three-phase feeder capacity between two adjoining substations shall be adequate to allow backfeeding during non-extreme load conditions.

e. Planning shall consider minimum tie-line conductor to be 336.4 kcmil ACSR at 12.5/7.2 kV and #4/0 ACSR at 24.9/14.4 kV. Minimum conductor for single-phase taps is 1/0 ACSR, if two-way feed is possible.

1.2 Distribution Line and Equipment Costs

Distribution line and equipment costs were based on recent construction costs prepared by R. W. Beck, Inc. and Kenergy Corp. The estimated costs include material, installation, engineering, and overheads, and are inflated 2.0 % per year from the first year of construction. The estimated costs of distribution line and equipment are given in the following tables:

Table 1-1
Overhead Distribution

Item	Estimated Cost / Mile (2010 $'s)
Reconductor	
3ϕ 795 kcmil ACSR	$181,000
3ϕ 336.4 kcmil ACSR	$124,000
3ϕ 4/0 ACSR	$75,000
3ϕ #1/0 ACSR	$68,000
3ϕ #2 ACSR	$58,000
Vϕ #1/0 ACSR	$50,000
Vϕ #2 ACSR	$45,000
1ϕ #1/0 ACSR	$40,000
1ϕ #2 ACSR	$35,000
New Construction	
3ϕ 795 kcmil ACSR	$175,000
3ϕ 336.4 kcmil ACSR	$120,000
3ϕ D.C. 336.4 kcmil ACSR	$195,000
3ϕ #4/0 ACSR	$105,000
3ϕ #1/0 ACSR	$75,000
1ϕ #1/0 ACSR	$42,000
1ϕ #2 ACSR	$38,000

Item	Estimated Cost / Mile (2010 $'s)
25 kV Conversion	
1ϕ Re-insulation	$7,500
3ϕ Re-insulation	$18,000

Note:
Estimates include material, installation, engineering, and overheads.

Table 1-2
Underground Distribution

Item	Estimated Cost / Mile (2010 $'s)
Reconductor	
1ϕ #2 Al 15 kV URD Cable	$120,000
3ϕ #2 Al15 kV URD Cable	$200,000
1ϕ #1/0 Al 25 kV URD Cable	$130,000
New Construction	
3ϕ 500 MCM Al 15 kV URD Cable	$325,000
3ϕ 4/0 Al 15 kV URD Cable	$265,000
1ϕ #2 Al 15 kV URD Cable	$68,000

Note:
Material, installation, engineering, and overheads are included. New construction is based on installation in ducts.

Table 1-3
Installed Distribution Equipment Cost Estimates

Item	Cost (2010 $'s)
Regulators	
Line Regulator – 50 amp, 3-1ϕ	$22,500
Line Regulator – 100 amp, 3-1ϕ	$30,000
Line Regulator – 150 amp, 3-1ϕ	$35,000
Line Regulator – 219 amp, 3-1ϕ	$40,000
Relocate Regulator Bank	$8,500
Remove Regulator Bank	$3,500
Step Transformers	
Relocate (1) Auto Bank	$9,000

Item	Cost (2010 $'s)
Remove (1) Auto Bank	$6,000
Switch	
3-ph Overhead Gang Switch	$6,000

1.3 Status of Previous CWP Items

The previous work plan was prepared in 2007 for the 2007-2010 construction period. Approximately 70% of the projects in this plan are complete and 15% were deleted. The remaining 15% will be designated as carry-overs in the 2010-2013 CWP. The status of each project is summarized in Exhibit 1 based on the following:

- Carryover Will not be completed by June 30, 2010
- Complete Will be completed by June 30, 2010
- Deleted Have been removed from the CWP Improvements.

1.4 Analysis of Current System Studies

1.4.1 Load Forecast

The design load for the summer of 2012 is 306.0 MW and 311.7 MW for the winter of 2012-2013. All new spot loads anticipated by Kenergy during the planning period were assumed to be included in the CWP design load.

1.4.2 2009 Operations and Maintenance Survey

Kenergy and the RUS field representative performed the Form 300 operations and maintenance review in September 2009. RUS Form 300 is located in Exhibit 2. The review indicated a satisfactory rating in all areas except the following, which received an acceptable rating.

- Substations: Inadequate ground clearance to terminators in Beech Grove substation. Correction planned 2010.
- Substations: Birds' nests observed in Morganfield and Caldwell Springs substations. Plan to review inspection criteria, emphasizing need to report condition.
- Overhead Distribution Lines: Some slack guys and leaning poles caused by January Ice Storm. All locations are identified and put on open Job Orders. Process of completing entire list of 5,500 Job Orders is 80% complete – will complete by year's end.
- Distribution Line Equipment: Some pad mount transformers and switch locations needed replacement of warning signs and map location.

1.4.3 Sectionalizing Studies

Kenergy reviews the coordination of all sectionalizing devices on the system. Kenergy will analyze the protection schemes of all new or significantly changed circuits due to CWP projects. For the remaining system, approximately one-fifth of the substations are studied each year; therefore, this is an on-going project.

Upon completion of the analyses, a list is prepared of reclosers, fuses, and other devices needed to adequately protect the circuits investigated. The estimated installed cost for the next planning period is included in Section 2 of this CWP.

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 1-4. The historical data was taken from Kenergy's RUS Form 7. Projections for the summer CWP design load of 306.0 MW and the winter CWP design load of 311.7 MW were based on the 2010 LRP, including Tyson and Valley Grain customer loads. The total projected system load was allocated to individual substations and feeders based on Kenergy's knowledge of the system, historical loading, customer growth, and known future development.

Table 1-4
Historical and Projected Annual Energy, Demand, and Consumer Data

Calendar Year	Energy Purchased (MWh) (2)	Energy Sold (1)		Energy Loss		Coincident Peak Demand (2)			Number of Customers (3)	
		(MWh)	Percent Change	(MWh)	Percent of Purchases (4)	Month/Yr.	(kW)	Percent Change	Average	Percent Change
2002	1,097,000	1,049,994	-	47,006	4.28%	Summer	242,810	-	51,313	-
2003	1,081,181	1,035,730	-1.36%	45,451	4.28%	Summer	236,194	-2.72%	51,869	1.08%
2004	1,109,089	1,060,495	2.39%	48,594	4.28%	Summer	244,804	3.65%	52,592	1.39%
2005	1,172,365	1,120,552	5.66%	51,813	4.28%	Summer	260,280	6.32%	53,264	1.28%
2006	1,155,956	1,103,136	-1.55%	52,820	4.28%	Summer	262,625	0.90%	53,860	1.12%
2007	1,235,849	1,177,269	6.72%	58,580	4.74%	Summer	274,843	4.65%	54,338	0.89%
2008	1,218,628	1,161,175	-1.37%	57,453	4.71%	Summer	261,136	-4.99%	54,736	0.73%
2009	1,270,492	1,213,459	4.50%	57,033	4.70%	Summer	258,170	-1.14%	55,046	0.57%
2010	1,280,977	1,223,474	0.83%	57,503	4.70%	Summer	280,427	8.62%	55,475	0.78%
2011	1,296,392	1,238,197	1.20%	58,195	4.70%	Summer	283,545	1.11%	56,119	1.16%
2012	1,311,757	1,252,872	1.19%	58,885	4.70%	Summer	286,653	1.10%	56,836	1.28%
2013	1,325,097	1,265,613	1.02%	59,484	4.70%	Summer	289,250	0.91%	57,565	1.28%

Notes:
(1) Includes energy for own use. Projected energy sold calculated from the 2009 LF for Extreme Weather purchases and the projected energy loss percentage.
(2) Projected data based on 2009 LF for Extreme Weather for the Rural system only and historical data provided by Kenergy.
(3) Average number of customers for projected CWP period was based on LF projections for Total System Requirements.

1.6 Substation Load Data

Kenergy purchases power from the BREC at forty-nine 69 kV delivery points. Table 1-5 summarizes the existing Kenergy substations, configuration, voltage, and capacity. A comparison of the existing winter and summer peak load and power factor to the substation capacity is given in Table 1-5 and Table 1-7, respectively. The substations are listed in Tables 1-10 and 1-11 with the calculated capacity and existing and projected substation peak demands.

The total installed substation transformer capacity for the Kenergy rural system is approximately 660.4 MVA in the winter and 507.9 MVA in the summer based on the current configuration and location of the transformers. The winter transformer capacity is 217% greater than the 2009 winter non-coincident system peak of 304.3 MW. The summer transformer capacity is 183% greater than the 2009 summer non-coincident system peak of 277.5 MW. During the existing summer peak, the South Dermont #1 and Tyson Substation transformers exceeded 100% of the base nameplate capacity.

Table 1-5
Substation Voltages and Capacities

Substation Transformer	Voltage (kV)	Summer Capacity (MVA)	Winter Capacity [(1)] (MVA)	Trans. Config. Qty.-Phase-Rating (MVA)
Adams Lane	69-12.47	10.0	13.0	(1) 3ø 10.0/13.3/16.6//18.7
Beda	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Beech Grove	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Bon Harbor	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Caldwell Springs	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Centertown	69-12.47	5.0	6.5	(3) 1ø1.67
Crossroads	69-24.9	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Dermont	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Dixon	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
East Owensboro	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Geneva	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Guffie	69-12.47	7.5	9.8	(1) 3ø 7.5
Hanson	69-12.47	3.8	4.9	(3) 1ø 1.25
Hawesville	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Horse Fork	69-12.47	15.0	19.5	(1) 3ø 15/20/25
Hudson	69-24.9	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Lewisport #1	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Lewisport #2	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Little Dixie	69-12.47	7.5	9.8	(6) 1ø 1.25
Lyon County	69-12.47	7.5	9.8	(1) 3ø 7.5
Maceo	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4

Substation Transformer	Voltage (kV)	Summer Capacity (MVA)	Winter Capacity (1) (MVA)	Trans. Config. Qty.-Phase-Rating (MVA)
Madisonville	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Marion	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Masonville	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Morganfield	69-24.9	10.0	13.0	(1) 3ø 10.0/13.3/16.6//18.7
Niagara	69-12.47	10.0	13.0	(1) 3ø 10.0/13.3/16.6//18.7
Nuckols	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Onton	69-12.47	5.0	6.5	(1) 3ø 5.0
Philpot #1	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Philpot #2	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Pleasant Ridge	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Providence	69-24.9	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Race Creek	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Riverport	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Sacramento	69-12.47	3.8	4.9	(3) 1ø 1.25
Saint Joseph	69-12.47	5.0	6.5	(3) 1ø 1.67
Sebree	69-12.47	5.0	6.5	(1) 3ø 5.0/6.3/7.0
South Dermont #1	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
South Dermont #2	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
South Hanson #1	69-12.47	10.0	13.0	(1) 3ø 10.0/13.3/16.6//18.7
South Hanson #2	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
South Owensboro #1	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
South Owensboro #2	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Stanley	69-12.47	5.0	6.5	(1) 3ø 5.0
Sullivan	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Thruston #1	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Thruston #2	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Tyson	69-24.9	10.0	13.0	(1) 3ø 10.0/13.3/16.6//18.7
Utica	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Weaverton	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Weberstown	69-12.47	7.5	9.8	(1) 3ø 7.5/8.4
West Owensboro	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Whitesville	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Wolf Hills	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4
Yager	69-12.47	1.5	2.0	(3) 1ø 0.50
Zion	69-12.47	10.0	13.0	(1) 3ø 10.0/12.5/14.4

Notes:
(1) Based on 130% of base nameplate rating of the substation transformer.

Table 1-6
2009 Winter Substation Demands

Substation Transformer	Winter Capacity (1) (MVA)	Non-Coincident Peak(2) (MW)	Power Factor @ Peak (2)	Percent Loaded (3)
Adams Lane	13.0	5.57	97%	44%
Beda	13.0	8.16	99%	63%
Beech Grove	13.0	4.51	99%	35%
Bon Harbor	13.0	5.51	99%	43%
Caldwell Springs	13.0	2.42	99%	19%
Centertown	6.5	2.98	99%	46%
Crossroads	13.0	6.94	100%	53%
Dermont	13.0	5.22	98%	41%
Dixon	13.0	5.28	100%	41%
East Owensboro	13.0	4.28	98%	34%
Geneva	13.0	8.01	98%	63%
Guffie	9.8	7.40	99%	76%
Hanson	4.9	3.72	100%	76%
Hawesville	13.0	7.26	99%	56%
Horse Fork	19.5	8.37	96%	45%
Hudson	13.0	6.05	93%	50%
Lewisport #1	13.0	5.18	98%	41%
Lewisport #2	13.0	2.60	97%	21%
Little Dixie	9.8	3.67	100%	37%
Lyon County	9.8	5.50	100%	56%
Maceo	13.0	3.65	99%	28%
Madisonville	13.0	5.11	97%	41%
Marion	13.0	7.61	100%	59%
Masonville	13.0	2.79	99%	22%
Morganfield	13.0	8.77	100%	67%
Niagara	13.0	8.06	100%	62%
Nuckols	13.0	5.68	99%	44%
Onton	6.5	6.32	99%	98%
Philpot #1	13.0	4.60	99%	36%
Philpot #2	13.0	3.36	99%	26%
Pleasant Ridge	13.0	5.77	100%	44%
Providence	13.0	5.60	99%	44%
Race Creek	13.0	6.16	100%	47%
Riverport	13.0	3.96	84%	36%
Sacramento	4.9	3.75	98%	78%
Saint Joseph	6.5	3.93	98%	62%
Sebree	6.5	5.01	99%	78%

Substation Transformer	Winter Capacity (1) (MVA)	Non-Coincident Peak(2) (MW)	Power Factor @ Peak (2)	Percent Loaded (3)
South Dermont #1	13.0	5.12	99%	40%
South Dermont #2	13.0	3.78	96%	30%
South Hanson #1	13.0	8.18	96%	66%
South Hanson #2	13.0	8.76	99%	68%
South Owensboro #1	13.0	4.58	98%	36%
South Owensboro #2	13.0	4.59	99%	36%
Stanley	6.5	4.76	95%	77%
Sullivan	13.0	3.89	100%	30%
Thruston #1	13.0	4.69	99%	36%
Thruston #2	13.0	3.46	99%	27%
Tyson	13.0	7.09	95%	57%
Utica	13.0	7.12	99%	55%
Weaverton	13.0	5.35	99%	42%
Weberstown	9.8	7.85	99%	81%
West Owensboro	13.0	6.63	96%	53%
Whitesville	13.0	7.84	95%	63%
Wolf Hills	13.0	2.98	99%	23%
Yager	2.0	0.12	95%	6%
Zion	13.0	9.01	100%	69%

Notes:
(1)Based on 130% of base nameplate rating of the substation transformer.
(2)Peak demand and power factor based on historical metered data provided by Kenergy Corp and the existing system load allocation in engineering model.
(3)Loading percentage stated as non-coincident peak (MVA) compared to the calculated capacity of the substation transformer.

Table 1-7
2009 Summer Substation Demands

Substation	Summer Capacity (1) (MVA)	Non-Coincident Peak (2) (MW)	Power Factor @ Peak (2)	Percent Loaded (3)
Adams Lane	10.0	4.81	90%	53%
Beda	10.0	7.13	93%	77%
Beech Grove	10.0	4.13	92%	45%
Bon Harbor	10.0	6.89	92%	75%
Caldwell Springs	10.0	2.13	93%	23%
Centertown	5.0	1.79	94%	38%
Crossroads	10.0	4.94	98%	50%
Dermont	10.0	6.77	92%	74%
Dixon	10.0	3.75	95%	39%

Substation	Summer Capacity (1) (MVA)	Non-Coincident Peak (2) (MW)	Power Factor @ Peak (2)	Percent Loaded (3)
East Owensboro	10.0	4.72	94%	50%
Geneva	10.0	5.44	93%	58%
Guffie	7.5	6.05	92%	88%
Hanson	3.8	2.35	97%	64%
Hawesville	10.0	6.94	92%	75%
Horse Fork	15.0	12.18	91%	89%
Hudson	10.0	6.59	91%	72%
Lewisport #1	10.0	5.86	90%	65%
Lewisport #2	10.0	2.73	90%	30%
Little Dixie	7.5	3.04	94%	43%
Lyon County	7.5	5.01	95%	70%
Maceo	10.0	3.21	94%	34%
Madisonville	10.0	3.64	92%	40%
Marion	10.0	5.72	95%	60%
Masonville	10.0	4.20	95%	44%
Morganfield	10.0	8.16	95%	86%
Niagara	10.0	5.86	96%	61%
Nuckols	10.0	4.75	93%	51%
Onton	5.0	4.40	92%	96%
Philpot #1	10.0	5.57	92%	61%
Philpot #2	10.0	3.36	92%	37%
Pleasant Ridge	10.0	4.47	94%	48%
Providence	10.0	3.63	94%	39%
Race Creek	10.0	5.62	94%	60%
Riverport	10.0	3.68	79%	47%
Sacramento	3.8	2.88	93%	81%
Saint Joseph	5.0	4.04	94%	86%
Sebree	5.0	4.24	90%	94%
South Dermont #1	10.0	10.20	93%	**110%**
South Dermont #2	10.0	6.48	93%	70%
South Hanson #1	10.0	3.96	94%	42%
South Hanson #2	10.0	5.69	94%	61%
South Owensboro #1	10.0	5.49	90%	61%
South Owensboro #2	10.0	5.70	90%	63%
Stanley	5.0	2.71	90%	60%
Sullivan	10.0	3.38	93%	36%
Thruston #1	10.0	4.82	92%	52%
Thruston #2	10.0	3.71	92%	40%
Tyson (4)	10.0	9.08	91%	**100%**

Substation	Summer Capacity (1) (MVA)	Non-Coincident Peak (2) (MW)	Power Factor @ Peak (2)	Percent Loaded (3)
Utica	10.0	5.61	94%	60%
Weaverton	10.0	4.70	95%	49%
Weberstown	7.5	5.28	93%	76%
West Owensboro	10.0	7.08	93%	76%
Whitesville	10.0	6.83	91%	75%
Wolf Hills	10.0	2.98	93%	32%
Yager	1.5	0.12	71%	11%
Zion	10.0	6.99	95%	74%

Notes:
(1)Based on 100% of base nameplate rating of the substation transformer.
(2)Peak demand and power factor based on historical metered data provided by Kenergy Corp and the existing system load allocation in engineering model.
(3)Loading percentage stated as non-coincident peak (MVA) compared to the calculated capacity of the substationf transformer.
(4)Loading acceptable: Tyson is only customer on transformer and top nameplate at 65°C is 18.7 MVA. No reserve capacity required.

1.7 Circuit Loads

The distribution system is served through (15) 24.9/14.4 kV substation breakers at Crossroads, Hudson, Morganfield, Tyson, and Providence and (173) 12.47/7.2 kV substation breakers at the remaining substations. The breaker continuous current rating and the conductor capacity of the backbone conductor on the feeder are compared to the peak feeder loads in Tables 1-8 and 1-9. Based on the existing peak loads from the distribution system model, none of the substation breaker exceeded the rated capacity and none of the backbone conductors exceeded the rated capacity.

Table 1-8
Summer Breaker and Feeder Loading at 2009 Peak

Substation /Feeder	2009 Load(1) (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor(1)	Percent Conductor Loading(1)
Adams Lane					
106-1	49	800	6.1%	3/0 ACSR	18%
106-2	103	800	12.9%	3/0 ACSR	37%
106-3	85	800	10.6%	3/0 ACSR	31%
Beda					
41-1	95	560	17.0%	336 ACSR	21%
41-2	55	560	9.8%	336 ACSR	12%
41-3	51	560	9.1%	1/0 STR CU	19%
41-4	139	560	24.8%	3/0 AL 15KV	48%

Substation /Feeder	2009 Load[1] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor[1]	Percent Conductor Loading[1]
Beech Grove					
33-1	48	560	8.6%	3/0 ACSR	17%
33-2	38	560	6.8%	336 ACSR	8%
33-3	50	560	8.9%	3/0 ACSR	18%
33-4	60	560	10.7%	3/0 ACSR	22%
Bon Harbor					
27-1	78	560	13.9%	336 ACSR	17%
27-2	94	560	16.8%	336 ACSR	21%
27-3	16	560	2.9%	336 ACSR	4%
27-4	77	560	13.8%	336 ACSR	17%
27-5	64	560	11.4%	336 ACSR	14%
Caldwell Springs					
60-1	11	560	2.0%	1/0 ACSR	5%
60-2	56	560	10.0%	1/0 ACSR	27%
60-3	35	560	6.3%	336 ACSR	8%
Centertown					
40-1	21	560	3.8%	1/0 ACSR	10%
40-2	22	560	3.9%	1/0 ACSR	10%
40-3	42	560	7.5%	1/0 ACSR	20%
40-4	0	560	0.0%	1/0 ACSR	0%
Crossroads					
61-1	32	560	5.7%	336 ACSR	8%
61-2	13	560	2.3%	336 ACSR	4%
61-3	59	560	10.5%	336 ACSR	14%
61-4	9	560	1.6%	336 ACSR	3%
Dermont					
17-1	172	560	30.7%	3/0 ACSR	63%
17-2	21	560	3.8%	3/0 ACSR	8%
17-3	33	560	5.9%	336 ACSR	7%
17-4	100	560	17.9%	336 ACSR	22%
Dixon					
62-1	62	800	7.8%	3/0 ACSR	23%
62-2	58	800	7.3%	3/0 ACSR	21%
62-3	56	800	7.0%	1/0 ACSR	27%
East Owensboro					
19-2	117	800	14.6%	336 ACSR	26%
19-3	31	800	3.9%	1/0 ACSR	15%
19-4	12	800	1.5%	336 ACSR	3%
19-5	64	800	8.0%	336 ACSR	14%

Substation /Feeder	2009 Load(1) (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor(1)	Percent Conductor Loading(1)
Geneva					
63-1	27	560	4.8%	1/0 ACSR	9%
63-2	130	560	23.2%	4/0 ACSR	41%
63-3	52	560	9.2%	1/0 ACSR	27%
Guffie					
31-1	124	560	22.1%	3/0 ACSR	45%
31-2	115	560	20.5%	3/0 ACSR	42%
31-3	14	560	2.5%	3/0 ACSR	5%
31-4	40	560	7.1%	3/0 ACSR	15%
Hanson					
51-3	8	560	1.4%	336 ACSR	2%
51-4	100	560	17.9%	336 ACSR	22%
Hawesville					
13-1	56	560	10.0%	3/0 ACSR	20%
13-2	88	560	15.7%	3/0 ACSR	32%
13-3	91	560	16.3%	3/0 ACSR	33%
13-4	51	560	9.1%	1/0 ACSR	25%
13-5	48	560	8.6%	3/0 ACSR	18%
Horse Fork					
20-1	115	800	14.4%	795 ACSR	15%
20-2	181	800	22.6%	795 ACSR	23%
20-3	1	800	0.1%	795 ACSR	0%
20-4	167	800	20.9%	795 ACSR	21%
20-5	133	800	16.6%	795 ACSR	17%
Hudson					
65-1	98	560	17.5%	336 ACSR	21%
65-4	64	560	11.4%	397.5 ACSR	13%
Lewisport #1					
12-1	79	560	14.1%	3/0 ACSR	29%
12-2	85	560	15.2%	2-3 STR CU	41%
12-3	27	560	4.8%	1/0 STR CU	10%
12-7	93	560	16.6%	336 ACSR	20%
Lewisport #2					
12-4	37	560	6.6%	3/0 ACSR	14%
12-5	72	560	12.9%	3/0 ACSR	26%
12-6	26	560	4.6%	336 ACSR	7%
Little Dixie					
66-1	65	800	8.1%	1/0 ACSR	31%
66-2	45	800	5.6%	336 ACSR	10%
66-3	34	800	4.3%	4/0 ACSR	11%

Substation /Feeder	2009 Load[(1)] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor[(1)]	Percent Conductor Loading[(1)]
Lyon County					
69-1	62	560	11.1%	1/0 ACSR	30%
69-2	123	560	22.0%	3/0 ACSR	45%
69-3	49	800	6.1%	3/0 ACSR	18%
Maceo					
28-1	15	800	1.9%	336 ACSR	3%
28-2	39	800	4.9%	336 ACSR	8%
28-3	32	800	4.0%	3/0 ACSR	12%
28-4	49	800	6.1%	336 ACSR	11%
28-5	18	800	2.3%	336 ACSR	4%
Marion					
70-1	69	560	12.3%	3/0 ACSR	25%
70-2	52	560	9.3%	3/0 ACSR	19%
70-3	58	560	10.3%	3/0 ACSR	26%
70-4	33	560	5.9%	4/0 ACSR	10%
Madisonville					
49-1	40	800	5.0%	336 ACSR	10%
49-2	67	800	8.4%	336 ACSR	15%
49-3	81	800	10.1%	4/0 AL 25KV	25%
Masonville					
23-1	13	560	2.3%	1/0 STR CU	5%
23-2	52	560	9.3%	1/0 STR CU	19%
23-3	125	560	22.3%	3/0 ACSR	46%
Morganfield					
71-1	74	560	13.2%	3/0 ACSR	27%
71-2	50	560	8.9%	4/0 ACSR	16%
71-3	39	560	7.0%	3/0 ACSR	14%
71-4	29	560	5.2%	3/0 ACSR	11%
Niagara					
80-1	126	560	22.5%	3/0 ACSR	46%
80-2	71	560	12.7%	3/0 ACSR	26%
80-3	75	560	13.4%	3/0 ACSR	27%
Nuckols					
42-1	1	800	0.1%	336 ACSR	0%
42-2	0	800	0.0%	336 ACSR	0%
42-3	102	800	12.8%	3/0 ACSR	37%
42-4	124	800	15.5%	3/0 ACSR	45%
Onton					
52-1	63	560	11.3%	3/0 ACSR	23%
52-2	108	560	19.3%	3/0 ACSR	40%
52-3	41	560	7.3%	3/0 ACSR	15%

Substation /Feeder	2009 Load[1] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor[1]	Percent Conductor Loading[1]
Philpot #1					
25-1	94	560	16.8%	336 ACSR	21%
25-3	58	560	10.4%	336 ACSR	13%
25-4	116	560	20.7%	336 ACSR	25%
Philpot #2					
25-5	76	800	9.5%	336 ACSR	17%
25-7	86	800	10.8%	336 ACSR	19%
Pleasant Ridge					
26-1	36	800	4.5%	3/0 ACSR	13%
26-2	101	800	12.6%	336 ACSR	23%
26-3	46	800	5.8%	336 ACSR	11%
26-4	29	800	3.6%	336 ACSR	7%
Providence					
81-1	18	800	2.3%	1/0 ACSR	8%
81-2	31	800	3.9%	4/0 ACSR	10%
81-4	37	800	4.6%	4/0 ACSR	12%
Race Creek					
82-1	68	560	12.1%	4/0 ACSR	22%
82-2	113	560	20.2%	4/0 ACSR	36%
82-3	86	560	15.4%	4/0 ACSR	27%
Riverport					
83-1	114	560	20.4%	4/0 ACSR	36%
83-2	86	560	15.4%	4/0 ACSR	27%
Sacramento					
50-1	82	560	14.6%	336 ACSR	18%
50-4	55	560	9.8%	336 ACSR	12%
50-3	48	560	8.6%	4/0 ACSR	15%
Saint Joseph					
32-1	93	560	16.6%	3/0 ACSR	34%
32-2	62	560	11.1%	3/0 ACSR	22%
32-3	35	560	6.3%	3/0 ACSR	13%
Sebree					
84-1	30	100	30.0%	4/0 ACSR	10%
84-2	42	560	7.5%	4/0 ACSR	13%
84-3	117	560	20.9%	336 ACSR	26%
84-4	21	70	30.0%	1/0 ACSR	10%
South Dermont #1					
18-1	161	560	28.8%	1/0 STR CU	56%
18-2	113	560	20.2%	3/0 ACSR	38%
18-4	213	560	38.0%	336 ACSR	46%

Substation /Feeder	2009 Load[(1)] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor[(1)]	Percent Conductor Loading[(1)]
South Dermont #2					
18-3	146	560	26.1%	1/0 STR CU	54%
18-5	42	560	7.5%	336 ACSR	9%
18-6	120	560	21.4%	336 ACSR	26%
South Hanson #1					
53-1	46	560	8.2%	336 ACSR	10%
53-4	38	560	6.8%	336 ACSR	8%
53-5	101	560	18.0%	336 ACSR	22%
South Hanson #2					
53-2	61	560	10.9%	1/0 ACSR	29%
53-3	76	560	13.6%	336 ACSR	17%
53-6	132	800	16.5%	336 ACSR	29%
South Owensboro #1					
58-3	26	560	4.6%	500 AL 15KV	6%
58-4	76	560	13.6%	500 AL 15KV	16%
58-6	107	560	19.1%	500 AL 15KV	23%
58-7	13	800	1.6%	336 ACSR	3%
South Owensboro #2					
58-1	111	560	19.8%	500 AL 15KV	24%
58-2	58	560	10.4%	4/0 AL 15KV	18%
58-5	99	560	17.7%	336 ACSR	21%
Stanley					
21-1	93	560	16.6%	3/0 ACSR	34%
21-2	15	560	2.7%	3/0 ACSR	5%
21-3	26	560	4.6%	3/0 ACSR	9%
Sullivan					
85-1	34	560	6.1%	3/0 ACSR	12%
85-2	79	560	14.1%	3/0 ACSR	29%
85-3	49	560	8.8%	3/0 ACSR	18%
Thruston #1					
11-1	32	560	5.7%	336 ACSR	7%
11-2	118	560	21.1%	3/0 ACSR	43%
11-3	84	560	15.0%	3/0 ACSR	30%
Thruston #2					
11-4	13	560	2.3%	336 ACSR	3%
11-5	166	560	29.6%	336 ACSR	36%
Tyson					
65-6	48	560	8.6%	397.5 ACSR	10%
65-7	175	560	31.3%	336 ACSR	36%

Substation /Feeder	2009 Load[(1)] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor[(1)]	Percent Conductor Loading[(1)]
Utica					
24-1	76	560	13.6%	336 ACSR	17%
24-2	83	560	14.8%	3/0 ACSR	31%
24-3	61	560	10.9%	1/0 STR CU	23%
24-4	46	560	8.2%	336 ACSR	10%
24-5	1	560	0.2%	1/0 ACSR	0%
Weaverton					
64-1	9	560	1.6%	3/0 ACSR	3%
64-2	166	560	29.6%	3/0 ACSR	60%
64-3	48	560	8.6%	3/0 ACSR	18%
Weberstown					
14-1	101	800	12.6%	336 ACSR	22%
14-2	69	560	12.3%	336 ACSR	15%
14-3	84	800	10.5%	3/0 ACSR	31%
West Owensboro					
22-1	17	560	3.0%	1/0 STR CU	6%
22-2	40	560	7.1%	1/0 STR CU	15%
22-3	136	560	24.3%	1/0 STR CU	51%
22-4	38	560	6.8%	4A	24%
22-5	109	560	19.5%	1/0 STR CU	41%
Whitesville					
15-1	42	560	7.5%	266 ACSR	11%
15-2	141	560	25.2%	336 ACSR	31%
15-3	97	560	17.3%	336 ACSR	21%
15-4	54	560	9.6%	336 ACSR	12%
Wolf Hills					
91-1	11	800	1.4%	1/0 AL 25KV	5%
91-3	81	800	10.1%	336 ACSR	18%
91-4	55	800	6.9%	1/0 ACSR	27%
Yager					
99-1	6	None	N/A	2 ACSR	4%
Zion					
90-1	39	560	7.0%	1/0 ACSR	19%
90-2	101	560	18.0%	336 ACSR	22%
90-3	128	560	22.9%	397.5 ACSR	25%
90-4	59	560	10.5%	3/0 ACSR	21%

Notes:
(1) Based on meter data from Kenergy and values from the existing engineering model.

Table 1-9
Winter Breaker and Feeder Loading at 2009 Peak

Substation /Feeder	2009 Load(1) (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor (1)	Percent Conductor Loading(1)
Adams Lane					
106-1	45	800	5.6%	3/0 ACSR	10%
106-2	144	800	18.0%	3/0 ACSR	32%
106-3	69	800	8.6%	3/0 ACSR	16%
Beda					
41-1	120	560	21.4%	336 ACSR	16%
41-2	76	560	13.6%	336 ACSR	10%
41-3	60	560	10.7%	1/0 STR CU	14%
41-4	110	560	19.6%	3/0 ALUG	38%
Beech Grove					
33-1	44	560	7.9%	3/0 ACSR	10%
33-2	39	560	7.0%	336 ACSR	5%
33-3	53	560	9.5%	3/0 ACSR	12%
33-4	61	560	10.9%	3/0 ACSR	14%
Bon Harbor					
27-1	36	560	6.4%	336 ACSR	5%
27-2	62	560	11.1%	336 ACSR	8%
27-3	9	560	1.6%	336 ACSR	2%
27-4	86	560	15.4%	336 ACSR	12%
27-5	55	560	9.8%	336 ACSR	7%
Caldwell Springs					
60-1	11	560	2.0%	1/0 ACSR	3%
60-2	61	560	10.9%	1/0 ACSR	18%
60-3	37	560	6.6%	336 ACSR	8%
Centertown					
40-1	22	560	3.9%	1/0 ACSR	6%
40-2	27	560	4.8%	1/0 ACSR	8%
40-3	81	560	14.5%	1/0 ACSR	24%
40-4	4	560	0.7%	1/0 ACSR	1%
Crossroads					
61-1	48	560	8.6%	336 ACSR	10%
61-2	18	560	3.2%	336 ACSR	4%
61-3	75	560	13.4%	336 ACSR	16%
61-4	14	560	2.5%	336 ACSR	3%
Dermont					
17-1	149	560	26.6%	3/0 ACSR	34%
17-2	15	560	2.7%	3/0 ACSR	3%

Substation /Feeder	2009 Load[(1)] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor [(1)]	Percent Conductor Loading[(1)]
17-3	16	560	2.9%	336 ACSR	2%
17-4	56	560	10.0%	336 ACSR	8%
Dixon					
62-1	90	800	11.3%	3/0 ACSR	20%
62-2	76	800	9.5%	3/0 ACSR	17%
62-3	70	800	8.8%	1/0 ACSR	21%
East Owensboro					
19-2	87	800	10.9%	336 ACSR	12%
19-3	20	800	2.5%	1/0 ACSR	6%
19-4	40	800	5.0%	336 ACSR	5%
19-5	47	800	5.9%	336 ACSR	6%
Geneva					
63-1	31	560	5.5%	1/0 ACSR	9%
63-2	138	560	24.6%	4/0 ACSR	27%
63-3	97	560	17.3%	1/0 ACSR	31%
Guffie					
31-1	153	560	27.3%	3/0 ACSR	34%
31-2	144	560	25.7%	3/0 ACSR	32%
31-3	11	560	2.0%	3/0 ACSR	3%
31-4	26	560	4.6%	3/0 ACSR	6%
Hanson					
51-3	17	560	3.0%	336 ACSR	2%
51-4	149	560	26.6%	336 ACSR	20%
Hawesville					
13-1	24	560	4.3%	3/0 ACSR	5%
13-2	73	560	13.0%	3/0 ACSR	16%
13-3	117	560	20.9%	3/0 ACSR	26%
13-4	73	560	13.0%	1/0 ACSR	22%
13-5	39	560	7.0%	3/0 ACSR	9%
Horse Fork					
20-1	50	800	6.3%	795 ACSR	4%
20-2	128	800	16.0%	795 ACSR	10%
20-3	2	800	0.3%	795 ACSR	0%
20-4	119	800	14.9%	795 ACSR	9%
20-5	90	800	11.3%	795 ACSR	7%
Hudson					
65-1	85	560	15.2%	336 ACSR	12%
65-4	60	560	10.7%	397.5 ACSR	7%
Lewisport #1					
12-1	57	560	10.2%	3/0 ACSR	13%
12-2	54	560	9.6%	2-3 STR CU	16%

Substation /Feeder	2009 Load[1] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor [1]	Percent Conductor Loading[1]
12-3	16	560	2.9%	1/0 STR CU	4%
12-7	106	560	18.9%	336 ACSR	14%
Lewisport #2					
12-4	30	560	5.4%	3/0 ACSR	7%
12-5	71	560	12.7%	3/0 ACSR	16%
12-6	31	560	5.5%	336 ACSR	4%
Little Dixie					
66-1	67	800	8.4%	1/0 ACSR	20%
66-2	57	800	7.1%	336 ACSR	8%
66-3	40	800	5.0%	4/0 ACSR	8%
Lyon County					
69-1	55	560	9.8%	1/0 ACSR	16%
69-2	115	560	20.5%	3/0 ACSR	26%
69-3	76	800	9.5%	3/0 ACSR	17%
Maceo					
28-1	22	800	2.8%	336 ACSR	3%
28-2	29	800	3.6%	336 ACSR	4%
28-3	49	800	6.1%	3/0 ACSR	11%
28-4	43	800	5.4%	336 ACSR	6%
28-5	21	800	2.6%	336 ACSR	3%
Marion					
70-1	93	560	16.6%	3/0 ACSR	21%
70-2	66	560	11.8%	3/0 ACSR	15%
70-3	70	560	12.5%	3/0 ACSR	19%
70-4	40	560	7.1%	4/0 ACSR	8%
Madisonville					
49-1	84	800	10.5%	336 ACSR	11%
49-2	106	800	13.3%	336 ACSR	14%
49-3	0	800	0.0%	4/0 ALUG	0%
Masonville					
23-1	11	560	2.0%	1/0 STR CU	3%
23-2	27	560	4.8%	1/0 STR CU	6%
23-3	82	560	14.6%	3/0 ACSR	18%
Morganfield					
71-1	43	560	7.7%	3/0 ACSR	10%
71-2	69	560	12.3%	4/0 ACSR	14%
71-3	50	560	8.9%	3/0 ACSR	11%
71-4	34	560	6.1%	3/0 ACSR	8%
Niagara					
80-1	174	560	31.1%	3/0 ACSR	39%
80-2	102	560	18.2%	3/0 ACSR	23%

Substation /Feeder	2009 Load[1] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor [1]	Percent Conductor Loading[1]
80-3	83	560	14.8%	3/0 ACSR	19%
Nuckols					
42-1	2	800	0.3%	336 ACSR	0%
42-2	0	800	0.0%	336 ACSR	0%
42-3	117	800	14.6%	3/0 ACSR	26%
42-4	138	800	17.3%	3/0 ACSR	31%
Onton					
52-1	104	560	18.6%	3/0 ACSR	23%
52-2	123	560	22.0%	3/0 ACSR	28%
52-3	58	560	10.4%	3/0 ACSR	13%
Philpot #1					
25-1	84	560	15.0%	336 ACSR	11%
25-3	42	560	7.5%	336 ACSR	6%
25-4	81	560	14.5%	336 ACSR	11%
Philpot #2					
25-5	76	800	9.5%	336 ACSR	10%
25-7	76	800	9.5%	336 ACSR	10%
Pleasant Ridge					
26-1	59	800	7.4%	3/0 ACSR	13%
26-2	105	800	13.1%	336 ACSR	14%
26-3	53	800	6.6%	336 ACSR	7%
26-4	32	800	4.0%	336 ACSR	4%
Providence					
81-1	27	800	3.4%	1/0 ACSR	8%
81-2	52	800	6.5%	4/0 ACSR	10%
81-4	46	800	5.8%	4/0 ACSR	9%
Race Creek					
82-1	83	560	14.8%	4/0 ACSR	16%
82-2	119	560	21.3%	4/0 ACSR	23%
82-3	74	560	13.2%	4/0 ACSR	14%
Riverport					
83-1	111	560	19.8%	4/0 ACSR	22%
83-2	99	560	17.7%	4/0 ACSR	19%
Sacramento					
50-1	111	560	19.8%	336 ACSR	15%
50-4	57	560	10.2%	336 ACSR	8%
50-3	0	560	0.0%	4/0 ACSR	0%
Saint Joseph					
32-1	82	560	14.6%	3/0 ACSR	19%
32-2	52	560	9.3%	3/0 ACSR	12%
32-3	43	560	7.7%	3/0 ACSR	10%

Substation /Feeder	2009 Load[1] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor [1]	Percent Conductor Loading[1]
Sebree					
84-1	36	100	36.0%	4/0 ACSR	7%
84-2	50	560	8.9%	4/0 ACSR	10%
84-3	116	560	20.7%	336 ACSR	16%
84-4	25	70	35.7%	1/0 ACSR	7%
South Dermont #1					
18-1	81	560	14.5%	1/0 STR CU	19%
18-2	53	560	9.5%	3/0 ACSR	12%
18-4	98	560	17.5%	336 ACSR	13%
South Dermont #2					
18-3	24	560	4.3%	1/0 STR CU	6%
18-5	65	560	11.6%	336 ACSR	9%
18-6	82	560	14.6%	336 ACSR	11%
South Hanson #1					
53-1	109	560	19.5%	336 ACSR	15%
53-4	70	560	12.5%	336 ACSR	9%
53-5	186	560	33.2%	336 ACSR	25%
South Hanson #2					
53-2	89	560	15.9%	1/0 ACSR	26%
53-3	98	560	17.5%	336 ACSR	13%
53-6	206	800	25.8%	336 ACSR	28%
South Owensboro #1					
58-3	25	560	4.5%	500 ALUG	5%
58-4	47	560	8.4%	500 ALUG	10%
58-6	85	560	15.2%	500 ALUG	18%
58-7	20	800	2.5%	336 ACSR	3%
South Owensboro #2					
58-1	81	560	14.5%	500 ALUG	17%
58-2	62	560	11.1%	4/0 ALUG	19%
58-5	55	560	9.8%	336 ACSR	7%
Stanley					
21-1	103	560	18.4%	3/0 ACSR	23%
21-2	18	560	3.2%	3/0 ACSR	4%
21-3	31	560	5.5%	3/0 ACSR	7%
Sullivan					
85-1	35	560	6.3%	3/0 ACSR	8%
85-2	74	560	13.2%	3/0 ACSR	17%
85-3	56	560	10.0%	3/0 ACSR	12%
Thruston #1					
11-1	32	560	5.7%	336 ACSR	4%
11-2	117	560	20.9%	3/0 ACSR	26%

Substation /Feeder	2009 Load[1] (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor [1]	Percent Conductor Loading[1]
11-3	61	560	10.9%	3/0 ACSR	14%
Thruston #2					
11-4	9	560	1.6%	336 ACSR	1%
11-5	146	560	26.1%	336 ACSR	20%
Tyson					
65-6	56	560	10.0%	397.5 ACSR	7%
65-7	109	560	19.5%	336 ACSR	15%
Utica					
24-1	79	560	14.1%	336 ACSR	11%
24-2	124	560	22.1%	3/0 ACSR	28%
24-3	73	560	13.0%	1/0 STR CU	17%
24-4	41	560	7.3%	336 ACSR	6%
24-5	1	560	0.2%	1/0 ACSR	0%
Weaverton					
64-1	13	560	2.3%	3/0 ACSR	3%
64-2	192	560	34.3%	3/0 ACSR	43%
64-3	36	560	6.4%	3/0 ACSR	8%
Weberstown					
14-1	148	800	18.5%	336 ACSR	20%
14-2	99	560	17.7%	336 ACSR	13%
14-3	106	800	13.3%	3/0 ACSR	24%
West Owensboro					
22-1	4	560	0.7%	1/0 STR CU	1%
22-2	26	560	4.6%	1/0 STR CU	6%
22-3	108	560	19.3%	1/0 STR CU	25%
22-4	42	560	7.5%	4A	17%
22-5	83	560	14.8%	1/0 STR CU	19%
Whitesville					
15-1	58	560	10.4%	266 ACSR	9%
15-2	99	560	17.7%	336 ACSR	13%
15-3	139	560	24.8%	336 ACSR	19%
15-4	71	560	12.7%	336 ACSR	10%
Wolf Hills					
91-1	9	800	1.1%	1/0 ALUG	4%
91-3	66	800	8.3%	336 ACSR	9%
91-4	61	800	7.6%	1/0 ACSR	18%
Yager					
99-1	4	None	N/A	2 ACSR	2%
Zion					
90-1	61	560	10.9%	1/0 ACSR	18%
90-2	137	560	24.5%	336 ACSR	18%

Substation /Feeder	2009 Load(1) (Amps)	Breaker Rating (Amps)	Percent Breaker Loading	Backbone Conductor (1)	Percent Conductor Loading(1)
90-3	163	560	29.1%	397 ACSR	20%
90-4	41	560	7.3%	3/0 ACSR	9%

Notes:
(1) Based on meter data from Kenergy and values from the existing engineering model.

