Generation Interconnection
Feasibility Study Report

for

PJM Generation Interconnection Request Queue
Position Y2-116 (withY2-095)

Sullivan 765 kV

August / 2013

General

Interconnection Customer (IC) proposes to interconnect 1211 MW under PJM project queue Y2-095 and another 600 MW under Y2-116. Primary point on interconnection (POI) is at Sullivan 765 kV and secondary POI is at Breed 345 kV.

System Normal @ Energy Output

Listed below are violations at Energy output and system normal conditions.

Table 1: AEP – System Normal @ Energy Output								
#	*Branch Fix*	*Rating MVA*	*Base %*	*Y2-095 %*	*Y2-116 %*	*Req. Rating MVA*	*Network Upgrade Cost Y2-095*	*Y2-116*
1	235428 WINDSOR 138 243131 05TILTON 138 1 Fix: Rebuild Windsor – Tiltonsville. AEP-FE tie line.	205	112.7	115.2	116.5	238.8		$6,285,000
2	242921 05CORNU 765 242934 05CORNU 345 1 Fix: Replace TX	1500	89.4	101.4	101.4	1506.0	$15,000,000	
3	242983 05CHANDR 138 243074 05PHILO 138 1 Fix: Risers and bus at Philo	191	97.5	100.8	102.7	196.2	$150,000	
4	243056 05NEWCOM 138 243094 05SCOSHC 138 1 Fix: Rebuild Newcomerstown - South Coshocton	138	106.1	109	110.8	152.9	$21,750,000	
5	243070 05OHIOCT 138 243094 05SCOSHC 138 1 Fix: Rebuild Ohio Central - South Coshocton	185	111.8	114.2	115.6	213.9		$24,165,000
6	243070 05OHIOCT 138 243145 05WCOSHC 138 1 Fix: Rebuild Ohio Central - West Coshocton	185	105.7	108	109.3	202.2		$30,510,000
7	243105 05SMILLB 138 243151 05WMILLS 138 1 Fix: Remote end South Millersburg equipment	159	104.2	106.9	108.5	172.5	$150,000	
8	243208 05JEFRSO 765 243209 05ROCKPT 765 1 Fix: Wavetrap at Rockport and Jefferson	4055	92.6	107.4	111.3	4513.2	$500,000	
9	243213 05BREED 345 346809 7CASEY 345 1 Fix: non-AEP conductor limited	1332	76	100.9	101.6	1353.3		
10	243225 05KEYSTN 345 243232 05SORENS 345 1 Fix: Tie in Desoto – Sorenson at Keystone 345 kV	897	115.9	121.5	123.4	1106.9	$5,000,000	
11	243230 05REYNOL 345 243878 05MEADOW 345 1 Fix: Pioneer Project, refer to Appendix A	971	108.7	117.4	120.1	1166.2		
12	243313 05HUNT J 138 243367 05ROCKCR 138 1 Fix: Replace Rock Creek switch	138	106.7	112	114.3	157.7	$150,000	
13	243313 05HUNT J 138 243377 05SORENS 138 1 Fix: Tie in Delaware – Sorenson at Huntington Junction	167	109.1	115.5	119	198.7	$3,500,000	
14	246652 BRIGSDL 39.4 246665 MCOMBS 39.4 1 Fix: Replace Briggsdale risers	32	101.7	102.3	113.1	36.2		$50,000

Category B @ Energy Output (DC Load Flow)

DC analysis was performed on contingencies that did not converge under AC analysis. Note that AC loadings are expected to be higher than DC loadings. Since, the fixes provided below are based on DC loadings, they should be considered preliminary. A more detailed AC analysis will be performed during impact study phase. Refer to Appendix B for contingency definitions.

Table 2: AEP - Category B @ Energy Output (DC Load Flow)

#	Branch Contingency Fix	Rating MVA	Base %	Y2-095 %	Y2-116 %	Req. Rating MVA	Network Upgrade Cost Y2-095	Network Upgrade Cost Y2-116
1	242931 05BEVERL 345 248101 NBURGER 345 1 41_B2_TOR544 Fix: Not required.	972	111.2	115.5	115.5	1123		

AEP DC Analysis

DC analysis was performed on contingencies that did not converge under AC analysis. Note that AC loadings are expected to be higher than DC loadings. Since, the fixes provided below are based on DC loadings, they should be considered preliminary. A more detailed AC analysis will be performed during impact study phase. Refer to Appendix B for contingency definitions.

Table 3: AEP – DC Analysis for non-convergent AC contingencies

#	*Branch Contingency Fix*	*Rating MVA*	*Base %*	*Y2-095 %*	*Y2-116 %*	*Req. Rating MVA*	*Network Upgrade Cost Y2-095*	*Y2-116*
1	242937 05KAMMER 345 242940 05MUSKNG 345 1 2942_C2_05KAMMER 765-PP Fix: Perform sag condition correction study	972	124	128	128	1244	$340,000	
2	242973 05BUCKH8 138 243105 05SMILLB 138 1 2942_C2_05KAMMER 765-PP Fix: Perform sag condition correction study	184	107	109	110	202		$10,000
3	242973 05BUCKH8 138 243145 05WCOSHC 138 1 2942_C2_05KAMMER 765-PP Fix: Perform sag condition correction study	185	109	111	111	205	$52,000	
4	243014 05GRBLOP 138 243366 05ROB PK 138 1 2932_C2_05JEFRSO 765-A2 Fix: Perform sag condition correction study.	223	96	99	100	223		$32,000
5	243045 05MUSKNG 138 243091 05SCALDW 138 2942_C2_05KAMMER 765-PP Fix: Perform sag condition correction study	205	111	114	114	234	$54,000	
6	243056 05NEWCOM 138 243094 05SCOSHC 138 1 2942_C2_05KAMMER 765-PP Fix: Remote end equipment upgrade	179	99	102	102	183	$500,000	
7	243105 05SMILLB 138 243151 05WMILLS 138 1 2942_C2_05KAMMER 765-PP Fix: Perform sag condition correction study	184	105	107	107	197	$15,000	
8	243206 05DUMONT 765 907020 X1-020 TAP 765 1 2932_C2_05JEFRSO 765-A2 Fix: Pioneer project network upgrade	4094	96	102	103	4217		
9	243208 05JEFRSO 765 248000 06CLIFTY 345 1 1760_C2_05JEFRSO 765-A	1935	121	135	139	2690		

Table 3: AEP – DC Analysis for non-convergent AC contingencies

#	Branch Contingency Fix	Rating MVA	Base %	Y2-095 %	Y2-116 %	Req. Rating MVA	Network Upgrade Cost Y2-095	Network Upgrade Cost Y2-116
	Fix: Pioneer project network upgrade							
10	243210 05SULLVA 765 243213 05BREED 345 1 2929_C2 Fix: Pioneer project network upgrade	1875	105	126	126	2363		
11	243210 05SULLVA 765 243213 05BREED 345 2 3007_C2 Fix: Pioneer project network upgrade	1905	97	130	130	2477		
12	243210 05SULLVA 765 243213 05BREED 345 3 7336_C2_05SULLVA 765-A Fix: Pioneer project network upgrade	2608	85	114	110	2869		
13	243213 05BREED 345 243216 05DARWIN 345 1 2930_C2 Fix: Pioneer project network upgrade	1419	100	118	118	1674		
14	243218 05DESOTO 345 243232 05SORENS 345 2 2979_C2_X1-020_X2-052 Fix: Perform sag condition correction study	971	102	106	106	1029	$100,000	
15	243229 05OLIVE 345 243353 05OLIVE 138 2 2979_C2_X1-020_X2-052 Fix: Upgrade relay thermal limits	818	101	101	102	834		$50,000
16	243230 05REYNOL 345 243878 05MEADOW 345 1 4690_C2_05OLIVE 345-D_A Fix: Pioneer project network upgrade	1195	116	120	121	1446		
17	243237 05ADAM 138 243358 05PENNVI 138 1 444 Fix: Perform sag condition correction study	205	101	106	106	217	$52,400	
18	243242 05ALLEN 138 243334 05MAGLEY 138 1 444 Fix: Perform sag condition correction study	205	101	107	107	219	$72,400	
19	243262 05COLLCO 138 250001 08COLINV 138 1 2932_C2_05JEFRSO 765-A2 Fix: Perform sag condition correction study	179	104	107	108	193	$49,000	

Table 3: AEP – DC Analysis for non-convergent AC contingencies

#	*Branch Contingency Fix*	*Rating* *MVA*	*Base* *%*	*Y2-095* *%*	*Y2-116* *%*	*Req. Rating* *MVA*	*Network Upgrade Cost* *Y2-095*	*Y2-116*
20	243262 05COLLCO 138 250106 08TODHJT 138 1 2932_C2_05JEFRSO 765-A2 Fix: Non-AEP sag limited conductor	201	86	89	89	201		
21	243274 05DEERCR 138 243303 05GRNTTA 138 1 3132_C2_05GRNTWN 765-T1 Fix: Previously identified for U4-039. Rebuild line.	307	101	104	105	322	$12,150,000	
22	243275 05DELAWR 138 243387 05VANBUR 138 1 444 Fix: Perform sag condition correction study	167	95	101	100	167	$120,000	
23	243312 05HUMMEL 138 243367 05ROCKCR 138 1 2979_C2_X1-020_X2-052 Fix: Remote end ckt terminal elements upgrade	184	138	142	144	265	$250,000	
24	243313 05HUNT J 138 243367 05ROCKCR 138 12979_C2_X1-020_X2-052 Fix: Tie in Delaware – Sorenson 138 kV line	167	146	151	153	256		
25	243313 05HUNT J 138 243377 05SORENS 138 1 2979_C2_X1-020_X2-052 Fix: Tie in Delaware – Sorenson 138 kV line	208	188	195	198	412		
26	243319 05JAY 138 243358 05PENNVI 138 1 444 Fix: Perform a sag condition correction study	205	105	110	110	226	$31,000	
27	243334 05MAGLEY 138 247500 R-003 C 138 1 444 Fix: Sag study and upgrade circuit terminal equipment	250	104	108	108	270	$549,000	
28	243490 05CORNER 138 243533 05LAYMAN 138 1 37_B2_TOR12_WOMOP Fix: Sag study and upgrade circuit terminal equipment	284	123	128	128	364	$529,000	
29	243533 05LAYMAN 138 243589 05WOLFCL 138 1 2942_C2_05KAMMER 765-PP Fix: Sag study and upgrade circuit terminal equipment	284	128	133	133	378	$535,000	

Category C @ Energy Output (AC Load Flow)

Overloads listed below are based on AC loadings. For contingency definitions, refer to Appendix C.

Table 4: AEP Category C @ Energy Output (AC Load Flow)

#	*Branch Contingency Fix*	*Rating* *MVA*	*Base* *%*	*Y2-095* *%*	*Y2-116* *%*	*Req. Rating* *MVA*	*Network Upgrade Cost* *Y2-095*	*Y2-116*
1	1 CAIMAN 138 243026 05KAMMR1 138 1 476 Fix: AEP-FE tie line	205	133.7	137.2	139.2	285		
2	1 CAIMAN 138 246940 05BIGR2Z 138 1 476 Fix: AEP-Fix tie line	205	103.5	106.8	108.8	223		
3	235363 MAHANS LANE 138 243127 05TIDD 138 1 4743_C2_05TIDD 345-CC Fix: Non-AEP conductor limited	250	109.7	112.7	114.6	287		
4	242516 05MOUNTN 765 242920 05BELMON 765 1 7445_C2_05MARYSV 765-B Fix: Upgrade wavetrap at Mountaineer	4253	102.8	106.7	108.5	4615	$500,000	
5	242528 05SPORN 345 248005 06KYGER 345 2 3019_C2_05SPORN 345-CC2 Fix: Perform sag condition correction study	1438	101.2	105.3	107.3	1543	$51,000	
6	242542 05ATKINS 138 242780 05RURALR 138 1 7587_C2_05J.FERR 765-B Fix: Rebuild Line	307	122.8	131.9	135.2	415	$9,025,000	
7	242566 05BROADF 138 242567 05BROADX 138 BP 7587_C2_05J.FERR 765-B Fix:	286	148.2	155.9	157.7	451		
8	242567 05BROADX 138 242803 05SMYTH 138 1 7587_C2_05J.FERR 765-B Fix: Rebuild line and upgrade remote end equipment	258	164.6	173	175	452	$21,275,000	
9	242608 05CLYTR1 138 242791 05SCHRIS 138 1 2914_C2_05J.FERR 765-B2 Fix: Perform sag condition correction study	167	103.4	105.3	108.5	181		$43,000
10	242609 05CLYTR2 138 242853 05WURNO 138 1 2914_C2_05J.FERR 765-B2	251	111.9	114.2	115.7	290		$551,400

Table 4: AEP Category C @ Energy Output (AC Load Flow)

#	*Branch Contingency Fix*	*Rating MVA*	*Base %*	*Y2-095 %*	*Y2-116 %*	*Req. Rating MVA*	*Network Upgrade Cost Y2-095*	*Network Upgrade Cost Y2-116*
	Fix: Upgrade terminal equipment and perform sag study							
11	242685 05J.FERX 138 242745 05PEAKCK 138 1 2914_C2_05J.FERR 765-B2 Fix: Rebuild line	335	112.6	115	115.6	387		$21,275,000
12	242725 05MTAIRY 138 242780 05RURALR 138 1 7587_C2_05J.FERR 765-B Fix: Rebuild Line	335	107.6	117	120.5	404	$6,875,000	
13	242745 05PEAKCK 138 242841 05W GLOW 138 1 2914_C2_05J.FERR 765-B2 Fix: Rebuild line	319	110	112.5	113.2	361		$1,530,000
14	242788 05SALTV1 138 242827 05TAZEWE 138 1 2916_C2_05J.FERR 765-A Fix: Perform sag condition correction study	296	99.8	101.8	102.4	303	$84,000	
15	242841 05W GLOW 138 242853 05WURNO 138 1 2914_C2_05J.FERR 765-B2 Fix: Rebuild line	319	108.3	110.8	111.5	356		$2,775,000
16	242858 05WYTHE1 138 242859 05WYTHE2 138 1 7587_C2_05J.FERR 765-B Fix: Upgrade relay thermal limits	305		104.4	104.2	318	$50,000	
17	242932 05CANTNC 345 914080 Y2-050 TAP 345 1 4743 Fix: Perform sag condition correction study	1409	114.1	116.1	117.3	1653		$210,000
18	242937 05KAMMER 345 242940 05MUSKNG 345 1 2937_C2_05KAMMER 345-CC Fix: Perform sag condition correction study	972	122.8	126.7	128.7	1251	$210,000	
19	242938 05MARQUI 345 243034 05MARQUI 138 3 6775_C2_05MARQUI 345-D1 Fix: Upgrade transformer	564		99.4	100.4	566		$5,000,000
20	242973 05BUCKH8 138 243145 05WCOSHC 138 1 5034_C2_05SCANTO 345-C2 Fix: Perform sag condition correction study	185	119.8	123.6	125.6	232	$52,000	

Table 4: AEP Category C @ Energy Output (AC Load Flow)

#	*Branch Contingency Fix*	*Rating MVA*	*Base %*	*Y2-095 %*	*Y2-116 %*	*Req. Rating MVA*	*Network Upgrade Cost Y2-095*	*Y2-116*
21	242998 05EPOINT 138 243001 05EZANEV 138 1 6403_C1_05OHIOCT 138-1 Fix: Rebuild line	284	104	105.7	106.6	303		$4,665,000
22	242998 05EPOINT 138 243070 05OHIOCT 138 1 6403_C1_05OHIOCT 138-1 Fix: Rebuild line and upgrade remote end equipment	255	119.7	121.5	122.5	312		$15,125,000
23	243006 05FOSTOR 138 243137 05W.END 138 1 517_C2 Fix: Perform sag condition correction study	296		99.3	105.6	313		$6,600
24	243014 05GRBLOP 138 243086 05S HICK 138 1 2906_C2_05MARYSV 765-A1 Fix: Perform sag condition correction study	223	105.3	110.3	113.2	252	$55,000	
25	243014 05GRBLOP 138 243366 05ROB PK 138 1 2906_C2_05MARYSV 765-A1 Fix: Perform sag condition correction study	223	109	114	117	261	$31,400	
26	243020 05HILLVI 138 243156 05WNPHIL 138 1 1917_C2_05SCANTO 345-B2 Fix: Perform sag condition correction study	290	112	115.9	118.2	343	$61,000	
27	243029 05LCKWRD 138 243086 05S HICK 138 1 6466_C2_05E LIMA 345-M2 Fix: Perform sag condition correction study	223		103.2	107	239	$196,000	
28	243045 05MUSKNG 138 243091 05SCALDW 138 1 474 Fix: Upgrade terminal equipment and perform sag study	205	117.5	121.1	122.9	252	$346,000	
29	243059 05NFINDL 138 243067 05NWOODC 138 1 724_C1_05E LIMA 345-2 Fix: Perform sag condition correction study	167	109.6	114.2	117	195	$47,000	
30	243068 05NZANEV 138 243161 05ZANESV 138 1 6404_C1_05OHIOCT 138-2 Fix: Rebuild line and upgrade remote end equipment	255	111.4	112.9	113.8	290		$519,000
31	243131 05TILTON 138 243143 05WBELLA 138 1	284	114.4	117.2	118.8	337	$18,675,000	