A review of Table 1-10 and Table 1-11 provides an overview of the existing transformer capacity compared to the existing peak and the projected CWP design load in 2012-2013. South Dermont #1, Onton, Sebree, and Tyson substation transformers are loaded over 100% in the 2012 summer peak projection.

Table 1-10
Summer 2012 Substation Transformer Capacity and Loading

Substation Transformer	Summer Capacity (MVA)(1)	Peak Load (MW) 2009 Actual(2)	Peak Load (MW) Projected 2012 (3)	Power Factor @Peak	Percent Loaded(4)
Adams Lane	10.0	4.8	5.1	90%	57%
Beda	10.0	7.1	7.8	93%	84%
Beech Grove	10.0	4.2	4.4	93%	47%
Bon Harbor	10.0	6.9	8.3	93%	89%
Caldwell Springs	10.0	2.1	2.1	93%	23%
Centertown	5.0	1.8	2.1	94%	44%
Crossroads	10.0	4.9	5.2	98%	54%
Dermont	10.0	6.8	7.6	92%	82%
Dixon	10.0	3.7	3.9	95%	42%
East Owensboro	10.0	4.7	5.3	94%	56%
Geneva	10.0	5.4	6.0	93%	64%
Guffie	7.5	6.0	6.4	92%	93%
Hanson	3.8	2.4	2.6	97%	70%
Hawesville	10.0	6.9	7.7	92%	83%
Horse Fork	15.0	12.2	13.1	91%	96%
Hudson	10.0	6.6	6.7	91%	74%
Lewisport #1	10.0	5.9	6.4	90%	71%
Lewisport #2	10.0	2.7	2.8	90%	31%
Little Dixie	7.5	3.0	3.0	94%	43%
Lyon County	7.5	5.0	5.6	95%	78%
Maceo	10.0	3.2	3.6	94%	38%
Madisonville	10.0	3.6	3.9	92%	42%
Marion	10.0	5.7	6.1	95%	64%

Substation Transformer	Summer Capacity (MVA)(1)	Peak Load (MW)		Power Factor @Peak	Percent Loaded(4)
		2009 Actual(2)	Projected 2012 (3)		
Masonville	10.0	4.2	4.8	95%	50%
Morganfield	10.0	8.2	8.6	95%	90%
Niagara	10.0	5.9	6.4	96%	66%
Nuckols	10.0	4.8	5.0	93%	53%
Onton	5.0	4.4	4.6	92%	**100%**
Philpot #1	10.0	5.6	6.0	92%	65%
Philpot #2	10.0	3.4	3.8	92%	41%
Pleasant Ridge	10.0	4.5	4.7	94%	50%
Providence	10.0	3.6	3.8	94%	41%
Race Creek	10.0	5.6	6.2	94%	67%
Riverport	10.0	3.7	3.7	79%	47%
Sacramento	3.8	2.9	3.0	93%	86%
Saint Joseph	5.0	4.0	4.5	94%	95%
Sebree	5.0	4.2	4.7	90%	**105%**
South Dermont #1	10.0	10.2	11.9	93%	**127%**
South Dermont #2	10.0	6.5	7.8	93%	83%
South Hanson #1	10.0	4.0	4.4	94%	47%
South Hanson #2	10.0	5.7	6.3	94%	67%
South Owensboro #1	10.0	5.5	5.6	90%	62%
South Owensboro #2	10.0	5.7	6.4	90%	70%
Stanley	5.0	2.7	2.9	90%	64%
Sullivan	10.0	3.4	3.7	93%	40%
Thruston #1	10.0	4.8	5.3	92%	58%
Thruston #2	10.0	3.7	4.0	92%	43%
Tyson (5)	10.0	9.1	9.1	91%	**100%**
Utica	10.0	5.6	6.2	94%	67%
Weaverton	10.0	4.7	5.2	95%	55%
Weberstown	8.4	5.3	5.6	93%	72%
West Owensboro	10.0	7.1	8.2	93%	88%
Whitesville	10.0	6.8	7.2	91%	79%
Wolf Hills	10.0	3.0	3.4	93%	36%
Yager	1.5	0.1	0.1	71%	11%
Zion	10.0	7.0	7.8	95%	82%

Notes:
(1) Transformer base nameplate rating of the substation transformer.
(2) Based on existing system load allocation in engineering model.
(3) Based on the load allocation in engineering model of the 2009 system peak.
(4) Based on the projected CWP load and the rated transformer capacity.
(5) Loading acceptable: Tyson is only customer on transformer and top nameplate at 65°C is 18.7 MVA. No reserve capacity required.

Table 1-11
Winter 2012-2013 Substation Transformer Capacity and Loading

Substation Transformer	Winter Capacity (MVA)(1)	Peak Load (MW) 2009 Actual(2)	Peak Load (MW) Projected 2012-2013(3)	Power Factor @Peak	Percent Loaded(4)
Adams Lane	13.0	5.6	5.7	97%	45%
Beda	13.0	8.2	8.4	99%	65%
Beech Grove	13.0	4.5	4.6	99%	36%
Bon Harbor	13.0	5.5	6.1	99%	47%
Caldwell Springs	13.0	2.4	2.4	99%	19%
Centertown	6.5	3.0	3.1	99%	48%
Crossroads	13.0	6.9	7.1	100%	55%
Dermont	13.0	5.2	5.4	98%	42%
Dixon	13.0	5.3	5.4	100%	42%
East Owensboro	13.0	4.3	4.5	98%	35%
Geneva	13.0	8.0	8.4	98%	66%
Guffie	9.8	7.4	7.5	99%	77%
Hanson	4.9	3.7	3.8	100%	78%
Hawesville	13.0	7.3	7.5	99%	58%
Horse Fork	19.5	8.4	8.7	96%	46%
Hudson	13.0	6.1	6.1	93%	50%
Lewisport #1	13.0	5.2	5.3	98%	42%
Lewisport #2	13.0	2.6	2.6	97%	21%
Little Dixie	9.8	3.7	3.7	100%	38%
Lyon County	9.8	5.5	5.7	100%	58%
Maceo	13.0	3.7	3.8	99%	30%
Madisonville	13.0	5.1	5.2	97%	41%
Marion	13.0	7.6	7.7	100%	59%
Masonville	13.0	2.8	3.0	99%	23%
Morganfield	13.0	8.8	8.9	100%	68%
Niagara	13.0	8.1	8.3	100%	64%
Nuckols	13.0	5.7	5.8	99%	45%
Onton	6.5	6.3	6.4	99%	99%
Philpot #1	13.0	4.6	4.7	99%	37%
Philpot #2	13.0	3.4	3.5	99%	27%
Pleasant Ridge	13.0	5.8	5.9	100%	45%
Providence	13.0	5.6	5.7	99%	44%
Race Creek	13.0	6.2	6.4	100%	49%
Riverport	13.0	4.0	4.0	84%	37%
Sacramento	4.9	3.7	3.8	99%	78%
Saint Joseph	6.5	3.9	4.0	99%	62%

Substation Transformer	Winter Capacity (MVA)(1)	Peak Load (MW)		Power Factor @Peak	Percent Loaded(4)
		2009 Actual(2)	Projected 2012-2013(3)		
Sebree	6.5	5.0	5.2	98%	82%
South Dermont #1	13.0	5.1	5.8	98%	46%
South Dermont #2	13.0	3.8	4.6	98%	36%
South Hanson #1	13.0	8.2	8.4	99%	65%
South Hanson #2	13.0	8.8	9.0	99%	70%
South Owensboro #1	13.0	4.6	4.6	96%	37%
South Owensboro #2	13.0	4.6	5.0	96%	40%
Stanley	6.5	3.2	3.3	95%	53%
Sullivan	13.0	3.9	4.0	100%	31%
Thruston #1	13.0	4.7	4.8	99%	37%
Thruston #2	13.0	3.5	3.5	99%	27%
Tyson	13.0	7.1	7.1	95%	57%
Utica	13.0	7.1	7.3	99%	57%
Weaverton	13.0	5.4	5.5	99%	43%
Weberstown	9.8	7.9	8.0	99%	82%
West Owensboro	13.0	5.8	6.3	96%	50%
Whitesville	13.0	7.8	8.0	95%	65%
Wolf Hills	13.0	3.0	3.1	99%	24%
Yager	2.0	0.1	0.1	95%	5%
Zion	13.0	9.0	9.3	100%	72%

Notes:
(1) Based on 130% of base nameplate rating of the substation transformer.
(2) Based on existing system load allocation in engineering model.
(3) Based on the load allocation in engineering model of the 2009 system peak.
(4) Based on the projected CWP load and the rated transformer capacity.

A review of Table 1-12 provides an overview of the existing transformer capacity compared to the projected CWP design load in summer 2012 or winter 2012-2013 before and after recommended load transfers. With the recommended transfers, the loading on South Dermont #1, Onton, and Sebree substations has been relieved. The existing transformer capacity above the base rating will be utilized to serve the projected load at Tyson.

Table 1-12
Projected Substation Transformer Loading With Load Transfers

Substation Transformer	Summer Capacity(1) (MVA)	Winter Capacity (2) (MVA)	Summer Or Winter	Projected 2012-2013 Peak Load (MW)		Power Factor @ Peak(3)	Percent Loaded(5)
				Before Switching(3)	After Switching(4)		
Adams Lane	10.0	13	Winter	5.69	5.69	97%	45%
Beda	10.0	13	Winter	8.39	8.39	99%	65%

Substation Transformer	Summer Capacity[1] (MVA)	Winter Capacity [2] (MVA)	Summer Or Winter	Projected 2012-2013 Peak Load (MW)		Power Factor @ Peak[3]	Percent Loaded[5]
				Before Switching[3]	After Switching[4]		
Beech Grove	10.0	13	Winter	4.57	4.57	99%	36%
Bon Harbor	10.0	13	Summer	8.31	8.31	93%	89%
Caldwell Springs	10.0	13	Winter	2.42	2.43	99%	19%
Centertown	5.0	6.5	Winter	3.11	3.11	99%	48%
Crossroads	10.0	13	Winter	7.06	7.06	100%	54%
Dermont	**10.0**	**13**	**Summer**	**7.56**	**5.72**	**92%**	**62%**
Dermont 2	**10.0**	**13**	**Summer**		**1.92**	**92%**	**---**
Dixon	**10.0**	**13**	**Winter**	**5.36**	**5.26**	**100%**	**40%**
East Owensboro	10.0	13	Summer	5.26	5.26	94%	56%
Geneva	10.0	13	Winter	8.37	8.37	98%	66%
Guffie	7.5	9.8	Winter	7.52	7.56	99%	78%
Hanson	3.8	4.9	Winter	3.83	3.83	100%	78%
Hawesville	**10.0**	**13**	**Winter**	**7.49**	**7.44**	**99%**	**58%**
Horse Fork	15.0	19.5	Summer	13.06	13.06	91%	96%
Hudson	10.0	13	Summer	6.68	6.68	91%	73%
Lewisport #1	10.0	13	Summer	6.35	6.35	90%	71%
Lewisport #2	10.0	13	Summer	2.79	2.79	90%	31%
Little Dixie	7.5	9.8	Winter	3.67	3.67	100%	37%
Lyon County	7.5	9.8	Winter	5.67	5.67	100%	58%
Maceo	10.0	13	Winter	3.78	3.78	99%	29%
Madisonville	**10.0**	**13**	**Winter**	**5.23**	**6.04**	**97%**	**48%**
Marion	10.0	13	Winter	7.73	7.73	100%	59%
Masonville	**10.0**	**13**	**Summer**	**4.77**	**5.85**	**95%**	**62%**
Morganfield	10.0	13	Winter	8.89	8.89	100%	68%
Niagara	**10.0**	**13**	**Winter**	**8.26**	**8.33**	**100%**	**64%**
Nuckols	10.0	13	Winter	5.76	5.80	99%	45%
Onton	5.0	6.5	Winter	6.42	6.45	99%	99%
Philpot #1	10.0	13	Summer	6.00	6.00	92%	65%
Philpot #2	10.0	13	Summer	3.76	3.76	92%	41%
Pleasant Ridge	10.0	13	Winter	5.87	5.87	100%	45%
Providence	**10.0**	**13**	**Winter**	**5.70**	**6.74**	**99%**	**52%**
Race Creek	10.0	13	Winter	6.36	6.36	100%	49%
Riverport	10.0	13	Winter	3.97	3.97	84%	36%
Sacramento	3.8	4.9	Winter	3.81	3.81	99%	79%
Saint Joseph	5.0	6.5	Summer	4.49	4.49	94%	96%
Sebree	5.0	6.5	Winter	5.17	5.17	98%	81%
South Dermont #1	**10.0**	**13**	**Summer**	**11.86**	**9.08**	**93%**	**98%**

Substation Transformer	Summer Capacity(1) (MVA)	Winter Capacity (2) (MVA)	Summer Or Winter	Projected 2012-2013 Peak Load (MW) Before Switching(3)	After Switching(4)	Power Factor @ Peak(3)	Percent Loaded(5)
South Dermont #2	**10.0**	**13**	**Summer**	**7.78**	**9.18**	**93%**	**99%**
South Hanson #1	**10.0**	**13**	**Winter**	**8.45**	**8.48**	**99%**	**66%**
South Hanson #2	**10.0**	**13**	**Winter**	**9.00**	**8.69**	**99%**	**68%**
South Owensboro #1	10.0	13	Summer	5.63	5.63	90%	63%
South Owensboro #2	10.0	13	Summer	6.35	6.35	90%	71%
Stanley	5.0	6.5	Winter	3.29	3.29	95%	53%
Sullivan	10.0	13	Winter	3.99	3.99	100%	25%
Thruston #1	**10.0**	**13**	**Summer**	**5.34**	**4.26**	**92%**	**46%**
Thruston #2	**10.0**	**13**	**Summer**	**3.99**	**5.84**	**92%**	**64%**
Tyson(6)	10.0	13	Summer	9.12	9.12	91%	100%
Utica	10.0	13	Winter	7.35	7.35	99%	57%
Weaverton	**10.0**	**13**	**Winter**	**5.52**	**5.35**	**99%**	**42%**
Weberstown	**7.5**	**9.8**	**Winter**	**7.98**	**8.04**	**99%**	**83%**
West Owensboro	10.0	13	Summer	8.16	8.16	93%	88%
Whitesville	10.0	13	Winter	7.95	7.95	95%	64%
Wolf Hills	10.0	13	Winter	3.04	3.09	99%	24%
Yager	1.5	1.95	Winter	0.12	0.12	95%	6%
Zion	10.0	13	Winter	9.30	9.30	100%	72%

Notes:
(1) Transformer base nameplate rating of the substation transformer.
(2) Based on 130% of base nameplate rating of the substation transformer.
(3) Based on the load allocation in engineering model of the 2012-2013 CWP system peak.
(4) Based on the engineering model after load transfers.
(5) Based on the projected CWP load after switching and the rated transformer capacity.
(6) Loading acceptable: Tyson is only customer on transformer and top nameplate at 65°C is 18.7 MVA. No reserve capacity required.
(7) Line items in **bold** indicate substations where switching occurred in the CWP.

1.8 Existing and Projected System Analysis

The Kenergy engineering database has been created using Milsoft's WindMil software package. The WindMil database is the core tool that is used to perform the load studies. These load studies are used to determine the need for system improvements.

This database is updated on an ongoing basis as system improvements are constructed. The database has been created in such a way that it displays an accurate impedance model and geographic representation of the electrical system. Each line section was created from Kenergy's GIS system. Using the GIS, the line section length and conductor size is accurately modeled.

Load data were obtained from the Kenergy member billing information. Load-flows were prepared to provide information such as the percent conductor loading to its capacity, calculated line losses, power factor information and voltage drop along line sections. The load-flow results from the computer model were compared to the criteria outlined in this report. Recommendations were then based on these results. Appendix A and B presents a sample load flow result before and after recommended improvements for a single substation

Each of the 188 circuits was analyzed with respect to adequate voltage and loading conditions. The computer analysis of the 2009 winter system peak at the existing system configuration revealed:

- Voltage levels less than 118 Volts in line sections in the following substations:
  - South Hanson 1
- Conductor loading greater than 70% in line sections in the following substations:
  - None
- Greater than 288 kVA on single-phase line sections in the following substations:
  - Adams Lane, Beda, Hawesville, Lyon County, Marion, Nuckols, Onton, Pleasant Ridge, Providence, South Hanson 1, South Hanson 2, Weaverton, Weberstown, and Zion

The computer analysis of the 2009 summer system peak at the existing system configuration revealed:

- Voltage levels less than 118 Volts in line sections in the following substations:
  - Beda, Dermont, Dixon, Guffie, Lyon County, Niagara, Nuckols, Onton, Philpot 1, South Hanson 2, Sebree, St. Joe, Stanley, Sullivan, Thruston 1, Weaverton, Weberstown, West Owensboro, and Whitesville
- Conductor loading greater than 70% in line sections in the following substations:
  - None
- Greater than 288 kVA on single-phase line sections in the following substations:
  - Bon Harbor, Providence, South Dermont 1, South Dermont 2, South Owensboro 1, South Owensboro 2, Sacramento, Sebree, Stanley, Weaverton, West Owensboro

In addition to the substations identified in the existing system analysis, computer analysis of the projected 2012-2013 winter system peak at the existing system configuration revealed:

- Voltage levels lower than 118 Volts in line sections in the following substations:
  - Whitesville
- Conductor loading greater than 70% in line sections in the following substations:
  - None
- Greater than 288 kVA on single-phase line sections in the following substations:
  - Race Creek and Sebree

Computer analysis of the projected 2012 summer system peak at the existing system configuration revealed:

- Voltage levels lower than 118 Volts in line sections in the following substations:
  - Bon Harbor, Centertown, Geneva, Hawesville , Morganfield, and Philpot 2
- Conductor loading greater than 70% in line sections in the following substations:
  - Dermont, Geneva, and South Dermont
- Greater than 288 kVA on single-phase line sections in the following substations:
  - Race Creek, Thruston 1, and UTICA

1.9 System Outages

A summary of the outages experienced by Kenergy for the last five years is given in Table 1-13. The five-year average annual outage minute per customer is 503.95 minutes. RUS suggests a system goal for outages of less than 120 minutes per customer in rural areas and 60 minutes in urban areas. Kenergy's goal is to improve system reliability and keep the average outage minute per customer below the recommended guideline.

Table 1-13
Service Interruption Summary
Average Minutes per Consumer by Cause (1)

Year	Power Supplier	Extreme Storm	Prearranged	Others	Total
2004	37.8	0.6	0.6	598.8 (2)	637.8
2005	4.2	0.0	0.6	156.0	160.8
2006	60.0	360.0 (3)	0.0	240.0	660.0
2007	13.2	46.8	7.2	117.0	660.0
2008	50.5	692.2 (4)	3.0	136.5	882.4
5 Yr. Avg.	32.4	223.9	3.0	244.5	503.9

Note:
(1) From RUS Form 7.
(2) A number of storms during the year 2-3 days in length.
(3) 4 days of storms around July 22, 2006
(4) February ice storm and September hurricane impacts

1.10 Service Reliability

Reliability was considered as part of the development of the alternative plans. The system shall have the ability to maintain adequate service with loss of a major system element such as a substation transformer or three-phase feeder during non-extreme conditions. Each substation should have reserve transformer capacity available to support an adjacent substation (OA/FA capacity) equal to projected non-extreme load of both substations, if distribution ties are available. Three-phase feeder capacity between two adjoining substations shall be adequate to allow backfeeding during non-extreme load conditions. System improvements are recommended where three-phase conductor capacity exceeds 70% of the calculated rating.

In areas where more than 288 kW of load (40 ampere on the 7.2-kV system or 20 ampere on the 14.4-kV system) up-grade to three-phase was recommended in order to provide greater reliability and load balance. Reliability is also increased as the sectionalizing practices of the system are reviewed. These measures should help Kenergy maintain adequate and reliable service and comply with RUS recommendations.

Section 2
CONSTRUCTION ITEMS

The recommended 2010-2013 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. The recommended CWP items were reviewed for consistency with the recommendations of the 2010 Long Range Plan (LRP).

2.1 Service to New Members

Historical information was reviewed for a 24-month period from 2007 to October 2009 to project new member services and meter requirements for the 2010-2013 CWP period. Kenergy elected to use the most recent data in order to reflect the current economic condition. The total number of new services were projected from the 2009 Load Forecast (LF). For new member single-phase transformer requirements, a customer ratio of 5 to 4 was assumed for projections, and the three-phase transformer requirements were projected based on past experience. The historical costs were inflated by 2.0% per year.

Table 2-1
Construction to Serve New Members

	2-Year Average	Estimated 36-Month Work Plan Period			
New Members	**2007-2009**	**2010-2011**	**2011-2012**	**2012-2013**	**TOTAL**
Number of New 3-ph Services					
Underground	11	13	15	15	43
Overhead	12	14	16	17	47
Total New 3-ph Services	**23**	**27**	**32**	**32**	**91**
Number of New 1-ph Services					
Underground	179	211	246	251	708
Overhead	486	573	668	682	1,923
Total New 1-ph Services	**665**	**784**	**914**	**933**	**2,631**
Total New Services	**688**	**811**	**946**	**965**	**2,722**
Linear Feet of New 3-ph Line					
Underground	3,791	4,331	5,052	5,153	14,536
Average Length/UG Member	335	334.5	334.5	334.5	334.5
Overhead	9,502	11,119	12,969	13,230	37,317

New Members	2-Year Average 2007-2009	Estimated 36-Month Work Plan Period 2010-2011	2011-2012	2012-2013	TOTAL
Average Length/OH Member	786	786.3	786.3	786.3	786.3
TOTAL – New 3-ph Line	**13,293**	**15,450**	**18,021**	**18,383**	**51,854**
Linear Feet of New 1-ph Line					
Underground	45,443	53,685	62,621	63,879	180,184
Average Length/UG Member	255	254.6	254.6	254.6	254.6
Overhead	132,822	156,583	182,648	186,317	525,548
Average Length/OH Member	273	273.3	273.3	273.3	273.3
TOTAL – New 1-ph Line	**178,265**	**210,268**	**245,269**	**250,195**	**705,732**
TOTAL – NEW LINE(feet)	**191,558**	**225,717**	**263,290**	**268,578**	**757,586**
TOTAL – NEW LINE(mile)	**36.28**	**42.75**	**49.87**	**50.87**	**143.48**
Cost of New 3-ph Line					
Underground	$178,963	$208,546	$248,126	$258,172	$714,843
Average Cost/UG Member	$15,791	$16,107	$16,429	$16,757	$16,431
Overhead	$201,174	$240,118	$285,689	$297,257	$823,064
Average Cost/OH Member	$16,649	$16,982	$17,322	$17,668	$17,324
Total – Cost New 3-ph Line	**$380,137**	**$448,664**	**$533,815**	**$555,428**	**$1,537,907**
Cost of New 1-ph Line					
Underground	$634,553	$764,624	$909,737	$946,576	$2,620,937
Average Cost/UG Member	$3,555	$3,626	$3,699	$3,773	$3,699
Overhead	$1,493,896	$1,796,366	$2,137,302	$2,223,799	$6,157,467
Average Cost/OH Member	$3,073	$3,135	$3,198	$3,261	$3,198
Total – Cost New 1-ph Line	**$2,128,449**	**$2,560,990**	**$3,047,039**	**$3,170,375**	**$8,778,404**
TOTAL COST OF NEW LINE	**$2,508,586**	**$3,009,653**	**$3,580,853**	**$3,725,804**	**$10,316,310**
Number of New 1-ph Transformers					
Number of Transformers	1,346	649	757	772	2,178
Avg. Cost/Transformer	$1,152	$1,175	$1,199	$1,223	$1,200
Total 1-ph Transformers	**$1,550,688**	**$762,340**	**$907,403**	**$944,156**	**$2,613,899**
Number of New 3-ph Transformers					
Number of Transformers	8	9	9	9	27
Avg. Cost/Transformer	$10,896	$11,114	$11,336	$11,563	$11,338
Total 3-ph Transformers	**$91,709**	**$100,026**	**$102,024**	**$104,067**	**$306,117**
TOTALCOST NEW TRANSFORMERS	**$1,642,397**	**$862,366**	**$1,009,427**	**$1,048,223**	**$2,920,016**
Number of New Meters					
Number of Meters	1,036	811	946	965	2,722
Avg. Cost/Meter	$156	$159	$162	$165	$162

New Members	2-Year Average 2007-2009	Estimated 36-Month Work Plan Period 2010-2011	2011-2012	2012-2013	TOTAL
TOTAL COST OF NEW METERS	$161,149	$128,949	$153,252	$159,225	$441,426
TOTAL COST OF NEW SERVICES	$4,312,132	$4,000,968	$4,743,532	$4,933,252	$13,677,752

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

RUS Code	Category Description	2010-2011	2011-2012	2012-2013	TOTAL
101	UG Lines – New Members	$973,170	$1,157,862	$1,204,748	$3,335,780
102	OH Lines – New Members	$2,036,484	$2,422,991	$2,521,056	$6,980,531
100	**Total New Lines**	**$3,009,653**	**$3,580,853**	**$3,725,804**	**$10,316,310**
601	1-ph Transformer – New Members	$762,340	$907,403	$944,156	$2,613,899
601	3-ph Transformer – New Members	$100,026	$102,024	$104,067	$306,117
601	Meters – New Members	$128,949	$153,252	$159,225	$441,426
601	**Total New Transformers and Meters**	**$991,315**	**$1,162,679**	**$1,207,448**	**$3,361,442**

2.2 Service Changes to Existing Members

Historical information was reviewed for a 24-month period from 2007 to October 2009 to project service upgrades to existing members for the CWP period. In order to include data from the ice storm in 2009, Kenergy elected to use 2009 data thru October. The historical number of services was increased approximately 1.00% per year for the 2010-2013 CWP period, based on the 2009 LF. The historical costs were inflated by 2.0% per year.

Table 2-3
Construction to Serve Existing Members

Service Charges to Existing Members	2-Year Average 2007-2009	Estimated 24-Month Work Plan Period 2010-2011	2011-2012	2012-2013	TOTAL
Service Upgrades					
Number of Services	123	124	126	127	377
Avg. Cost/Service	$1,857	$1,895	$1,932	$1,971	$1,933
Total Cost Service Upgrades	**$228,617**	**$234,980**	**$243,432**	**$250,317**	**$728,729**

Table 2-4
Summary of Costs for Service Changes

RUS Code	Category Description	2010-2011	2011-2012	2012-2013	TOTAL
602	Total Service Upgrades	$234,980	$243,432	$250,317	$728,729

2.3 Poles

Based on Kenergy's pole inspection and treatment program results and approximately nine years of historical information, it is estimated that 1,908 poles will be replaced during the CWP period.

Table 2-5 is a summary of pole replacement costs for the 2010 – 2013 CWP period. The CWP includes sufficient pole replacements to average 737 poles each year of the CWP period. The costs were inflated by 2.0% per year.

Table 2-5
Poles

POLES	2-Year Average	ESTIMATED 36-MONTH WORK PLAN PERIOD			
	2007-2009	2010-2011	2011-2012	2012-2013	TOTAL
Pole Replacements					
Number of Poles	752	737	611	568	568
Avg. Cost/Pole	$2,329	$2,375	$2,423	$2,471	$2,422
TOTAL POLE REPLACEMENTS	**$1,751,871**	**$1,451,125**	**$1,376,264**	**$1,403,528**	**$4,230,917**
Clearance Poles					
Number of Clearance Poles	48	45	58	58	159
Avg. Cost/Pole	$1,916	$1,954	$1,993	$2,033	$1,997
TOTALCLEARANCE POLES	**$91,333**	**$87,930**	**$115,594**	**$117,914**	**$321,438**

Table 2-6
Summary of Costs for Poles

RUS Code	Category Description	2010-2011	2011-2012	2012-2013	TOTAL
606	Number of poles	**656**	**626**	**626**	**1,908**
606	Pole Replacements	$1,451,125	$1,376,264	$1,403,528	$4,230,917
606	Clearance Poles	$87,930	$115,594	$117,914	$321,438
606	**Total Poles**	**$1,539,055**	**$1,491,858**	**$1,521,442**	**$4,552,355**

2.4 Security Lights

Historical information was reviewed for a 24-month period from 2007 to October 2009 to project security light requirements for the CWP period. In order to include data from the ice storm in 2009, Kenergy elected to use 2009 data thru October. Kenergy has installed an average of 360 security lights per year at an average cost of $768 each. The historical number of security lights was increased approximately 1.00% per year for the 2010-2013 CWP period, based on the 2009 LF. Kenergy estimates that the cost will increase 2.0% a year during the CWP period. A summary of the security light costs for the CWP period is given below.

Table 2-7
Other Distribution

OTHER DISTRIBUTION	2-Year Average	ESTIMATED 36-MONTH WORK PLAN PERIOD			
	2007-2009	2010-2011	2011-2012	2012-2013	TOTAL
Security Lights					
Number of Security Lights	360	363	367	371	1,101
Avg. Cost/Security Light (1)	$768	$783	$799	$815	$799
TOTAL SECURITY LIGHTS	**$276,134**	**$284,229**	**$293,233**	**$302,365**	**$879,827**

Table 2-8
Summary of Costs for Other Distribution

RUS Code	Category Description	2010-2011	2011-2012	2012-2013	TOTAL
701	Security Lights	$284,229	$293,233	$302,365	$879,827

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. Phase balancing to relieve voltage design criteria violations was evaluated and documented external to the CWP.

Line and equipment costs were inflated by 2.0% 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 2010-2013 CWP.

Beda – Circuit 41-1

- **Location – Silver Beech Rd.**
- **RUS CODE – 301** **$102,100 in Year 2**

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR on sections between 701799 and 701738 for 1.33 miles. In addition, extend approximately 0.13 miles of three-phase 1/0 ACSR from section 701551 to section 701799. Open switch SW95080372 and back feed section 701799 to the new extension. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 57.1 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-1 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section -1526908763. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to overloading nearby single-phase taps.

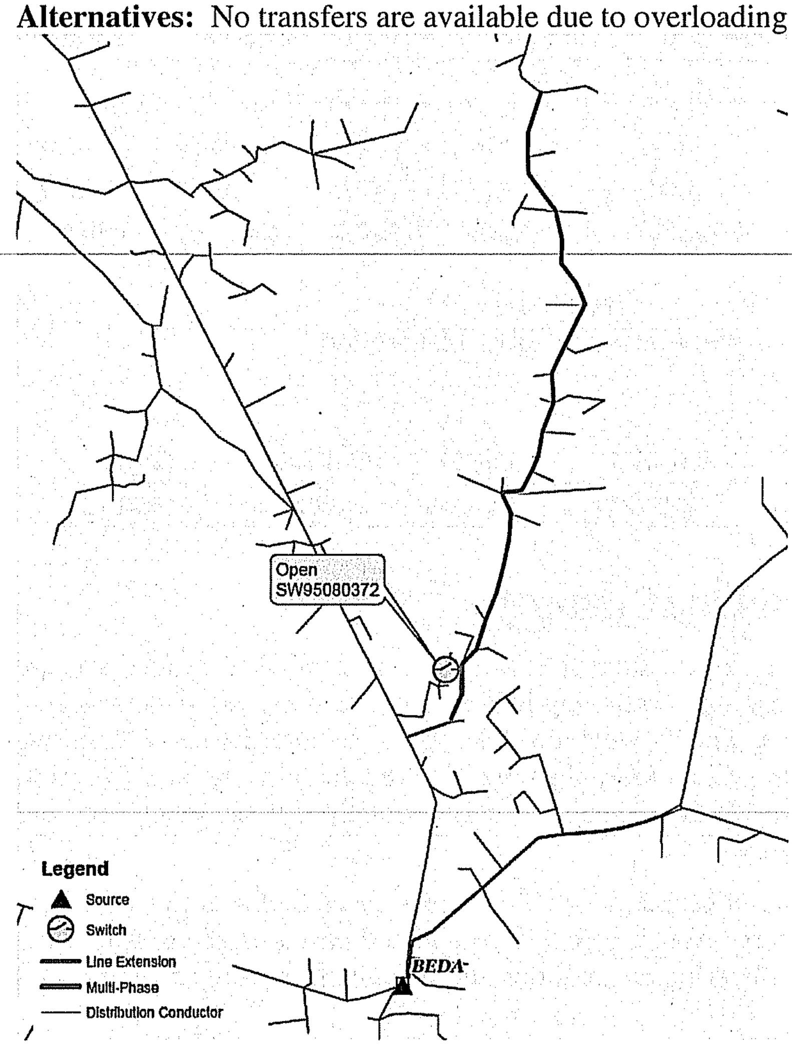

Figure 2-1: RUS CODE 301

Crossroads – Circuit 61-1

- Location – HWY 70 (Beulah Rd.)
- RUS CODE – 302 **$197,400 in Year 3**

Description: Multi-phase and reconductor from single-phase 2 ACSR to three-phase 1/0 ACSR on line sections between 301490 and 301623 for 2.79 miles. The project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 27.8 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-2 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 338039. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to overloading nearby single-phase taps. Also, some line construction would need to be completed to tie to nearby taps.

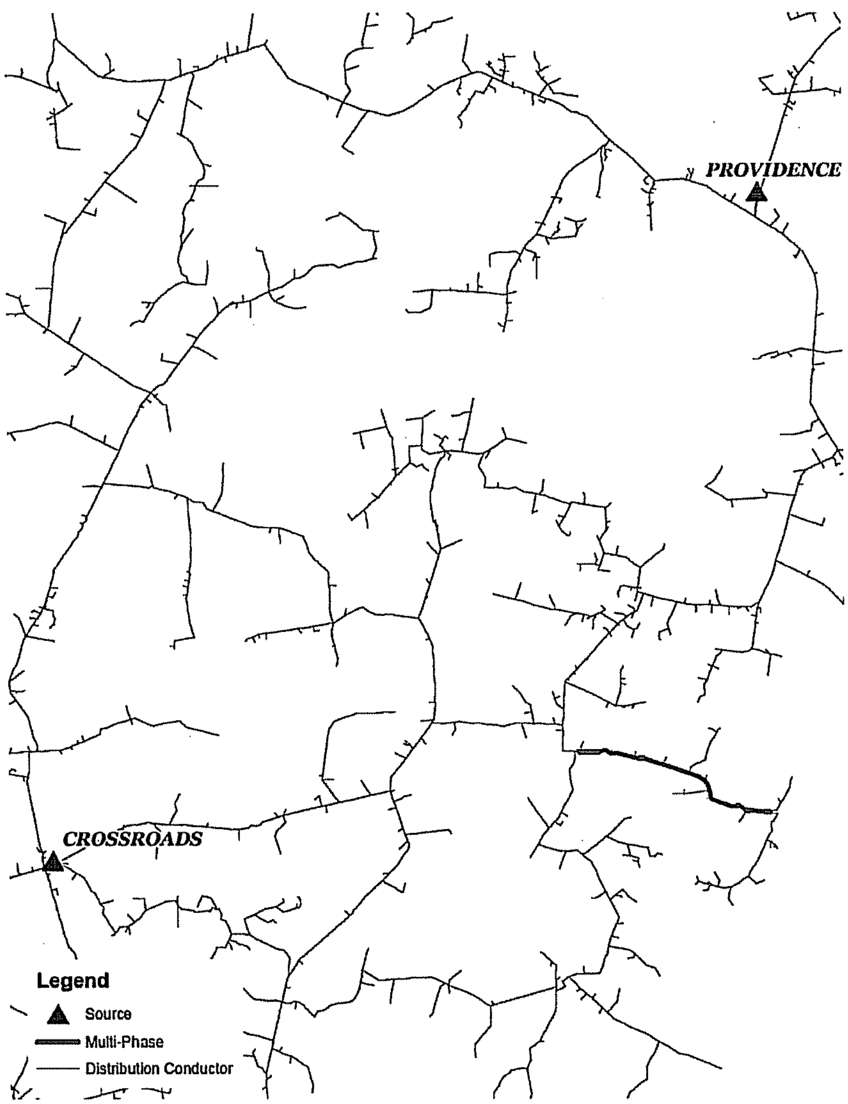

Figure 2-2: RUS CODE 302

Crossroads – Circuit 61-3

- **Location – Princeton-Olney Rd.**
- **RUS CODE – 303** **$536,200 in Year 2**

Description: Multi-phase and reconductor from single-phase 4 ACSR to three-phase 1/0 ACSR on line sections between 305052 and 304929 for 7.73 miles. Also, re-energize the tie between line sections 375266555 and 555136576 on the circuit and perform the following switching:

- Open at section -1579468454
- Backfeed to the energized tie

The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 35.0 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-3 for a geographic representation of the location of the project.

Sectionalizing: Add three single-phase reclosers on section 305052. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to overloading nearby single-phase taps.

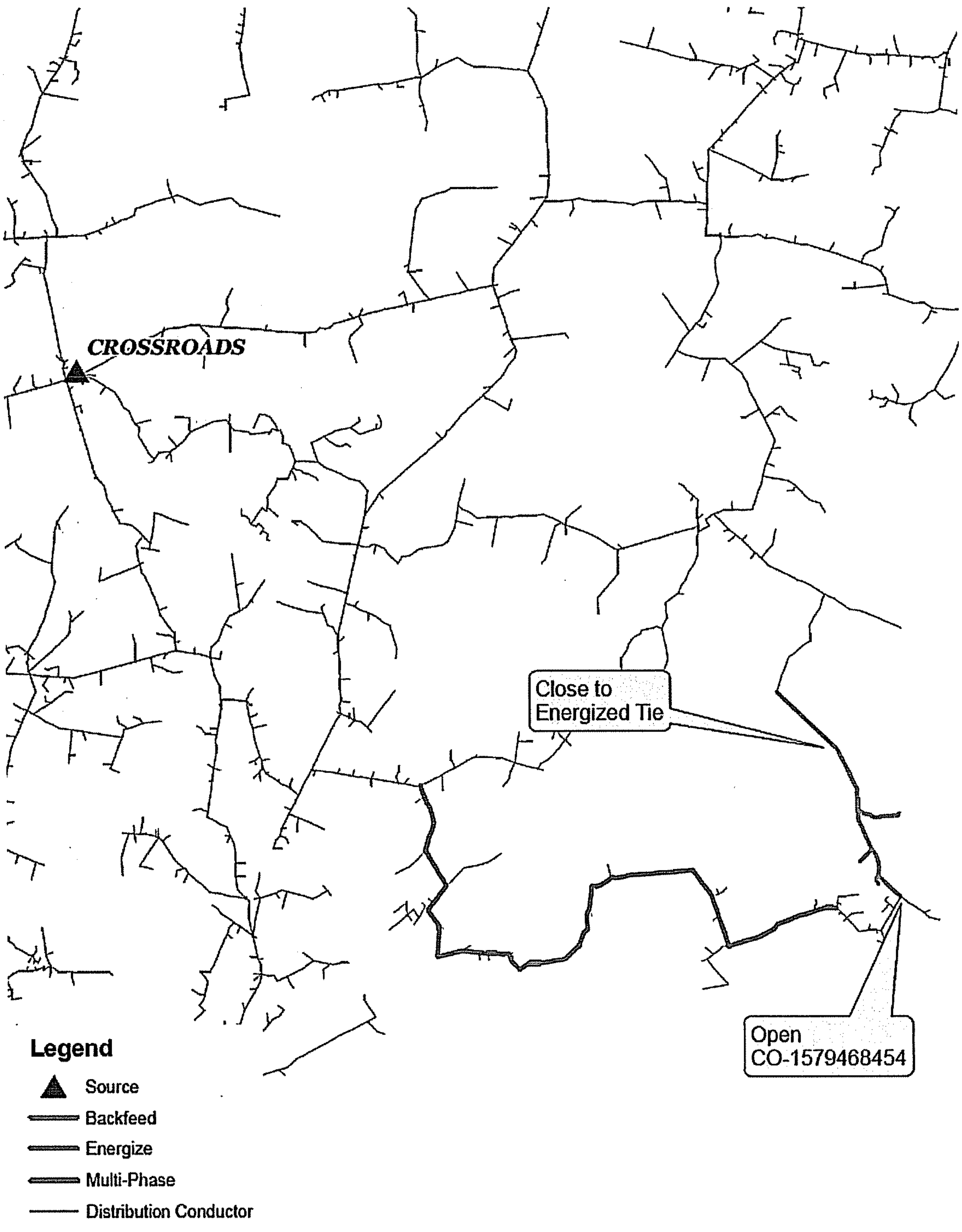

Figure 2-3: RUS CODE 303

Dermont – Circuit 17-1

- **Location – Pleasant Valley to Lane Rd.**
- **RUS CODE – 304** **$204,900 in Year 3**

Description: Using an existing feeder bay, construct a new Dermont circuit with double circuit three-phase 336 ACSR along the existing Dermont Circuit 17-1 route. The new double circuit will be constructed from line section 729313 to section 729328 for 1.01 miles. The following switching is also recommended with this project:

- Transfer the tap at section 728959 to the new circuit to transfer load from Dermont Circuit 17-1 to the new circuit
- Open switch SW702099 and close switch SW948158652 to transfer load from the new Dermont Circuit to Thruston Circuit 11-2
- Transfer the tap at section -315813815 to section 723422 to transfer load from Thruston Circuit 11-2 to Thruston Circuit 11-3
- Open at section 723494 and close switch SW702000 to transfer load from Thruston Circuit 3 to Thruston Circuit 4

The project is recommended to relieve conductor loading (Design Criteria #4). Before improvements, sections on Dermont were loaded to 70% of capacity by the end of the work plan. With the recommended improvements, the conductor loading was calculated to be 13% of capacity. See Figure 2-4 for a geographic representation of the location of the project.