Table 4: AEP Category C @ Energy Output (AC Load Flow)

#	*Branch Contingency Fix*	*Rating MVA*	*Base %*	*Y2-095 %*	*Y2-116 %*	*Req. Rating MVA*	*Network Upgrade Cost Y2-095*	*Y2-116*
	4743_C2_05TIDD 345-CC Fix: Rebuild line							
32	243217 05DEQUIN 345 243878 05MEADOW 345 1 6485_C2_05DEQUIN 345-C1 Fix: Pioneer Project	1304		102.9	105.6	1377		
33	243217 05DEQUIN 345 243878 05MEADOW 345 2 4704_C2_05DEQUIN 345-B1 Fix: Pioneer Project	1304	102.9	105.6	102.9	1377		
34	243218 05DESOTO 345 243232 05SORENS 345 2 4817_C2_05SORENS 345-B2 Fix: Perform sag condition correction study	971	121.5	128.7	131.1	1273	$100,000	
35	243218 05DESOTO 345 247508 U2-090 C 345 2 3024_C2_05TANNER 345-Q1 Fix: Perform sag condition correction study	1166	104	106.3	106.8	1245		$340,000
36	243229 05OLIVE 345 243230 05REYNOL 345 1 4690_C2_05OLIVE 345-D_B Fix: Pioneer Project	1195		101	103.4	1236		
37	243242 05ALLEN 138 243330 05LINCOL 138 2 7907_C2_05ROB PK 138-C Fix: Perform sag condition correction study	268		100.4	101.3	271	$31,400	
38	243242 05ALLEN 138 243334 05MAGLEY 138 1 3006_C2_05SORENS 345-D Fix: Perform sag condition correction study	205		99.4	101.1	207		$73,000
39	243312 05HUMMEL 138 243367 05ROCKCR 138 1 7456_C2_05SORENS 345-C Fix: Upgrade remote end equipment	184	101.5	105.2	106.8	197	$250,000	
40	243348 05MULLIN 138 246771 05SELWDZ 138 1 6981_C2_05FISHER 138-A Fix: Upgrade remote end equipment	250	102.4	102.7	102.8	257	$250,000	
41	243469 05BEATTY 138 243519 05HALLRD 138 1 5094	223	100.9	103	103.9	232		$24,600

Table 4: AEP Category C @ Energy Output (AC Load Flow)								
#	Branch Contingency Fix	Rating MVA	Base %	Y2-095 %	Y2-116 %	Req. Rating MVA	Network Upgrade Cost Y2-095	Network Upgrade Cost Y2-116
	Fix: Perform a sag condition correction study							

Category B @ Capacity Output (AC Load Flow)

Overloads listed below are based on AC loadings. For contingency definitions, refer to Appendix C.

Table 5: AEP Category B @ Capacity Output (AC Load Flow)								
#	Branch Contingency Fix	Rating MVA	Base %	Y2-095 %	Y2-116 %	Req. Rating MVA	Network Upgrade Cost Y2-095	Network Upgrade Cost Y2-116
1	243213 05BREED 345 243216 05DARWIN 345 1 685_B2 Fix: Pioneer project network upgrade	971			111.6	1084		
2	243213 05BREED 345 243217 05DEQUIN 345 1 672_B2_TOR1713 Fix: Pioneer project network upgrade	971			104.6	1016		
3	243217 05DEQUIN 345 243221 05EUGENE 345 1 667_B2_TOR1697 Fix: Pioneer project network upgrade	971	104.5	114.9	120.2	1167		
4	243217 05DEQUIN 345 243878 05MEADOW 345 1 6490_B2_TOR16000 Fix: Pioneer project network upgrade	971	104.6	118.1	124.8	1212		
5	243217 05DEQUIN 345 243878 05MEADOW 345 2 6472_B2_TOR15258 Fix: Pioneer project network upgrade	971	104.6	118.1	124.8	1212		
6	243225 05KEYSTN 345 243232 05SORENS 345 1 4814_B2_TOR2543 Fix: Tie in Delaware – Sorenson at Huntington Junction	897		106.2	109.9	986		
7	243230 05REYNOL 345 243878 05MEADOW 345 1 4689_B2_TOR15257 Fix: Pioneer project network upgrade	971		106.7	112.1	1088		
8	242998 05EPOINT 138 243070 05OHIOCT 138 1 B3_05ZANESVILLE_138-1	255		99	102	260		$50,000

Table 5: AEP Category B @ Capacity Output (AC Load Flow)

#	*Branch Contingency Fix*	*Rating* *MVA*	*Base* *%*	*Y2-095* *%*	*Y2-116* *%*	*Req. Rating* *MVA*	*Network Upgrade Cost* *Y2-095*	*Y2-116*
	Fix: Replace risers at Ohio Central							
9	243056 05NEWCOM 138 243094 05SCOSHC 138 1 B3_05MUSKINGUM_138-1 Fix: Replace risers at Newcomerstown	179		99.7	100.5	180		$50,000
10	243207 05GRNTWN 765 249742 08GRTOWN 138 1 1733_C2_X1-020 Fix: Non-AEP transformer	789	105.4	110.8	112.9	891		
11	243313 05HUNT J 138 243367 05ROCKCR 138 1 1733_C2_X1-020 Fix: Tie in Delaware – Sorenson 138 kV line	167		105.6	110	184		
12	243313 05HUNT J 138 243377 05SORENS 138 1 360_B2_TOR1679_X1-020A Fix: Tie in Delaware – Sorenson 138 kV line	208	105.1	116.8	122.5	255		
13	246020 N PORTLN 69 246022 PORTLAND 69 1 5505_B2_TOR1728_woMOAB Fix: Upgrade relay trip settings	69	99	102	103.2	71	$50,000	

Category B @ Capacity Output (DC Load Flow)

DC analysis was performed on contingencies that did not converge under AC analysis. Note that AC loadings are expected to be higher than DC loadings. Since, the fixes provided below are based on DC loadings, they should be considered preliminary. A more detailed AC analysis will be performed during impact study phase. Refer to Appendix B for contingency definitions.

Table 6: AEP Category B @ Capacity Output (DC Load Flow)

#	*Branch Contingency Fix*	*Rating* *MVA*	*Base* *%*	*Y2-095* *%*	*Y2-116* *%*	*Req. Rating* *MVA*	*Network Upgrade Cost* *Y2-095*	*Y2-116*
1	243210 05SULLVA 765 243213 05BREED 345 1 363_B2_TOR1682 Fix: Pioneer project network upgrade	1680	88	112	124	2083		
2	243210 05SULLVA 765 243213 05BREED 345 2 363_B2_TOR1682 Fix: Pioneer project network upgrade	1650	92	117	130	2145		
3	243213 05BREED 345 243216 05DARWIN 345 1 363_B2_TOR1682 Fix: Pioneer project network upgrade	971	119	145	158	1534		
4	243213 05BREED 345 243217 05DEQUIN 345 1 363_B2_TOR1682 Fix: Pioneer project network upgrade	971	104	120	127	1233		
5	243213 05BREED 345 254539 16WHEAT 345 1 363_B2_TOR1682 Fix: Pioneer project network upgrade	956	87	122	139	1329		
6	243213 05BREED 345 346809 7CASEY 345 1 363_B2_TOR1682 Fix: Pioneer project network upgrade	1332	105	140	157	2091		
7	243216 05DARWIN 345 243221 05EUGENE 345 1 363_B2_TOR1682 Fix: Pioneer project network upgrade	971	119	145	158	1534		
8	243230 05REYNOL 345 243878 05MEADOW 345 1 363_B2_TOR1682 Fix: Pioneer project network upgrade	971	92	101	105	1020		

Appendix B

Listed below are contingencies that did not converge under AC analysis. A more detailed voltage analysis will be performed on these contingencies during impact study phase which may result in new violations.

Contingency '41_B2_TOR544'
Open branch from bus 242925 to bus 242930 ckt 1 / 242925 05KAMMER 765 242930 05SCANTO 765 1
Open branch from bus 242930 to bus 242943 ckt 3 / 242930 05SCANTO 765 242943 05SCANTO 345 3
end
Contingency '3132_C2_05GRNTWN 765-T1'
Open branch from bus 243207 to bus 907020 ckt 1 / 243207 05GRNTWN 765 907020 X1-020 TAP 765 1
Open branch from bus 243207 to bus 249742 ckt 1 / 243207 05GRNTWN 765 249742 08GRTOWN 138 1
Open branch from bus 243312 to bus 249742 ckt 1 / 243312 05HUMMEL 138 249742 08GRTOWN 138 1
end
Contingency '2942_C2_05KAMMER 765-PP'
Open branch from bus 242920 to bus 242925 ckt 1 / 242920 05BELMON 765 242925 05KAMMER 765 1
Open branch from bus 242516 to bus 242920 ckt 1 / 242516 05MOUNTN 765 242920 05BELMON 765 1
Open branch from bus 235102 to bus 242920 ckt 1 / 235102 BELMONT 500 242920 05BELMON 765 1
Open branch from bus 242925 to bus 243188 ckt 1 / 242925 05KAMMER 765 243188 05MLG1 26.0 1
Remove unit 1 from bus 243188 / 243188 05MLG1 26.0
end
Contingency '1732_X1-020A'
Open branch from bus 243207 to bus 907020 ckt 1 / 243207 05GRNTWN 765 907020 X1-020 TAP 765 1
Open branch from bus 243207 to bus 243208 ckt 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1
Open branch from bus 243207 to bus 249742 ckt 1 / 243207 05GRNTWN 765 249742 08GRTOWN 138 1
Open branch from bus 243207 to bus 252004 ckt 1 / 243207 05GRNTWN 765 252004 08GRNTWN 1.00 1
Open branch from bus 249619 to bus 252004 ckt 1 / 249619 08GRNTWN 230 252004 08GRNTWN 1.00 1
Open branch from bus 249741 to bus 252004 ckt 1 / 249741 08GRTOW2 138 252004 08GRNTWN 1.00 1
end
Contingency '7589_C2_05J.FERR 765-C2'
Open branch from bus 242514 to bus 242520 ckt 1 / 242514 05J.FERR 765 242520 05J.FERR 500 1
Open branch from bus 242514 to bus 242684 ckt 2 / 242514 05J.FERR 765 242684 05J.FERR 138 2
Open branch from bus 242520 to bus 306100 ckt 1 / 242520 05J.FERR 500 306100 8ANTIOCH 500 1
end
Contingency '2998_C2'
Open branch from bus 242508 to bus 242516 ckt 1 / 242508 05AMOS 765 242516 05MOUNTN 765 1
Open branch from bus 242516 to bus 242920 ckt 1 / 242516 05MOUNTN 765 242920 05BELMON 765 1
Open branch from bus 242516 to bus 242923 ckt 1 / 242516 05MOUNTN 765 242923 05GAVIN 765 1
end
Contingency '6189_C2_05HANG R 765-D1'
Open branch from bus 242921 to bus 242924 ckt 1 / 242921 05CORNU 765 242924 05HANG R 765 1
Open branch from bus 242924 to bus 243208 ckt 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1
end

```
CONTINGENCY '2932_C2_05JEFRSO 765-A2'
 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1            / 242924 05HANG R 765 243208
05JEFRSO 765 1
 OPEN BRANCH FROM BUS 243208 TO BUS 248000 CKT 1            / 243208 05JEFRSO 765 248000
06CLIFTY 345 1
 end
Contingency '1760_C2_05JEFRSO 765-A'
   Open branch from bus 243207 to bus 243208 ckt 1  /  243207 05GRNTWN    765 243208 05JEFRSO    765 1
   Open branch from bus 242924 to bus 243208 ckt 1  /  242924 05HANG R    765 243208 05JEFRSO    765 1
 end
CONTINGENCY '2929_C2'
 OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1          / 243207 05GRNTWN 765 243208
05JEFRSO 765 1
 OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1          / 243208 05JEFRSO 765 243209
05ROCKPT 765 1
 end
CONTINGENCY '3007_C2'
 OPEN BRANCH FROM BUS 243209 TO BUS 243210 CKT 1          / 243209 05ROCKPT 765 243210
05SULLVA 765 1
 OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 1          / 243210 05SULLVA 765 243213
05BREED 345 1
 end
CONTINGENCY '7336_C2_05SULLVA 765-A'
 OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 1          / 243210 05SULLVA 765 243213
05BREED 345 1
 OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 2          / 243210 05SULLVA 765 243213
05BREED 345 2
 end
CONTINGENCY '2930_C2'
 OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1          / 243208 05JEFRSO 765 243209
05ROCKPT 765 1
 OPEN BRANCH FROM BUS 243208 TO BUS 248000 CKT 1          / 243208 05JEFRSO 765 248000
06CLIFTY 345 1
 end
Contingency '3002_C2_05ROCKPT 765-C2'
   Open branch from bus 243208 to bus 243209 ckt 1  /  243208 05JEFRSO    765 243209 05ROCKPT    765 1
   Open branch from bus 243209 to bus 243240 ckt 8  /  243209 05ROCKPT    765 243240 05AKSTL2    138 8
   Open branch from bus 243785 to bus 243240 ckt 1  /  243785 05AKSTL     138 243240 05AKSTL2    138 1
 end
CONTINGENCY '2979_C2_X1-020_X2-052'
 OPEN BRANCH FROM BUS 243206 TO BUS 907020 CKT 1    / 243206 05DUMONT 765 243207
05GRNTWN 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 243219 CKT 2    / 243206 05DUMONT 765 243219
05DUMONT 345 2
 OPEN BRANCH FROM BUS 243219 TO BUS 909180 CKT 2  / 243219 05DUMONT 345 243229 05OLIVE
345 2
 end
CONTINGENCY '4690_C2_05OLIVE 345-D_A'
 OPEN BRANCH FROM BUS 914010 TO BUS 243229 CKT 1  / 914010 Y2-010 TAP 345 243229 05OLIVE
345 1
 OPEN BRANCH FROM BUS 243229 TO BUS 274804 CKT 1  / 243229 05OLIVE 345 274804 UPNOR;RP
345 1
 end
Contingency '6527_C2_05MEADOW 345-B'
   Open branch from bus 243230 to bus 243878 ckt 1  /  243230 05REYNOL    345 243878 05MEADOW    345
1
   Open branch from bus 243229 to bus 243230 ckt 1  /  243229 05OLIVE     345 243230 05REYNOL    345 1
   Open branch from bus 243230 to bus 255173 ckt 1  /  243230 05REYNOL    345 255173 17RYNLDS    138
1
```

end

Contingency '444'
Open branch from bus 243218 to bus 243225 ckt 1 / 243218 05DESOTO 345 243225 05KEYSTN 345 1
Open branch from bus 243218 to bus 243232 ckt 2 / 243218 05DESOTO 345 243232 05SORENS 345 2
Open branch from bus 243218 to bus 243233 ckt 1 / 243218 05DESOTO 345 243233 05TANNER 345 1
end

Contingency '37_B2_TOR12_woMOP'
Open branch from bus 242920 to bus 242925 ckt 1 / 242920 05BELMON 765 242925 05KAMMER 765 1
Open branch from bus 242516 to bus 242920 ckt 1 / 242516 05MOUNTN 765 242920 05BELMON 765 1
Open branch from bus 235102 to bus 242920 ckt 1 / 235102 BELMONT 500 242920 05BELMON 765 1
end

Contingency '363_B2_TOR1682'
Open branch from bus 243208 to bus 243209 ckt 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
end

Appendix C

Listed below are all the other contingencies that resulted in violations.