Sectionalizing: See RUS CODE – 502, which includes costs to add a breaker, switches, and associated bus to the available feeder bay at Dermont Substation. Device coordination was reviewed based on the suggested improvements, and no improvements are recommended.

Alternatives: No transfers are available due to overloading the available tie circuits.

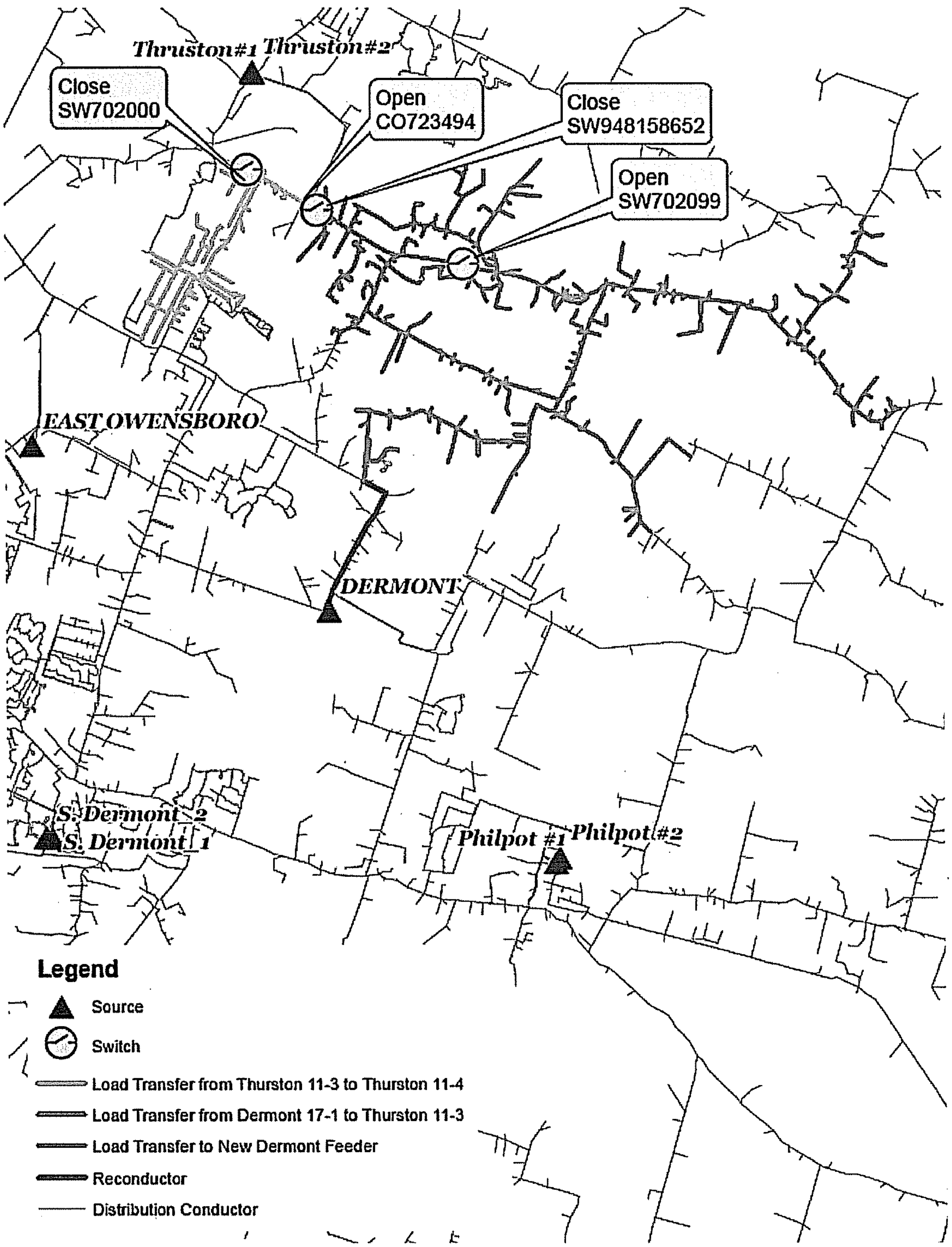

Figure 2-4: RUS CODE 304

Dixon – Circuit 62-2

- **Location – HWY 41A near Vanderburg Lisman Rd.**
- **RUS funds are not requested** **Year 1**

Description: Open at switch SW2080326309 and close to Providence Circuit 4 at switch SW808477692. This project is recommended to balance circuit loading and improve low voltage (Design Criteria #1). Before the project, the voltage was calculated to be 117.6 V on sections of Dixon Circuit 62-2. With improvements, the voltage improved to 118.9 V. See Figure 2-5 for a geographic representation of the location of the project.

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

Alternatives: The recommended switching avoids costs of conductor upgrades or adding regulators.

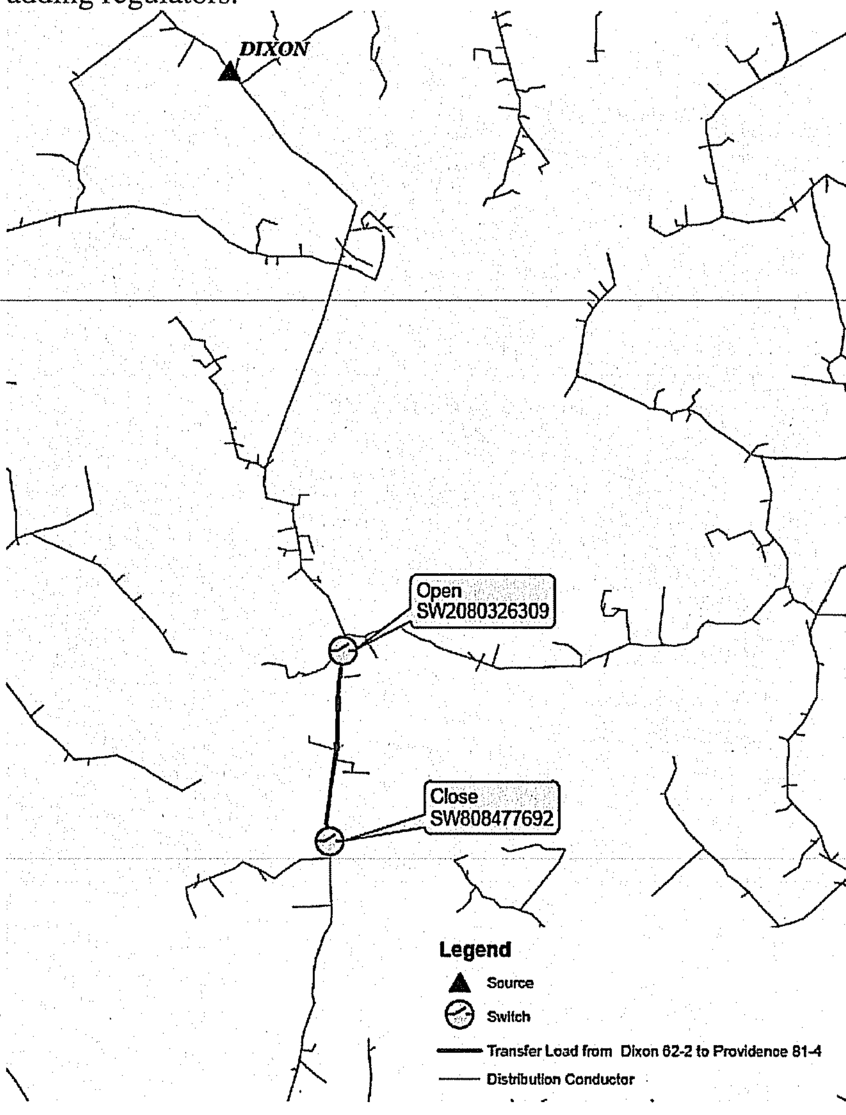

Figure 2-5: HWY 41A near Vanderburg Lisman Rd.

Hawesville – Circuit 13-2

- **Location – HWY 60 toward Cloverport**
- **RUS CODE – 305** **$139,400 in Year 3**

Description: Multi-phase and reconductor from single-phase 4 Stranded CU to three-phase 1/0 ACSR between sections 720767 and 722547 for 1.97 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on Hawesville were loaded to 40.1 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-6 for a geographic representation of the location of the project.

Sectionalizing: Add three single-phase reclosers on section 720767. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to the radial nature of the tap.

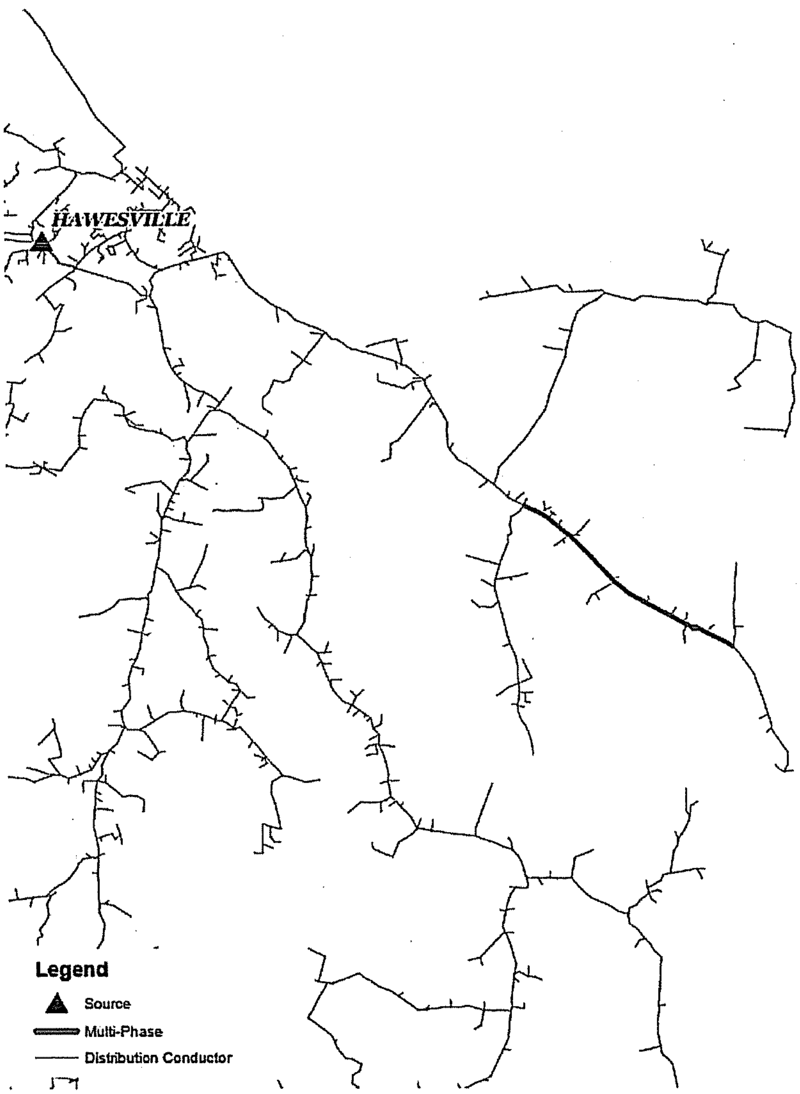

Figure 2-6: RUS CODE 305

Hawesville – Circuit 13-4

- **Location – Franklin Gaynor Rd.**
- **RUS CODE – 306** **$332,000 in Year 1**

Description: Multi-phase and reconductor from single-phase 4 ACSR to three-phase 1/0 ACSR on sections between 720148 and 721935 for 1.99 miles. Multi-phase from single-phase 2 ACSR to three-phase 1/0 ACSR between sections -1024115974 and -1933655749 for 1.05 miles. Extend three-phase 1/0 ACSR from line section 721935 to 1024115974 for 0.38 miles, and extend three-phase 1/0 ACSR from section -1933655749 to 724981 for 1.29 miles. The following switching is recommended with this project:

- Open at section 1503717739 and back feed section -1024115974 to the new extension to transfer load from Weberstown Circuit 14-1 to Hawesville Circuit 13-4.
- Open at sections 724978 and 724913 and close switch SW-1782190769, and back feed this area to the new extension.

The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on Hawesville Circuit 13-4 were loaded to 44.0 A, and sections Weberstown Circuit 14-1 were loaded to 49.0 A by the end of the work plan. With the recommended improvements, the single-phase loading issues were alleviated. See Figure 2-7 for a geographic representation of the location of the project.

Sectionalizing: Remove existing 100 A regulators at RG300100 and install (3) single-phase 150-A regulators at section 720018. See RUS CODE - 604-10. Install a single-phase fuse on sections 724980 and 724981. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: This area contains many single-phase taps, most of which are at or exceeding the single-phase Design Criteria. The multi-phasing and switching project give greater reliability in an area with a large number of customers.

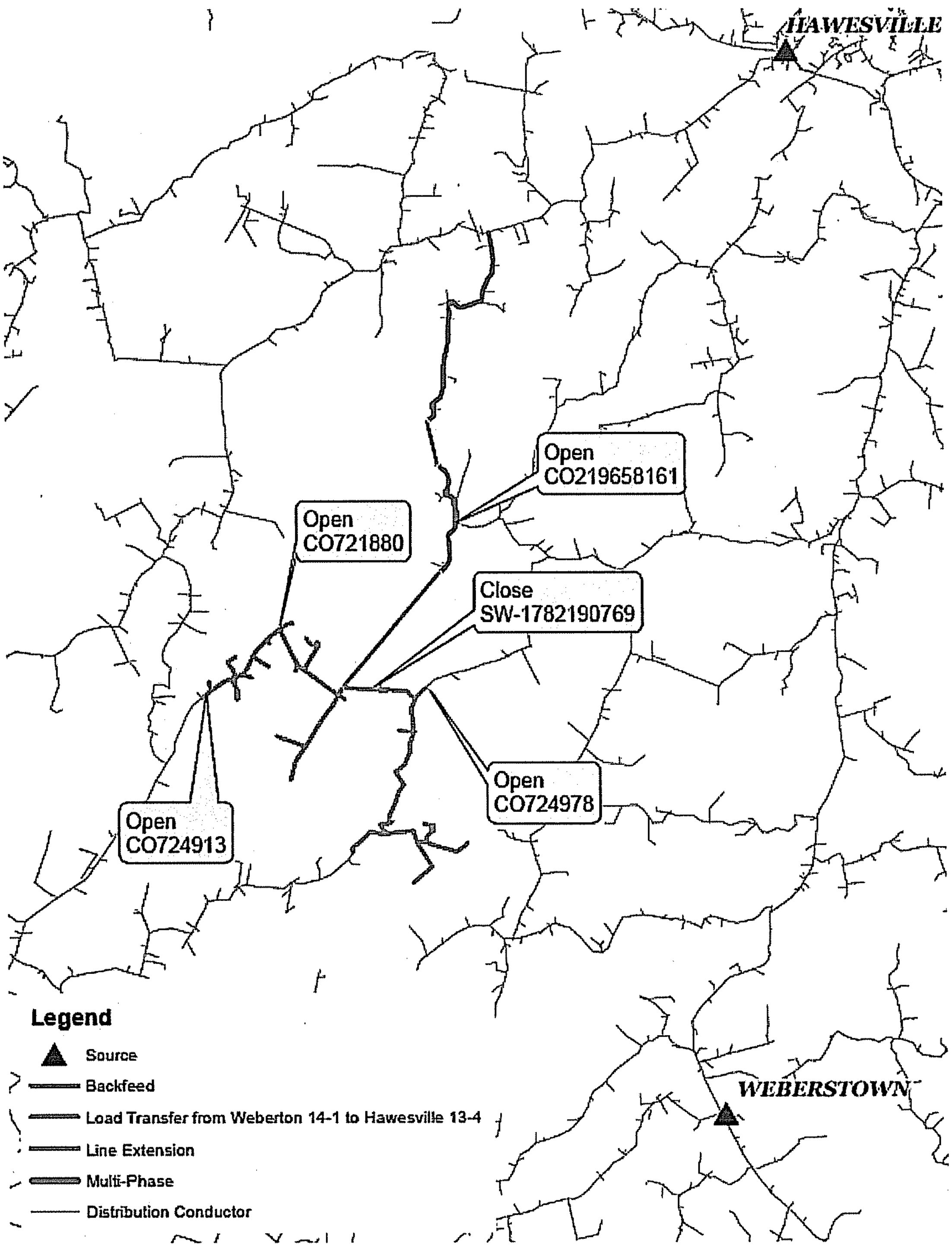

Figure 2-7: RUS CODE 306

Lyon County – Circuit 69-3

- **Location – KY 1271**
- **RUS CODE – 307** **$27,900 in Year 1**

Description: Multi-phase and reconductor from single-phase 4 ACSR to three-phase 1/0 ACSR on sections between 306933 and 306577 for 0.41 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 41.1 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-8 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 306933. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to the radial nature of the tap.

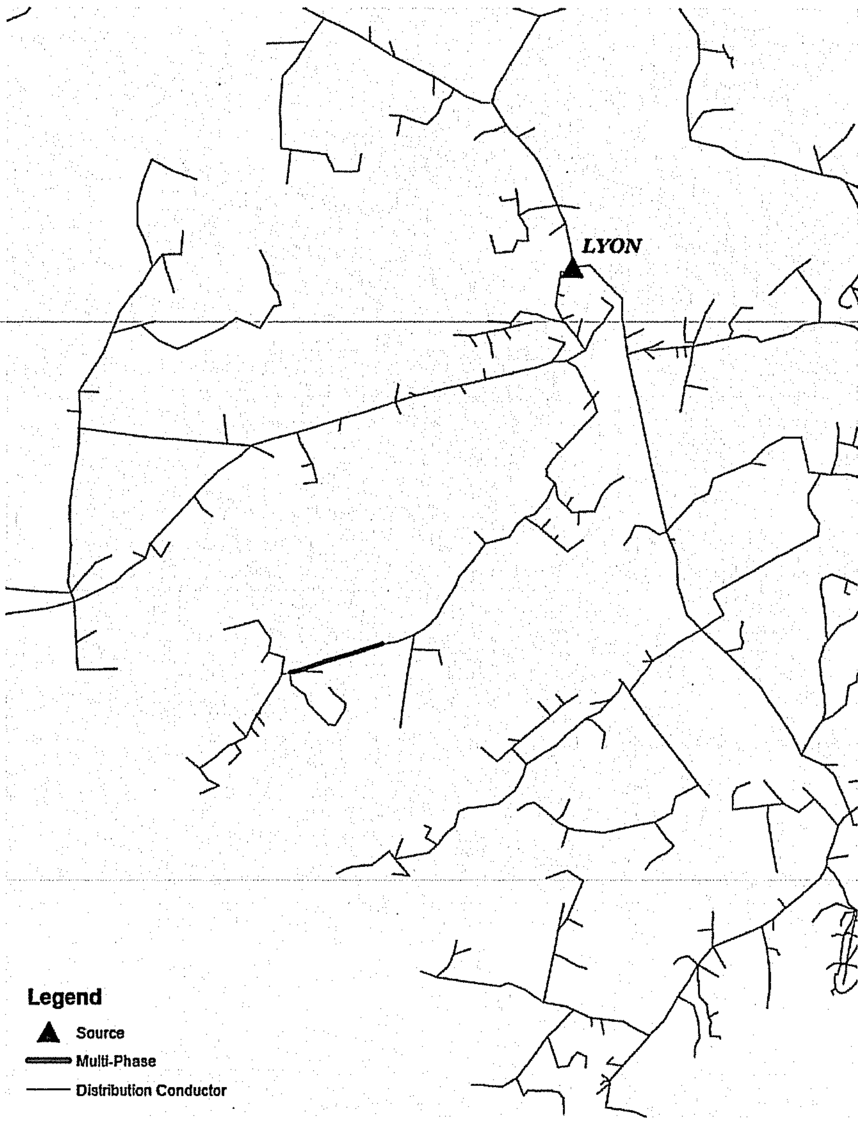

Figure 2-8: RUS CODE 307

Marion – Circuit 70-2

- **Location – Country View Dr. to Coleman Rd.**
- **RUS CODE – 308** **$10,100 in Year 1**

Description: Extend approximately 0.24 miles of single-phase 1/0 ACSR from section 302534 to section 302612. Transfer load between Circuit 2 taps by opening at section 302544 and back feeding to the new extension. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on Marion were loaded to 20.3 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-9 for a geographic representation of the location of the project.

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

Alternatives: The transfer project was selected in place of a multi-phasing project to avoid additional costs in an area where switching alleviates the issue.

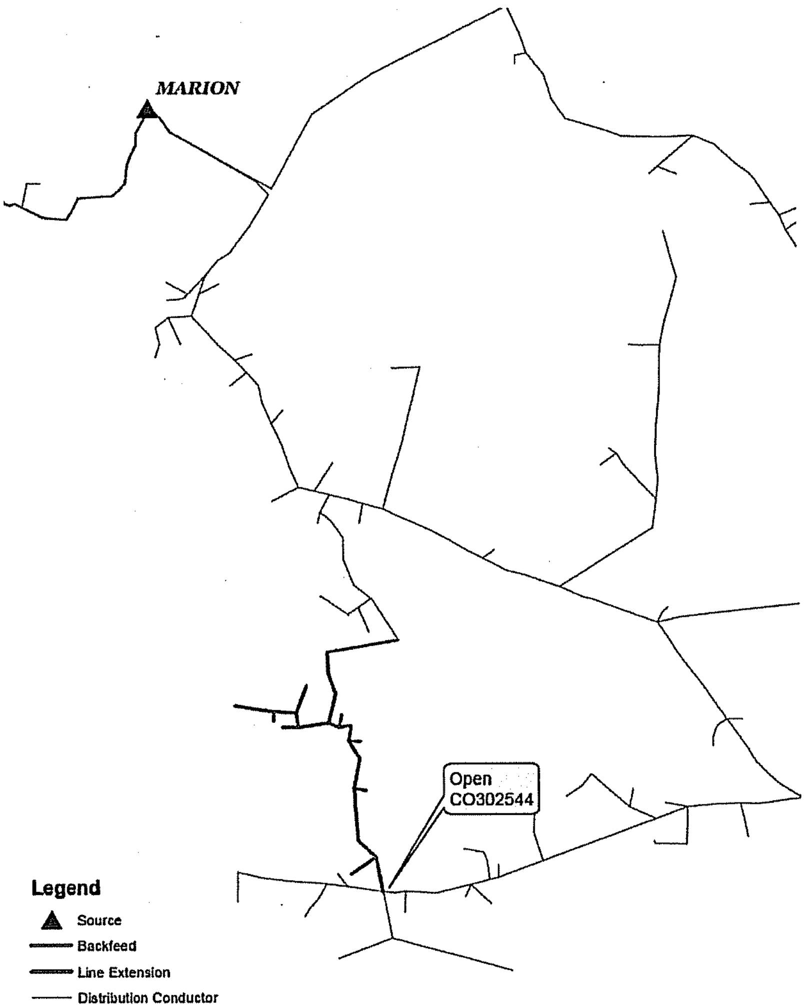

Figure 2-9: RUS CODE 308

Marion – Circuit 70-3

- **Location – KY 723**
- **RUS CODE – 309** **$45,300 in Year 3**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 315614 and 315605 for 0.75 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on Marion were loaded to 22.1 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-10 for a geographic representation of the location of the project.

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

Alternatives: No transfers are available due to the radial nature of the tap.

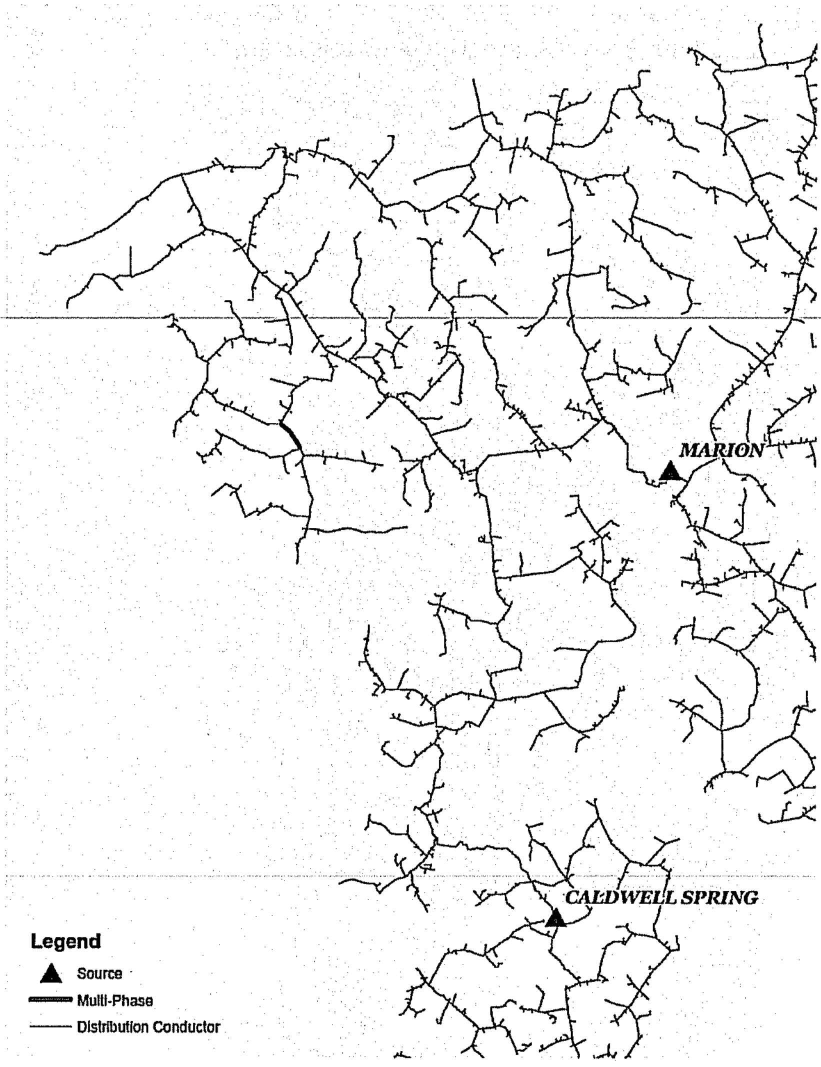

Figure 2-10: RUS CODE 309

Nuckols – Circuit 42-3

- **Location – Hicks Rd.**
- **RUS CODE – 310** **$68,600 in Year 2**

Description: Multi-phase from single-phase 2 ACSR to two-phase 2 ACSR on sections between 518091 to 518139 for 1.11 miles. Also, multi-phase from two-phase 2 ACSR to three-phase 2 ACSR on sections between 518088 and 518092 for 0.3 miles. The project is recommended to relieve single phase loading and low voltage (Design Criteria #1 and #2). Before improvements, sections on the tap were loaded to 45.7 A, and voltage at the end of the tap was calculated to be 116.3 V by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated and the voltage was improved to 119.6 V. See Figure 2-11 for a geographic representation of the location of the project.

Sectionalizing: Install (3) single-phase 150-A regulators. See RUS CODE – 604-11. Add one single-phase recloser on section 518202. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to the radial nature of the tap.

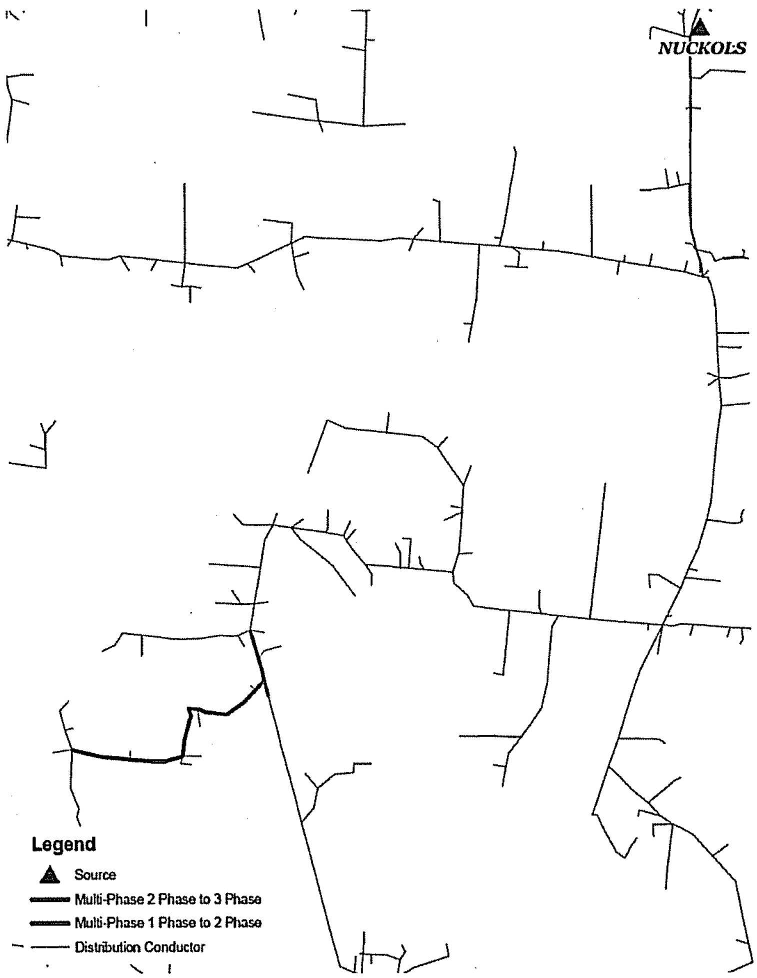

Figure 2-11: RUS CODE 310

Onton – Circuit 52-1

- **Location – Stagecoach Rd.**
- **RUS CODE – 311** **$80,400 in Year 1**

Description: Multi-phase and reconductor from single-phase 8A to three-phase 1/0 ACSR on sections between 518916 and 518699 for 1.09 miles. Extend approximately 0.15 miles of single-phase 1/0 ACSR from section 518909 to section 518692. Transfer load between taps by opening at section 518892 and back feed to the new extension. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the taps were loaded to 49.2 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-12 for a geographic representation of the location of the project

Sectionalizing: Add two single-phase reclosers on section 518943. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: There are multiple single-phase taps in the area experiencing single-phase Design Criteria violations. This multi-phase and load transfer project alleviates the issue and improves reliability in an area with a large number of customers.

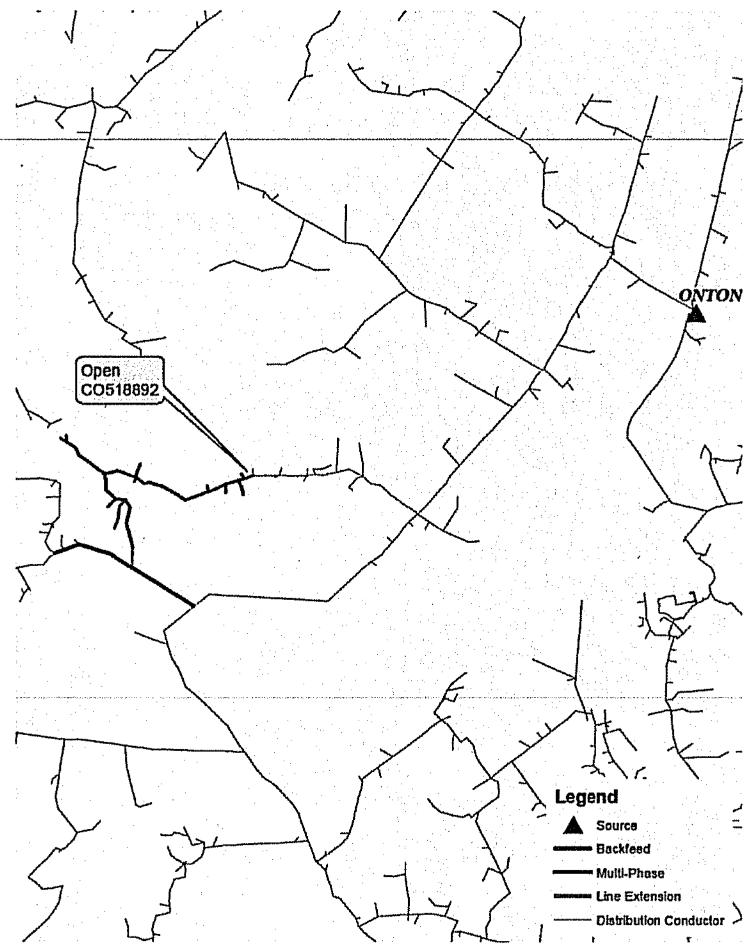

Figure 2-12: RUS CODE 311

Pleasant Ridge – Circuit 26-3

- **Location – Poplar Log Bridge Rd.**
- **RUS CODE – 312** **$92,700 in Year 3**

Description: Multi-phase and reconductor from single-phase 4 ACSR to three-phase 1/0 ACSR between sections 710655 and 710599 for 1.31 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 45.2 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-13 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 710730. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to overloading the available tie circuits.

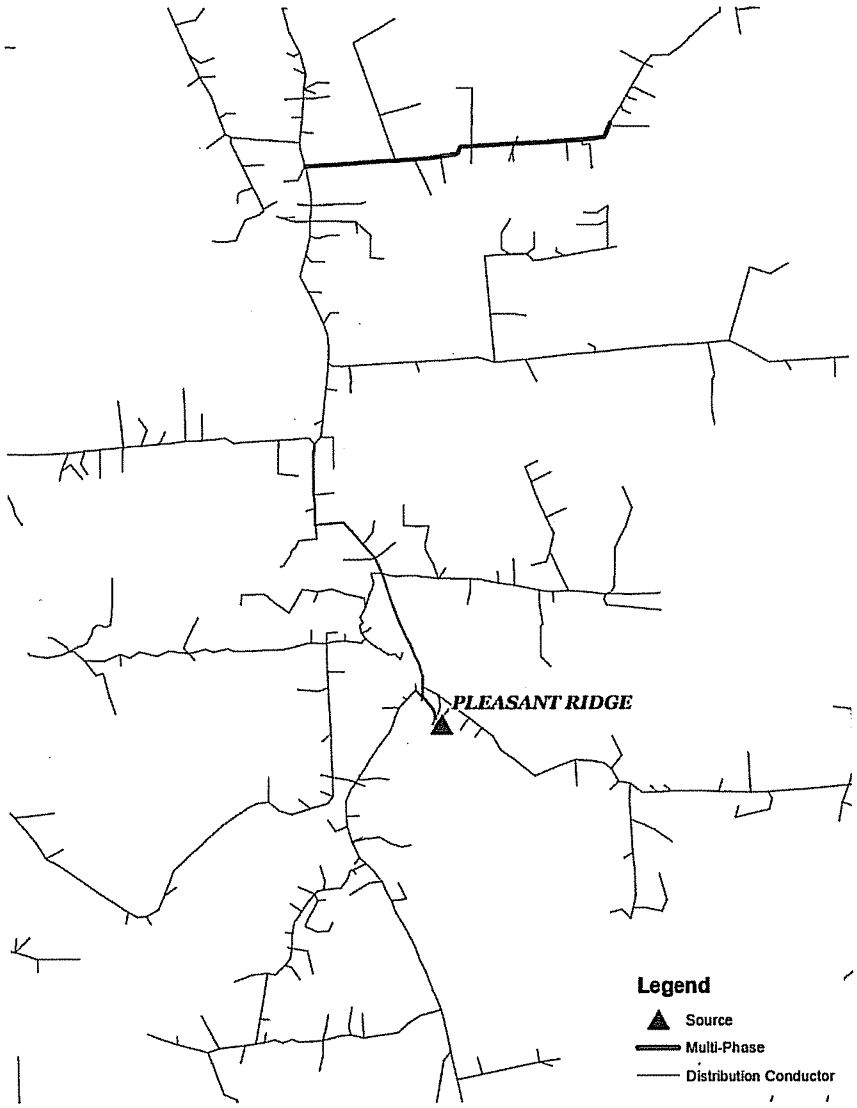

Figure 2-13: RUS CODE 312

Pleasant Ridge – Circuit 26-3

- **Location – Crane Pond Rd.**
- **RUS CODE – 313** **$47,900 in Year 2**

Description: Multi-phase and reconductor from single-phase 4 ACSR to three-phase 1/0 ACSR between sections 712541 and 712129 for 0.69 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 40.9 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-14 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 712541. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to the radial nature of the tap.

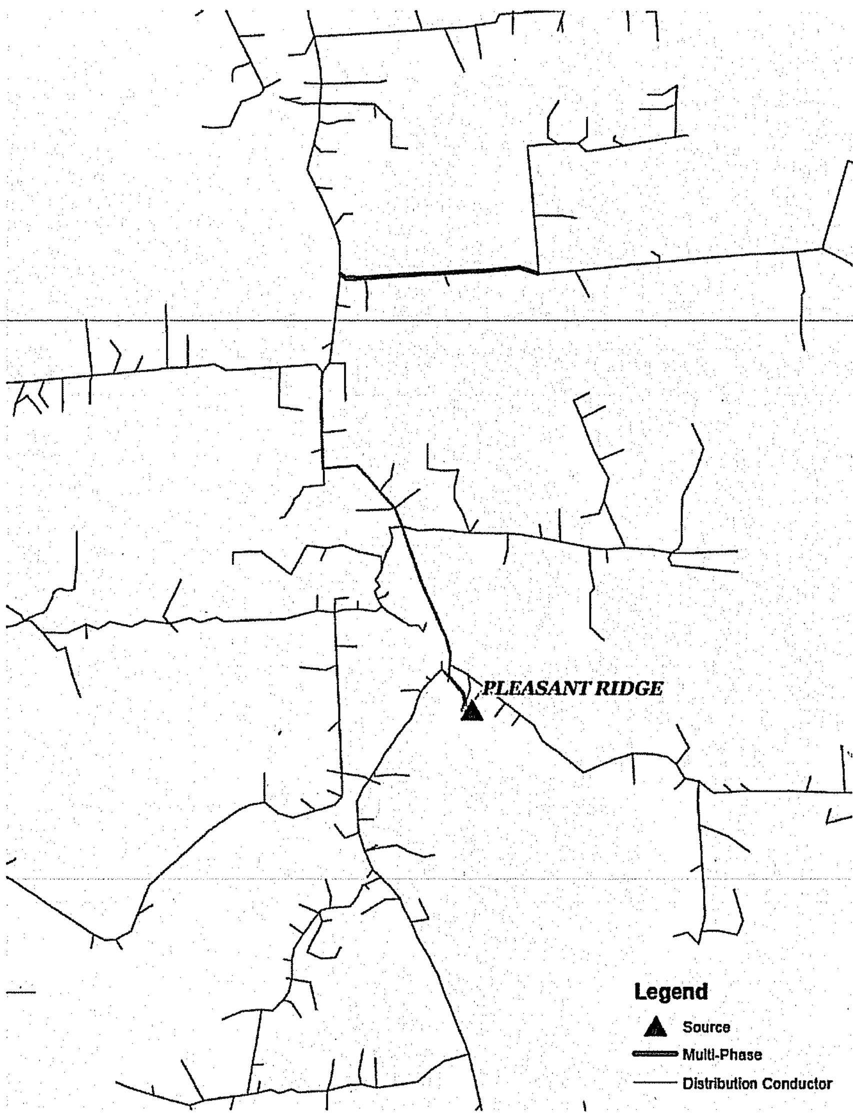

Figure 2-14: RUS CODE 313

Providence – Circuit 81-2

- **Location – Rose Creek Rd. near Coiltown**
- **RUS CODE – 314** **$162,300 in Year 3**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 1570 and 667 for 2.69 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on Providence were loaded to 34.0 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-15 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 1570. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to the radial nature of the tap.

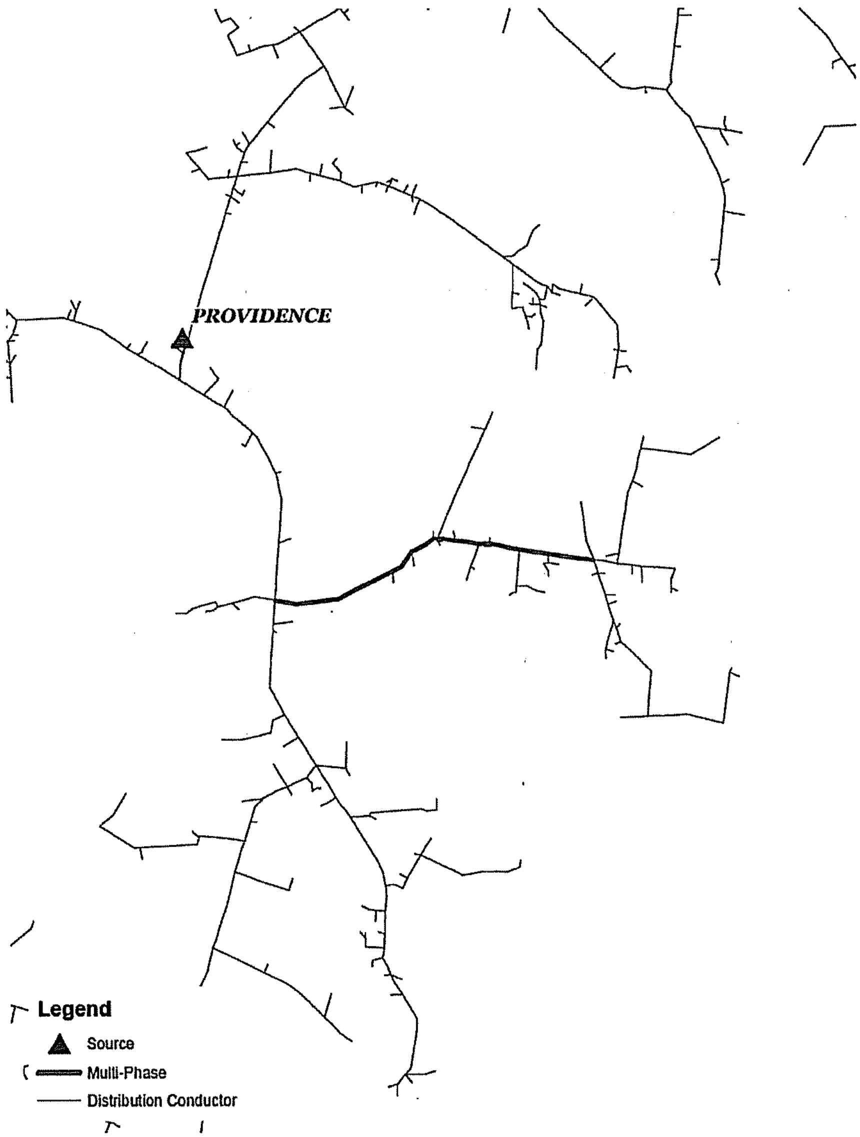

Figure 2-15: RUS CODE 314

Providence – Circuit 81-2

- **Location – Government Rd. near Dalton**
- **RUS CODE – 315** **$23,200 in Year 1**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 354 and 357 for 0.4 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on Providence were loaded to 26.0 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-16 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 479. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due overloading the available tie circuits.