Contingency '476'
Open branch from bus 242946 to bus 248101 ckt 1 / 242946 05TIDD 345 248101 NBURGER 345 1
Open branch from bus 242937 to bus 242948 ckt 1 / 242937 05KAMMER 345 242948 05WBELLA 345 1
Open branch from bus 242946 to bus 242948 ckt 1 / 242946 05TIDD 345 242948 05WBELLA 345 1
end
Contingency '4743_C2_05TIDD 345-CC'
Open branch from bus 235707 to bus 242946 ckt 1 / 235707 WYLIE RIDGE 345 242946 05TIDD 345 1
Open branch from bus 242946 to bus 253965 ckt 1 / 242946 05TIDD 345 253965 15COLLIE 345 1
end
Contingency '7445_C2_05MARYSV 765-B'
Open branch from bus 242922 to bus 242928 ckt 1 / 242922 05FLTLCK 765 242928 05MARYSV 765 1
Open branch from bus 242928 to bus 299951 ckt 1 / 242928 05MARYSV 765 299951 05SOREN 765 1
end
Contingency '3019_C2_05SPORN 345-CC2'
Open branch from bus 242522 to bus 242528 ckt 1 / 242522 05AMOS 345 242528 05SPORN 345 1
Open branch from bus 242528 to bus 248005 ckt 1 / 242528 05SPORN 345 248005 06KYGER 345 1
Open branch from bus 242528 to bus 242808 ckt 4 / 242528 05SPORN 345 242808 05SPORNB 138 4
end
Contingency '7587_C2_05J.FERR 765-B'
Open branch from bus 242512 to bus 242514 ckt 1 / 242512 05CLOVRD 765 242514 05J.FERR 765 1
Open branch from bus 242514 to bus 242684 ckt 2 / 242514 05J.FERR 765 242684 05J.FERR 138 2
end
Contingency '2915_C2_05J.FERR 765-A1_A'
Open branch from bus 914140 to bus 242514 ckt 1 / 914140 y2-058 tap 765 242514 05j.ferr 765 1
Open branch from bus 242514 to bus 242684 ckt 2 / 242514 05j.ferr 765 242684 05j.ferr 138 2
end
Contingency '2914_C2_05J.FERR 765-B2'
Open branch from bus 242512 to bus 242514 ckt 1 / 242512 05CLOVRD 765 242514 05J.FERR 765 1
Open branch from bus 242514 to bus 242520 ckt 1 / 242514 05J.FERR 765 242520 05J.FERR 500 1
Open branch from bus 242520 to bus 306100 ckt 1 / 242520 05J.FERR 500 306100 8ANTIOCH 500 1
end
Contingency '2916_C2_05J.FERR 765-A'
Open branch from bus 242509 to bus 242514 ckt 1 / 242509 05AXTON 765 242514 05J.FERR 765 1
Open branch from bus 242514 to bus 914140 ckt 1 / 242514 05J.FERR 765 914140 Y2-058 TAP 765 1
Open branch from bus 242509 to bus 242545 ckt 1 / 242509 05AXTON 765 242545 05AXTONX 138 1
Open branch from bus 242544 to bus 242545 ckt SR / 242544 05AXTON 138 242545 05AXTONX 138 SR
end
CONTINGENCY '4743'
OPEN BRANCH FROM BUS 242946 TO BUS 253965 CKT 1 / 242946 05TIDD 345 253965 15COLLIE 345 1
OPEN BRANCH FROM BUS 242946 TO BUS 235707 CKT 1 / 242946 05TIDD 345 235707 WYLIE RIDGE 345 1
END
Contingency '2937_C2_05KAMMER 345-CC'
Open branch from bus 242925 to bus 242937 ckt 4 / 242925 05KAMMER 765 242937 05KAMMER 345 4
Open branch from bus 242937 to bus 243189 ckt 2 / 242937 05KAMMER 345 243189 05MLG2 26.0 2
Remove unit 2 from bus 243189 / 243189 05MLG2 26.0
end
Contingency '6775_C2_05MARQUI 345-D1'
Open branch from bus 242938 to bus 246888 ckt 1 / 242938 05MARQUI 345 246888 05NFORK 345 1
Open branch from bus 242938 to bus 248005 ckt 1 / 242938 05MARQUI 345 248005 06KYGER 345 1
Open branch from bus 242938 to bus 243034 ckt 2 / 242938 05MARQUI 345 243034 05MARQUI 138 2
end
Contingency '5034_C2_05SCANTO 345-C2'
Open branch from bus 242925 to bus 242930 ckt 1 / 242925 05KAMMER 765 242930 05SCANTO 765 1
Open branch from bus 242930 to bus 242943 ckt 3 / 242930 05SCANTO 765 242943 05SCANTO 345 3

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   Open branch from bus 242943 to bus 243092 ckt 4  /  242943 05SCANTO     345 243092 05SCANTE     138 4
 end
Contingency '6403_C1_05OHIOCT 138-1'
   Open branch from bus 243070 to bus 243075 ckt 1  /  243070 05OHIOCT     138 243075 05POWELS     138 1
   Open branch from bus 243070 to bus 243160 ckt 1  /  243070 05OHIOCT     138 243160 05WTRNWY     138 1
   Open branch from bus 243070 to bus 245338 ckt 1  /  243070 05OHIOCT     138 245338 OHIO CTR    69.0 1
   Open branch from bus 245323 to bus 245338 ckt 1  /  245323 DRESDEN8    69.0 245338 OHIO CTR    69.0 1
 end
Contingency '517_C2'
   Open branch from bus 242936 to bus 913440 ckt 1  /  242936 05FOSTOR     345 913440 Y1-069 TAP   345 1
   Open branch from bus 238889 to bus 242936 ckt 1  /  238889 02LEMOYN     345 242936 05FOSTOR     345 1
 end
CONTINGENCY '2906_C2_05MARYSV 765-A1'
  OPEN BRANCH FROM BUS 242926 TO BUS 242928 CKT 1              / 242926 05MALIS 765 242928 05MARYSV
765 1
  OPEN BRANCH FROM BUS 242928 TO BUS 242939 CKT 1            / 242928 05MARYSV 765 242939 05MARYSV
345 1
  OPEN BRANCH FROM BUS 239133 TO BUS 242939 CKT 1             / 239133 02TANGY 345 242939 05MARYSV
345 1
  END
Contingency '1917_C2_05SCANTO 345-B2'
   Open branch from bus 242925 to bus 242930 ckt 1  /  242925 05KAMMER     765 242930 05SCANTO     765 1
   Open branch from bus 242930 to bus 242943 ckt 3  /  242930 05SCANTO     765 242943 05SCANTO     345 3
   Open branch from bus 242932 to bus 242943 ckt 1  /  242932 05CANTNC     345 242943 05SCANTO     345 1
   Open branch from bus 242943 to bus 243092 ckt 4  /  242943 05SCANTO     345 243092 05SCANTE     138 4
 end
Contingency '6466_C2_05E LIMA 345-M2'
   Open branch from bus 242935 to bus 242936 ckt 1  /  242935 05E LIMA     345 242936 05FOSTOR     345 1
   Open branch from bus 242935 to bus 247503 ckt 1  /  242935 05E LIMA     345 247503 T-130 C      345 1
 end
Contingency '474'
   Open branch from bus 242931 to bus 248101 ckt 1  /  242931 05BEVERL     345 248101 NBURGER      345 1
   Open branch from bus 242937 to bus 242940 ckt 1  /  242937 05KAMMER     345 242940 05MUSKNG     345 1
 end
Contingency '724_C1_05E LIMA 345-2_woMOP'
   Open branch from bus 242935 to bus 242936 ckt 1  /  242935 05E LIMA     345 242936 05FOSTOR     345 1
 end
Contingency '6404_C1_05OHIOCT 138-2'
   Open branch from bus 242998 to bus 243070 ckt 1  /  242998 05EPOINT     138 243070 05OHIOCT     138 1
   Open branch from bus 243070 to bus 243094 ckt 1  /  243070 05OHIOCT     138 243094 05SCOSHC     138 1
 end
Contingency '6485_C2_05DEQUIN 345-C1'
   Open branch from bus 243217 to bus 243878 ckt 2  /  243217 05DEQUIN     345 243878 05MEADOW     345 2
   Open branch from bus 243217 to bus 249525 ckt 1  /  243217 05DEQUIN     345 249525 08WESTWD     345 1
   Open branch from bus 249525 to bus 249874 ckt 1  /  249525 08WESTWD     345 249874 08WESTWD     138 1
 end
Contingency '4704_C2_05DEQUIN 345-B1'
   Open branch from bus 243217 to bus 243878 ckt 1  /  243217 05DEQUIN     345 243878 05MEADOW     345 1
   Open branch from bus 243217 to bus 249525 ckt 1  /  243217 05DEQUIN     345 249525 08WESTWD     345 1
   Open branch from bus 249525 to bus 249874 ckt 1  /  249525 08WESTWD     345 249874 08WESTWD     138 1
 end
Contingency '4817_C2_05SORENS 345-B2'
   Open branch from bus 243225 to bus 243232 ckt 1  /  243225 05KEYSTN     345 243232 05SORENS     345 1
 end
Contingency '3024_C2_05TANNER 345-Q1'
   Open branch from bus 243218 to bus 243233 ckt 1  /  243218 05DESOTO     345 243233 05TANNER     345 1
   Open branch from bus 243233 to bus 248001 ckt 1  /  243233 05TANNER     345 248001 06DEARB1     345 1
   Open branch from bus 243233 to bus 249565 ckt 1  /  243233 05TANNER     345 249565 08EBEND      345 1
   Open branch from bus 248000 to bus 248001 ckt 1  /  248000 06CLIFTY     345 248001 06DEARB1     345 1
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   Open branch from bus 248001 to bus 248013 ckt 1  /  248001 06DEARB1     345 248013 06PIERCE     345 1
 end
Contingency '4690_C2_05OLIVE 345-D_B'
  OPEN BRANCH FROM BUS 243878 TO BUS 914010 CKT 1       / 243878 05MEADOW 345 914010 Y2-010 TAP 345
1
  OPEN BRANCH FROM BUS 243229 TO BUS 274804 CKT 1       / 243229 05OLIVE 345 274804 UPNOR;RP 345 1
  END
Contingency '7907_C2_05ROB PK 138-C'
   Open branch from bus 243231 to bus 243366 ckt 5  /  243231 05ROB PK     345 243366 05ROB PK     138 5
   Open branch from bus 243397 to bus 243786 ckt 1  /  243397 05WILMGZ     138 243786 05APCI       138 1
   Open branch from bus 243247 to bus 243397 ckt 1  /  243247 05AUBURN     138 243397 05WILMGZ     138 1
   Open branch from bus 243366 to bus 243397 ckt 1  /  243366 05ROB PK     138 243397 05WILMGZ     138 1
 end
Contingency '3006_C2_05SORENS 345-D'
   Open branch from bus 243211 to bus 243232 ckt 1  /  243211 05ALLEN      345 243232 05SORENS     345 1
   Open branch from bus 243218 to bus 243232 ckt 2  /  243218 05DESOTO     345 243232 05SORENS     345 2
 end
Contingency '7456_C2_05SORENS 345-C'
   Open branch from bus 243232 to bus 243377 ckt 1  /  243232 05SORENS     345 243377 05SORENS     138 1
   Open branch from bus 243232 to bus 243377 ckt 2  /  243232 05SORENS     345 243377 05SORENS     138 2
 end
Contingency '6981_C2_05FISHER 138-A_woMOAB'
   Open branch from bus 243274 to bus 243303 ckt 1  /  243274 05DEERCR     138 243303 05GRNTTA     138 1
   Open branch from bus 243293 to bus 243302 ckt 1  /  243293 05FISHER     138 243302 05GRANT      138 1
   Open branch from bus 243293 to bus 243303 ckt 1  /  243293 05FISHER     138 243303 05GRNTTA     138 1
   Open branch from bus 243303 to bus 891220 ckt 1  /  243303 05GRNTTA     138 891220 U4-038 TAP   138 1
   Open branch from bus 243293 to bus 246004 ckt 1  /  243293 05FISHER     138 246004 05FISHER    13.8 1
   Open branch from bus 246010 to bus 246763 ckt 1  /  246010 PIPE CKL    12.0 246763 05PIPECK     138 1
 end
Contingency '5094'
   Open branch from bus 243453 to bus 243457 ckt 1  /  243453 05BEATTY     345 243457 05HAYDEN     345 1
   Open branch from bus 243457 to bus 243458 ckt 1  /  243457 05HAYDEN     345 243458 05HYATT      345 1
   Open branch from bus 243457 to bus 243461 ckt 2  /  243457 05HAYDEN     345 243461 05ROBRT1     345 2
   Open branch from bus 243457 to bus 243460 ckt 1  /  243457 05HAYDEN     345 243460 05ROBRT2     345 1
 end
Contingency '685_B2'
   Open branch from bus 243213 to bus 346809 ckt 1  /  243213 05BREED      345 346809 7CASEY       345 1
 end
Contingency '672_B2_TOR1713'
   Open branch from bus 243217 to bus 243221 ckt 1  /  243217 05DEQUIN     345 243221 05EUGENE     345 1
 end
Contingency '667_B2_TOR1697'
   Open branch from bus 243213 to bus 243217 ckt 1  /  243213 05BREED      345 243217 05DEQUIN     345 1
 end
Contingency '667_B2_TOR1697'
   Open branch from bus 243213 to bus 243217 ckt 1  /  243213 05BREED      345 243217 05DEQUIN     345 1
 end
Contingency '6490_B2_TOR16000'
   Open branch from bus 243217 to bus 243878 ckt 2  /  243217 05DEQUIN     345 243878 05MEADOW     345 2
 end
Contingency '6472_B2_TOR15258'
   Open branch from bus 243217 to bus 243878 ckt 1  /  243217 05DEQUIN     345 243878 05MEADOW     345 1
 end
Contingency '4814_B2_TOR2543'
   Open branch from bus 243218 to bus 243232 ckt 2  /  243218 05DESOTO     345 243232 05SORENS     345 2
 end
Contingency '4689_B2_TOR15257_Y2-010A'
   Open branch from bus 243878 to bus 914010 ckt 1  /  243878 05MEADOW     345 914010 Y2-010 TAP   345 1
 end
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Contingency 'B3_05ZANESVILLE_138-1 & 2_WOMOAB'
   Open branch from bus 243161 to bus 245423 ckt 1  /  243161 05ZANESV     138 245423 ZANESVIL    69.0 1
   Open branch from bus 243068 to bus 243161 ckt 1  /  243068 05NZANEV     138 243161 05ZANESV     138 1
   Open branch from bus 243025 to bus 243161 ckt 1  /  243025 05JUNCTN     138 243161 05ZANESV     138 1
   Open branch from bus 243161 to bus 245422 ckt 1  /  243161 05ZANESV     138 245422 ZANESVIL    12.0 1
   Open branch from bus 245399 to bus 245423 ckt 1  /  245399 LINDEN A    69.0 245423 ZANESVIL    69.0 1
   Open branch from bus 245416 to bus 245423 ckt 1  /  245416 SCHINICK    69.0 245423 ZANESVIL    69.0 1
   Open branch from bus 245386 to bus 245423 ckt 1  /  245386 BROCKWAY    69.0 245423 ZANESVIL    69.0 1
 end
Contingency 'B3_05MUSKINGUM_138-1_WOMOAB'
   Open branch from bus 243045 to bus 245429 ckt 1  /  243045 05MUSKNG     138 245429 MUSKINGU    69.0 1
   Open branch from bus 243045 to bus 243589 ckt 1  /  243045 05MUSKNG     138 243589 05WOLFCL     138 1
   Open branch from bus 243045 to bus 243091 ckt 1  /  243045 05MUSKNG     138 243091 05SCALDW     138 1
   Open branch from bus 242997 to bus 243045 ckt 1  /  242997 05ENCONC     138 243045 05MUSKNG     138 1
   Open branch from bus 242977 to bus 243045 ckt 1  /  242977 05CALDWE     138 243045 05MUSKNG     138 1
 end
Contingency '1733_c2_x1-020'
  Open branch from bus 243206 to bus 907020 ckt 1        / 243206 05dumont 765 243207 05grntwn 765 1
  Open branch from bus 243207 to bus 252004 ckt 1        / 243207 05grntwn 765 252004 08grntwn 1.00 1
  Open branch from bus 249619 to bus 252004 ckt 1       / 249619 08grntwn 230 252004 08grntwn 1.00 1
  Open branch from bus 249741 to bus 252004 ckt 1      / 249741 08grtow2 138 252004 08grntwn 1.00 1
  end
Contingency '360_B2_TOR1679_X1-020A'
   Open branch from bus 243206 to bus 907020 ckt 1  /  243206 05DUMONT     765 907020 X1-020 TAP   765 1
 end
Contingency '5505_B2_TOR1728_woMOAB'
   Open branch from bus 243237 to bus 246232 ckt 1  /  243237 05ADAM       138 246232 ADAMS1EQ     999 1
   Open branch from bus 246231 to bus 246232 ckt 1  /  246231 ADAMS-      69.0 246232 ADAMS1EQ     999 1
   Open branch from bus 246230 to bus 246232 ckt 1  /  246230 ADAMS       34.5 246232 ADAMS1EQ     999 1
   Open branch from bus 243237 to bus 247500 ckt 1  /  243237 05ADAM       138 247500 R-003 C      138 1
   Open branch from bus 243334 to bus 247500 ckt 1  /  243334 05MAGLEY     138 247500 R-003 C      138 1
   Open branch from bus 243237 to bus 243358 ckt 1  /  243237 05ADAM       138 243358 05PENNVI     138 1
   Open branch from bus 243319 to bus 243358 ckt 1  /  243319 05JAY        138 243358 05PENNVI     138 1
   Open branch from bus 243358 to bus 246021 ckt 1  /  243358 05PENNVI     138 246021 PENNVL L     12.0 1
 end
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PJM Analysis - Network Impacts

The Queue Project #Y2-116 was studied as a 600.0MW (Capacity 600.0MW) injection at the Sullivan 765 kV substation in the AEP area. Project #Y2-116 was evaluated for compliance with reliability criteria for summer peak conditions in 2016. Potential network impacts were as follows:

Table 7: Option 1 - Connection to Sullivan 765 Substation	
Contingency Name	**Description**
05BELMON _05KAMMER _108	CONTINGENCY '05BELMON _05KAMMER _108' DISCONNECT BRANCH FROM BUS 242920 TO BUS 242925 CKT 1 /* 765/765KV, AREA 205/205. END
05HANG R _05JEFRSO _114	CONTINGENCY '05HANG R _05JEFRSO _114' DISCONNECT BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 /* 765/765KV, AREA 205/205. END
05JEFRSO _05ROCKPT _122	CONTINGENCY '05JEFRSO _05ROCKPT _122' DISCONNECT BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 /* 765/765KV, AREA 205/205. END
05MOUNTN _05BELMON _102	CONTINGENCY '05MOUNTN _05BELMON _102' DISCONNECT BRANCH FROM BUS 242516 TO BUS 242920 CKT 1 /* 765/765KV, AREA 205/205. END
1375_C1	CONTINGENCY '1375_C1' OPEN BRANCH FROM BUS 242511 TO BUS 242518 CKT 4 / 242511 05BROADF 765 242518 05BROADF 500 4 OPEN BRANCH FROM BUS 242518 TO BUS 360106 CKT 1 / 242518 05BROADF 500 360106 8SULLIVAN TN 500 1 END
1589_B3_05CLOVRD 765-10_WOMOAB	CONTINGENCY '1589_B3_05CLOVRD 765-10_WOMOAB' OPEN BRANCH FROM BUS 242512 TO BUS 242514 CKT 1 / 242512 05CLOVRD 765 242514 05J.FERR 765 1 OPEN BRANCH FROM BUS 242512 TO BUS 242515 CKT 1 / 242512 05CLOVRD 765 242515 05JOSHUA 765 1 OPEN BRANCH FROM BUS 242512 TO BUS 242524 CKT 10 / 242512 05CLOVRD 765 242524 05CLOVRD 345 10 END
1760_C2_05JEFRSO 765-A	CONTINGENCY '1760_C2_05JEFRSO 765-A' OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
2906_C2_05MARYSV 765-A1	CONTINGENCY '2906_C2_05MARYSV 765-A1' OPEN BRANCH FROM BUS 242926 TO BUS 242928 CKT 1 / 242926 05MALIS 765 242928 05MARYSV 765 1 OPEN BRANCH FROM BUS 242928 TO BUS 242939 CKT 1 / 242928 05MARYSV 765 242939 05MARYSV 345 1 OPEN BRANCH FROM BUS 239133 TO BUS 242939 CKT 1 / 239133 02TANGY 345 242939 05MARYSV

Table 7: Option 1 - Connection to Sullivan 765 Substation	
Contingency Name	**Description**
	345 1 END
2929_C2	CONTINGENCY '2929_C2' OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END
2930_C2	CONTINGENCY '2930_C2' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 248000 CKT 1 / 243208 05JEFRSO 765 248000 06CLIFTY 345 1 END
2932_C2_05JEFRSO 765-A2	CONTINGENCY '2932_C2_05JEFRSO 765-A2' OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 248000 CKT 1 / 243208 05JEFRSO 765 248000 06CLIFTY 345 1 END
3002_C2_05ROCKPT 765-C2	CONTINGENCY '3002_C2_05ROCKPT 765-C2' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243209 TO BUS 243240 CKT 8 / 243209 05ROCKPT 765 243240 05AKSTL2 138 8 OPEN BRANCH FROM BUS 243785 TO BUS 243240 CKT 1 / 243785 05AKSTL 138 243240 05AKSTL2 138 1 END
3007_C2	CONTINGENCY '3007_C2' OPEN BRANCH FROM BUS 243209 TO BUS 243210 CKT 1 / 243209 05ROCKPT 765 243210 05SULLVA 765 1 OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 1 / 243210 05SULLVA 765 243213 05BREED 345 1 END
3183_C2_05ROCKPT 765-C	CONTINGENCY '3183_C2_05ROCKPT 765-C' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243209 TO BUS 243239 CKT 7 / 243209 05ROCKPT 765 243239 05AKSTL1 138 7 OPEN BRANCH FROM BUS 243785 TO BUS 243239 CKT 1 / 243785 05AKSTL 138 243239 05AKSTL1 138 1 END
361_1_B2	CONTINGENCY '361_1_B2' OPEN BRANCH FROM BUS 243206 TO BUS 299951 CKT 1 /* 243206 05DUMONT 765 299951 05SORENS 765 1

Table 7: Option 1 - Connection to Sullivan 765 Substation	
Contingency Name	**Description**
	END
37_B2_TOR12_WOMOP	CONTINGENCY '37_B2_TOR12_WOMOP' OPEN BRANCH FROM BUS 242920 TO BUS 242925 CKT 1 / 242920 05BELMON 765 242925 05KAMMER 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 242516 CKT 1 / 242920 05BELMON 765 242516 05MOUNTN 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 235102 CKT 1 / 242920 05BELMON 765 235102 BELMONT 500 1 END
4689_B2_TOR15257_A	CONTINGENCY '4689_B2_TOR15257_A' OPEN BRANCH FROM BUS 243878 TO BUS 914010 CKT 1 / 243878 05MEADOW 345 914010 Y2-010 TAP 345 1 END
4690_C2_05OLIVE 345-D	CONTINGENCY '4690_C2_05OLIVE 345-D' OPEN BRANCH FROM BUS 914010 TO BUS 243229 CKT 1 / 914010 Y2-010 TAP 345 243229 05OLIVE 345 1 OPEN BRANCH FROM BUS 243229 TO BUS 274804 CKT 1 / 243229 05OLIVE 345 274804 UPNOR;RP 345 1 END
474_A	CONTINGENCY '474_A' OPEN BRANCH FROM BUS 242931 TO BUS 248101 CKT 1 / 242931 05BEVERL 345 242946 05TIDD 345 1 OPEN BRANCH FROM BUS 242937 TO BUS 242940 CKT 1 / 242937 05KAMMER 345 242940 05MUSKNG 345 1 END
4831_C2_05KAMMER 765-NN	CONTINGENCY '4831_C2_05KAMMER 765-NN' OPEN BRANCH FROM BUS 242925 TO BUS 242930 CKT 1 / 242925 05KAMMER 765 242930 05SCANTO 765 1 OPEN BRANCH FROM BUS 242925 TO BUS 235117 CKT 1 / 242925 05KAMMER 765 235117 KAMMER 500 1 OPEN BRANCH FROM BUS 242930 TO BUS 242943 CKT 3 / 242930 05SCANTO 765 242943 05SCANTO 345 3 OPEN BRANCH FROM BUS 235111 TO BUS 235117 CKT 1 / 235111 502 JUNCTION 500 235117 KAMMER 500 1 OPEN BRANCH FROM BUS 242943 TO BUS 243092 CKT 4 / 242943 05SCANTO 345 243092 05SCANTE 138 4 END
5031_C2_05KAMMER 765-PP2	CONTINGENCY '5031_C2_05KAMMER 765-PP2' OPEN BRANCH FROM BUS 242920 TO BUS 242925 CKT 1 / 242920 05BELMON 765 242925 05KAMMER 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 242516 CKT 1 / 242920 05BELMON 765 242516 05MOUNTN 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 235102 CKT 1 / 242920 05BELMON 765 235102 BELMONT 500 1 OPEN BRANCH FROM BUS 242925 TO BUS 235117 CKT 1 / 242925 05KAMMER 765 235117 KAMMER 500 1

Table 7: Option 1 - Connection to Sullivan 765 Substation	
Contingency Name	**Description**
	OPEN BRANCH FROM BUS 235111 TO BUS 235117 CKT 1 / 235111 502 JUNCTION 500 235117 KAMMER 500 1 END
6189_C2_05HANG R 765-D1	CONTINGENCY '6189_C2_05HANG R 765-D1' OPEN BRANCH FROM BUS 242921 TO BUS 242924 CKT 1 / 242921 05CORNU 765 242924 05HANG R 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
6430_B2_TOR22_WOMOAB	CONTINGENCY '6430_B2_TOR22_WOMOAB' OPEN BRANCH FROM BUS 242529 TO BUS 242528 CKT 1 / 242529 05TRISTA 345 248005 06KYGER 345 1 OPEN BRANCH FROM BUS 242528 TO BUS 248005 CKT 1 / 242529 05TRISTA 345 248005 06KYGER 345 1 OPEN BRANCH FROM BUS 242529 TO BUS 242835 CKT 1 / 242529 05TRISTA 345 242835 05TRISTA 138 1 END
6472_B2_TOR15258	CONTINGENCY '6472_B2_TOR15258' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1 END
6488_A	CONTINGENCY '6488_A' OPEN BRANCH FROM BUS 243878 TO BUS 914010 CKT 1 / 243878 05MEADOW 345 914010 Y2-010 TAP 345 1 OPEN BRANCH FROM BUS 243878 TO BUS 243230 CKT 1 / 243878 05MEADOW 345 243230 05REYNOL 345 1 OPEN BRANCH FROM BUS 243229 TO BUS 243230 CKT 1 / 243229 05OLIVE 345 243230 05REYNOL 345 1 OPEN BRANCH FROM BUS 243230 TO BUS 255173 CKT 1 / 243230 05REYNOL 345 255173 17RYNLDS 138 1 END
6490_B2_TOR3002545	CONTINGENCY '6490_B2_TOR3002545' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 2 / 243217 05DEQUIN 345 243878 05MEADOW 345 2 END
667_B2_TOR1697	CONTINGENCY '667_B2_TOR1697' OPEN BRANCH FROM BUS 243213 TO BUS 243217 CKT 1 / 243213 05BREED 345 243217 05DEQUIN 345 1 END
7336_C2_05SULLVA 765-A	CONTINGENCY '7336_C2_05SULLVA 765-A' OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 1 / 243210 05SULLVA 765 243213 05BREED 345 1 OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 2 / 243210 05SULLVA 765 243213 05BREED

Table 7: Option 1 - Connection to Sullivan 765 Substation	
Contingency Name	**Description**
	345 2 END
AP_C5_19	CONTINGENCY 'AP_C5_19' /BRIGHTON LOOP OPEN BRANCH FROM BUS 200003 TO BUS 235105 CKT 1 OPEN BRANCH FROM BUS 200003 TO BUS 200004 CKT 1 END

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line(DCTL), Line with Failed Breaker(LFFB) and Bus Fault(Bus) contingencies for the full energy output.)