Figure 2-16: RUS CODE 315

Race Creek – Circuit 82-3

- **Location – HWY 1078 near Baskett**
- **RUS CODE – 317** **$19,800 in Year 2**

Description: Multi-phase and reconductor from single-phase 2 ACSR to three-phase 2 ACSR on sections between 333913 and 334620 for 0.30 miles. Extend approximately 0.05 miles of single-phase 1/0 ACSR from section 334620 to section 334214. Transfer load between taps by opening at section 302202152 and back feed to the new extension. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the taps were loaded to 41.2 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-17 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 333931. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to overloading the available tie circuits.

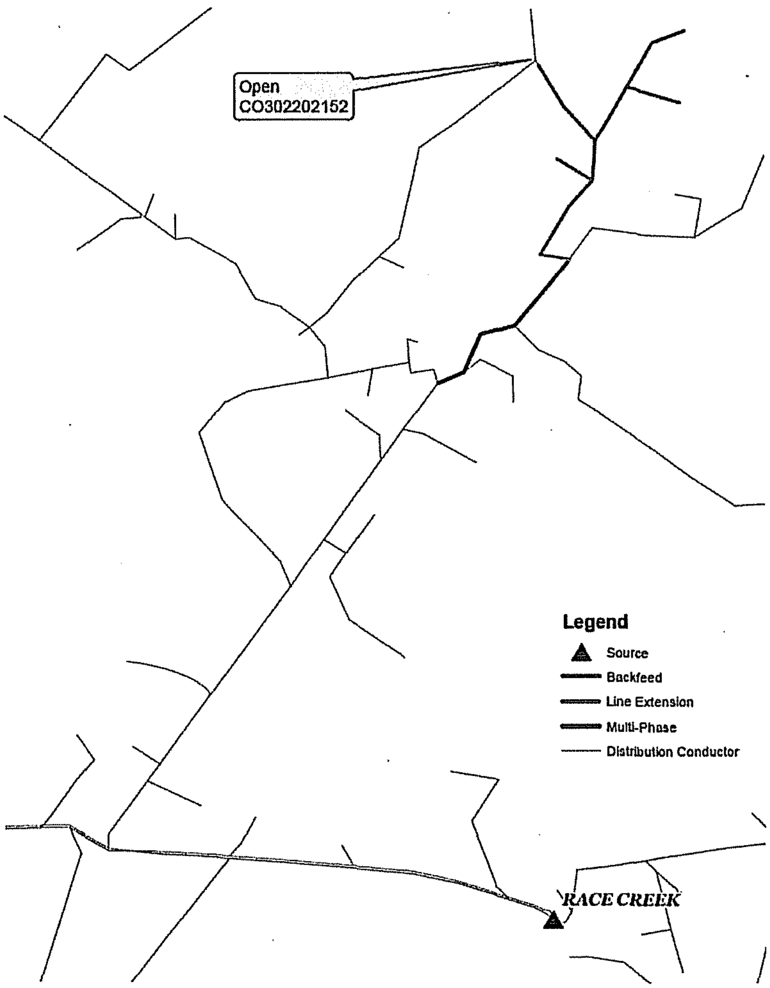

Figure 2-17: RUS CODE 317

Sacramento – Circuit 50-1

- **Location – Patterson Rd.**
- **RUS CODE – 318** **$15,100 in Year 1**

Description: Extend approximately 0.36 miles of single-phase 1/0 ACSR from section 521181 to section 521051. Transfer load from Sacramento Circuit 50-1 to Sacramento Circuit 50-4 by opening at section 500163 and back feed to the new extension. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 50.9 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-18 for a geographic representation of the location of the project.

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

Alternatives: No other transfers are available due to the radial nature of the area.

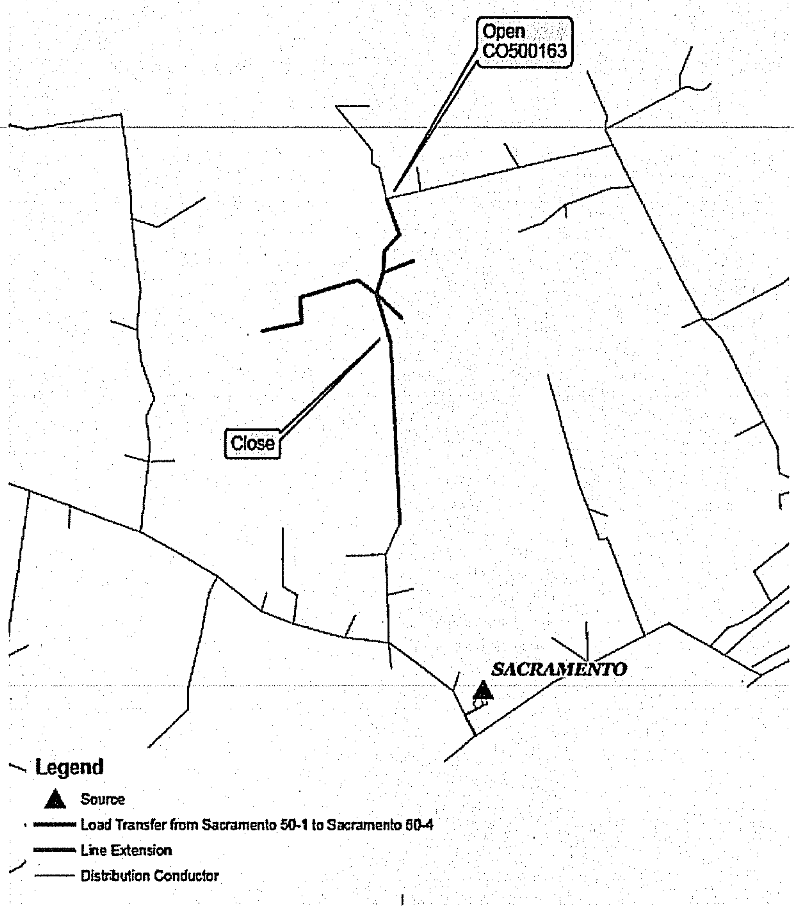

Figure 2-18: RUS CODE 318

Sebree – Circuit 84-1

- **Location – Handley Rd.**
- **RUS CODE – 331** **$53,300 in Year 1**

Description: Extend approximately 0.71 miles of three-phase 1/0 ACSR between sections 323212 and 323324. Balance load between taps by opening at section 323369 and back feed to the new extension. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 41.2 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-19 for a geographic representation of the location of the project.

Sectionalizing: Add three single-phase reclosers on the extension. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: There are no ties available to transfer load from this tap. The extension is the shortest route to use.

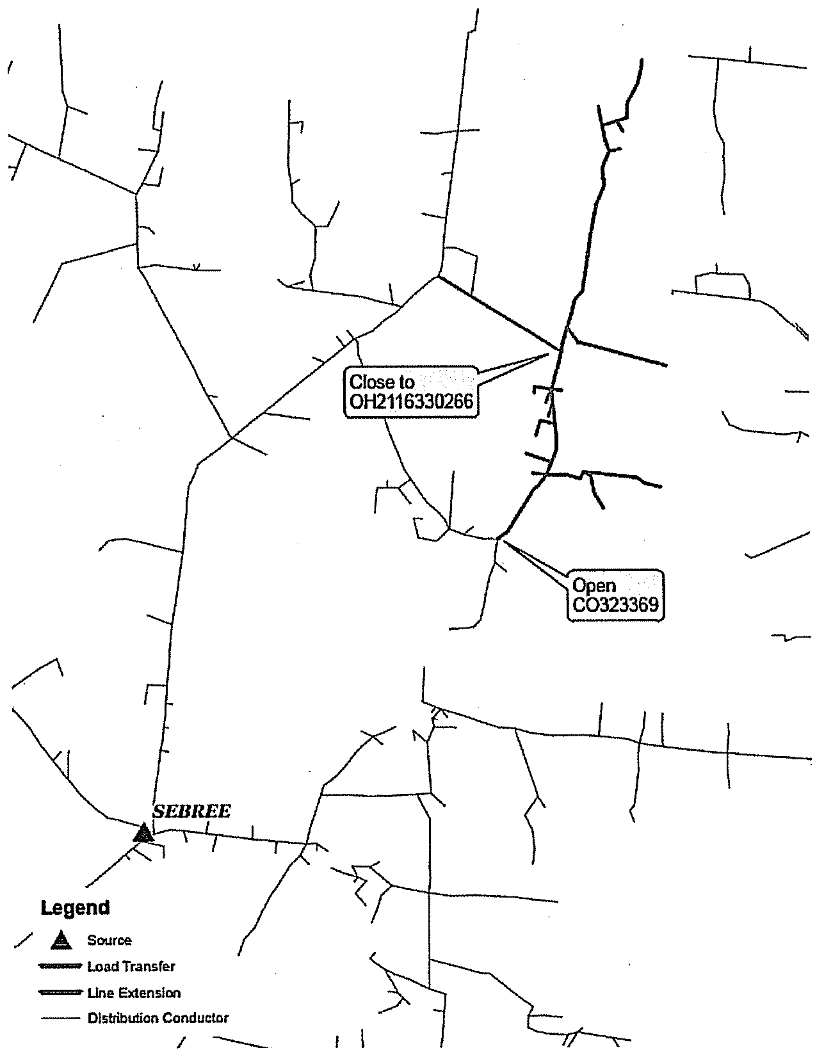

Figure 2-19: RUS CODE 331

Sebree – Circuit 84-3

- **Location – HWY 132 near Wildwood Golf Course**
- **RUS CODE – 332** **$135,300 in Year 1**

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR on sections between 309743 and 309679 for 1.99 miles. Balance load between taps by opening at section 309759 and back feed to section 309706. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 63.7 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-20 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 309992. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due to overloading the available tie circuits.

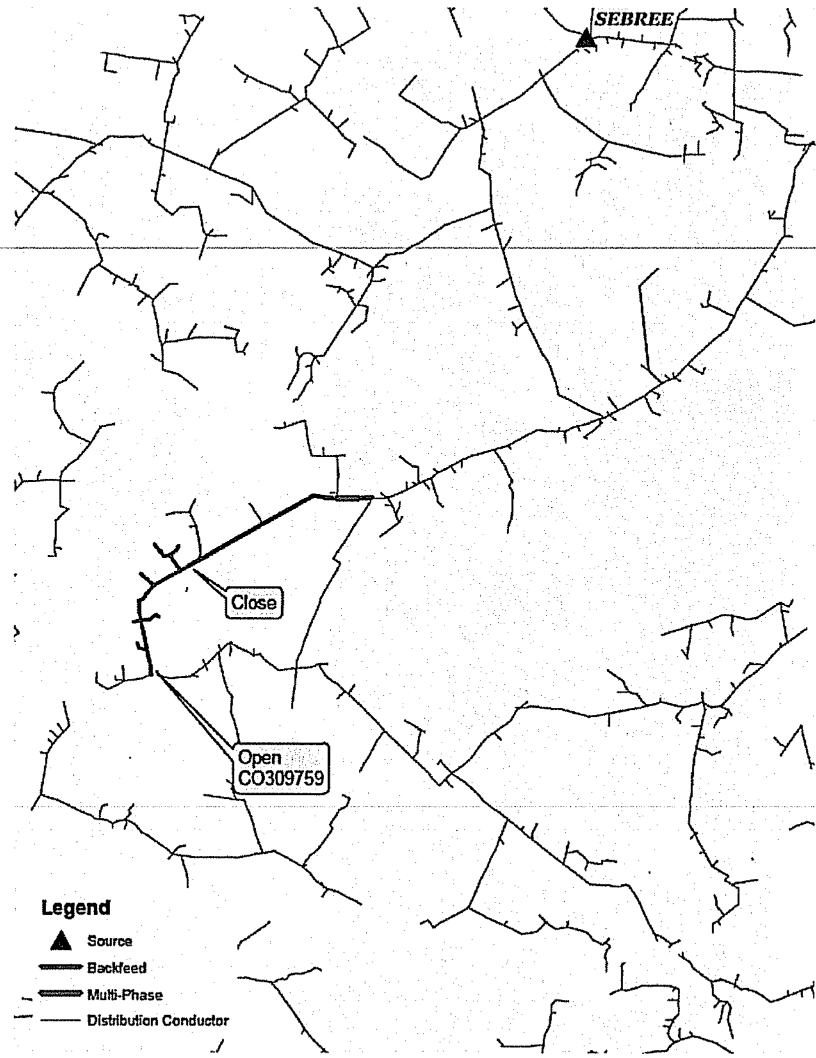

Figure 2-20: RUS CODE 332

South Dermont 1 – Circuit 18-1

- **Location – near Kohl's Department Store**
- **RUS CODE –No RUS funds required** **Year 3**

Description: Open from South Dermont 1 Circuit 18-1 at line section 728448 and close switch SW1696227798 to South Dermont 2 Circuit 18-2. The project is recommended to relieve substation transformer and conductor loading (Design Criteria #3 and #4). Before improvements, South Dermont 1 substation transformer loading was over 100% and Circuit 18-1 line sections were loaded up to 75% of capacity by the end of the work plan. With the recommended improvements, the substation transformer loading was reduced below 100% and conductor loading was reduced to 62%. See Figure 2-21 for a geographic representation of the location of the project.

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

Alternatives: The transfer project was selected to delay a larger scale substation transformer upgrade project at South Dermont Substation, including various conductor upgrades and new feeders.

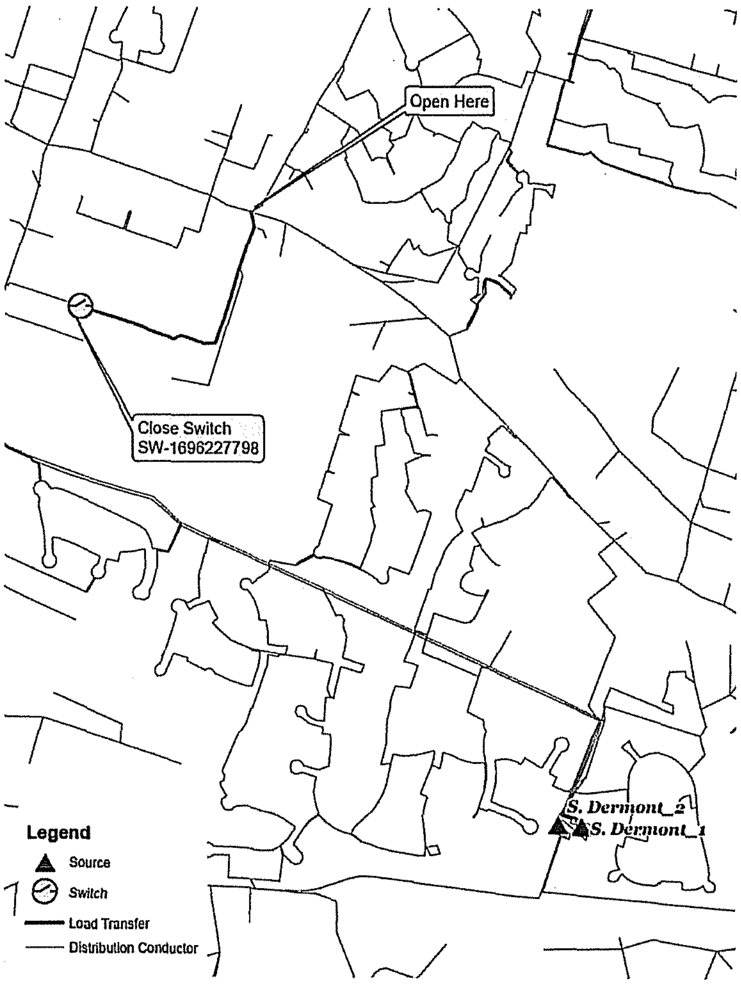

Figure 2-21: near Kohl's Department Store

South Dermont – Circuit 18-2

- **Location – HWY 54 & Chambers St.**
- **RUS funds are not requested** **Year 1**

Description: Open at switch SW702409 and close to Dermont Circuit 17-3 at switch SW700529. This project is recommended to relieve substation transformer loading (Design Criteria #3). Before improvements, South Dermont 1 substation transformer loading was over 100% of capacity by the end of the work plan. With the recommended improvements, the substation transformer loading was reduced below 100%. See Figure 2-22 for a geographic representation of the location of the project.

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

Alternatives: The transfer project was selected to delay a larger scale substation transformer upgrade project at South Dermont Substation, including various conductor upgrades and new feeders.

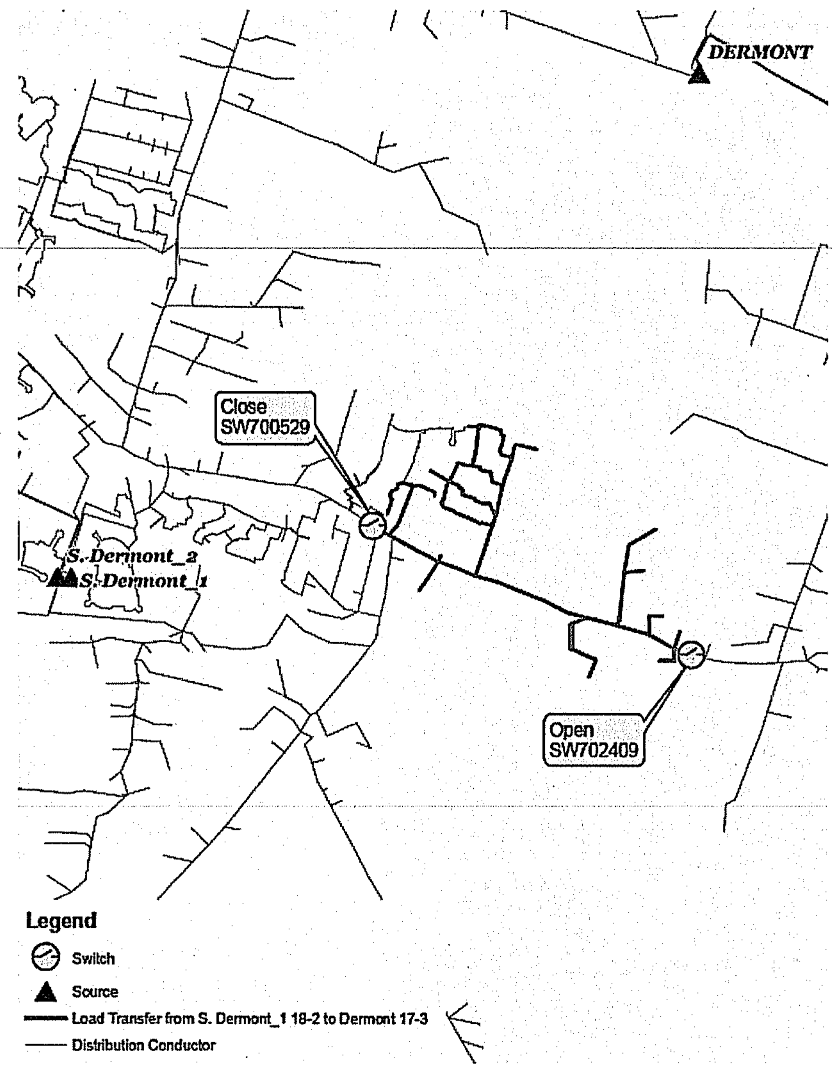

Figure 2-22: HWY 54 & Chambers St.

South Dermont 2 – Circuit 18-3

- **Location – Newbolt Rd.**
- **RUS CODE – 348 Carry-Over** **$14,500 in Year 1**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between -1110237418 and 705075 for 0.25 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 78.8 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-23 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 705116. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due overloading nearby single-phase taps.

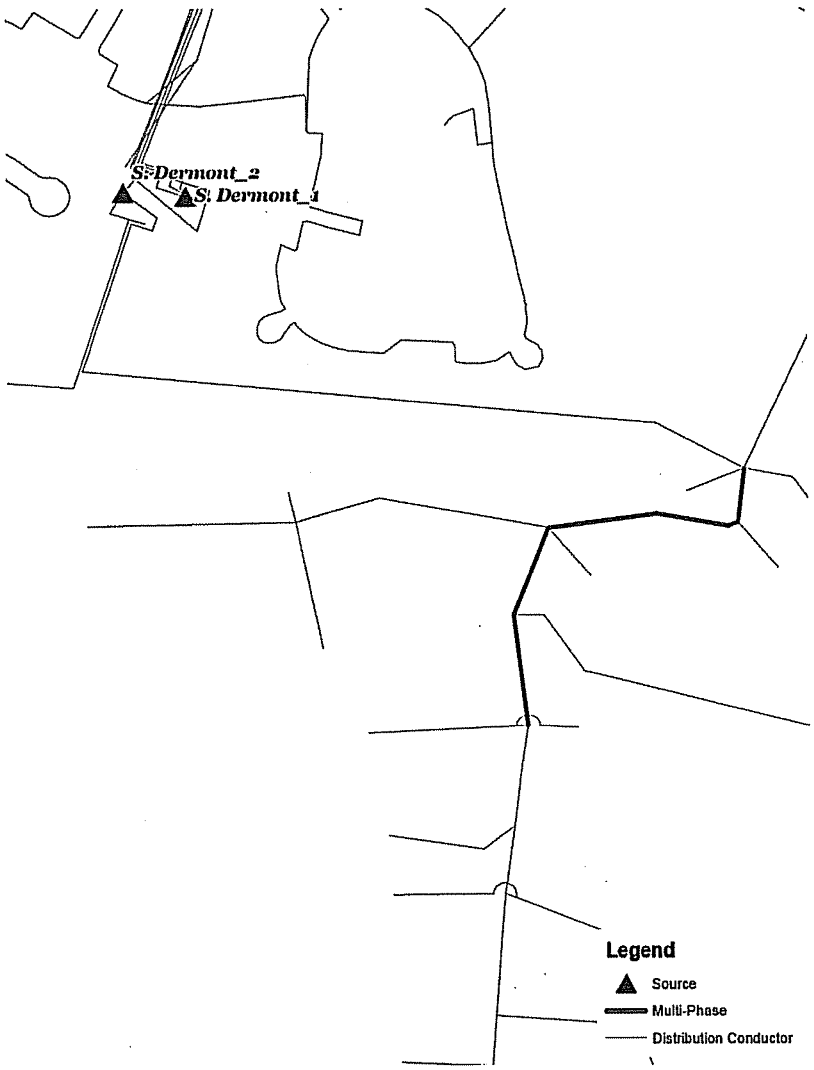

Figure 2-23: RUS CODE 348 Carry-Over

South Dermont 1 – Circuit 18-4

- **Location – Old Hartford Rd.**
- **RUS CODE – 333** **$13,700 in Year 1**

Description: Construct three-phase double circuit 336 ACSR from section 704527 to section 704467 for 0.07 miles. The following switching is included:

- Transfer the tap at section 704467 to the new extension to transfer load from South Dermont 1 Circuit 18-4 to Masonville Circuit 23-2.
- Transfer the tap at section 1919249073 from South Dermont Circuit 4 to South Dermont Circuit 6.

The project is recommended to relieve South Dermont 1 substation transformer loading and South Dermont Circuit 4 feeder loading (Design Criteria #3 and #13). Before improvements, substation transformer loading on South Dermont 1 was over 100% capacity and Circuit 4 loading was over 5 MW by the end of the work plan. With the recommended improvements, the substation transformer and circuit loading issue was alleviated. See Figure 2-24 for a geographic representation of the location of the project.

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

Alternatives: The transfer project was selected to delay a larger scale substation transformer upgrade project at South Dermont Substation, including various conductor upgrades and new feeders.

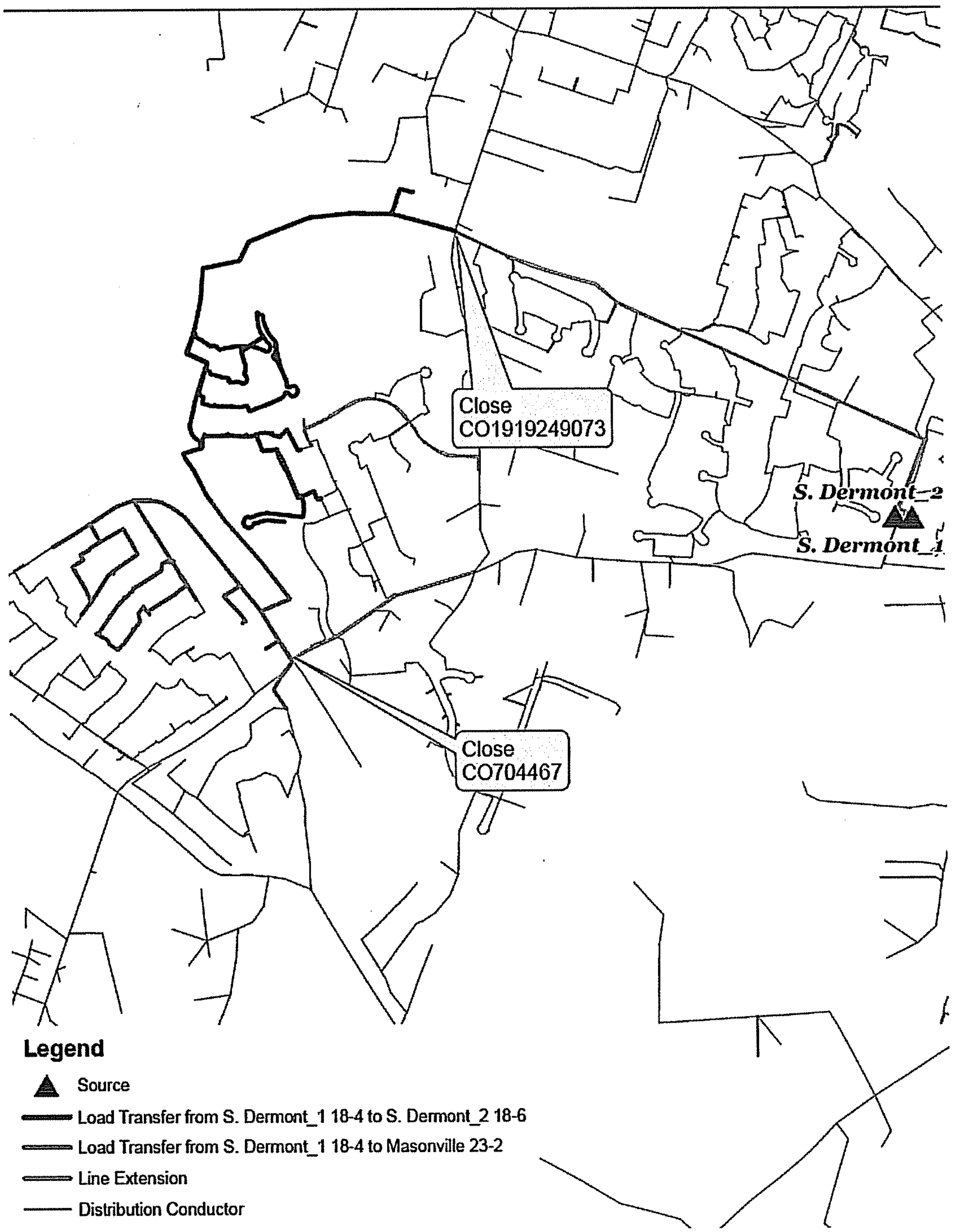

Figure 2-24: RUS CODE 333

South Hanson 1 – Circuit 53-1

- **Location – Shakerag Hills Rd.**
- **RUS CODE – 334** **$10,900 in Year 1**

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR on sections between -636819019 and 100908 for 0.16 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 42.8 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-25 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 100782. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due overloading the available tie circuits.

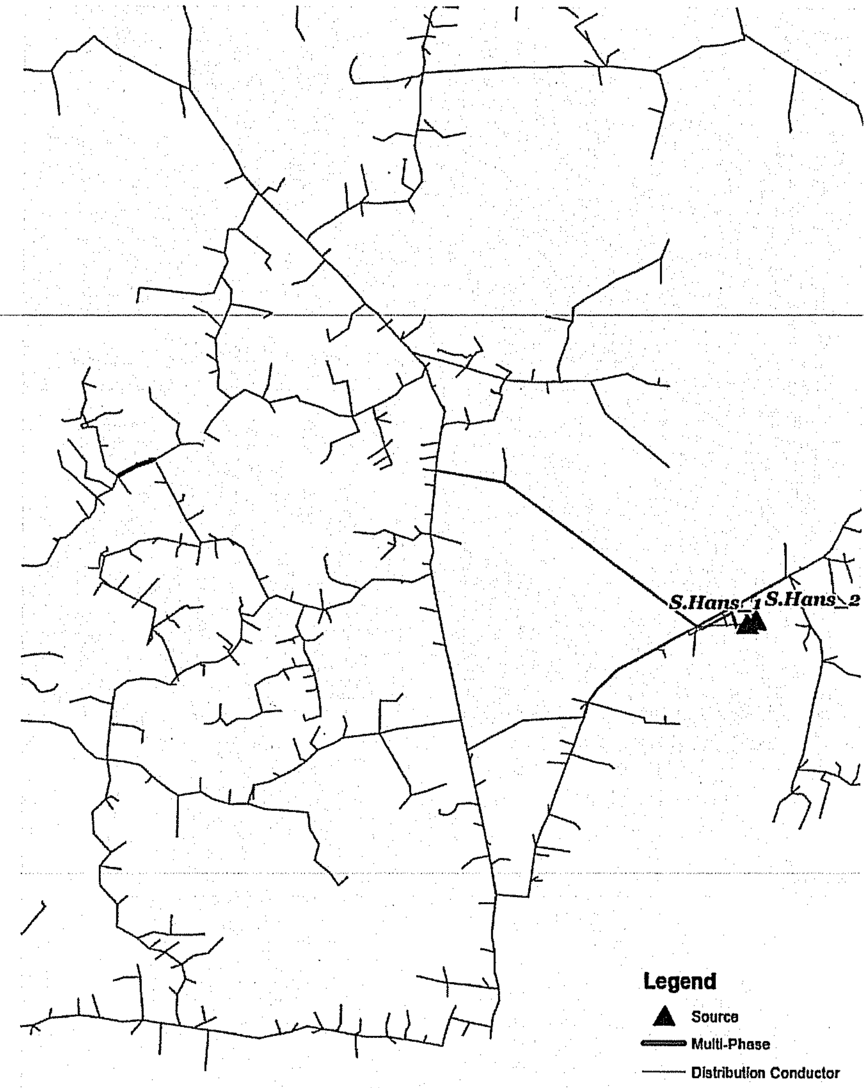

Figure 2-25: RUS CODE 334

South Hanson 1 – Circuit 53-1

- **Location – Daybreak Rd.**
- **RUS CODE – 335** **$44,400 in Year 2**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 103821 and 100876 for 0.50 miles and on sections between 100876 and 100765 for 0.25 miles. Transfer load from South Hanson 1 Circuit 53-1 to South Hanson Circuit 53-5 by opening at section 100897 and closing switch SW533838419. This project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 71.3 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-26 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 103821. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

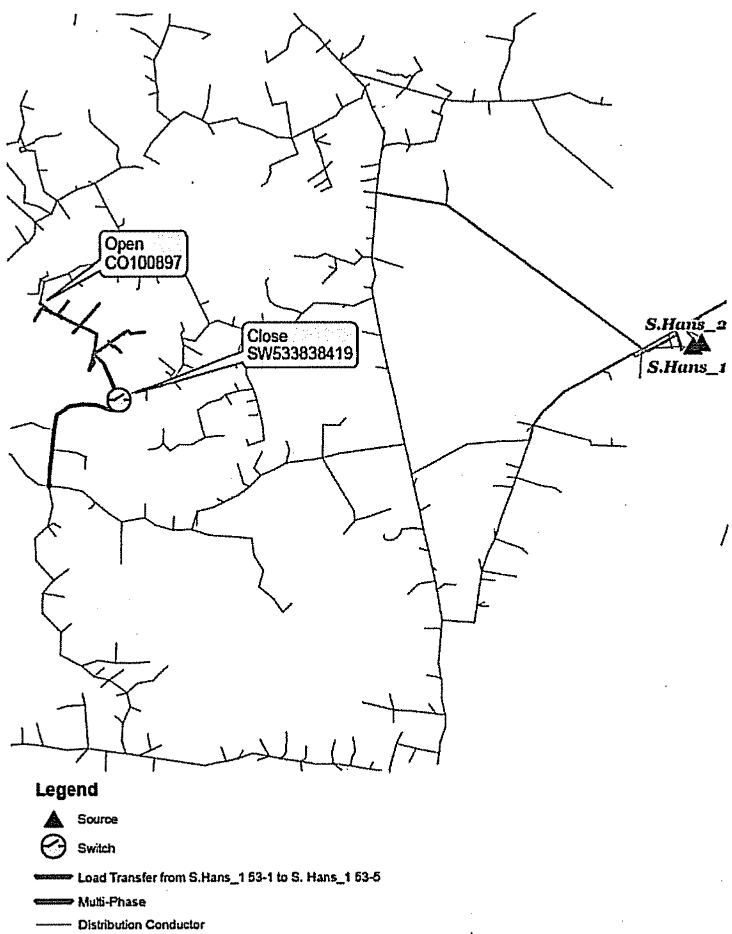

Figure 2-26: RUS CODE 335

South Hanson 1 – Circuit 53-5

- **Location – Yarbrough Hill Rd.**
- **RUS CODE – 350 Modified Carry-Over** **$21,900 in Year 1**

Description: Transfer load from South Hanson 1 Circuit 53-5 by opening at section 2507 and back feed section 899 to Providence Circuit 81-4. Convert from 12.47 kV to 24.9 kV from line section 2507 to OH2116330352 for 2.92 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 57.4 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-27 for a geographic representation of the location of the project.

Sectionalizing: Add one single-phase recloser on section OH2116330352. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

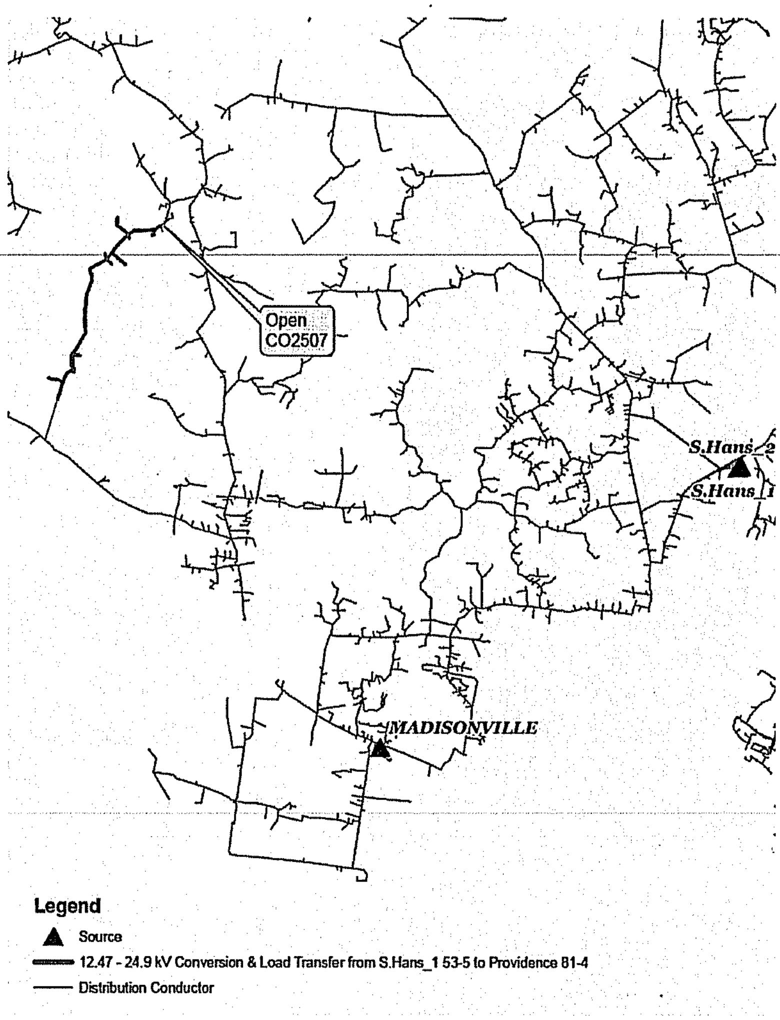

Figure 2-27: RUS CODE 350 Modified Carry-Over

South Hanson 1 & 2 – Circuits 53-5 & 53-6

- **Location – Buntin School Rd.**
- **RUS CODE – 336** **$64,600 in Year 3**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 1639690772 and 809 for 0.73 miles. Extend approximately 0.47 miles of single-phase 1/0 ACSR from section 1161 to section -2114026935. Open from South Hanson 1 Circuit 53-5 at section 101411 and back feed section -2114026935 to South Hanson Circuit 53-6. The project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the taps were loaded to 49.4 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-28 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 1639690772. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

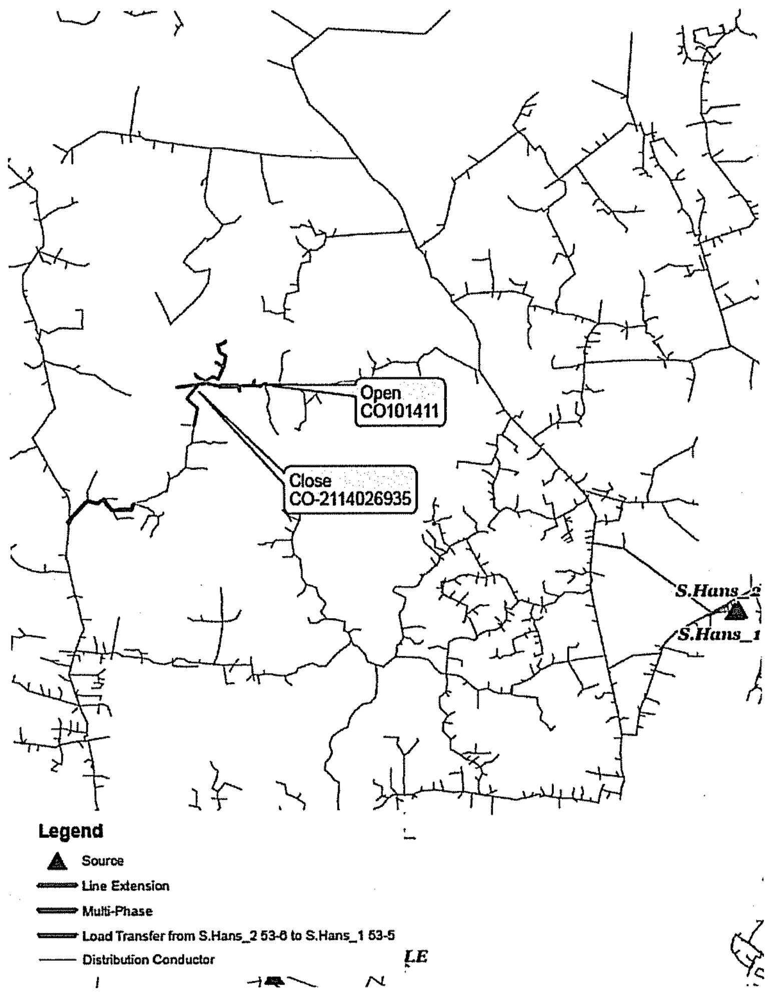

Figure 2-28: RUS CODE 336

South Hanson 2 – Circuit 53-6

- **Location – Slaughter Lake Rd.**
- **RUS CODE – 337** **$104,700 in Year 3**

Description: Multi-phase and reconductor from single-phase 6A to three-phase 1/0 ACSR on sections between 101686 and 512763 for 1.48 miles. The project is recommended to relieve single phase loading and improve low voltage (Design Criteria #1 and #2). Before improvements, sections on the tap were loaded to 56.0 A, and voltage was calculated to be 114.9 V by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated and voltage was improved to 120.7 V. See Figure 2-29 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section -1297862001. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due overloading the available tie circuits.

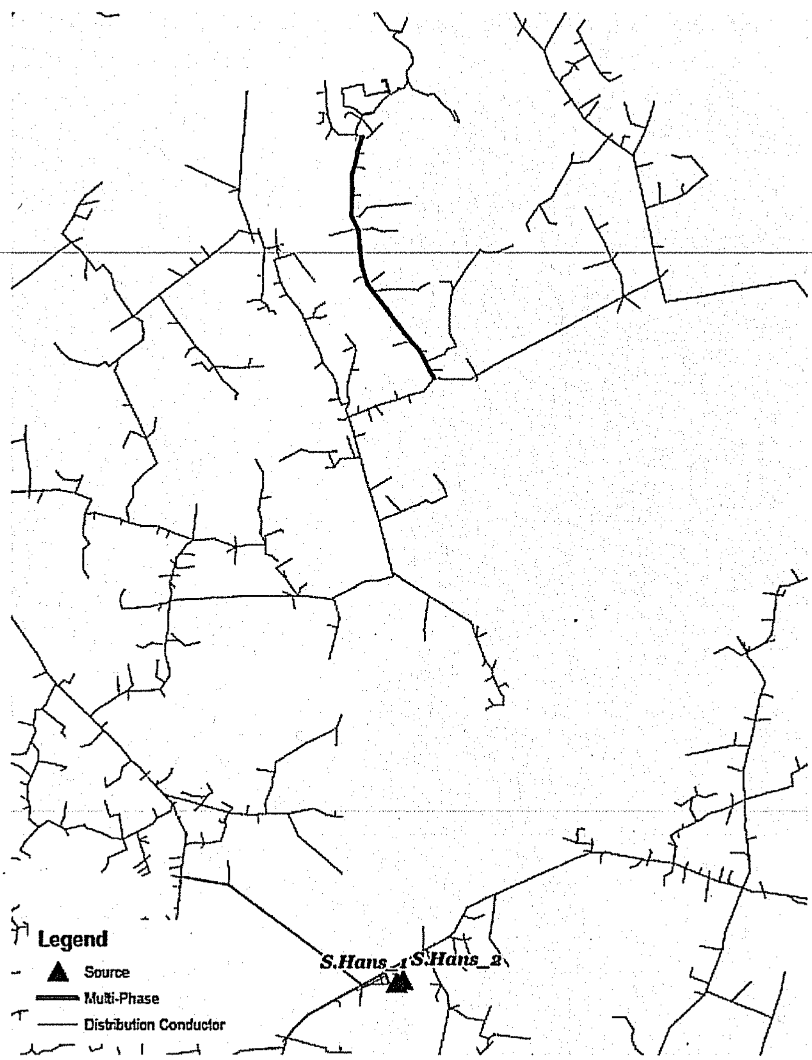

Figure 2-29: RUS CODE 337

South Hanson 2 – Circuit 53-6

- **Location – Shakerag Rd.**
- **RUS CODE – 338** **$17,400 in Year 1**

Description: Extend three-phase 1/0 ACSR from section -1078048288 to section 100741 for 0.10 miles. Multi-phase and reconductor from single-phase 2 ACSR to three-phase 2 ACSR between switch SW-82585161 and section 100741 for 0.17 miles. Transfer load from South Hanson Circuit 53-6 to South Hanson Circuit 53-1 by performing the following switching:

- Open at sections 101490 and 100857 and close switch SW-825851161
- Back feed section 100741 to the new extension on South Hanson Circuit 53-1

The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the taps were loaded to 41.3 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-30 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase fuses on sections -1242078086 and 100773. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

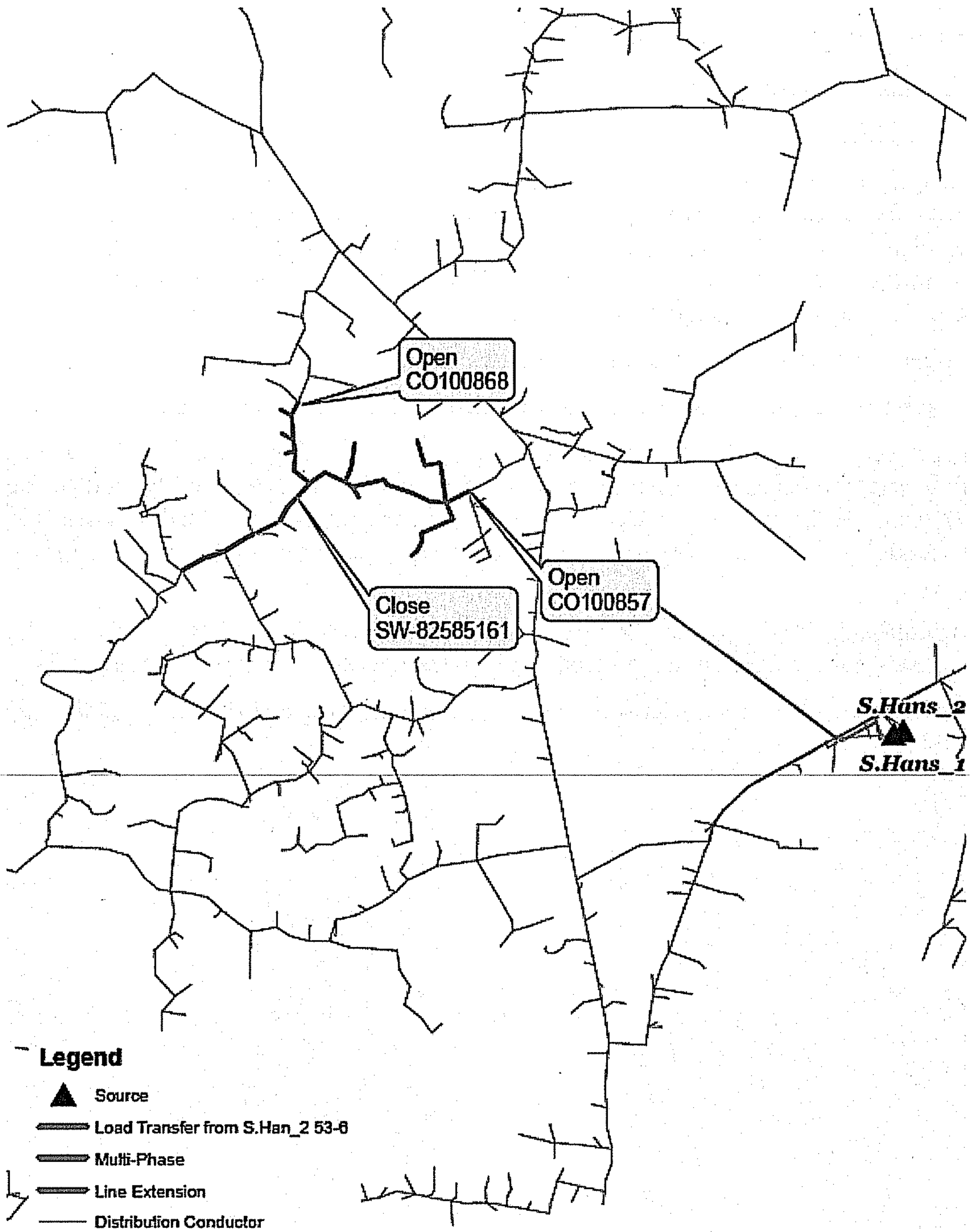

Figure 2-30: RUS CODE 338

Stanley – Circuit 21-1

- Location – Woods & Laketown Rd.
- RUS CODE – No RUS funds required **Year 1**

Description: Balance loading on Stanley Circuit 21-1 taps by opening switch SW39956766 and back feed to section 1585836839. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 47.3 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-31 for a geographic representation of the location of the project.

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

Alternatives: The transfer project alleviates the single-phase loading issue and avoids the cost of multi-phasing.

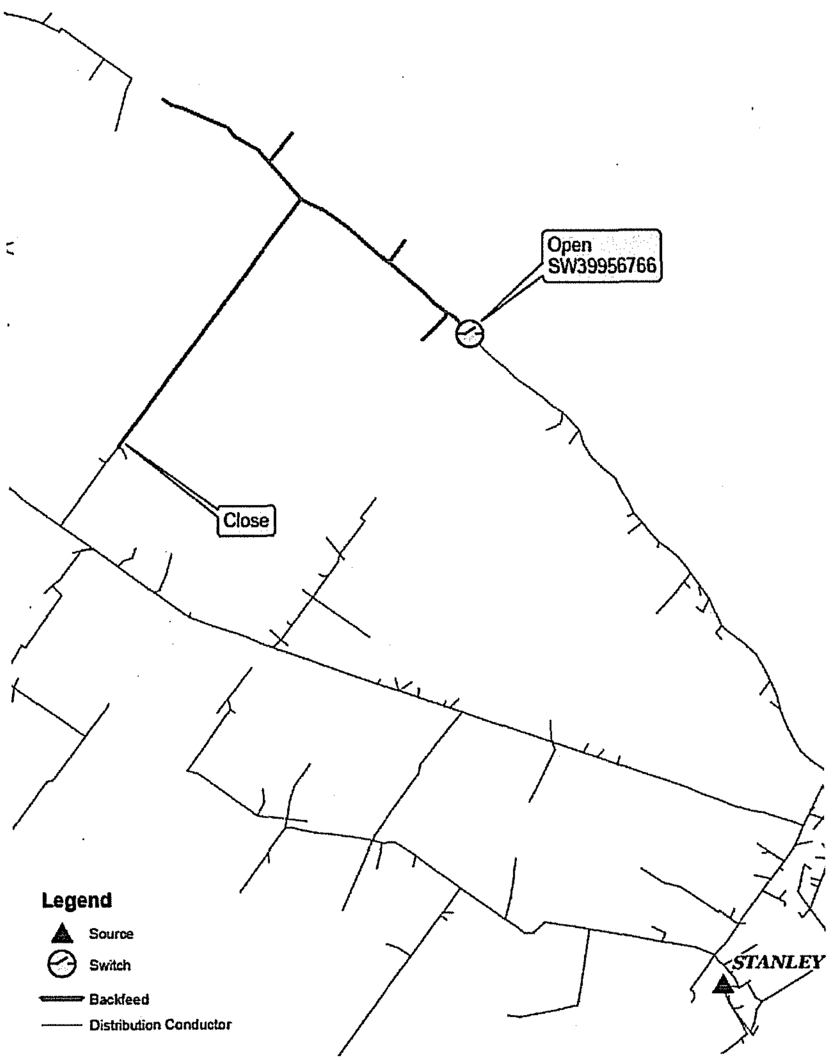

Figure 2-31: Woods & Laketown Rd.

Thruston – Circuit 11-2

- **Location – HWY 1389**
- **RUS CODE – 354 Modified Carry-Over** **$262,900 in Year 1**

Description: Reconductor from three-phase #4 CWC to three-phase 336 ACSR on sections between 721697 and 728086 for 2.12 miles. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 116.7 V was calculated on sections of Thruston 1 Circuit 11-2. With the recommended improvements, voltage improved to 122.4 V. See Figure 2-32 for a geographic representation of the location of the project.

Sectionalizing: Install (3) single-phase 100 A regulators on section 715578. See RUS CODE 604-06. Device coordination was reviewed based on the suggested improvements, and no improvements are recommended.

Alternatives: No load transfer options available due to expected deficiencies on Hawesville Circuit 4.

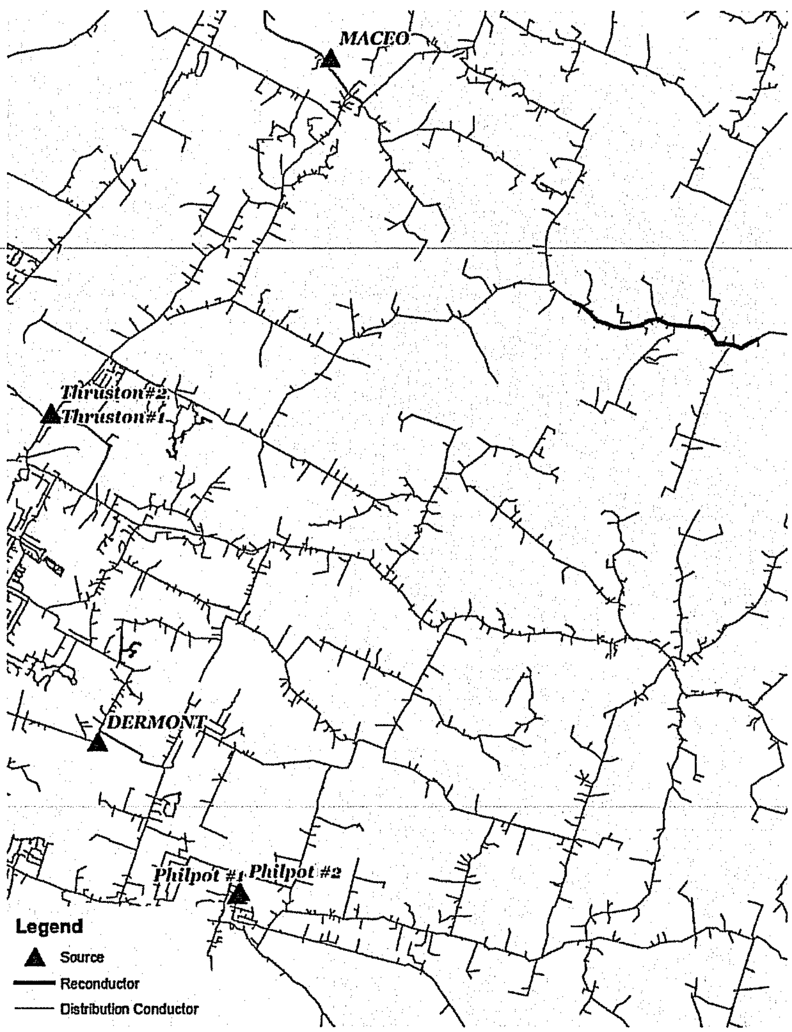

Figure 2-32: RUS CODE 354 Modified Carry-Over

Utica – Circuit 24-4

- **Location – KY 1207**
- **RUS CODE – 340** **$113,800 in Year 2**

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR on sections between 522297 and 529714 for 1.64 miles. The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 41.4 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-33 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 522297. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

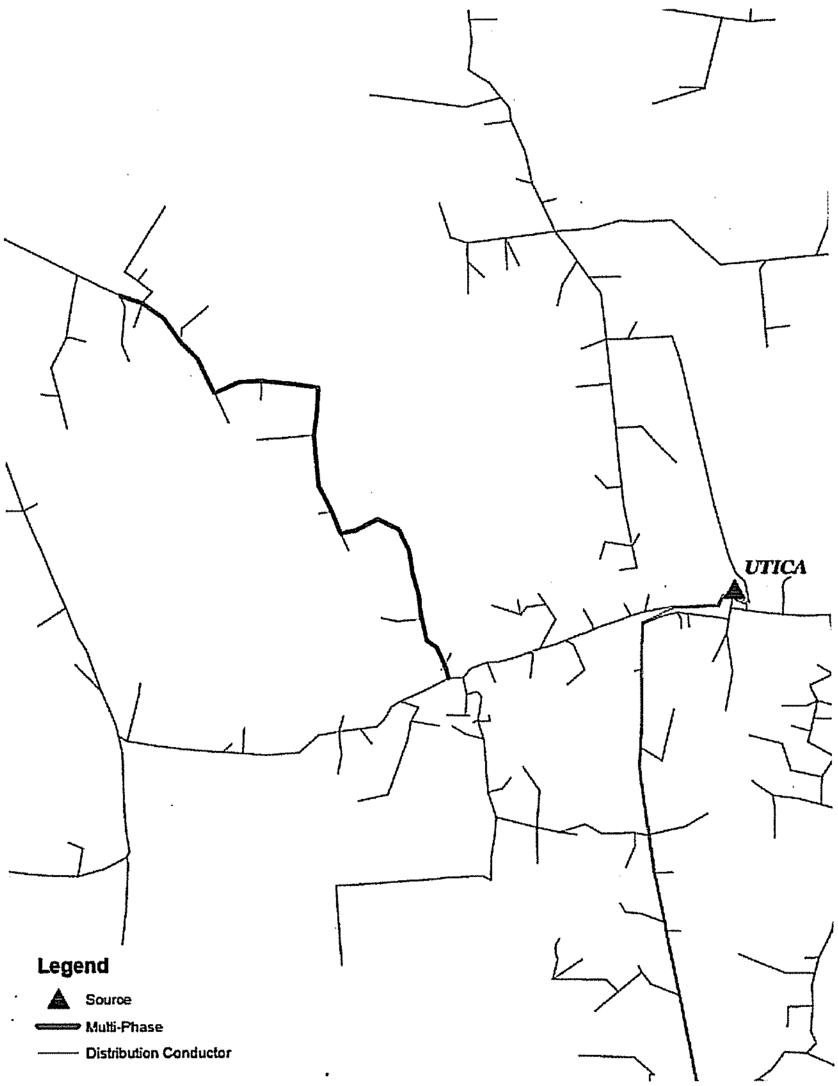

Figure 2-33: RUS CODE 340

Weaverton – Circuit 64-2

- **Location – Pruitt-Agnew Rd.**
- **RUS CODE – 341** **$57,800 in Year 1**

Description: Extend approximately 0.77 miles of three-phase 1/0 ACSR from section 332636 to section 332748. Transfer load by performing the following switching:

- Transfer section 332748 to the new extension.
- Open at section 324712 and back feed to section 325136 to transfer load to Niagara Circuit 80-2.

The project is recommended to relieve single phase loading and improve low voltage (Design Criteria #1 and #2). Before improvements, sections on the tap were loaded to 47.6 A, and voltage was calculated to be 117.3 V by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated and voltage was improved to 122.0 V. See Figure 2-34 for a geographic representation of the location of the project.

Sectionalizing: Add three single-phase reclosers on the extension. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

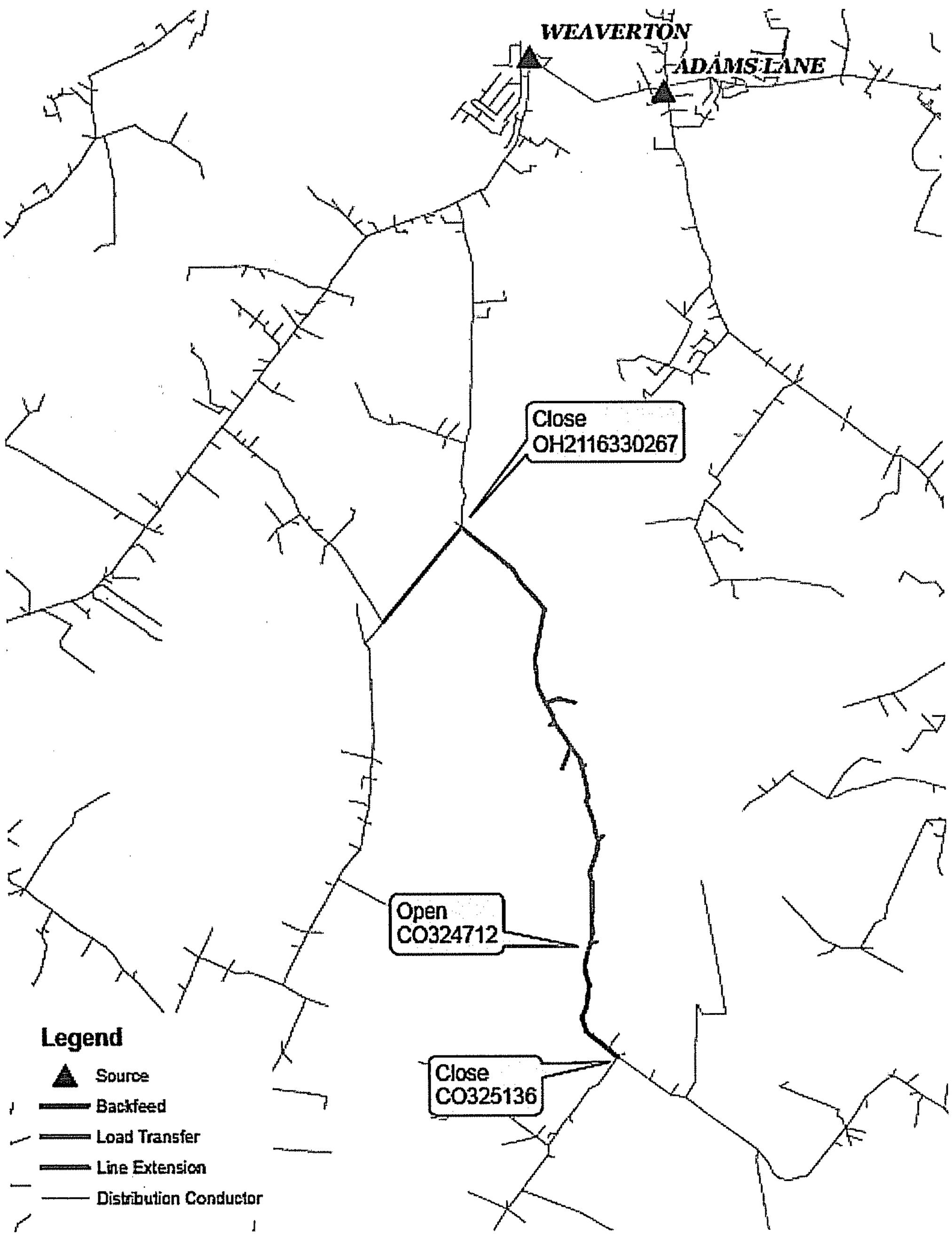

Figure 2-34: RUS CODE 341

Weaverton – Circuit 64-2

- Location – Rudy Rd.
- RUS CODE – 342 **$103,200 in Year 3**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 325331 and 325352 for 1.71 miles. The project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 50.8 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-35 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 325854. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due overloading the available tie circuits.

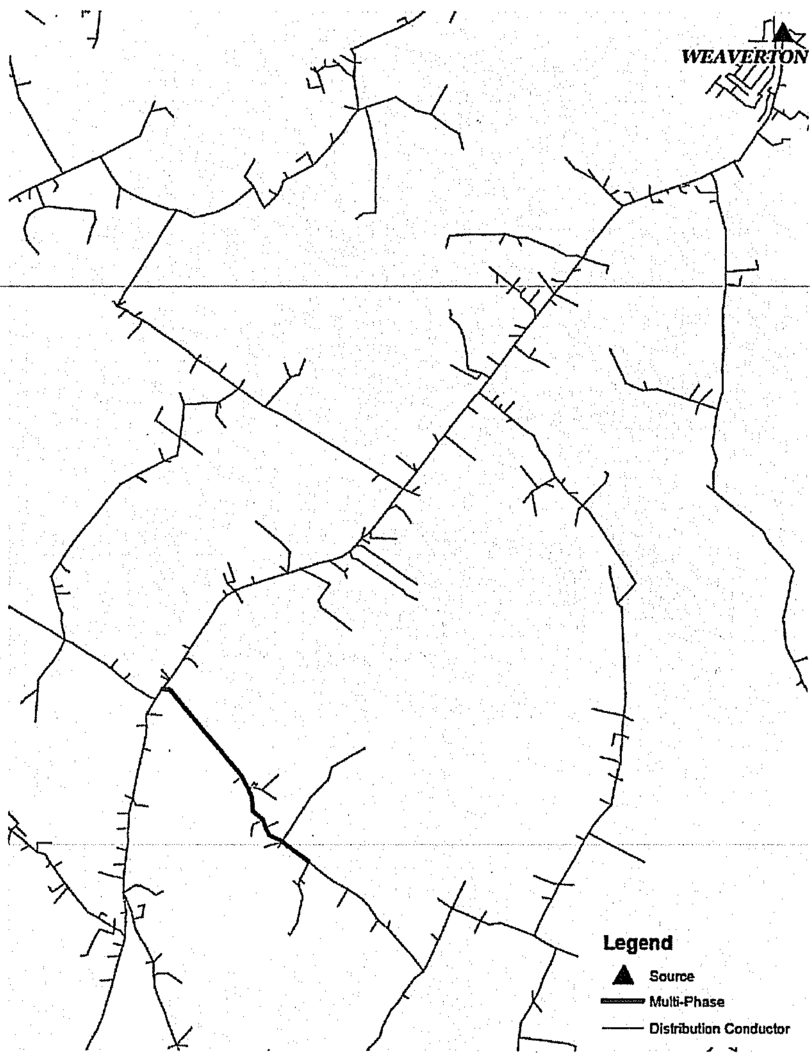

Figure 2-35: RUS CODE 342

Weaverton – Circuit 64-2

- **Location – HWY 41A near Cairo**
- **RUS CODE – 343** **$88,200 in Year 1**

Description: Multi-phase from two-phase 2 ACSR to three-phase 2 ACSR on sections between 325414 and 325439 for 1.52 miles. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 115.5 V was calculated on sections of Weaverton Circuit 64-2. With the recommended improvements, voltage improved to 120.7 V. See Figure 2-36 for a geographic representation of the location of the project.

Sectionalizing: Add one single-phase recloser on section 325869. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due overloading the available tie circuits.

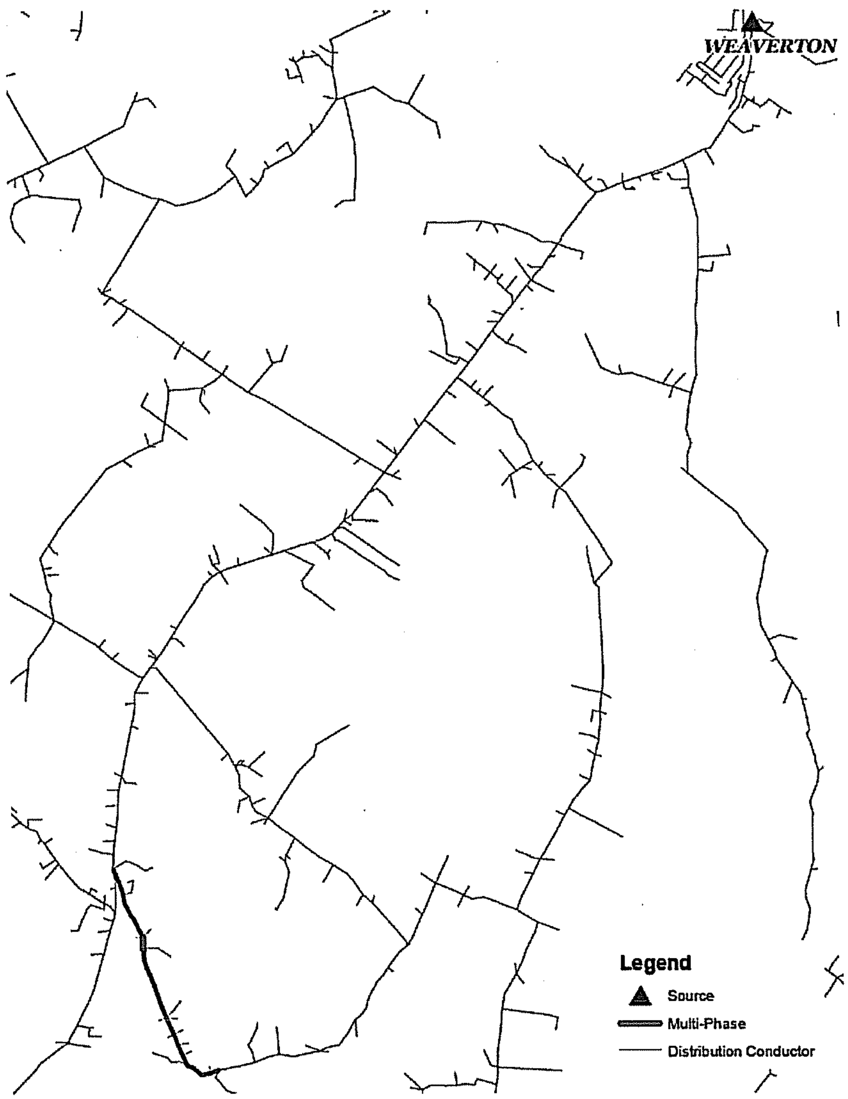

Figure 2-36: RUS CODE 343

Weaverton – Circuit 64-2

- **Location – Old Madisonville Rd.**
- **RUS CODE – 355 Modified Carry-Over** **$382,700 in Year 1**

Description: Reconductor from three-phase 3/0 ACSR to three-phase double circuit 336 ACSR from the substation to section 332291 for 1.96 miles. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 114.8 V was calculated on sections of Weaverton Circuit 64-2. With the recommended improvements, voltage improved to 118.7 V. See Figure 2-37 for a geographic representation of the location of the project.

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

Alternatives: No transfers are available due overloading the available tie circuits. The double circuit is recommended to coincide with a new feeder out of Weaverton recommended in the 2010 Long Range Plan (LRP).

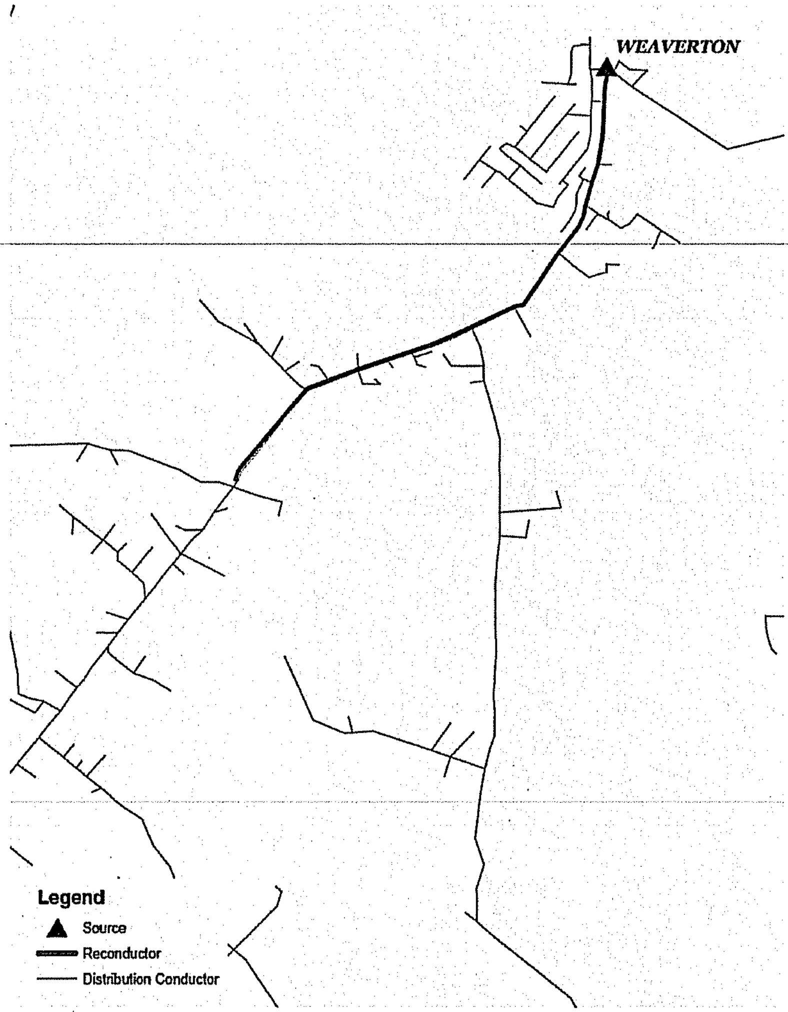

Figure 2-37: RUS CODE 355 Modified Carry-Over

Weberstown – Circuit 14-1

- **Location – Goering Rd.**
- **RUS CODE – 344** **$162,400 in Year 3**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 1353500175 and 725510 for 2.5 miles. Extend single-phase 2 ACSR from section 725512 to 725534 for 0.29 miles. Perform the following switching:

- Open switch SW97333537 and close switch SW857188497 to transfer load from Hawesville Circuit 13-3 to Weberstown Circuit 14-1.
- Open section 725547 and back feed to the new extension to transfer more load to Weberstown Circuit 14-1.

The project is recommended to relieve single phase loading (Design Criteria #2). Before improvements, sections on the Weberstown tap were loaded to 49.0 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-38 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 1353500175. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: The ties are both exceeding single-phase loading limits. Multi-phasing one route and completing the load transfers avoids additional costs of multi-phasing both taps.

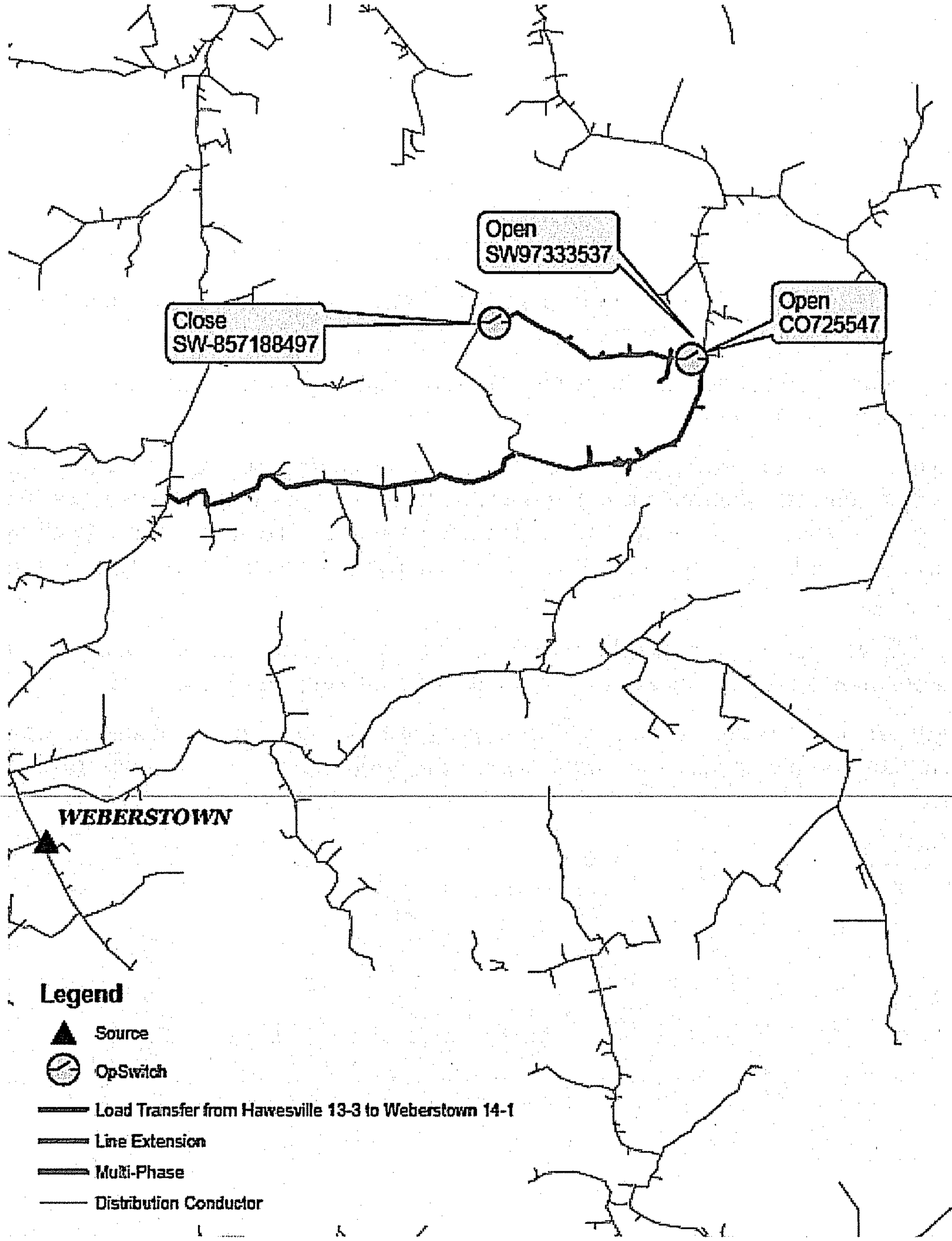

Figure 2-38: RUS CODE 344

Whitesville – Circuit 15-3

- **Location – Morgantown Rd.**
- **RUS CODE – 345** **$3,000 in Year 1**

Description: Extend approximately 0.08 miles of single-phase 2 ACSR from section 711266 to 711245. Balance load on Circuit 15-3 taps by opening at section 711243 and back feed to the new extension. The project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 41.5 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-39 for a geographic representation of the location of the project.

Sectionalizing: Add a single-phase fuse on the extension. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due to the radial nature of the tap.

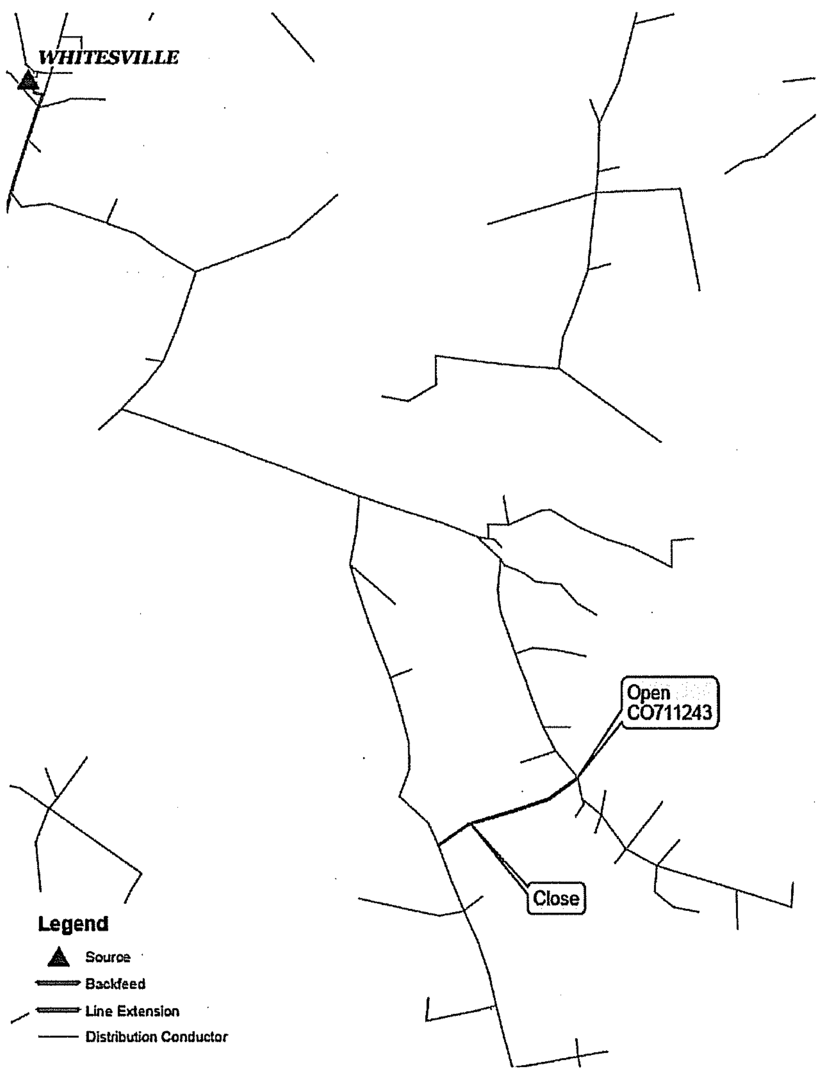

Figure 2-39: RUS CODE 345

Whitesville – Circuit 15-3

- **Location – Narrows Rd.**
- **RUS CODE – 346** **$89,800 in Year 1**

Description: Multi-phase from single-phase 1/0 ACSR to three-phase 1/0 ACSR on sections between 713405 and 713429 for 1.32 miles. The project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 47.7 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-40 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 713529. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No transfers are available due to the radial nature of the tap.

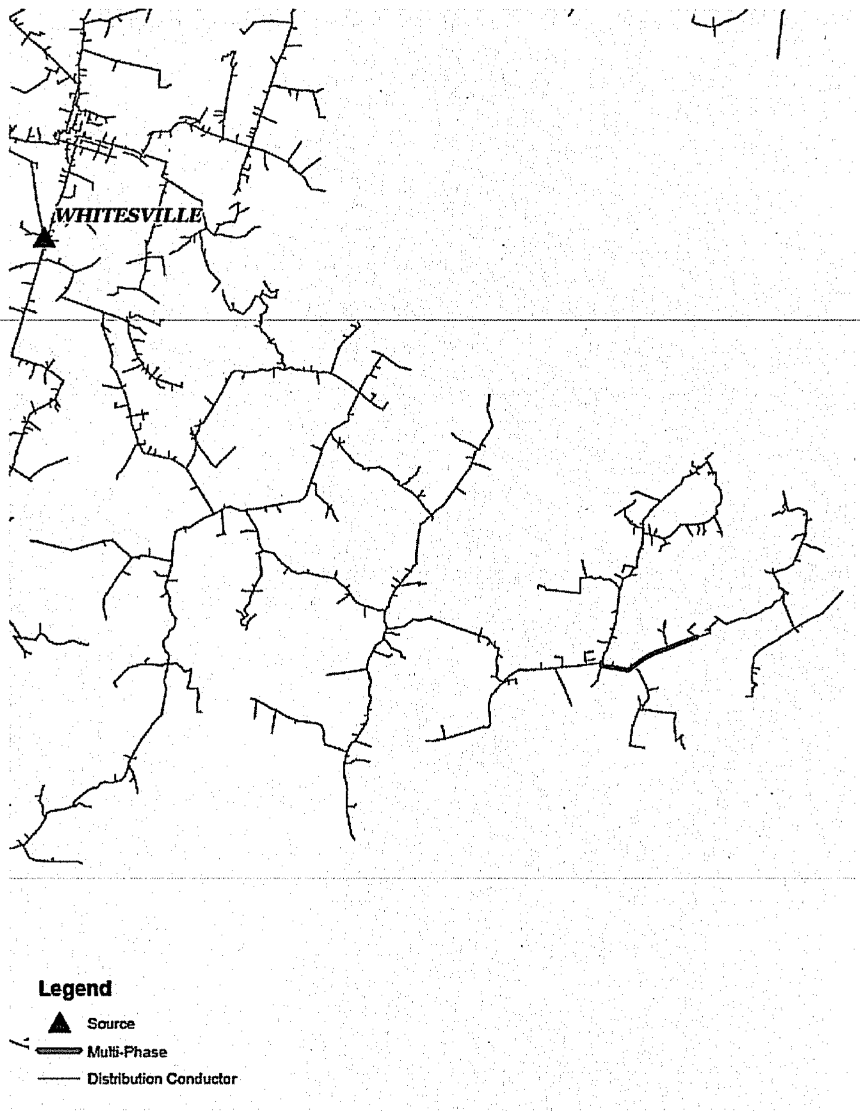

Figure 2-40: RUS CODE 346

Whitesville – Circuit 15-3

- **Location – Magan Rd.**
- **RUS CODE – 356** **$94,500 in Year 1**

Description: Reconductor from three-phase 2 ACSR to three-phase 4/0 ACSR on sections between 713281 and 713108 for 1.26 miles. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 116.3 V was calculated on the tap. With the recommended improvements, voltage improved to 118.3 V. See Figure 2-41 for a geographic representation of the location of the project.

Sectionalizing: Relocate regulator RG300098 to section 1500981325. See RUS CODE 604-15. Device coordination was reviewed based on the suggested improvements, and no improvements are recommended.

Alternatives: There is already a regulator on the tap, and there are no ties available for transferring load. Therefore, the reconductor project was selected.

Figure 2-41: RUS CODE 356

Zion – Circuit 90-3

- **Location – Spottsville Bluff City Rd.**
- **RUS CODE – 357** **$66,400 in Year 3**

Description: Multi-phase from single-phase 2 ACSR to three-phase 2 ACSR on sections between 336992 and 336883 for 1.10 miles. The project is recommended to relieve single-phase loading (Design Criteria #2). Before improvements, sections on the tap were loaded to 42.8 A by the end of the work plan. With the recommended improvements, the single-phase loading issue was alleviated. See Figure 2-42 for a geographic representation of the location of the project.

Sectionalizing: Add two single-phase reclosers on section 336992. The cost is not included in this project, but is in the general sectionalizing fund 603.

Alternatives: No other transfers are available due to the radial nature of the tap.

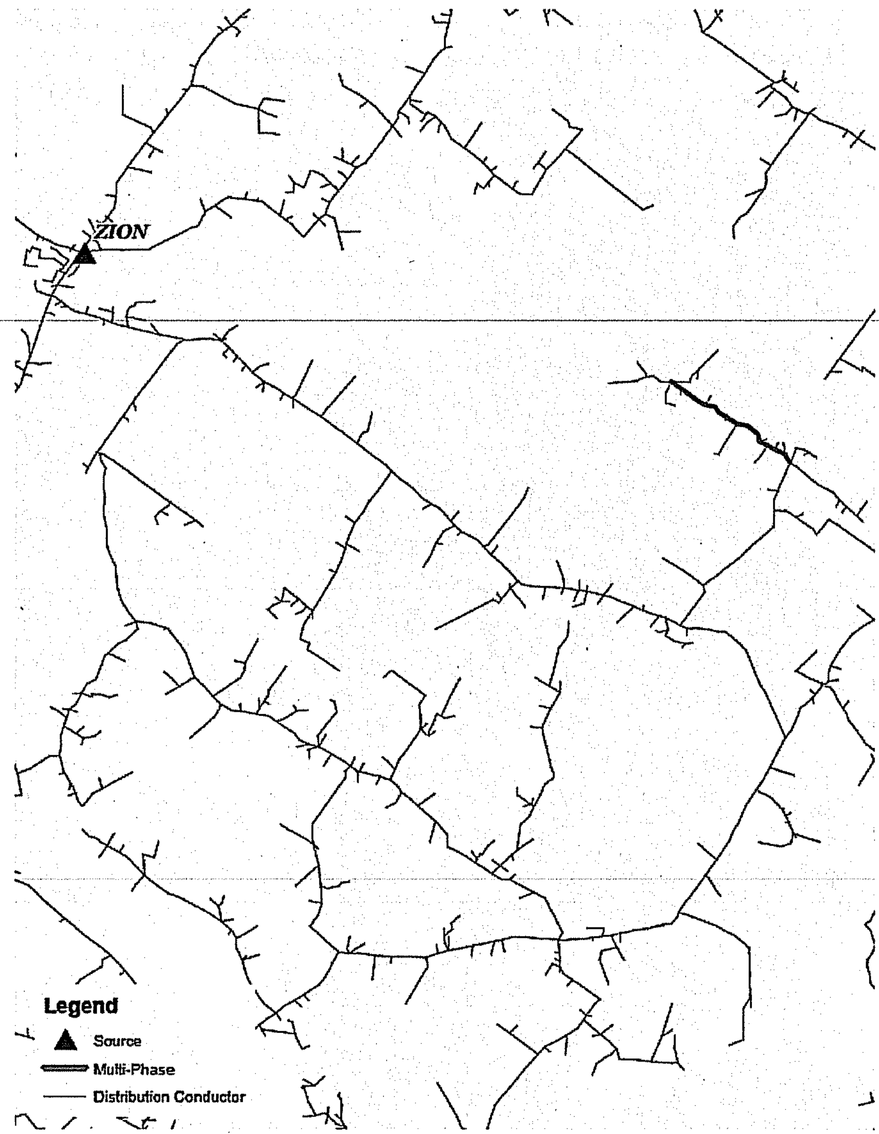

Figure 2-42: RUS CODE 357

System-Wide

- **RUS CODE – 371** **$795,700**

Description: Replace approximately 2.0 miles/year of underground cable on the Kenergy system. Based on existing records, Kenergy is beginning to experience an increase in failures on vintage XLP, unjacketed underground cable with concentric neutrals. Underground sections with three failures are replaced as indicated in Design Criteria #5. Kenergy is projecting approximately eight miles of underground cable should be replaced over a four-year period. It is anticipated that half of the new underground cable will require boring to replace the faulted cable.

- **RUS CODE – 372** **$3,199,100**

Description: Reconductor approximately 21.79 miles/year in Year 1, 25.0 miles/year in Year 2, and 21.55 miles/year in Year 3 of single-phase and three-phase copper and #4 ACSR conductors with ACSR (size determined by load requirements), respectively, to replace aging conductor and improve reliability. It was estimated that 33% of the total conductor replacement is three-phase, and the remaining is single-phase based on the program in the previous CWP.

2.6 Substation Changes

Substation changes were required for the addition a new feeder and miscellaneous substation work. Estimated costs were inflated by 2.0% per year based on the anticipated year of construction. The following changes are recommended for the 2010-2013 CWP.

System-Wide

- **RUS CODE – 501** **$1,039,517**

Description: Includes system-wide miscellaneous substation work that is anticipated to arise during the 2010-2013 CWP.

Dermont – Circuit 17-1

- **RUS CODE – 502** **$34,300 in Year 3**

Description: Using an existing feeder bay at Dermont Substation, add a breaker, switches, and associated bus to construct the feeder recommended in RUS CODE 304.

2.7 Sectionalizing Equipment

Specific locations for sectionalizing equipment were not identified in this report. However, based on discussions with Kenergy staff, the cost for sectionalizing equipment was estimated to be $1,182,483 for the 2010-2013 CWP period. This is the based on the 2010 sectionalizing budget, and the cost was inflated by 2.0% per year.

- **RUS Code – 603** **$1,182,483**

Description: Purchase sectionalizing equipment as needed to maintain adequate and reliable service.

Table 2-9
Sectionalizing Equipment

RUS Code	Category Description	2010-2011	2011-2012	2012-2013	TOTAL
603	Sectionalizing Equipment	$386,382	$394,110	$401,992	$1,182,483

2.8 Conductor Replacements

This is a system-wide fund anticipated during the 2010-2013 CWP associated with construction to replace aged-deteriorating lines including structure changes. The total three-year budgeted values were provided by Kenergy and spread over the timeline.

- **RUS Code – 608** **$4,863,692**

2.9 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 2.0% per year to the recommended year of the 2010-2013 CWP.

Geneva – Circuit 63-2

- **Location – HWY 60 near Corydon Geneva Rd.**
- **RUS CODE – 604-03** **$31,200 in Year 3**

Description: Install three single-phase 100-Amp regulators on section 331740. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 117.9 V was calculated on sections of Geneva Circuit 63-2. With the recommended improvements, voltage improved to 122.8 V. See Figure 2-43 for a geographic representation of the location of the project.

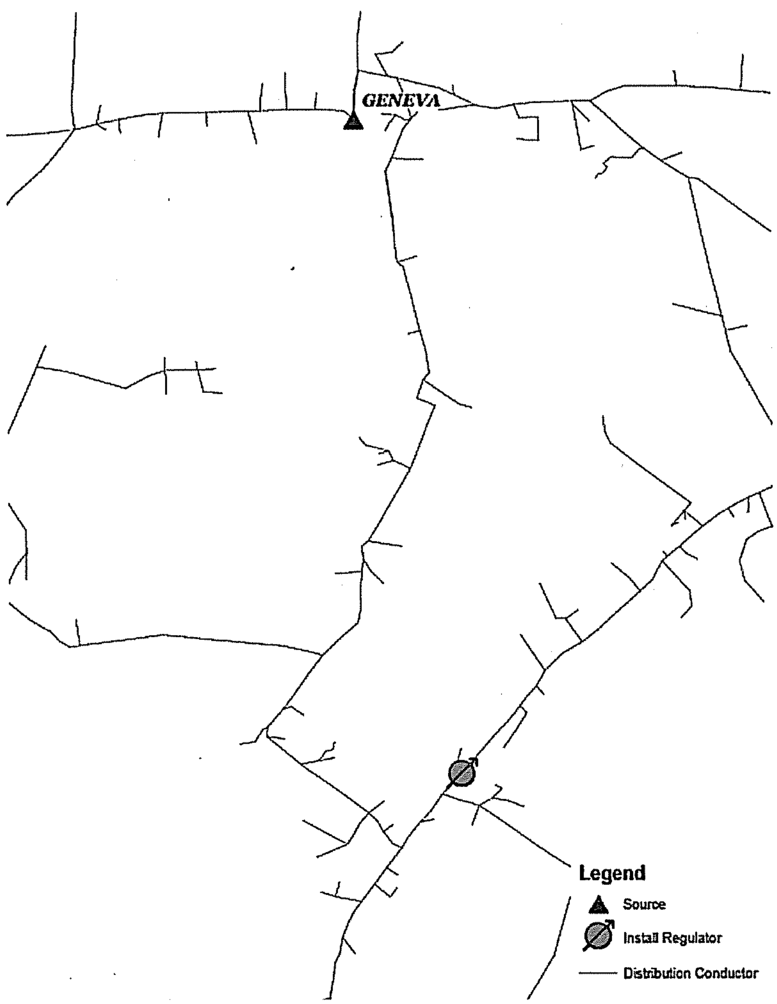

Figure 2-43: RUS CODE 604-03

Guffie – Circuit 31-1

- **Location – HWY 81 at Glenville**
- **RUS CODE – 604-09** **$8,500 in Year 1**

Description: Relocate regulator bank RG300106 from section 529413 to section 505750. The project is recommended to improve voltage issues (Design Criteria #1). Before improvements, a minimum voltage of 115.7 V was calculated on sections of Guffie Circuit 31-1. With the recommended improvements, voltage improved to 122.3 V. See Figure 2-44 for a geographic representation of the location of the project.

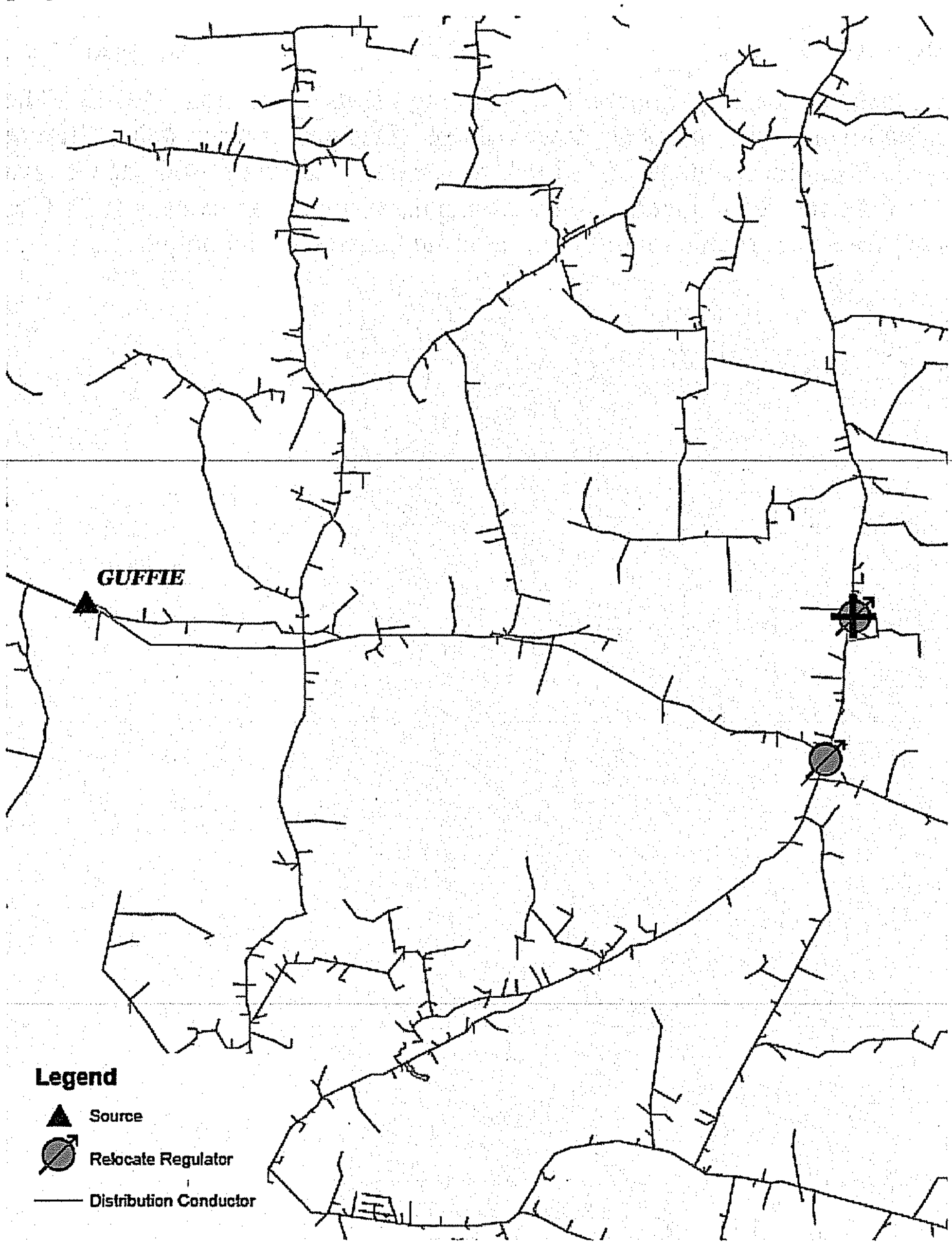

Figure 2-44: RUS CODE 604-09

Hawesville – Circuit 13-4

- **Location – KY 1389 near Tom Bolin Rd.**
- **RUS CODE – 604-10** **$38,500 in Year 1**

Description: Remove RG300100 and install three single-phase 150-Amp regulators on section 720018. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 117.9 V was calculated on sections of Hawesville Circuit 13-4. With the recommended improvements, voltage improved to 121.0 V. See RUS CODE 306. See Figure 2-45 for a geographic representation of the location of the project.

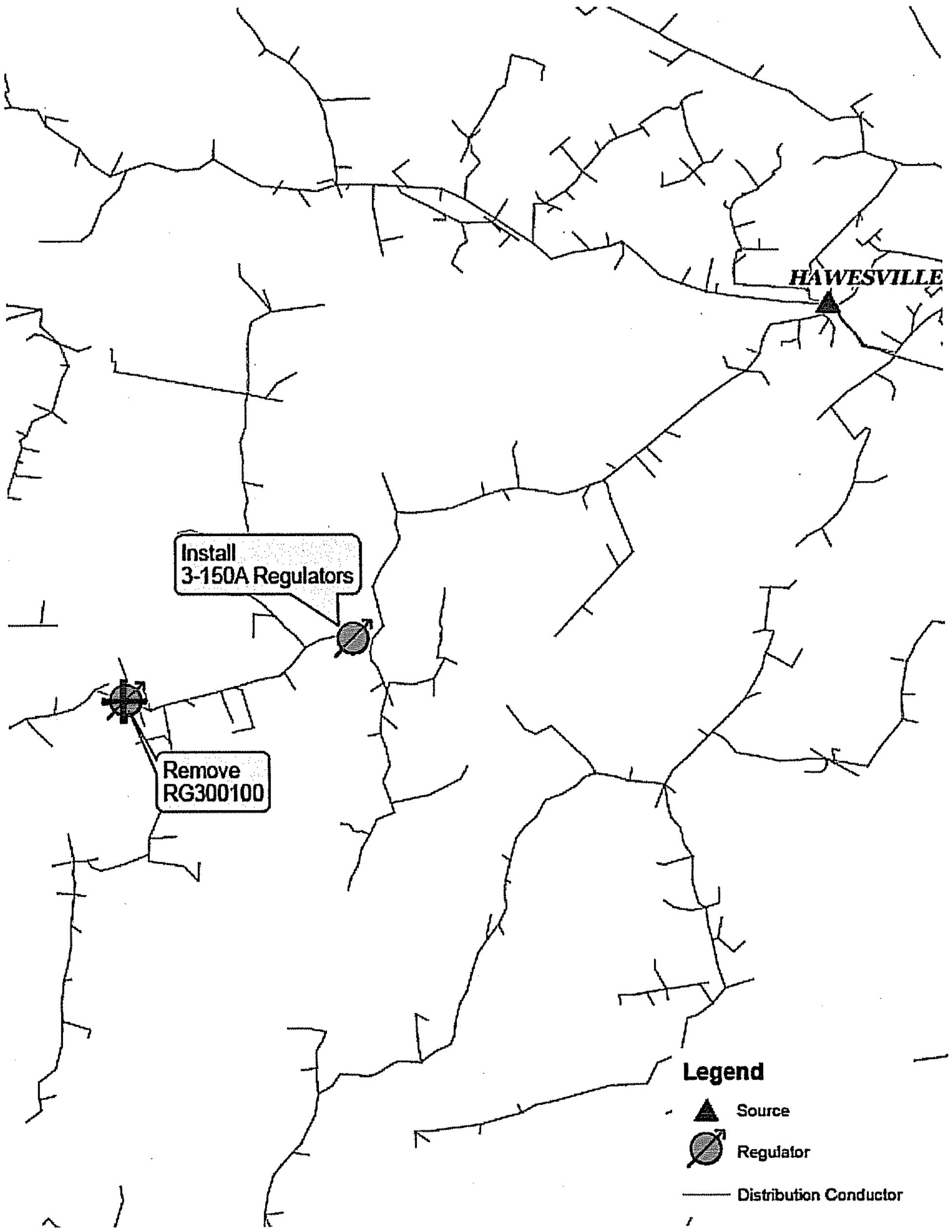

Figure 2-45: RUS CODE 604-10

Niagara – Circuit 80-1

- **Location – HWY 416 near Coraville**
- **RUS CODE – 604-17** **$30,000 in Year 1**

Description: Install three single-phase 100-Amp regulators on section 322886. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 116.4 V was calculated on sections of Niagara Circuit 80-1. With the recommended improvements, voltage improved to 120.8 V. See Figure 2-46 for a geographic representation of the location of the project.

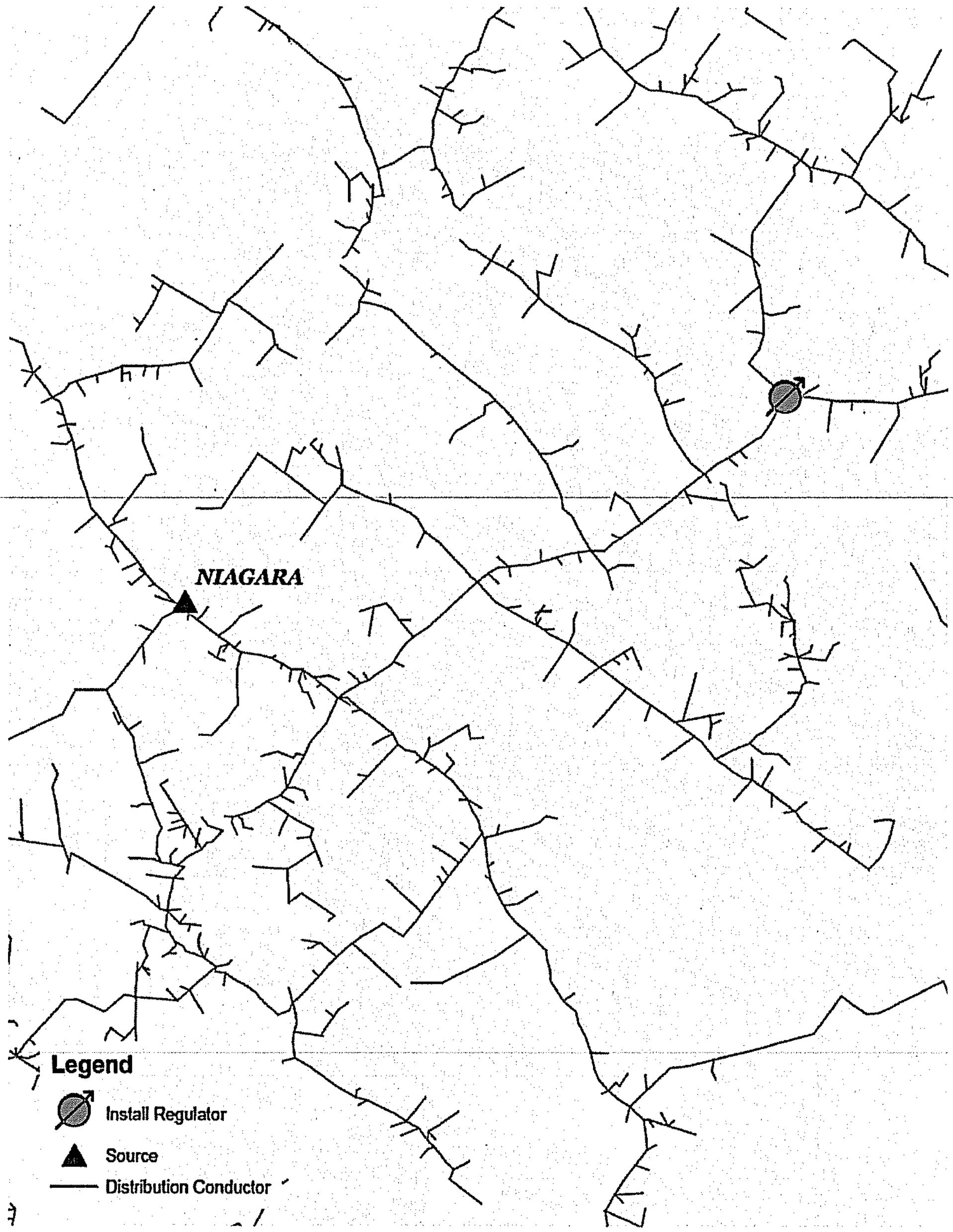

Figure 2-46: RUS CODE 604-17

Nuckols – Circuit 42-3

- **Location – HWY 431 near Barrett Hill Rd.**
- **RUS CODE – 604-11** **$35,000 in Year 1**

Description: Install three single-phase 150-Amp regulators on section 518213. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 113.3 V was calculated on sections of Nuckols Circuit 42-3. With the recommended improvements, voltage improved to 119.1 V. See RUS CODE 310. See Figure 2-47 for a geographic representation of the location of the project.

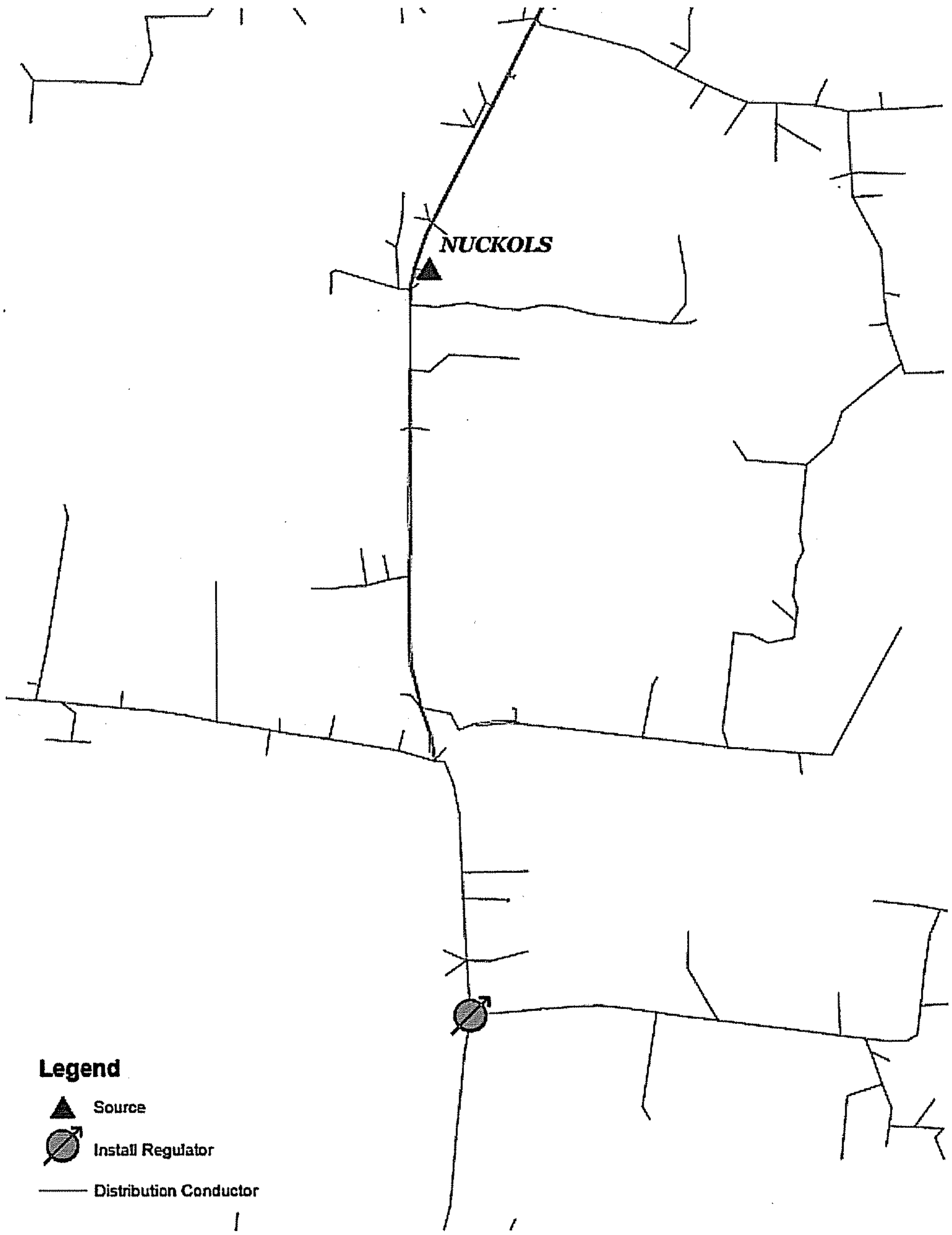

Figure 2-47: RUS CODE 604-11

Onton – Circuit 52-2

- **Location – HWY 41 near Sassafrass Grove Rd.**
- **RUS CODE – 604-04** **$38,500 in Year 1**

Description: Remove regulator bank RG1056943411, and install three single-phase 150-amp regulators at section 517370. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 113.2 V was calculated on sections of Onton Circuit 52-2. With the recommended improvements, voltage improved to 119.1 V. See Figure 2-48 for a geographic representation of the location of the project.

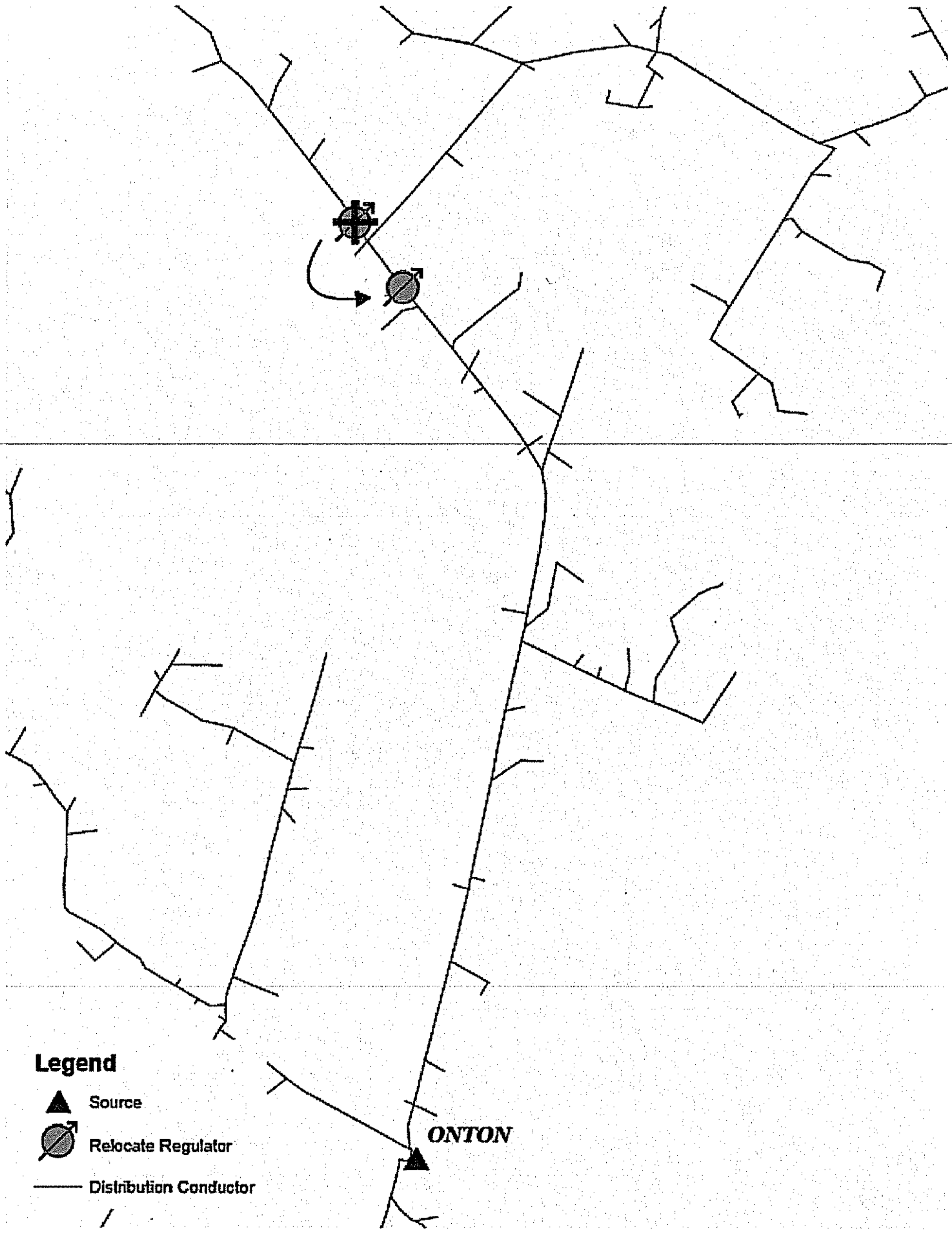

Figure 2-48: RUS CODE 604-04

Sebree – Circuit 84-3

- **Location – Cottingham Pratt South**
- **RUS CODE – 604-16** **$30,000 in Year 1**

Description: Install three single-phase 100-Amp regulators on section 318466. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 115.1 V was calculated on sections of Sebree Circuit 84-3. With the recommended improvements, voltage improved to 118.9 V. See Figure 2-49 for a geographic representation of the location of the project.

Figure 2-49: RUS CODE 604-16

Stanley – Circuit 21-1

- **Location – HWY 60 near Newman**
- **RUS CODE – 604-14** **$30,600 in Year 2**

Description: Install three single-phase 100-Amp regulators on section 522796. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 116.8 V was calculated on sections of Stanley Circuit 21-1. With the recommended improvements, voltage improved to 119.9 V. See Figure 2-50 for a geographic representation of the location of the project.

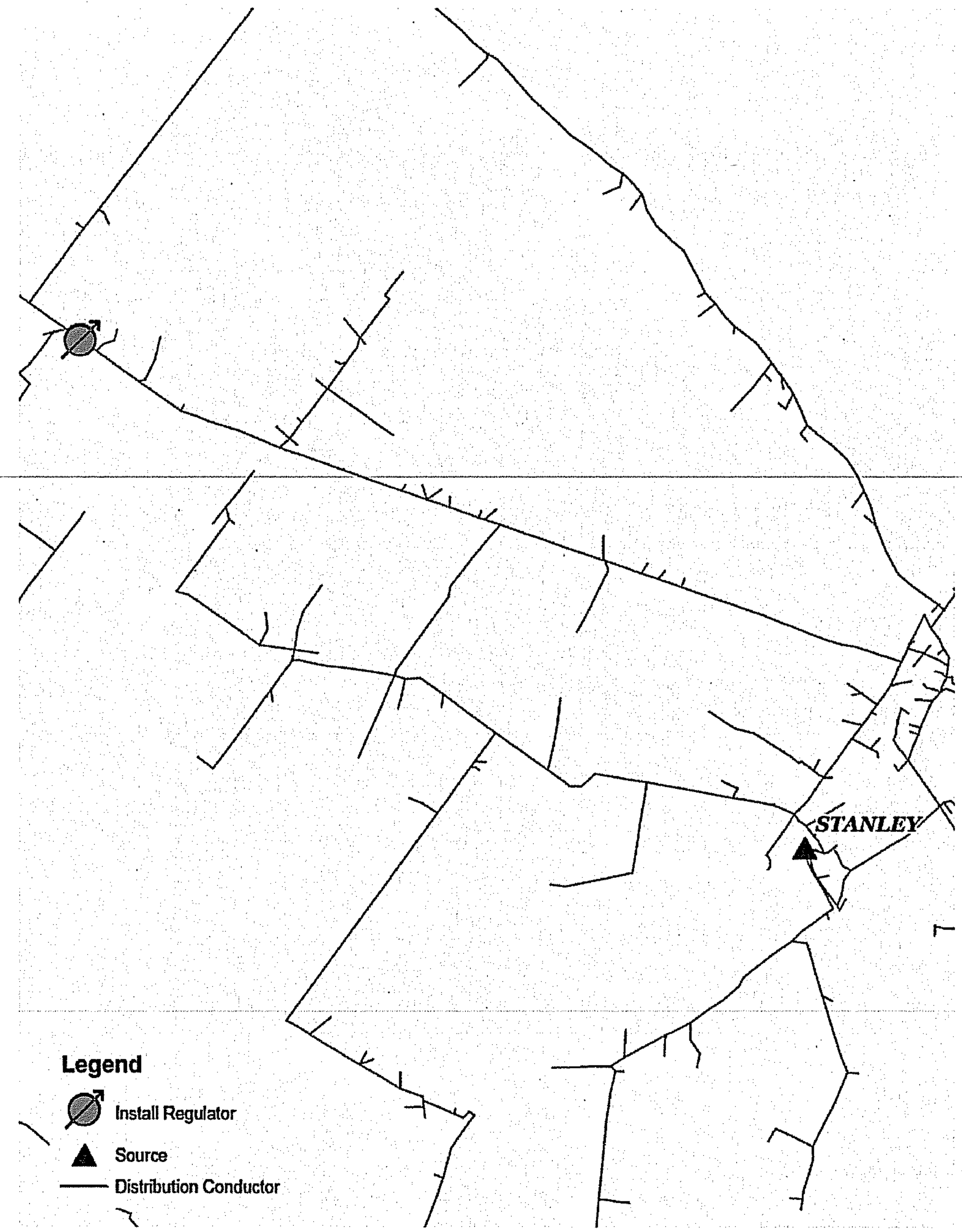

Figure 2-50: RUS CODE 604-14

St. Joe – Circuit 32-1

- **Location – KY 500 at Curdsville**
- **RUS CODE – 604-12** **$35,000 in Year 1**

Description: Install three single-phase 150-Amp regulators on section 524375. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 116.1 V was calculated on sections of St. Joe Circuit 32-1. With the recommended improvements, voltage improved to 120.8 V. See Figure 2-51 for a geographic representation of the location of the project.

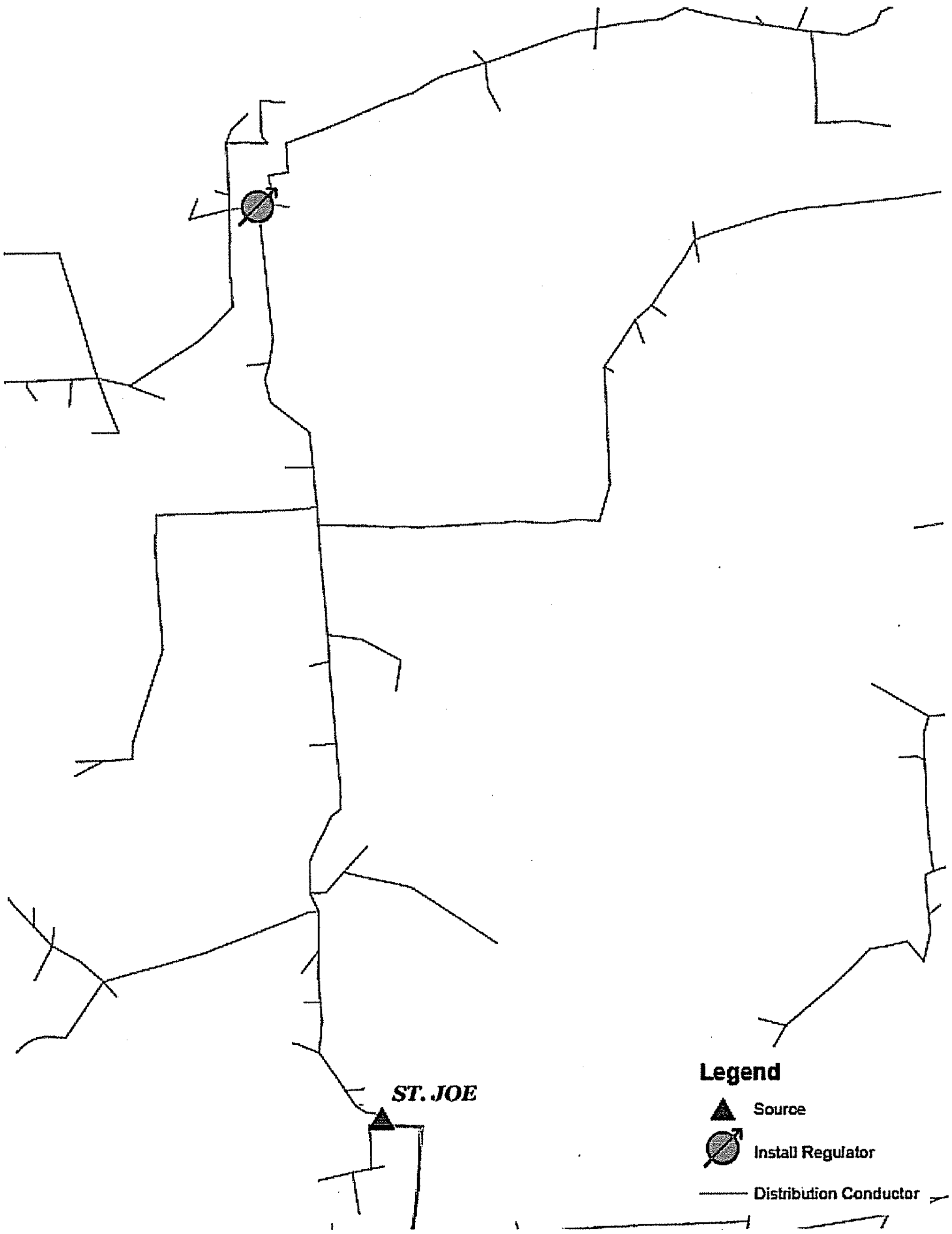

Figure 2-51: RUS CODE 604-12

Thruston 1 – Circuit 11-2

- **Location – HWY 1389 near Free Silver Rd.**
- **RUS CODE – 604-06** **$30,000 in Year 1**

Description: Install three single-phase 100-Amp regulators on section 715578. The project is recommended to improve low voltage (Design Criteria #1). Before improvements, a minimum voltage of 116.7 V was calculated on sections of Thruston 1 Circuit 11-2. With the recommended improvements, voltage improved to 122.4 V. See RUS CODE 354. See Figure 2-52 for a geographic representation of the location of the project.

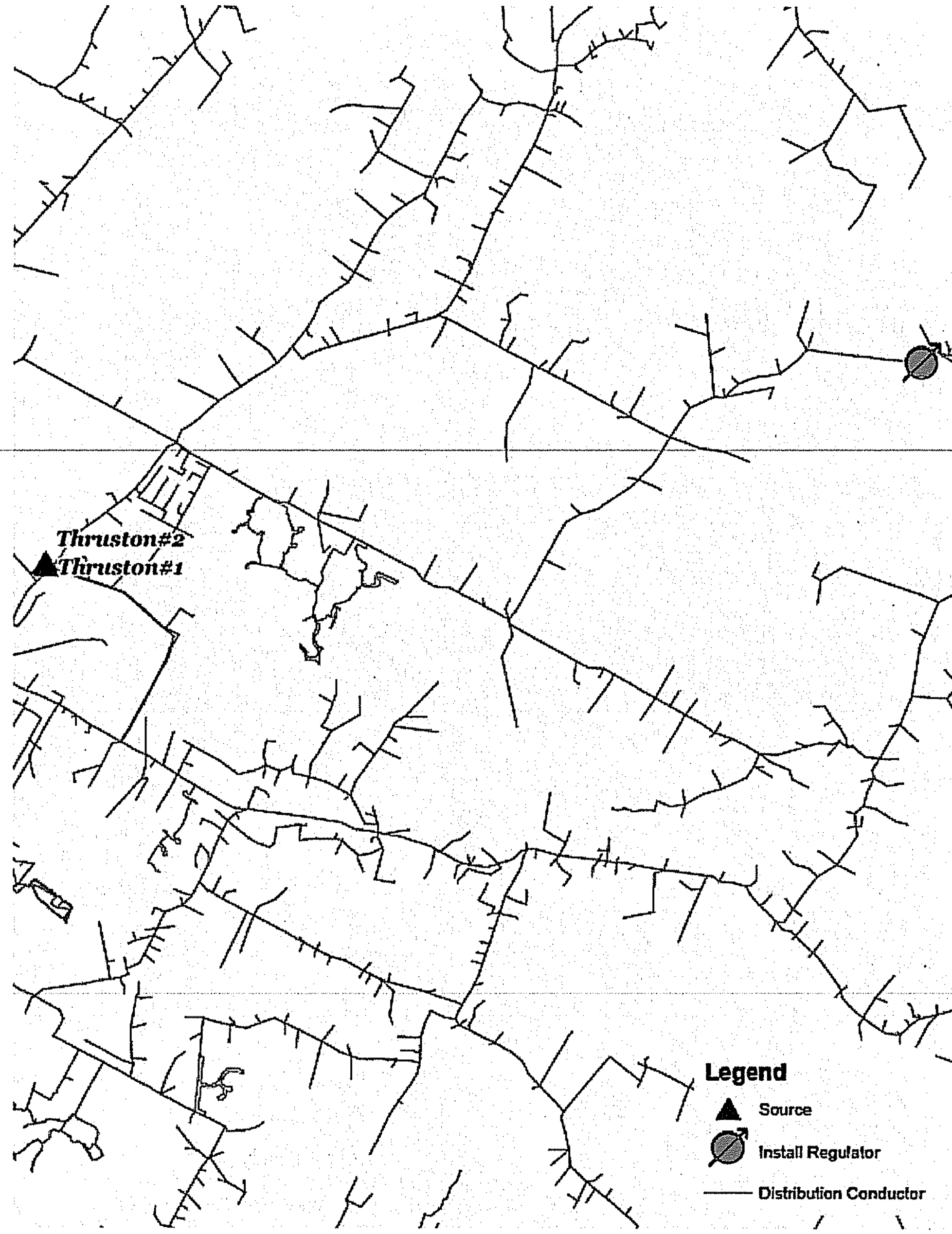

Figure 2-52: RUS CODE 604-06

Whitesville – Circuit 15-3

- **Location – Magan Rd.**
- **RUS CODE – 604-15** **$43,500 in Year 1**

Description: Relocate regulator bank RG300098 from section 713297 to 1500981325. Also, install three single-phase 150-Amp regulators on section 700704. The project is recommended to improve low voltage (Design Criteria #1) and provide single-contingency reliability between Beda Circuit 41-2 and Whitesville Circuit 15-3 (Design Criteria #19). Before improvements, a minimum voltage of 116.3 V was calculated on sections of Whitesville Circuit 15-3. With the recommended improvements, voltage improved to 118.3 V. See RUS CODE 356.

While relocating regulator bank RG300098 improved low voltage on Whitesville, it also weakened an important back-feeding scenario between Beda and Whitesville. The location of the new regulator bank was determined by evaluating the average winter peak load for the substations. See Figure 2-53 for a geographic representation of the location of the project.

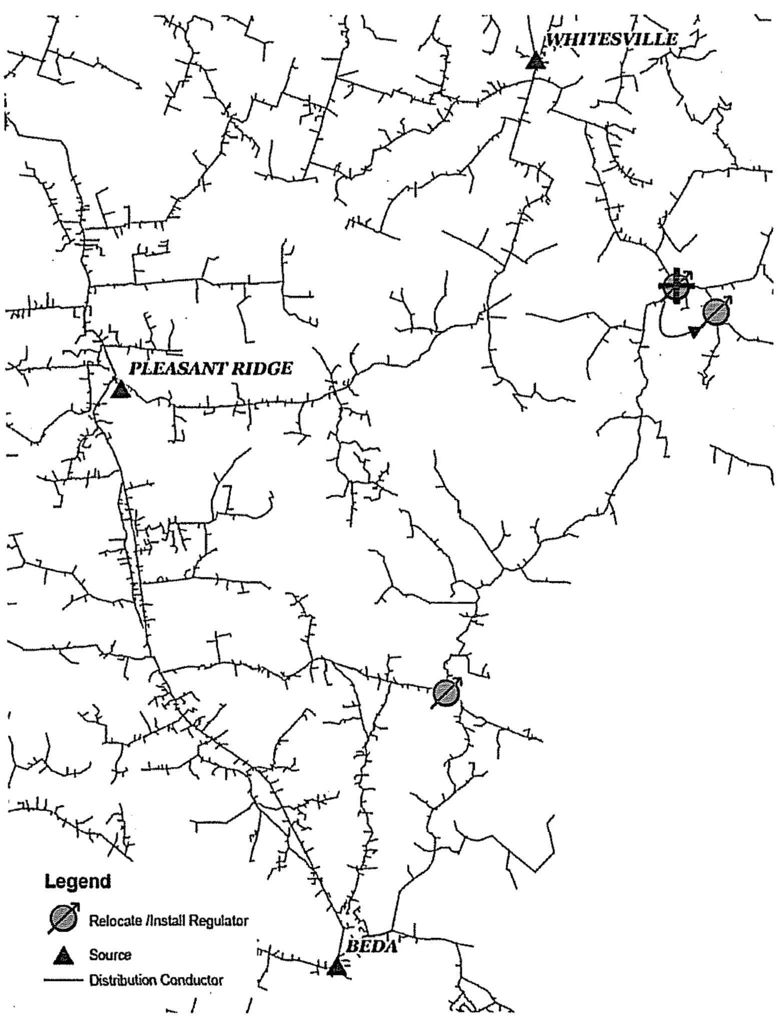

Figure 2-53: RUS CODE 604-15

Section 3
ECONOMIC CONDUCTOR SELECTION

The data contained in this Section details the assumptions which were used to calculate the cost of losses and evaluate the economic conductor selection.

3.1 Interest Rates

To determine a real interest rate, historical interest rates were reviewed relative to the rate of inflation. Historically, prime lending rates have been one to three percent greater than inflation. Based on information from Kenergy, the discount rate for economic analysis was 2.0%.

3.2 Fixed Annual Charge Rates

The annual fixed charge rate applied to the initial plant investment gives the annual revenue requirement for capital. Annual fixed charge rates, provided by Kenergy, were developed based on a three-year average of cost of operation and maintenance, depreciation, insurance, and taxes as a percentage of installed plant cost and the cost of capital as previously developed. The provided depreciation life in years is 33 years for substation and 27 years for distribution facilities. For transmission facilities, a typical value of 40 years was assumed. The annual fixed charge rates used in the analysis are summarized in Table 3-1.

Table 3-1
Summary of Assumed Fixed Annual Charge Rates

Item	Plant(1)		
	Transmission (2)	Substation	Distribution
Cost of Capital	5.50%	5.50%	5.50%
Depreciation	2.50%	3.03%	3.70%
Operation and Maintenance(2)	2.00%	3.50%	5.29%
Taxes	0.66%	0.66%	0.66%
Insurance	0.05%	0.05%	0.05%
TOTAL	**10.71%**	**12.75%**	**15.20%**

Notes:
1. Rates expressed as a percent of original installed cost.
2. Transmission O & M cost is assumed.

3.3 Cost of Power

According to the 2009 Load Forecast, the cost of power is projected to increase 5.0% annually over the CWP period.

3.4 Cost of Losses

The cost of losses was calculated based on the wholesale power cost of 20.4 mills/kWh and $7.37/kW-mo. The wholesale power costs were obtained from Kenergy. The calculated cost of losses was based on an average of the 2006, 2007, and 2008 monthly billing demands and an average annual load factor of 47.75%. The cost of losses to carry one kW of loss at peak is $113.10. The calculation is presented in Exhibit 3.

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, #4/0 ACSR, 336 kcmil ACSR, and 795 MCM ACSR have been selected by Kenergy.

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 increase at a rate of 5.0%. A 27-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 to reconductor the line. Generally, voltage-drop problems are relieved through 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	2.48%
■ Annual cost of peak kW losses	$113.10
■ Compound annual power cost increase	5.0%
■ Fixed cost factor	15.20%
■ Present worth discount factor	5.5%
■ Distribution line cost estimates in Section 1	

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 288 kW.

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

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 1,100 kW:	2 ACSR
■ For loads greater than 1,100 kW and less than 2,000 kW:	1/0 ACSR
■ For loads greater than 2,000 kW and less than 2,300 kW:	4/0 ACSR
■ For loads greater than 2,300 kW and less than 4,400 kW:	336 ACSR
■ For loads greater than 4,400 kW:	795 ACSR

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

■ For loads less than 1,000 kW:	2 ACSR
■ For loads greater than 1,000 kW and less than 2,300 kW:	1/0 ACSR
■ For loads greater than 2,300 kW and less than 4,500 kW:	336 ACSR
■ For loads greater than 4,500 kW:	795 ACSR

Economic conductor selection curves for overhead conductors are graphically presented in Figures 3-1 through 3-2. The economic conductor selection curves and guides should be updated periodically based on changes in construction cost, power cost, or fixed operating cost.

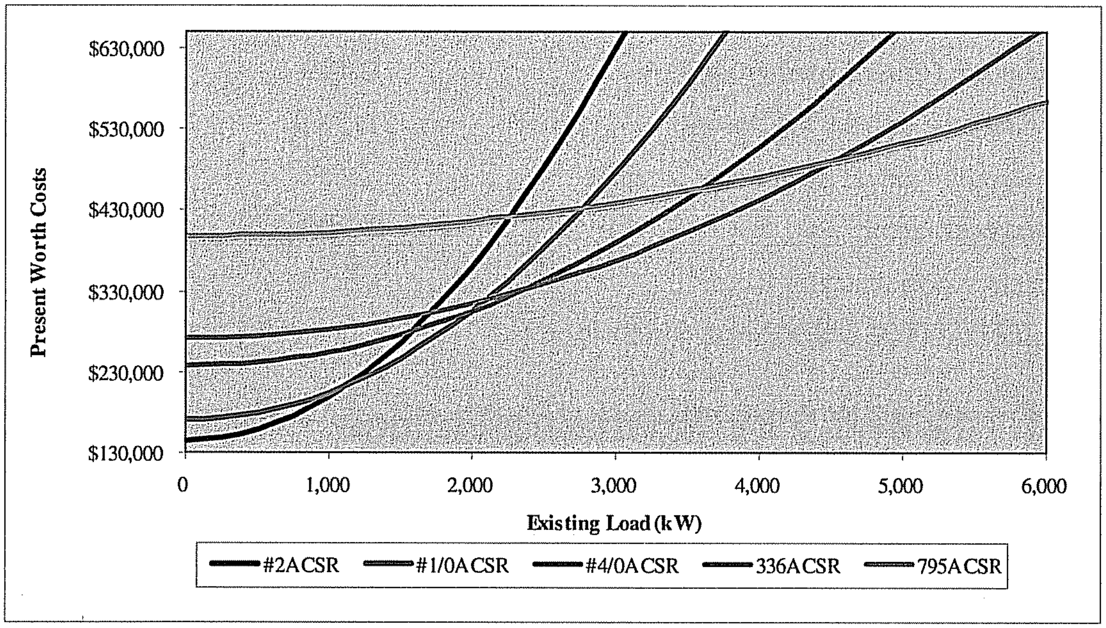

Figure 3-1: New Three-Phase Construction 12.47 kV

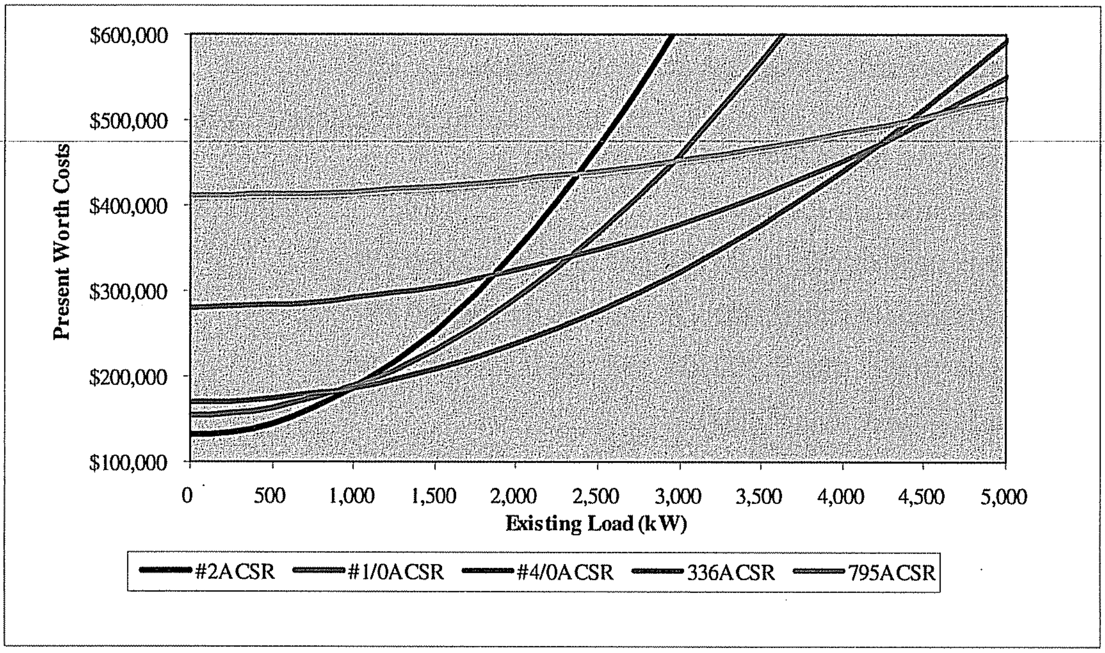

Figure 3-2: Three-Phase Reconductor 12.47 kV

3.5.2 24.9/14.4 kV Operating Voltage

The following general guidelines were developed based upon the analysis described previously for overhead conductors at an operating voltage of 24.9/14.4 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 288 kW.

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

New three-phase 24.9 kV distribution lines should be constructed with the following conductors at the initial load given as follows:

- For loads less than 2,200 kW: 2 ACSR
- For loads greater than 2,200 kW and less than 3,900 kW: 1/0 ACSR
- For loads greater than 3,900 kW and less than 4,600 kW: 4/0 ACSR
- For loads greater than 4,600 kW and less than 8,800 kW: 336 ACSR
- For loads greater than 8,800 kW: 795 ACSR

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

- For loads less than 2,100 kW: 2 ACSR
- For loads greater than 2,100 kW and less than 4,600 kW: 1/0 ACSR
- For loads greater than 4,600 kW and less than 9,100 kW: 336 ACSR
- For loads greater than 9,100 kW: 795 ACSR

Economic conductor selection curves for overhead conductors are graphically presented in Figures 3-3 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.

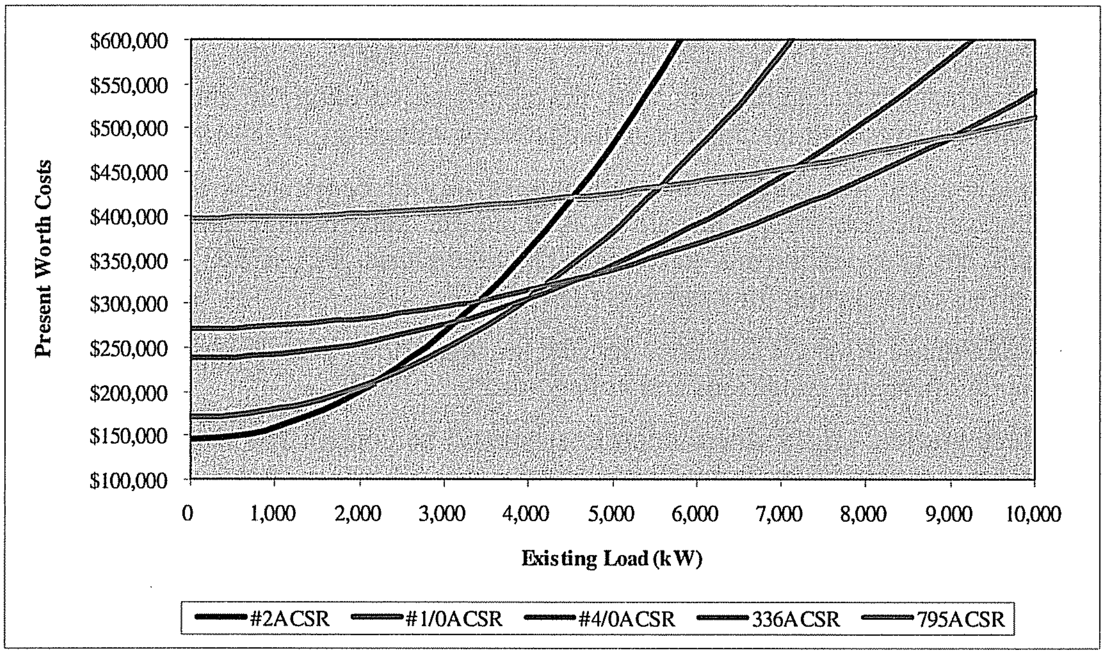

Figure 3-3: New Three-Phase Construction 24.9 kV

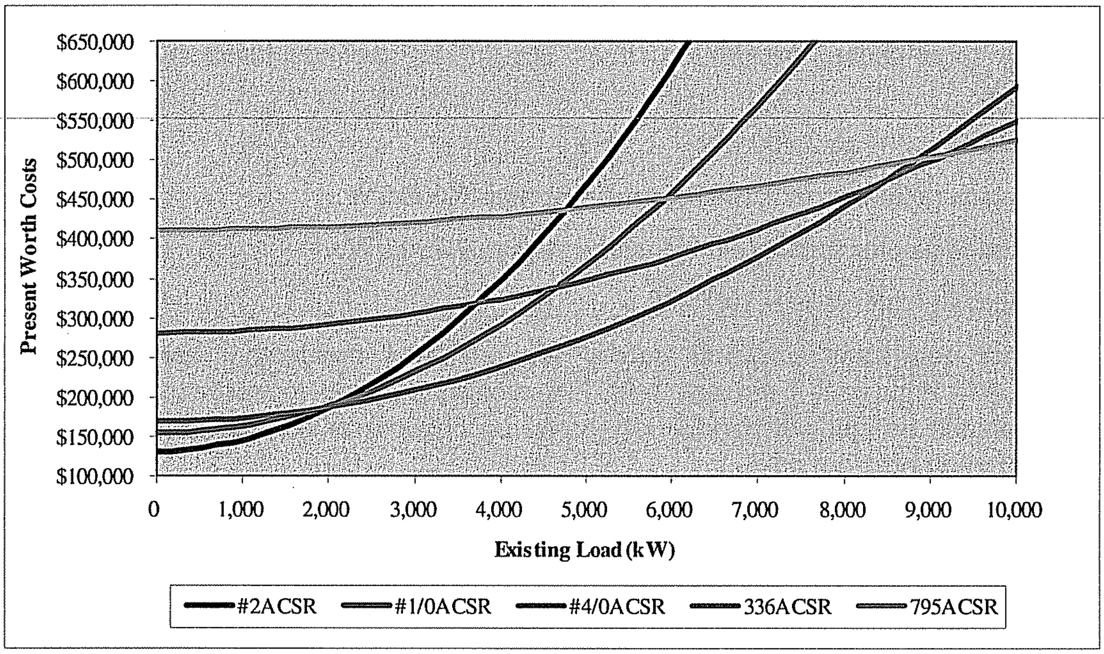

Figure 3-4: Three-Phase Reconductor 24.9 kV

Exhibit 1
STATUS OF PREVIOUS CWP PROJECTS

Status of Previous
2007 - 2010 Construction Work Plan
New Construction/Tie Lines/Distribution

CFR Code	Substation	Description	CWP Est. Miles	Actual Mi.	2007-2010 CWP	W.O. Est. Cost	Actual Cost	Estimated Status 6/30/10
103	Southgate	Extend 500 MCM 15 KV cable	0.80		$206,000		$232,172	Complete
		Modified Carryover						
104	Bon Harbor	Tie Line - Modified Carryover OH	0.30		$117,790	$39,094		Complete
104	Bon Harbor	Tie Line - 3-ph UG				$121,828		Complete
202	Sacramento C/O	Construct 500 MCM Al 15 KV cable	0.10		$27,800	$43,852		Complete
319	Little Dixie C/O	Convert to 3ph # 1/0 ACSR	0.20	0.23	$8,400	$9,084	$11,727	Complete
323	Marion C/O	Convert 1 ph to 25 KV	32.60		$21,700		$22,061	Complete
323		Convert 1 ph to 25 KV	10.00				$15,041	Complete
328	Providence	1-ph 2 acsr to 3-ph 2 acsr	2.20	2.14	$80,600	$132,906	$118,142	Complete
~~329~~	~~Morganfield C/O~~	~~Convert to 3 ph 25 KV~~	~~15.00~~		~~$30,000~~			Deleted
		~~Remove auto-xfrmr & 3 1 ph 100 amp~~						Deleted
330	Whitesville C/O	Reconductor 3 ph 4/0 ACSR	2.50	1.18	$133,000	$92,653	$77,520	Complete
347	S. Dermont	1-ph #2 15 KV UG	0.04	0.07	$1,900	$4,998	$4,098	Complete
348	S. Dermont	Convert to to 3 ph #2 ACSR	0.20		$7,330			Deferred (Carryover)
~~349~~	~~S. Hanson~~	~~1-ph 6A to 3-ph 4/0 acsr~~	~~0.44~~		~~$23,400~~	~~$77,114~~		Deleted
350	Providence	Extend 1 ph 2 ACSR	0.60		$29,000	$29,465		Complete
		Convert 1 ph to 25 KV	2.00					Deferred (Carryover)
351	St. Joe	1-ph 2 acsr to 3-ph 2 acsr	1.90		$80,000	$52,341	$52,056	Complete
352	Sullivan	Convert 1 ph to 25 KV	19.50		$289,790			Complete
		Convert V ph to 25 KV	0.75					Complete
		Convert 3 ph to 25 KV	7.30					Complete
		Relocate 1,000 KVA auto-xfrmr						Complete
~~353~~	~~Sullivan~~	~~1 ph 2 ACSR to 3 ph 1/0 ACSR~~	~~3.87~~		~~$173,490~~			Deleted
354	Thruston	Reconductor to 3 ph 336 ACSR	1.55		$143,780			Deferred (Carryover)
355	Weaverton	Reconductor to 3 ph 336 ACSR	1.00		$92,760			Deferred (Carryover)
386	Horse Fork C/O	Expand 3 ph 795 ACSR	1.00	0.72	$139,400	$194,571	$208,164	Complete
502	Sacramento C/O	Install electronic recloser & switches			$35,150			Complete
371	System	Replace 1 ph & 3 ph URD			$789,740		$742,604	
372	System	Replace 1 ph & 3 ph deteriorated OH conductor			$2,733,980		$1,485,581	

Exhibit 2
RUS FORM 300

File: 010522/07-70146-01410-2000

R·W·BECK
An SAIC Company

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL UTILITIES SERVICE

REVIEW RATING SUMMARY

BORROWER DESIGNATION: KY 65

DATE PREPARED: September 3, 2009

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

PART I. TRANSMISSION and DISTRIBUTION FACILITIES

1. Substations (Transmission and Distribution)	(Rating)
a. Safety, Clearance, Code Compliance	2
b. Physical Conditions: Structure, Major Equipment, Appearance	2
c. Inspection Records - Each Substation	3
d. Oil Spill Prevention	3

2. Transmission Lines	(Rating)
a. Right-of-Way: Clearing, Erosion, Appearance, Intrusions	N/A
b. Physical Condition: Structure, Conductor, Guying	
c. Inspection Program and Records	

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

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	2
Appearance: Settlement, Condition	3
Other	N/A
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
Retirement of Idle Services	3
Other	3

7. Service Interruptions

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

PREVIOUS 5 YEARS (Year)	POWER SUPPLIER a.	MAJOR EVENT b.	PLANNED c.	ALL OTHER d.	TOTAL e.	(Rating)
2004	11.89	0.03	0.85	144.36	157.13	
2005	4.39	0	0.67	126.55	131.61	
2006	6.77	0	3.13	171.17	181.07	
2007	13.24	8.43	7.09	112.59	141.35	
2008	9.90	9.68	2.98	132.34	154.90	

b. Emergency Restoration Plan ____

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	3
c. Substation and Feeder Loading	3

10. Maps and Plant Records	(Rating)
a. Operating Maps: Accurate and Up-to-Date	3
b. Circuit Diagrams	3
c. Staking Sheets	3

PART III. ENGINEERING

11. System Load Conditions and Losses		(Rating)
a. Annual System Losses	4.70%	3
b. Annual Load Factor	49.7%	3
c. Power Factor at Monthly Peak	94.0%	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	2
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	2007	2008	2009	2010	2011	2012
	Actual $ Thousands	Actual $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands
Normal Operation	3,897	4,272	4,548	4,685	4,825	4,970
Normal Maintenance	8,147	9,601	8,864	9,030	9,079	9,306
Additional (Deferred) Maintenance						
Total	12,044	13,873	13,412	13,715	13,904	14,276

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

15. Date Discussed with Board of Directors 10/13/2009 *(Date)*

EXPLANATORY NOTES

ITEM NO.	COMMENTS
Part I - 1a	Rating 2: Inadequate ground clearance to terminators in Beech Grove substation. Correction planned for 2010.
Part I - 1b	Rating 2: Birds nests observed in Morganfield and Caldwell Springs substations. Plan to review inspection criteria, emphasizing need to report condition; other minor items at substations are noted on Field Report. These are scheduled for or have been corrected.
Part I - 3c	Rating 2: (Other) Some slack guys and leaning poles caused by January Ice Storm. All locations are identified and put on open Job Orders. Process of completing entire list of 5500 Job Orders is 80% complete - will complete by years' end.
Part I 5d	Rating 2: Some pad mount transformers and switch locations needed replacement of warning signs and map location; being conducted, see field report.
Part III 13a	Present LRPG is 14 years old: have begun selection of consultant for new plan to be completed in 2010.

		TITLE	DATE
RATED BY:	[signatures]	V. P. Engineering V. P. Operations	10/14/09
REVIEWED BY:	[signature]	President & CEO	10/14/09
REVIEWED BY:		RUS GFR	

Exhibit 3
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	$65.23 /kW
Cost for Energy:	(.84(LF^2) + .16(LF))*1kW*(ER)*8760 hours	$47.87 /kW

DR = Existing Power Demand Rate (1)
= $7.37 /kW
LF = Three Year Average Annual Load Factor
= 47.75%
ER = Existing Power Energy Rate (1)
= $0.02040 /kWh
DF = Three Year Average Annual Demand Factor
= 8.85

ANNUAL COST FOR 1kW OF PEAK LOSSES: $113.10 /kW

CORE LOSS CALCULATION

ANNUAL COST OF LOSS PER kW:

Cost for Demand:	1kW*DR*12 months	$88.44 /kW
Cost for Energy	1kW*ER*8760 hours	$178.70 /kW

DR = Existing Power Demand Rate (1)
= $7.37 /kW
ER = Existing Power Energy Rate (1)
= $0.02040 /kWh

ANNUAL COST FOR 1kW OF PEAK LOSSES: $267.14 /kW

LOAD FACTOR CALCULATION (2)

Month	Peak Load (kW) 2006	2007	2008	Three Year Average	Percent of Peak	Percent of Peak Squared
January	219,435	263,571	280,504	254,503	89.21%	0.80
February	244,801	270,805	255,301	256,969	90.08%	0.81
March	211,117	218,579	241,648	223,781	78.44%	0.62
April	188,082	211,237	194,542	197,954	69.39%	0.48
May	234,125	229,010	204,051	222,395	77.96%	0.61
June	259,103	253,852	258,241	257,065	90.11%	0.81
July	283,499	264,711	280,288	276,166	96.80%	0.94
August	283,332	298,971	273,541	285,282	100.00%	1.00
September	220,195	266,441	268,517	251,717	88.23%	0.78
October	213,324	231,952	205,050	216,775	75.99%	0.58
November	214,014	218,800	225,314	219,376	76.90%	0.59
December	263,099	239,201	283,115	261,805	91.77%	0.84
System Peak	283,499	298,971	283,115	285,282	100.00%	8.85
Ann. MWh Purch.	1,155,880	1,232,914	1,230,543	1,206,446		
Ann. Load Factor	46.54%	47.08%	49.62%	47.75%		

Notes : (1) Based on the annual energy purchases and power cost for 2009 power bills.
(2) MWh Purch. and Peak Loading was taken from
2009 Load Forecast and Kenergy data.

Appendix A
SAMPLE LOAD FLOWS – BEFORE IMPROVEMENTS

Balanced Voltage Drop Report
Source: DERMONT

Database: G:\010522\07-70146-01410\WORK PRODUCTS\WINDMIL MODEL\SUMMER\EXISTING SUMMER 2009 MODEL_REV.WM\
Title: Dermont Summer CWP Year 3 No Improvements
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	
DERMONT		ABC	DERMONT	7.50Y	125.0	0.00	0.00	364.26	0	7552	3184	92	0.00	0.0	0.000	0.000	0	0	0	1500	
----------- Feeder No. 4 (17-4) Beginning with Device 17-4 -----------																					
17-4	C0729696	ABC	REC_400_RE	7.50Y	125.0	0.00	0.01	111.50	0	2311	976	92	0.00	0.0	0.007	0.000	0	0	0	560	
----------- Feeder No. 2 (17-2) Beginning with Device 17-2 -----------																					
17-2	C0729694	ABC	REC_400_RE	7.50Y	125.0	0.00	0.00	23.38	0	485	204	92	0.00	0.0	0.009	0.000	0	0	0	107	
----------- Feeder No. 3 (17-3) Beginning with Device 17-3 -----------																					
17-3	C0729695	ABC	REC_400_RE	7.50Y	125.0	0.00	0.00	36.74	0	762	321	92	0.00	0.0	0.012	0.000	0	0	0	140	
P C0725781	C0725789	C	2 ACSR 1P	7.46Y	124.4	0.00	0.63	0.00	0	0	0	100	0.00	0.0	2.254	0.067	0	0	0	0	P
P C0726239	C0725781	C	2 ALUG 15K	7.46Y	124.4	0.00	0.63	0.00	0	0	0	100	0.00	0.0	2.256	0.002	0	0	0	0	P
----------- Feeder No. 1 (17-1) Beginning with Device 17-1 -----------																					
17-1	C0729693	ABC	REC_400_RE	7.50Y	125.0	0.00	0.02	192.64	0	3994	1682	92	0.00	0.0	0.010	0.002	0	0	0	693	
L C0724248	C0724247	ABC	336 ACSR 3	7.08Y	118.0	0.04	7.02	55.78	12	1104	430	93	0.22	0.0	4.320	0.087	12	5	1	209	L
L C0724249	C0724248	ABC	336 ACSR 3	7.08Y	118.0	0.03	7.05	55.17	12	1092	425	93	0.15	0.0	4.379	0.059	3	1	1	208	L
L C0724250	C0724249	ABC	336 ACSR 3	7.08Y	117.9	0.03	7.08	55.00	12	1088	423	93	0.18	0.0	4.452	0.073	6	2	2	207	L
L C0724251	C0724250	ABC	336 ACSR 3	7.07Y	117.9	0.01	7.09	52.71	12	1043	405	93	0.07	0.0	4.483	0.031	0	0	0	200	L
L C0724252	C0724251	ABC	336 ACSR 3	7.07Y	117.9	0.02	7.11	38.20	8	755	295	93	0.07	0.0	4.537	0.054	0	0	0	146	L
L C0724253	C0724252	ABC	336 ACSR 3	7.07Y	117.9	0.02	7.13	38.20	8	755	295	93	0.06	0.0	4.590	0.053	8	3	1	146	L
L C0724254	C0724253	ABC	336 ACSR 3	7.07Y	117.9	0.02	7.15	37.80	8	747	292	93	0.09	0.0	4.662	0.072	0	0	0	145	L
L C0724255	C0724254	ABC	336 ACSR 3	7.07Y	117.8	0.01	7.16	37.80	8	747	291	93	0.05	0.0	4.703	0.041	2	1	1	145	L
L C0724442	C0724255	ABC	3/0 ACSR 3	7.07Y	117.8	0.00	7.16	37.71	14	745	291	93	0.02	0.0	4.709	0.006	0	0	0	144	L
L SW702099-B	C0724442	ABC	Closed	7.07Y	117.8	0.00	7.16	37.71	0	745	291	93	0.00	0.0	4.709	0.006	0	0	0	144	L
L SW702099-A	SW702099-B	ABC	Closed	7.07Y	117.8	0.00	7.16	37.71	0	745	291	93	0.00	0.0	4.709	0.006	0	0	0	144	L
L C0724441	SW702099-A	ABC	3/0 ACSR 3	7.07Y	117.8	0.02	7.19	37.71	14	745	291	93	0.10	0.0	4.751	0.042	0	0	0	144	L
L C0724257	C0724441	ABC	3/0 ACSR 3	7.07Y	117.8	0.04	7.23	37.71	14	745	290	93	0.21	0.0	4.838	0.086	0	0	0	144	L
L C0724256	C0724257	ABC	3/0 ACSR 3	7.06Y	117.7	0.03	7.26	37.71	14	745	290	93	0.14	0.0	4.896	0.058	0	0	0	144	L
L C0724259	C0724256	ABC	3/0 ACSR 3	7.06Y	117.7	0.03	7.29	37.71	14	745	290	93	0.14	0.0	4.954	0.058	0	0	0	144	L
L C0724258	C0724259	ABC	3/0 ACSR 3	7.06Y	117.7	0.03	7.32	37.71	14	745	290	93	0.14	0.0	5.014	0.060	0	0	0	144	L
L C0728050	C0724258	ABC	3/0 ACSR 3	7.06Y	117.6	0.04	7.37	37.71	14	744	289	93	0.20	0.0	5.098	0.084	0	0	0	144	L
L C0722829	C0728050	A	2 ACSR 1P	7.05Y	117.6	0.07	7.44	33.30	21	219	86	93	0.12	0.1	5.161	0.063	0	0	1	45	L
L C0728231	C0722829	A	4 ACSR 1P	7.05Y	117.6	0.00	7.44	5.28	4	35	14	93	0.00	0.0	5.188	0.027	35	14	3	3	L
L C0728230	C0722829	A	4 ACSR 1P	7.05Y	117.6	0.01	7.45	28.01	24	184	72	93	0.01	0.0	5.167	0.007	0	0	0	41	L
L OC701936	C0728230	A	4H	7.05Y	117.6	0.00	7.45	28.01	0	184	72	93	0.00	0.0	5.167	0.007	0	0	0	41	L
L C0728229	OC701936	A	4 ACSR 1P	7.05Y	117.5	0.06	7.50	28.01	24	184	72	93	0.09	0.0	5.211	0.044	0	0	0	41	L
L C0723219	C0728229	A	2 ACSR 1P	7.05Y	117.5	0.00	7.51	3.21	2	21	8	93	0.00	0.0	5.288	0.077	21	8	3	3	L
L C0722890	C0728229	A	4 ACSR 1P	7.05Y	117.4	0.05	7.55	22.67	19	149	58	93	0.06	0.0	5.261	0.050	10	4	2	36	L
L C0722983	C0722890	A	2 ACSR 1P	7.05Y	117.4	0.00	7.56	0.77	0	5	2	93	0.00	0.0	5.327	0.066	2	1	1	2	L
L C0722984	C0722983	A	2 ACSR 1P	7.05Y	117.4	0.00	7.56	0.53	0	4	1	97	0.00	0.0	5.367	0.040	0	0	0	1	L
L C0722982	C0722984	A	2 ACSR 1P	7.05Y	117.4	0.00	7.56	0.53	0	4	1	97	0.00	0.0	5.394	0.027	4	1	1	1	L
L C0723798	C0722890	A	4 ACSR 1P	7.05Y	117.4	0.01	7.56	20.41	17	134	53	93	0.01	0.0	5.267	0.007	0	0	0	32	L
L SW702005-B	C0723798	A	Closed	7.05Y	117.4	0.00	7.56	20.41	0	134	53	93	0.00	0.0	5.267	0.007	0	0	0	32	L
L SW702005-A	SW702005-B	A	Closed	7.05Y	117.4	0.00	7.56	20.41	0	134	53	93	0.00	0.0	5.267	0.007	0	0	0	32	L
L C0723799	SW702005-A	A	4 ACSR 1P	7.04Y	117.4	0.02	7.58	20.41	17	134	53	93	0.02	0.0	5.290	0.023	0	0	0	32	L
L C0722794	C0723799	A	4 ACSR 1P	7.04Y	117.4	0.00	7.58	0.42	0	3	1	95	0.00	0.0	5.342	0.052	3	1	2	2	L
L C0723502	C0723799	A	4 ACSR 1P	7.04Y	117.4	0.03	7.61	19.99	17	131	52	93	0.03	0.0	5.319	0.029	0	0	0	30	L
L C0723504	C0723502	A	4 ACSR 1P	7.04Y	117.4	0.03	7.64	19.99	17	131	52	93	0.03	0.0	5.347	0.028	2	1	1	30	L
L C0723503	C0723504	A	4 ACSR 1P	7.04Y	117.3	0.06	7.70	19.74	17	129	51	93	0.06	0.0	5.414	0.067	6	2	2	29	L
L C0722971	C0723503	A	1/0 ACSR 1	7.04Y	117.3	0.02	7.72	15.27	7	100	39	93	0.01	0.0	5.476	0.062	5	2	1	22	L
L C0722970	C0722971	A	1/0 ACSR 1	7.04Y	117.3	0.02	7.74	14.48	7	95	37	93	0.01	0.0	5.527	0.052	14	5	1	21	L
L C0722783	C0722970	A	1/0 ACSR 1	7.04Y	117.3	0.01	7.75	6.14	3	40	16	93	0.00	0.0	5.584	0.057	4	2	1	8	L
L C0722972	C0722783	A	1/0 ACSR 1	7.04Y	117.3	0.00	7.75	2.12	1	14	5	94	0.00	0.0	5.631	0.047	14	6	2	2	L
L C0179643465	C0722972	A	1/0 ACSR 1	7.04Y	117.3	0.00	7.75	0.00	0	0	0	100	0.00	0.0	5.659	0.028	0	0	0	0	L
L SW608253429-B	C0179643465	A	Open	7.04Y	117.3	0.00	7.75	0.00	0	0	0	100	0.00	0.0	5.659	0.028	0	0	0	0	L
L C0722804	C0722783	A	4 ACSR 1P	7.03Y	117.2	0.00	7.75	3.43	3	22	9	93	0.00	0.0	5.609	0.024	0	0	0	5	L
L C0723032	C0722804	A	4 ACSR 1P	7.03Y	117.2	0.00	7.75	3.43	3	22	9	93	0.00	0.0	5.652	0.043	16	6	4	5	L
L C0723033	C0723032	A	4 ACSR 1P	7.03Y	117.2	0.00	7.76	0.95	1	6	2	95	0.00	0.0	5.681	0.029	6	2	1	1	L
L C0723208	C0722970	A	1/0 ACSR 1	7.04Y	117.3	0.01	7.75	6.24	3	41	16	93	0.00	0.0	5.602	0.074	0	0	0	12	L
L C0722995	C0723208	A	2 ACSR 1P	7.03Y	117.2	0.00	7.75	1.48	1	10	4	93	0.00	0.0	5.639	0.038	9	3	1	2	L
L C0722996	C0722995	A	2 ACSR 1P	7.03Y	117.2	0.00	7.75	0.18	0	1	0	100	0.00	0.0	5.689	0.050	1	0	1	1	L
L C0723210	C0723208	A	1/0 ACSR 1	7.03Y	117.2	0.01	7.76	4.76	2	31	12	93	0.00	0.0	5.659	0.057	0	0	0	10	L
L C0722999	C0723210	A	2 ACSR 1P	7.03Y	117.2	0.00	7.76	1.61	1	11	4	94	0.00	0.0	5.710	0.051	3	1	1	3	L
L C0723000	C0722999	A	2 ACSR 1P	7.03Y	117.2	0.00	7.76	1.20	1	8	3	94	0.00	0.0	5.762	0.052	8	3	2	2	L
L C0722803	C0723210	A	4 ACSR 1P	7.03Y	117.2	0.00	7.76	1.60	1	10	4	93	0.00	0.0	5.693	0.034	11	4	4	4	L
L C0723209	C0723210	A	1/0 ACSR 1	7.03Y	117.2	0.00	7.76	1.55	1	10	4	93	0.00	0.0	5.747	0.089	0	0	0	3	L
L C0728227	C0723209	A	1/0 ACSR 1	7.03Y	117.2	0.00	7.76	0.00	0	0	0	100	0.00	0.0	5.826	0.079	0	0	0	0	L
L C0723206	C0723209	A	4 ACSR 1P	7.03Y	117.2	0.00	7.76	1.55	1	10	4	93	0.00	0.0	5.795	0.048	8	3	1	3	L
L C0723207	C0723206	A	4 ACSR 1P	7.03Y	117.2	0.00	7.76	0.34	0	2	1	89	0.00	0.0	5.827	0.032	2	1	2	2	L
L C0723131	C0723503	A	2 ACSR 1P	7.04Y	117.3	0.00	7.70	3.62	2	24	9	94	0.00	0.0	5.452	0.038	0	0	0	5	L
L C0723129	C0723131	A	2 ACSR 1P	7.04Y	117.3	0.00	7.71	3.62	2	24	9	94	0.00	0.0	5.502	0.050	10	4	2	5	L
L C0723130	C0723129	A	2 ACSR 1P	7.04Y	117.3	0.00	7.71	2.16	1	14	6	92	0.00	0.0	5.566	0.064	0	0	1	3	L
L C0722793	C0723130	A	4 ACSR 1P	7.04Y	117.3	0.00	7.71	2.16	2	14	6	92	0.00	0.0	5.614	0.049	14	6	2	2	L
L C0723220	C0728229	A	2 ACSR 1P	7.05Y	117.5	0.00	7.51	2.13	1	14	5	94	0.00	0.0	5.273	0.062	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

Balanced Voltage Drop Report
Source: DERMONT

Database: G:\010522\07-70146-01410\WORK PRODUCTS\WINDMIL MODEL\SUMMER\EXISTING SUMMER 2009 MODEL_REV.WM\
Title: Dermont Summer CWP Year 3 No Improvements
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	Element Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
L CO728049	CO723220	A	2 ACSR 1P	7.05Y	117.5	0.00	7.51	2.13	1	14	5	94	0.00	0.0	5.336	0.063	0	0	0	2	L
L CO724332	CO728049	A	2 ACSR 1P	7.05Y	117.5	0.00	7.51	2.13	1	14	5	94	0.00	0.0	5.374	0.038	9	4	1	2	L
L CO724333	CO724332	A	2 ACSR 1P	7.05Y	117.5	0.00	7.52	0.71	0	5	2	93	0.00	0.0	5.407	0.033	0	0	0	1	L
L CO724334	CO724333	A	2 ACSR 1P	7.05Y	117.5	0.00	7.52	0.71	0	5	2	93	0.00	0.0	5.443	0.036	5	2	1	1	L
L CO724338	CO724334	A	4 ACSR 1P	7.05Y	117.5	0.00	7.52	0.00	0	0	0	100	0.00	0.0	5.450	0.007	0	0	0	0	L
L OC702079	CO724338	A	FUS_50_ASC	7.05Y	117.5	0.00	7.52	0.00	0	0	0	100	0.00	0.0	5.450	0.007	0	0	0	0	L
L CO724337	OC702079	A	4 ACSR 1P	7.05Y	117.5	0.00	7.52	0.00	0	0	0	100	0.00	0.0	5.473	0.023	0	0	0	0	L
L SW702112-B	CO724337	A	Open	7.05Y	117.5	0.00	7.52	0.00	0	0	0	100	0.00	0.0	5.473	0.023	0	0	0	0	L
L CO723500	CO728050	ABC	3/0 ACSR 3	7.06Y	117.6	0.02	7.39	25.30	9	500	193	93	0.07	0.0	5.160	0.062	0	0	0	93	L
L CO723501	CO723500	ABC	3/0 ACSR 3	7.06Y	117.6	0.02	7.41	25.30	9	500	193	93	0.06	0.0	5.218	0.058	0	0	0	93	L
L CO723497	CO723501	ABC	3/0 ACSR 3	7.05Y	117.6	0.03	7.43	25.30	9	500	193	93	0.08	0.0	5.295	0.078	0	0	0	93	L
L CO723498	CO723497	ABC	3/0 ACSR 3	7.05Y	117.6	0.01	7.45	25.30	9	500	193	93	0.04	0.0	5.336	0.040	0	0	0	93	L
L CO723496	CO723498	ABC	3/0 ACSR 3	7.05Y	117.5	0.02	7.46	25.30	9	499	193	93	0.05	0.0	5.385	0.049	0	0	0	93	L
L CO723802	CO723496	C	2 ALUG 15K	7.05Y	117.5	0.01	7.48	39.71	24	262	100	93	0.03	0.0	5.392	0.007	0	0	0	39	L
L OC701950	CO723802	C	FUSE	7.05Y	117.5	0.00	7.48	39.71	0	262	100	93	0.00	0.0	5.392	0.007	0	0	0	39	L
L CO723854	OC701950	C	2 ALUG 15K	7.04Y	117.3	0.18	7.66	39.71	24	262	100	93	0.40	0.2	5.496	0.104	0	0	0	39	L
L CO722949	CO723854	C	2 ALUG 15K	7.03Y	117.2	0.11	7.76	39.73	24	261	100	93	0.22	0.1	5.566	0.070	66	26	7	39	L
L CO722948	CO722949	C	2 ALUG 15K	7.03Y	117.1	0.14	7.90	29.77	18	196	74	94	0.22	0.1	5.684	0.118	33	13	7	32	L
L CO722951	CO722948	C	2 ALUG 15K	7.02Y	117.0	0.13	8.04	24.87	15	163	62	93	0.17	0.1	5.820	0.136	36	14	6	25	L
L CO723832	CO722951	C	2 ALUG 15K	7.01Y	116.9	0.09	8.13	19.49	12	128	48	94	0.10	0.1	5.941	0.121	23	9	4	19	L
L CO722897	CO723832	C	2 ALUG 15K	7.01Y	116.8	0.09	8.22	16.03	10	105	40	93	0.08	0.1	6.087	0.145	21	8	4	15	L
L CO723625	CO722897	C	2 ALUG 15K	7.00Y	116.7	0.05	8.27	12.81	8	84	32	93	0.03	0.0	6.175	0.088	15	6	2	11	L
L CO723626	CO723625	C	2 ALUG 15K	7.00Y	116.7	0.03	8.30	10.55	6	69	27	93	0.01	0.0	6.258	0.083	33	13	4	9	L
L CO729931	CO723626	C	2 ALUG 15K	7.00Y	116.7	0.00	8.30	5.54	3	36	14	93	0.00	0.0	6.288	0.031	28	11	3	5	L
L CO722896	CO729931	C	2 ALUG 15K	7.00Y	116.7	0.00	8.30	1.38	1	9	3	95	0.00	0.0	6.333	0.045	9	4	2	2	L
L CO723499	CO723496	ABC	3/0 ACSR 3	7.05Y	117.5	0.01	7.47	12.06	4	238	93	93	0.01	0.0	5.424	0.039	0	0	0	54	L
L CO722889	CO723499	ABC	3/0 ACSR 3	7.05Y	117.5	0.01	7.48	12.06	4	238	93	93	0.01	0.0	5.471	0.047	0	0	0	54	L
L CO723805	CO722889	B	2 ACSR 1P	7.05Y	117.5	0.01	7.48	23.37	15	153	60	93	0.01	0.0	5.477	0.006	0	0	0	30	L
L OC701990	CO723805	B	REC_35_4H	7.05Y	117.5	0.00	7.48	23.37	0	153	60	93	0.00	0.0	5.477	0.006	0	0	0	30	L
L CO723806	OC701990	B	2 ACSR 1P	7.05Y	117.5	0.01	7.50	23.37	15	153	60	93	0.01	0.0	5.492	0.015	0	0	0	30	L
L CO723118	CO723806	B	2 ACSR 1P	7.05Y	117.5	0.03	7.53	23.37	15	153	60	93	0.04	0.0	5.534	0.042	8	3	2	30	L
L CO722792	CO723118	B	4 ACSR 1P	7.05Y	117.5	0.00	7.53	0.79	1	5	2	93	0.00	0.0	5.576	0.041	5	2	1	1	L
L CO723116	CO723118	B	2 ACSR 1P	7.04Y	117.4	0.06	7.59	21.33	13	140	55	93	0.07	0.0	5.622	0.087	0	0	0	27	L
L CO115790323	CO723116	B	2 ACSR 1P	7.04Y	117.4	0.06	7.65	20.45	13	134	53	93	0.06	0.0	5.705	0.083	2	1	1	26	L
L CO723115	CO115790323	B	2 ACSR 1P	7.04Y	117.3	0.04	7.69	20.08	13	132	52	93	0.04	0.0	5.764	0.059	5	2	1	25	L
L CO723117	CO723115	B	2 ACSR 1P	7.03Y	117.2	0.07	7.76	19.29	12	126	50	93	0.07	0.1	5.877	0.113	1	0	1	24	L
L CO728052	CO723117	B	2 ACSR 1P	7.03Y	117.2	0.05	7.81	19.11	12	125	49	93	0.05	0.0	5.955	0.078	0	0	0	23	L
L CO724301	CO728052	B	2 ACSR 1P	7.03Y	117.2	0.04	7.85	19.11	12	125	49	93	0.03	0.0	6.012	0.057	0	0	0	23	L
L CO724302	CO724301	B	2 ACSR 1P	7.03Y	117.1	0.03	7.88	13.29	8	87	34	93	0.02	0.0	6.081	0.069	0	0	0	16	L
L CO723942	CO724302	B	2 ACSR 1P	7.03Y	117.1	0.00	7.88	1.52	1	10	4	93	0.00	0.0	6.154	0.073	10	4	2	2	L
L CO723887	CO724302	B	2 ACSR 1P	7.03Y	117.1	0.02	7.90	11.77	7	77	30	93	0.01	0.0	6.142	0.061	0	0	0	14	L
L CO724300	CO723887	B	2 ACSR 1P	7.03Y	117.1	0.00	7.90	1.02	1	7	3	92	0.00	0.0	6.193	0.051	7	3	1	1	L
L CO724299	CO723887	B	2 ACSR 1P	7.03Y	117.1	0.01	7.92	10.75	7	70	28	93	0.01	0.0	6.177	0.035	1	0	1	13	L
L CO-152998822	CO724299	B	2 ACSR 1P	7.02Y	117.1	0.01	7.93	10.61	7	69	27	93	0.01	0.0	6.206	0.028	0	0	0	12	L
L CO1820271014	CO-152998822	B	2 ACSR 1P	7.02Y	117.1	0.02	7.94	10.61	7	69	27	93	0.01	0.0	6.254	0.048	4	1	2	12	L
L CO724309	CO1820271014	B	2 ACSR 1P	7.02Y	117.1	0.00	7.94	0.00	0	0	0	100	0.00	0.0	6.331	0.077	0	0	0	0	L
L SW702103-B	CO724309	B	Open	7.02Y	117.1	0.00	7.94	0.00	0	0	0	100	0.00	0.0	6.331	0.077	0	0	0	0	L
L CO723948	CO1820271014	B	2 ACSR 1P	7.02Y	117.1	0.00	7.95	2.42	2	16	6	94	0.00	0.0	6.303	0.049	16	6	2	2	L
L CO723932	CO1820271014	B	2 ACSR 1P	7.02Y	117.0	0.02	7.96	7.63	5	50	20	93	0.01	0.0	6.316	0.062	2	1	1	8	L
L CO724290	CO723932	B	2 ACSR 1P	7.02Y	117.0	0.01	7.97	7.39	5	48	19	93	0.01	0.0	6.376	0.060	0	0	0	7	L
L CO724291	CO724290	B	2 ACSR 1P	7.02Y	117.0	0.01	7.99	7.39	5	48	19	93	0.00	0.0	6.430	0.055	7	3	1	7	L
L CO723956	CO724291	B	4 ACSR 1P	7.02Y	117.0	0.00	7.99	2.57	2	17	7	92	0.00	0.0	6.440	0.009	17	7	1	1	L
L CO724292	CO724291	B	2 ACSR 1P	7.02Y	117.0	0.01	7.99	3.74	2	24	10	92	0.00	0.0	6.494	0.064	0	0	0	5	L
L CO724293	CO724292	B	2 ACSR 1P	7.02Y	117.0	0.00	7.99	0.00	0	0	0	100	0.00	0.0	6.591	0.096	0	0	0	0	L
L CO724294	CO724293	B	2 ACSR 1P	7.02Y	117.0	0.00	7.99	0.00	0	0	0	100	0.00	0.0	6.646	0.055	0	0	0	0	L
L CO-1068219769	CO724294	B	2 ACSR 1P	7.02Y	117.0	0.00	7.99	0.00	0	0	0	100	0.00	0.0	6.727	0.082	0	0	0	0	L
L CO723934	CO724292	B	2 ACSR 1P	7.02Y	117.0	0.00	8.00	3.74	2	24	10	92	0.00	0.0	6.544	0.049	22	9	2	5	L
L CO724295	CO723934	B	2 ACSR 1P	7.02Y	117.0	0.00	8.00	0.42	0	3	1	95	0.00	0.0	6.591	0.047	0	0	0	3	L
L CO724296	CO724295	B	2 ACSR 1P	7.02Y	117.0	0.00	8.00	0.42	0	3	1	95	0.00	0.0	6.665	0.074	0	0	1	3	L
L CO724297	CO724296	B	2 ACSR 1P	7.02Y	117.0	0.00	8.00	0.08	0	1	0	100	0.00	0.0	6.708	0.043	0	0	0	1	L
L CO724298	CO724297	B	2 ACSR 1P	7.02Y	117.0	0.00	8.00	0.08	0	1	0	100	0.00	0.0	6.773	0.065	1	0	1	1	L
L CO723857	CO724296	B	4 ACSR 1P	7.02Y	117.0	0.00	8.00	0.35	0	2	1	89	0.00	0.0	6.737	0.073	2	1	1	1	L
L CO724303	CO724301	B	4 ACSR 1P	7.03Y	117.1	0.01	7.85	2.87	2	19	7	94	0.00	0.0	6.061	0.049	0	0	0	5	L
L CO724304	CO724303	B	4 ACSR 1P	7.03Y	117.1	0.01	7.86	2.87	2	19	7	94	0.00	0.0	6.127	0.067	5	2	2	5	L
L CO723859	CO724304	B	4 ACSR 1P	7.03Y	117.1	0.00	7.86	2.08	2	14	5	94	0.00	0.0	6.169	0.041	14	5	3	3	L
L CO723872	CO724301	B	2 ACSR 1P	7.03Y	117.1	0.00	7.85	2.95	2	19	8	92	0.00	0.0	6.067	0.055	20	8	2	2	L
L CO722788	CO723116	B	2 ACSR 1P	7.04Y	117.4	0.00	7.59	0.88	1	6	2	95	0.00	0.0	5.665	0.043	6	2	1	1	L
L CO723803	CO722889	A	2 ACSR 1P	7.05Y	117.5	0.00	7.48	1.29	1	8	3	94	0.00	0.0	5.477	0.006	0	0	0	2	L
L OC701978	CO723803	A	FUSE	7.05Y	117.5	0.00	7.48	1.29	0	8	3	94	0.00	0.0	5.477	0.006	0	0	0	2	L
L CO723804	OC701978	A	2 ACSR 1P	7.05Y	117.5	0.00	7.48	1.29	1	8	3	94	0.00	0.0	5.509	0.032	0	0	0	2	L
L CO723111	CO723804	A	2 ACSR 1P	7.05Y	117.5	0.00	7.48	1.29	1	8	3	94	0.00	0.0	5.581	0.072	0	0	0	2	L
L CO723112	CO723111	A	2 ACSR 1P	7.05Y	117.5	0.00	7.49	1.29	1	8	3	94	0.00	0.0	5.665	0.084	9	3	2	2	L
L CO723531	CO722889	ABC	336 ACSR 3	7.05Y	117.5	0.00	7.48	3.85	1	76	29	93	0.00	0.0	5.496	0.025	4	2	2	22	L
L CO723532	CO723531	ABC	336 ACSR 3	7.05Y	117.5	0.00	7.48	3.63	1	72	28	93	0.00	0.0	5.546	0.050	5	2	1	20	L
L CO722894	CO723532	C	2 ACSR 1P	7.05Y	117.5	0.00	7.48	0.00	0	0	0	100	0.00	0.0	5.565	0.019	0	0	0	1	L
L CO722895	CO722894	C	2 ACSR 1P	7.05Y	117.5	0.00	7.48	0.00	0	0	0	100	0.00	0.0	5.712	0.147	0	0	1	1	L
L CO723529	CO723532	ABC	336 ACSR 3	7.05Y	117.5	0.00	7.48	3.38	1	67	26	93	0.00	0.0	5.592	0.046	4	2	1	18	L
L CO723528	CO723529	ABC	336 ACSR 3	7.05Y	117.5	0.00	7.48	2.90	1	57	22	93	0.00	0.0	5.641	0.049	10	4	1	15	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

Balanced Voltage Drop Report
Source: DERMONT

Database: G:\010522\07-70146-01410\WORK PRODUCTS\WINDMIL MODEL\SUMMER\EXISTING SUMMER 2009 MODEL_REV.WM\
Title: Dermont Summer CWP Year 3 No Improvements
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	Element Length (mi)	Element KW	Element KVAR	Cons On	Cons Thru	
L C0722981	C0723528	A	2 ACSR 1P	7.05Y	117.5	0.01	7.49	2.81	2	19	7	94	0.00	0.0	5.696	0.055	0	0	0	4	L
L C0722980	C0722981	A	2 ACSR 1P	7.05Y	117.5	0.01	7.49	2.81	2	19	7	94	0.00	0.0	5.753	0.057	0	0	0	4	L
L CO-2056746532	C0722980	A	2 ALUG 15K	7.05Y	117.5	0.00	7.49	1.58	1	11	4	94	0.00	0.0	5.763	0.009	0	0	0	1	L
L OC-2071978669	CO-2056746532	A	QA	7.05Y	117.5	0.00	7.49	1.58	0	11	4	94	0.00	0.0	5.763	0.009	0	0	0	1	L
L C01649920797	OC-2071978669	A	2 ALUG 15K	7.05Y	117.5	0.00	7.50	1.58	1	11	4	94	0.00	0.0	5.888	0.125	11	4	1	1	L
L C0722979	C0722980	A	2 ACSR 1P	7.05Y	117.5	0.01	7.50	1.23	1	8	3	94	0.00	0.0	5.889	0.136	0	0	0	3	L
L C0722978	C0722979	A	2 ACSR 1P	7.05Y	117.5	0.00	7.50	1.23	1	8	3	94	0.00	0.0	5.975	0.087	0	0	0	3	L
L C0722784	C0722978	A	2 ACSR 1P	7.05Y	117.5	0.00	7.50	1.23	1	8	3	94	0.00	0.0	5.997	0.022	8	3	3	3	L
L C0723627	C0723528	C	4 ACSR 1P	7.05Y	117.5	0.00	7.49	0.53	0	4	1	97	0.00	0.0	5.727	0.086	0	0	0	1	L
L C0723628	C0723627	C	4 ACSR 1P	7.05Y	117.5	0.00	7.49	0.53	0	4	1	97	0.00	0.0	5.813	0.085	4	1	1	1	L
L C0723530	C0723528	ABC	336 ACSR 3	7.05Y	117.5	0.00	7.48	1.29	0	25	10	93	0.00	0.0	5.711	0.070	26	10	9	9	L
L SW948158652-B	C0723530	ABC	Open	7.05Y	117.5	0.00	7.48	0.00	0	0	0	100	0.00	0.0	5.711	0.070	0	0	0	0	L
L C0723807	C0723529	A	2 ACSR 1P	7.05Y	117.5	0.00	7.48	0.76	0	5	2	93	0.00	0.0	5.599	0.007	0	0	0	2	L
L OC701930	C0723807	A	QA	7.05Y	117.5	0.00	7.48	0.76	0	5	2	93	0.00	0.0	5.599	0.007	0	0	0	2	L
L C0723808	OC701930	A	2 ACSR 1P	7.05Y	117.5	0.00	7.48	0.76	0	5	2	93	0.00	0.0	5.629	0.031	5	2	2	2	L
L C0723800	C0728050	C	2 ACSR 1P	7.06Y	117.6	0.00	7.37	3.92	2	26	10	93	0.00	0.0	5.104	0.007	0	0	0	6	L
L OC701938	C0723800	C	QA	7.06Y	117.6	0.00	7.37	3.92	0	26	10	93	0.00	0.0	5.104	0.007	0	0	0	6	L
L C0723801	OC701938	C	2 ACSR 1P	7.06Y	117.6	0.00	7.37	3.92	2	26	10	93	0.00	0.0	5.129	0.025	0	0	0	6	L
L C0728051	C0723801	C	2 ACSR 1P	7.06Y	117.6	0.00	7.37	3.92	2	26	10	93	0.00	0.0	5.165	0.036	4	2	1	6	L
L C0724305	C0728051	C	2 ACSR 1P	7.06Y	117.6	0.00	7.38	3.29	2	22	8	94	0.00	0.0	5.182	0.017	3	1	1	5	L
L C0723884	C0724305	C	2 ACSR 1P	7.06Y	117.6	0.00	7.38	2.80	2	18	7	93	0.00	0.0	5.205	0.023	4	1	1	4	L
L C0724307	C0723884	C	4 ACSR 1P	7.06Y	117.6	0.00	7.38	2.24	2	15	6	93	0.00	0.0	5.260	0.055	9	4	1	3	L
L C0724306	C0724307	C	4 ACSR 1P	7.06Y	117.6	0.00	7.38	0.83	1	5	2	93	0.00	0.0	5.284	0.024	5	2	2	2	L
L C0724312	C0724251	B	2 ACSR 1P	7.07Y	117.9	0.00	7.10	21.58	14	142	56	93	0.01	0.0	4.490	0.007	0	0	0	30	L
L OC702094	C0724312	B	REC_35_4H	7.07Y	117.9	0.00	7.10	21.58	0	142	56	93	0.00	0.0	4.490	0.007	0	0	0	30	L
L C0724313	OC702094	B	2 ACSR 1P	7.07Y	117.9	0.02	7.12	21.58	14	142	56	93	0.02	0.0	4.520	0.030	0	0	0	30	L
L C0724262	C0724313	B	2 ACSR 1P	7.07Y	117.8	0.04	7.16	18.84	12	124	49	93	0.03	0.0	4.580	0.059	0	0	0	27	L
L C0724263	C0724262	B	2 ACSR 1P	7.07Y	117.8	0.06	7.21	18.84	12	124	49	93	0.05	0.0	4.670	0.091	3	1	1	27	L
L C0724264	C0724263	B	2 ACSR 1P	7.07Y	117.8	0.03	7.25	18.43	12	121	48	93	0.03	0.0	4.727	0.057	22	9	4	26	L
L C0724288	C0724264	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	1.98	1	13	5	93	0.00	0.0	4.794	0.067	0	0	0	3	L
L C0724286	C0724288	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	0.89	1	6	2	95	0.00	0.0	4.817	0.023	0	0	0	1	L
L C0724287	C0724286	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	0.89	1	6	2	95	0.00	0.0	4.867	0.050	6	2	1	1	L
L C0724289	C0724288	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	1.09	1	7	3	92	0.00	0.0	4.855	0.060	7	3	2	2	L
L C0724308	C0724289	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	0.00	0	0	0	100	0.00	0.0	4.861	0.006	0	0	0	0	L
L SW702103-A	C0724308	B	Open	7.06Y	117.7	0.00	7.25	0.00	0	0	0	100	0.00	0.0	4.861	0.006	0	0	0	0	L
L C0724265	C0724264	B	2 ACSR 1P	7.06Y	117.7	0.03	7.28	11.96	8	79	31	93	0.02	0.0	4.800	0.072	0	0	0	17	L
L C0724266	C0724265	B	2 ACSR 1P	7.06Y	117.7	0.02	7.30	11.96	8	79	31	93	0.01	0.0	4.857	0.057	10	4	3	17	L
L C0724267	C0724266	B	2 ACSR 1P	7.06Y	117.7	0.01	7.31	10.53	7	69	27	93	0.00	0.0	4.885	0.028	9	3	2	14	L
L C0724270	C0724267	B	2 ACSR 1P	7.06Y	117.7	0.02	7.33	9.22	6	61	24	93	0.01	0.0	4.947	0.062	10	4	2	12	L
L C0724268	C0724270	B	4 ACSR 1P	7.06Y	117.7	0.00	7.33	1.59	1	10	4	93	0.00	0.0	4.988	0.041	0	0	0	2	L
L C0724269	C0724268	B	4 ACSR 1P	7.06Y	117.7	0.00	7.33	1.59	1	10	4	93	0.00	0.0	5.034	0.045	3	1	1	2	L
L C0723898	C0724269	B	2 ACSR 1P	7.06Y	117.7	0.00	7.33	1.10	1	7	3	92	0.00	0.0	5.078	0.044	7	3	1	1	L
L C0724273	C0724270	B	2 ACSR 1P	7.06Y	117.7	0.01	7.33	6.12	4	40	16	93	0.00	0.0	4.983	0.036	0	0	0	8	L
L C0724272	C0724273	B	4 ACSR 1P	7.06Y	117.7	0.00	7.33	1.09	1	7	3	92	0.00	0.0	5.034	0.051	1	0	1	3	L
L C0724271	C0724272	B	4 ACSR 1P	7.06Y	117.7	0.00	7.34	1.00	1	7	3	92	0.00	0.0	5.091	0.057	7	3	2	2	L
L C0724274	C0724273	B	2 ACSR 1P	7.06Y	117.7	0.00	7.34	5.03	3	33	13	93	0.00	0.0	5.010	0.027	0	0	0	5	L
L C0724275	C0724274	B	2 ACSR 1P	7.06Y	117.7	0.01	7.34	5.03	3	33	13	93	0.00	0.0	5.057	0.047	0	0	0	5	L
L C0724278	C0724275	B	2 ACSR 1P	7.06Y	117.6	0.01	7.35	3.58	2	24	9	94	0.00	0.0	5.105	0.048	0	0	0	4	L
L C0724279	C0724278	B	2 ACSR 1P	7.06Y	117.6	0.00	7.35	2.12	1	14	5	94	0.00	0.0	5.130	0.025	0	0	0	3	L
L C0724280	C0724279	B	2 ACSR 1P	7.06Y	117.6	0.00	7.36	2.12	1	14	5	94	0.00	0.0	5.184	0.054	0	0	0	3	L
L C0724276	C0724280	B	2 ACSR 1P	7.06Y	117.6	0.00	7.36	2.12	1	14	5	94	0.00	0.0	5.213	0.029	8	3	1	2	L
L C0724277	C0724276	B	2 ACSR 1P	7.06Y	117.6	0.00	7.36	0.93	1	6	2	95	0.00	0.0	5.281	0.069	6	2	1	1	L
L C0724285	C0724280	B	4 ACSR 1P	7.06Y	117.6	0.00	7.36	0.00	0	0	0	100	0.00	0.0	5.307	0.123	0	0	0	1	L
L C0724284	C0724285	B	4 ACSR 1P	7.06Y	117.6	0.00	7.36	0.00	0	0	0	100	0.00	0.0	5.399	0.092	0	0	1	1	L
L C0723878	C0724278	B	2 ACSR 1P	7.06Y	117.6	0.00	7.35	1.46	1	10	4	93	0.00	0.0	5.160	0.055	0	0	0	1	L
L C0724281	C0723878	B	2 ACSR 1P	7.06Y	117.6	0.00	7.36	1.46	1	10	4	93	0.00	0.0	5.229	0.069	0	0	0	1	L
L C0724282	C0724281	B	2 ACSR 1P	7.06Y	117.6	0.00	7.36	1.46	1	10	4	93	0.00	0.0	5.311	0.082	10	4	1	1	L
L C0723866	C0724275	B	4 ACSR 1P	7.06Y	117.7	0.00	7.35	1.44	1	9	4	91	0.00	0.0	5.104	0.048	10	4	1	1	L
L C0723899	C0724264	B	2 ACSR 1P	7.07Y	117.8	0.00	7.25	1.16	1	8	3	94	0.00	0.0	4.757	0.029	8	3	2	2	L
L C0724260	C0724313	B	2 ACSR 1P	7.07Y	117.9	0.00	7.12	2.74	2	18	7	93	0.00	0.0	4.562	0.041	0	0	0	3	L
L C0724261	C0724260	B	2 ACSR 1P	7.07Y	117.9	0.00	7.12	0.64	0	4	2	89	0.00	0.0	4.585	0.023	4	2	1	2	L
L C0729824	C0724261	B	2 ACSR 1P	7.07Y	117.9	0.00	7.12	0.00	0	0	0	100	0.00	0.0	4.604	0.020	0	0	1	1	L
L C0723894	C0724260	B	2 ACSR 1P	7.07Y	117.9	0.00	7.12	2.11	1	14	5	94	0.00	0.0	4.605	0.044	14	5	1	1	L
L CO-831338014	C0724251	A	2 ACSR 1P	7.07Y	117.9	0.01	7.11	21.96	14	146	54	94	0.02	0.0	4.503	0.020	0	0	0	24	L
L C0724316	CO-831338014	A	2 ACSR 1P	7.07Y	117.9	0.00	7.11	21.96	14	146	54	94	0.00	0.0	4.505	0.002	0	0	0	24	L
L OC-1635186946	C0724316	A	L	7.07Y	117.9	0.00	7.11	21.96	0	146	54	94	0.00	0.0	4.505	0.002	0	0	0	24	L
L C0724364	OC-1635186946	A	2 ALUG 15K	7.07Y	117.9	0.00	7.11	1.98	1	13	5	93	0.00	0.0	4.512	0.007	0	0	0	1	L
L OC702092	C0724364	A	FUSE	7.07Y	117.9	0.00	7.11	1.98	0	13	5	93	0.00	0.0	4.512	0.007	0	0	0	1	L
L C0724365	OC702092	A	2 ALUG 15K	7.07Y	117.9	0.00	7.11	1.98	1	13	5	93	0.00	0.0	4.550	0.039	13	5	1	1	L
L C0724366	OC-1635186946	A	2 ACSR 1P	7.07Y	117.9	0.00	7.11	19.98	13	133	49	94	0.00	0.0	4.512	0.007	0	0	0	23	L
L C0724367	C0724366	A	2 ACSR 1P	7.07Y	117.9	0.03	7.15	19.98	13	133	49	94	0.03	0.0	4.559	0.048	0	0	0	23	L
L C01563169479	C0724367	A	2 ACSR 1P	7.07Y	117.9	0.00	7.15	2.22	1	15	5	95	0.00	0.0	4.562	0.003	0	0	0	2	L
L OC344555771	C01563169479	A	QA	7.07Y	117.9	0.00	7.15	2.22	0	15	5	95	0.00	0.0	4.562	0.003	0	0	0	2	L
L C0724317	OC344555771	A	2 ACSR 1P	7.07Y	117.9	0.00	7.15	2.22	1	15	5	95	0.00	0.0	4.571	0.009	0	0	0	2	L
L C0724318	C0724317	A	2 ACSR 1P	7.07Y	117.8	0.01	7.15	2.22	1	15	5	95	0.00	0.0	4.650	0.079	3	1	1	2	L
L C0724319	C0724318	A	2 ACSR 1P	7.07Y	117.8	0.00	7.15	1.75	1	12	4	95	0.00	0.0	4.713	0.063	0	0	0	1	L
L C0724320	C0724319	A	2 ACSR 1P	7.07Y	117.8	0.00	7.16	1.75	1	12	4	95	0.00	0.0	4.727	0.015	0	0	0	1	L
L C0724321	C0724320	A	2 ALUG 15K	7.07Y	117.8	0.00	7.16	1.75	1	12	4	95	0.00	0.0	4.734	0.007	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

Balanced Voltage Drop Report
Source: DERMONT

Database: G:\010522\07-70146-01410\WORK PRODUCTS\WINDMIL MODEL\SUMMER\EXISTING SUMMER 2009 MODEL_REV.WM\
Title: Dermont Summer CWP Year 3 No Improvements
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	-Element- Length (mi)	KW	KVAR	Cons On	Cons Thru
L OC702121	CO724321	A	QA	7.07Y	117.8	0.00	7.16	1.75	0	12	4	95	0.00	0.0	4.734	0.007	0	0	0	1 L
L CO724322	OC702121	A	2 ALUG 15K	7.07Y	117.8	0.00	7.16	1.75	1	12	4	95	0.00	0.0	4.809	0.075	12	5	1	1 L
L CO724324	CO724367	A	2 ACSR 1P	7.07Y	117.8	0.04	7.18	17.76	11	118	44	94	0.03	0.0	4.620	0.061	0	0	0	21 L
L CO724323	CO724324	A	2 ACSR 1P	7.07Y	117.8	0.03	7.21	17.76	11	118	44	94	0.03	0.0	4.677	0.056	0	0	0	21 L
L CO724326	CO724323	A	2 ALUG 15K	7.07Y	117.8	0.00	7.22	4.29	3	28	11	93	0.00	0.0	4.683	0.007	0	0	0	5 L
L OC702072	CO724326	A	FUS_10_ASC	7.07Y	117.8	0.00	7.22	4.29	0	28	11	93	0.00	0.0	4.683	0.007	0	0	0	5 L
L CO724327	OC702072	A	2 ALUG 15K	7.07Y	117.8	0.00	7.22	4.29	3	28	11	93	0.00	0.0	4.686	0.003	0	0	0	5 L
L CO729918	CO724327	A	2 ALUG 15K	7.07Y	117.8	0.00	7.22	4.30	3	28	11	93	0.00	0.0	4.720	0.034	23	9	4	5 L
L CO724325	CO729918	A	2 ALUG 15K	7.07Y	117.8	0.00	7.22	0.81	0	5	2	93	0.00	0.0	4.760	0.040	5	2	1	1 L
L CO723927	CO724323	A	2 ACSR 1P	7.07Y	117.8	0.01	7.23	13.46	8	89	33	94	0.01	0.0	4.709	0.033	0	0	0	16 L
L CO724328	CO723927	A	2 ALUG 15K	7.07Y	117.8	0.00	7.23	13.46	8	89	33	94	0.00	0.0	4.716	0.007	0	0	0	16 L
L OC702091	CO724328	A	QA	7.07Y	117.8	0.00	7.23	13.47	0	89	33	94	0.00	0.0	4.716	0.007	0	0	0	16 L
L CO724329	OC702091	A	2 ALUG 15K	7.06Y	117.7	0.04	7.27	13.47	8	89	33	94	0.03	0.0	4.780	0.065	0	0	0	16 L
L CO-1454363754	CO724329	A	2 ALUG 15K	7.06Y	117.7	0.00	7.27	0.07	0	0	0	100	0.00	0.0	4.857	0.077	0	0	1	1 L
L CO724330	CO724329	A	2 ALUG 15K	7.06Y	117.7	0.04	7.31	13.42	8	89	33	94	0.03	0.0	4.845	0.064	10	4	2	15 L
L CO724331	CO724330	A	2 ALUG 15K	7.06Y	117.6	0.05	7.36	11.99	7	79	29	94	0.03	0.0	4.950	0.106	9	3	2	13 L
L CO723958	CO724331	A	2 ALUG 15K	7.06Y	117.6	0.05	7.41	10.73	6	71	27	93	0.03	0.0	5.081	0.130	17	7	2	11 L
L CO723974	CO723958	A	2 ALUG 15K	7.05Y	117.6	0.01	7.42	8.23	5	54	20	94	0.00	0.0	5.103	0.022	14	5	2	9 L
L CO723961	CO723974	A	2 ALUG 15K	7.05Y	117.6	0.00	7.42	1.07	1	7	3	92	0.00	0.0	5.131	0.028	7	3	1	1 L
L CO723959	CO723974	A	2 ALUG 15K	7.05Y	117.6	0.01	7.43	5.07	3	34	12	94	0.00	0.0	5.157	0.054	3	1	1	6 L
L CO723957	CO723959	A	2 ALUG 15K	7.05Y	117.6	0.01	7.44	4.56	3	30	11	94	0.00	0.0	5.220	0.063	20	8	3	5 L
L CO724336	CO723957	A	2 ALUG 15K	7.05Y	117.6	0.00	7.44	1.58	1	10	4	93	0.00	0.0	5.288	0.068	11	4	2	2 L
L CO724335	CO724336	A	2 ALUG 15K	7.05Y	117.6	0.00	7.44	-0.00	0	0	0	100	0.00	0.0	5.295	0.007	0	0	0	0 L
L SW702112-A	CO724335	A	Open	7.05Y	117.6	0.00	7.44	0.00	0	0	0	100	0.00	0.0	5.295	0.007	0	0	0	0 L
L CO723949	CO724250	BC	2 ACSR 2P	7.08Y	117.9	0.00	7.08	2.98	2	39	15	93	0.00	0.0	4.516	0.063	24	10	2	5 L
L CO723931	CO723949	B	2 ACSR 1P	7.07Y	117.9	0.00	7.09	2.31	1	15	6	93	0.00	0.0	4.568	0.052	15	6	3	3 L
L CO724062	OC702097	B	2 ACSR 1P	7.08Y	118.0	0.05	7.01	19.16	12	126	50	93	0.04	0.0	5.102	0.072	0	0	0	25 L
L CO723904	CO724062	B	2 ACSR 1P	7.08Y	118.0	0.00	7.01	1.60	1	11	4	94	0.00	0.0	5.162	0.060	11	4	1	1 L
L CO723903	CO724062	B	2 ACSR 1P	7.08Y	118.0	0.00	7.01	0.15	0	1	0	100	0.00	0.0	5.149	0.047	1	0	2	2 L
L CO724019	CO724062	B	2 ACSR 1P	7.08Y	117.9	0.05	7.06	17.41	11	115	45	93	0.04	0.0	5.188	0.086	0	0	0	22 L
L CO724020	CO724019	B	2 ACSR 1P	7.07Y	117.9	0.06	7.12	17.41	11	115	45	93	0.05	0.0	5.291	0.103	4	2	2	22 L
L CO724014	CO724020	B	2 ACSR 1P	7.07Y	117.9	0.00	7.12	1.96	1	13	5	93	0.00	0.0	5.348	0.057	0	0	0	3 L
L CO724015	CO724014	B	2 ACSR 1P	7.07Y	117.9	0.00	7.13	1.96	1	13	5	93	0.00	0.0	5.421	0.073	13	5	2	3 L
L CO724016	CO724015	B	2 ACSR 1P	7.07Y	117.9	0.00	7.13	0.00	0	0	0	100	0.00	0.0	5.494	0.073	0	0	1	1 L
L CO724017	CO724020	B	2 ACSR 1P	7.07Y	117.9	0.02	7.14	14.83	9	98	38	93	0.01	0.0	5.329	0.038	5	2	1	17 L
L CO724018	CO724017	B	2 ACSR 1P	7.07Y	117.8	0.03	7.17	14.07	9	93	36	93	0.02	0.0	5.398	0.070	3	1	1	16 L
L CO724013	CO724018	B	2 ACSR 1P	7.07Y	117.8	0.03	7.20	9.15	6	60	24	93	0.01	0.0	5.485	0.086	0	0	0	12 L
L CO724010	CO724013	B	2 ACSR 1P	7.07Y	117.8	0.02	7.22	9.15	6	60	24	93	0.01	0.0	5.565	0.080	5	2	1	12 L
L CO724009	CO724010	B	2 ACSR 1P	7.07Y	117.8	0.01	7.23	8.46	5	56	22	93	0.01	0.0	5.609	0.043	0	0	0	11 L
L CO724004	CO724009	B	2 ACSR 1P	7.07Y	117.8	0.00	7.23	2.33	1	15	6	93	0.00	0.0	5.633	0.024	10	4	1	3 L
L CO724005	CO724004	B	2 ACSR 1P	7.07Y	117.8	0.00	7.24	0.82	1	5	2	93	0.00	0.0	5.675	0.042	5	2	2	2 L
L CO724008	CO724009	B	2 ACSR 1P	7.07Y	117.8	0.01	7.24	4.80	3	32	12	94	0.00	0.0	5.668	0.060	0	0	0	7 L
L CO724006	CO724008	B	2 ACSR 1P	7.07Y	117.8	0.01	7.25	3.53	2	23	9	93	0.00	0.0	5.723	0.054	2	1	1	5 L
L CO724007	CO724006	B	2 ACSR 1P	7.06Y	117.7	0.01	7.25	2.53	2	17	7	92	0.00	0.0	5.784	0.062	0	0	0	3 L
L CO724002	CO724007	B	2 ACSR 1P	7.06Y	117.7	0.01	7.26	2.53	2	17	7	92	0.00	0.0	5.860	0.076	0	0	0	3 L
L CO723906	CO724002	B	2 ACSR 1P	7.06Y	117.7	0.00	7.26	1.15	1	8	3	94	0.00	0.0	5.930	0.070	0	0	0	1 L
L CO723877	CO723906	B	4 ACSR 1P	7.06Y	117.7	0.00	7.27	1.15	1	8	3	94	0.00	0.0	6.002	0.073	8	3	1	1 L
L CO724003	CO724002	B	2 ACSR 1P	7.06Y	117.7	0.00	7.26	0.32	0	2	1	89	0.00	0.0	5.900	0.040	0	0	0	1 L
L CO723987	CO724003	B	2 ACSR 1P	7.06Y	117.7	0.00	7.26	0.32	0	2	1	89	0.00	0.0	5.956	0.055	2	1	1	1 L
L SW702113-B	CO723987	B	Open	7.06Y	117.7	0.00	7.26	0.00	0	0	0	100	0.00	0.0	5.956	0.055	0	0	0	0 L
L CO723875	CO724002	B	4 ACSR 1P	7.06Y	117.7	0.00	7.26	1.06	1	7	3	92	0.00	0.0	5.920	0.060	7	3	1	1 L
L CO723998	CO724006	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	0.73	0	5	2	93	0.00	0.0	5.781	0.059	0	0	0	1 L
L CO723999	CO723998	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	0.73	0	5	2	93	0.00	0.0	5.846	0.065	0	0	0	1 L
L CO724000	CO723999	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	0.73	0	5	2	93	0.00	0.0	5.888	0.042	0	0	0	1 L
L CO724001	CO724000	B	2 ACSR 1P	7.06Y	117.7	0.00	7.25	0.73	0	5	2	93	0.00	0.0	5.943	0.055	5	2	1	1 L
L CO723876	CO724008	B	4 ACSR 1P	7.07Y	117.8	0.00	7.24	1.28	1	8	3	94	0.00	0.0	5.707	0.039	8	3	2	2 L
L CO723907	CO724009	B	4 ACSR 1P	7.07Y	117.8	0.00	7.23	1.33	1	9	3	95	0.00	0.0	5.649	0.040	9	3	1	1 L
L CO724012	CO724018	B	2 ACSR 1P	7.07Y	117.8	0.00	7.17	1.95	1	13	5	93	0.00	0.0	5.473	0.074	11	4	1	2 L
L CO724011	CO724012	B	2 ACSR 1P	7.07Y	117.8	0.00	7.17	0.24	0	2	1	89	0.00	0.0	5.506	0.034	2	1	1	1 L
L CO723880	CO724018	B	2 ACSR 1P	7.07Y	117.8	0.00	7.17	2.56	2	17	7	92	0.00	0.0	5.489	0.091	17	7	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

	Load	Adjustment	Capacitance	Charging	Gen&Motors	Loops&Metas	Losses	No Load Losses	Total
KW	7343	55	0	0	0	0	154	0.00	7552
KVAR	2969	23	0	-47	0	0	238		3184

Lowest Voltage = 116.70 on Element CO722896
Max Accm VoltD = 8.30 on Element CO722896
Max Elem VoltD = 0.18 on Element CO729319

Substation Summary:

Substation	KW	KW Losses	KVAR	KVAR Losses	KVA	% Capacity
DERMONT	7552.00	154.00	3230.00	238.00	8195.82	0.00
Total:	7552.00	154.00	3230.00	238.00	8195.82	

Appendix B
SAMPLE LOAD FLOWS – AFTER IMPROVEMENTS

Balanced Voltage Drop Report
Source: Dermont 2

Database: G:\010522\07-70146-01410\WORK PRODUCTS\WINDMIL MODEL\SUMMER\SUMMER CWP.WM\
Title: Dermont Summer CWP Year 3 With Improvements
'ase:

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	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru
Dermont 2		ABC	ADAMS LANE	7.50Y	125.0	0.00	0.00	92.17	0	1917	792	92	0.00	0.0	0.000	0.000	0	0	0	333
----------- Feeder No. 0 (New Dermont Ckt) Beginning with Device New Dermont Ckt -----------																				
P CO812043723	CO-1792456853	B	2 ALUG 15K	7.43Y	123.8	0.00	1.20	-0.01	0	0	0	100	0.00	0.0	1.536	0.018	0	0	0	0 P

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	1852	28	0	0	0	0	37	0.00	1917
KVAR	727	11	0	-6	0	0	60		792

Lowest Voltage = 121.11 on Element CO724359
Max Accm VoltD = 3.89 on Element CO724359
Max Elem VoltD = 0.37 on Element OH2116330250

Balanced Voltage Drop Report
Source: DERMONT

Database: G:\010522\07-70146-01410\WORK PRODUCTS\WINDMIL MODEL\SUMMER\SUMMER CWP.WM\
Title: Dermont Summer CWP Year 3 With Improvements
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	
DERMONT		ABC	DERMONT	7.50Y	125.0	0.00	0.00	275.49	0	5718	2394	92	0.00	0.0	0.000	0.000	0	0	0	1174	
----------- Feeder No. 4 (17-4) Beginning with Device 17-4 -----------																					
17-4	CO729696	ABC	REC_400_RE	7.50Y	125.0	0.00	0.01	111.50	0	2311	976	92	0.00	0.0	0.007	0.000	0	0	0	560	
P CO728298	CO-929824448	A	2 ALUG 15K	7.37Y	122.8	0.00	2.20	0.00	0	0	0	100	0.00	0.0	2.656	0.001	0	0	0	0	P
P CO728373	CO728838	C	2 ALUG 15K	7.36Y	122.7	0.00	2.28	0.00	0	0	0	100	0.00	0.0	2.654	0.001	0	0	0	0	P
P CO728917	CO728916	B	2 ALUG 15K	7.35Y	122.5	0.00	2.46	-0.00	0	0	0	100	0.00	0.0	2.684	0.006	0	0	0	0	P
P CO728659	CO-982421992	B	2 ALUG 15K	7.36Y	122.7	0.00	2.27	-0.00	0	0	0	100	0.00	0.0	2.419	0.003	0	0	0	0	P
P CO-2069158803	CO728659	B	2 ALUG 15K	7.36Y	122.7	0.00	2.27	0.00	0	0	0	100	0.00	0.0	2.422	0.002	0	0	0	0	P
----------- Feeder No. 2 (17-2) Beginning with Device 17-2 -----------																					
17-2	CO729694	ABC	REC_400_RE	7.50Y	125.0	0.00	0.00	23.38	0	485	204	92	0.00	0.0	0.009	0.002	0	0	0	107	
----------- Feeder No. 3 (17-3) Beginning with Device 17-3 -----------																					
17-3	CO729695	ABC	REC_400_RE	7.50Y	125.0	0.00	0.01	78.48	0	1617	709	92	0.00	0.0	0.012	0.002	0	0	0	291	
----------- Feeder No. 1 (17-1) Beginning with Device 17-1 -----------																					
17-1	CO729693	ABC	REC_400_RE	7.50Y	125.0	0.00	0.01	62.17	0	1305	505	93	0.00	0.0	0.010	0.002	0	0	0	216	
P CO729610	CO729609	C	2 ALUG 15K	7.44Y	123.9	0.00	1.07	-0.00	0	0	0	100	0.00	0.0	2.179	0.007	0	0	0	0	P

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	5574	101	0	0	0	0	43	0.00	5718
KVAR	2316	42	0	-46	0	0	81		2394

Lowest Voltage = 122.54 on Element CO728916
Max Accm VoltD = 2.46 on Element CO728916
Max Elem VoltD = 0.17 on Element CO729372

Substation Summary:

Substation	KW	KW Losses	KVAR	KVAR Losses	KVA	% Capacity
DERMONT	5718.00	43.00	2439.00	81.00	6198.54	0.00
Dermont 2	1917.00	37.00	798.00	60.00	2073.76	0.00
otal:	7635.00	80.00	3237.00	141.00	8272.30	

Appendix C
CWP MAP