Table 8A below provides a summary of the impacts caused by Y2-116 on the AEP transmission system and other TO areas for multiple facility contingency:

Table 8A: Option 1 - Connection to Sullivan 765 Substation

Y2-116 Multiple Facility Contingency

	Contingency		Bus				Loading		Rating		MW	FG
#	Type	Name	Facility Description	From	To	Cir.	Initial	Final	Type	MVA	Cont.	App.
1	LFFB	1760_C2_05JEFRSO 765-A	06KYGER-05SPORN 345 kV line	248005	242528	1	99.77	100.12	ER	1438	30.5	1
2	LFFB	2932_C2_05JEFRSO 765-A2	05JEFRSO-05GRNTWN 765 kV line	243208	243207	1	99.07	103.47	ER	4094	180.3	3

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

Table 9A below provides a summary of the impacts caused by Y2-116 on the AEP transmission system and other TO areas for contribution to previously identified overloads:

Table 9A: Option 1 - Connection to Sullivan 765 Substation

Y2-116 Contribution to Previously Identified Overloads

	Contingency			Bus			Loading		Rating		MW	FG
#	Type	Name	Facility Description	From	To	Cir.	Initial	Final	Type	MVA	Cont.	App.
1	LFFB	5031_C2_05KAMMER 765-PP2	05J.FERR-05CLOVRD 765 kV line	242514	242512	1	101.16	101.43	ER	4055	69.35	2
2	LFFB	6189_C2_05HANG R 765-D1	X1-020 TAP-05DUMONT 765 kV line	907020	243206	1	104.65	107.08	ER	4094	99.4	4
3	N-1	05JEFRSO _05ROCKPT _122	X2-052 TAP-05DUMONT 345 kV line	909180	243219	2	106.93	109.75	ER	1409	39.74	5
4	N-1	361_1_B2	05JEFRSO-05HANG R 765 kV line	243208	242924	1	109.96	112.94	ER	4055	139.8	6
5	N-1	37_B2_TOR12_WOMOP	05J.FERR-05CLOVRD 765 kV line	242514	242512	1	114.2	114.51	ER	3176	61.65	7
6	N-1	05JEFRSO _05ROCKPT _122	7PANA-KINCA; R 345 kV line	347945	270797	1	112.69	115.6	ER	1195	34.71	8
7	N-1	05JEFRSO _05ROCKPT _122	08NOBLSV-05FALL C 345 kV line	249515	243222	1	115.81	119.77	ER	956	37.88	9
8	BUS	1375_C1	05JEFRSO-05HANG R 765 kV line	243208	242924	1	116.72	119.91	ER	4253	135.8	10
9	N-1	05HANG R _05JEFRSO _114	05JEFRSO 765/345 kV transformer	243208	248000	1	116.47	123.13	ER	1935	129.1	11
10	LFFB	2932_C2_05JEFRSO 765-A2	X1-020 TAP-05DUMONT 765 kV line	907020	243206	1	119.78	123.54	ER	4094	154.1	12
11	LFFB	7336_C2_05SULLVA 765-A	05SULLVA-05ROCKPT 765 kV line	243210	243209	1	110.75	124.86	ER	4253	600	13
12	N-1	05MOUNTN _05BELMON _102	05WATERF-05MUSKNG 345 kV line	242947	242940	2	126.39	126.6	ER	2572	32.35	14
13	DCTL	474_A	05MOUNTN-05BELMON 765 kV line	242516	242920	1	132.31	132.62	ER	4253	84.71	15
14	N-1	1589_B3_05CLOVRD 765-10_WOMOAB	05MOUNTN-05BELMON 765 kV line	242516	242920	1	134.68	135	ER	4055	83.21	16
15	N-1	05JEFRSO _05ROCKPT _122	05REYNOL-05OLIVE 345 kV line	243230	243229	1	133.06	137.6	ER	972	44.09	17
16	N-1	667_B2_TOR1697	05ROCKPT-05JEFRSO 765 kV line	243209	243208	1	135.54	142.07	ER	4055	264.7	18
17	LFFB	2906_C2_05MARYSV 765-A1	05MOUNTN-05BELMON 765 kV line	242516	242920	1	143.63	143.97	ER	4253	92.19	19
18	LFFB	2929_C2	05BREED-05DEQUIN 345 kV line	243213	243217	1	137.87	144.22	ER	1272	80.74	20
19	N-1	6430_B2_TOR22_WOMOAB	06KYGER-05SPORN 345 kV line	248005	242528	2	145.07	145.48	ER	1438	36.08	21
20	LFFB	2930_C2	05BREED-05DEQUIN 345 kV line	243213	243217	1	139.43	145.89	ER	1272	82.17	22
21	DCTL	6488_A	05ROCKPT-05JEFRSO 765 kV line	243209	243208	1	140.83	147	ER	4253	262.6	23
22	N-1	05JEFRSO _05ROCKPT _122	05EUGENE-08CAYSUB 345 kV line	243221	249504	1	140.18	148.06	ER	1386	117.1	24
~~23~~	~~N-1~~	~~05BELMON _05KAMMER _108~~	~~05BELMON 765/500 kV transformer~~	~~242920~~	~~235102~~	~~1~~	~~151.14~~	~~151.61~~	~~ER~~	~~2094~~	~~61.04~~	~~25~~
24	LFFB	6189_C2_05HANG R 765-D1	05JEFRSO 765/345 kV transformer	243208	248000	1	148.85	157.29	ER	1935	129.1	26

Table 9A: Option 1 - Connection to Sullivan 765 Substation

Y2-116 Contribution to Previously Identified Overloads

	Contingency			Bus			Loading		Rating		MW	FG
#	Type	Name	Facility Description	From	To	Cir.	Initial	Final	Type	MVA	Cont.	App.
25	N-1	4689_B2_TOR15257_A	05MEADOW-05REYNOL 345 kV line	243878	243230	1	156.76	160.95	ER	971	40.7	27
26	N-1	05JEFRSO _05ROCKPT _122	05FALL C-05DESOTO 345 kV line	243222	243218	1	156.03	161.56	ER	1016	56.16	28
27	LFFB	4690_C2_05OLIVE 345-D	05REYNOL-05OLIVE 345 kV line	243230	243229	1	161.89	162.49	ER	972	36.45	29
~~28~~	~~LFFB~~	~~4831_C2_05KAMMER 765-NN~~	~~05BELMON 765/500 kV transformer~~	~~242920~~	~~235102~~	~~1~~	~~165.12~~	~~165.7~~	~~ER~~	~~2094~~	~~77.49~~	~~30~~
29	N-1	667_B2_TOR1697	05EUGENE-05DEQUIN 345 kV line	243221	243217	1	168.06	171.82	ER	971	36.46	31
30	N-1	05JEFRSO _05ROCKPT _122	05BREED-7CASEY 345 kV line	243213	346809	1	164.09	178.28	ER	1466	208	32
31	LFFB	2929_C2	05EUGENE-08CAYSUB 345 kV line	243221	249504	1	170.66	179.16	ER	1386	117.8	33
32	LFFB	7336_C2_05SULLVA 765-A	05ROCKPT-05JEFRSO 765 kV line	243209	243208	1	169.43	183.33	ER	4253	591.4	34
33	LFFB	2929_C2	05BREED-7CASEY 345 kV line	243213	346809	1	170.2	184.37	ER	1466	207.8	35
34	LFFB	2930_C2	05BREED-7CASEY 345 kV line	243213	346809	1	171.74	185.97	ER	1466	208.5	36
35	N-1	6490_B2_TOR3002545	05DEQUIN-05MEADOW 345 kV line	243217	243878	1	181.28	186.53	ER	971	50.95	37
36	N-1	6472_B2_TOR15258	05DEQUIN-05MEADOW 345 kV line	243217	243878	2	181.28	186.53	ER	971	50.95	38
37	N-1	05JEFRSO _05ROCKPT _122	05BREED-05DEQUIN 345 kV line	243213	243217	1	179.46	187.86	ER	971	81.63	39
38	LFFB	1760_C2_05JEFRSO 765-A	05JEFRSO 765/345 kV transformer	243208	248000	1	191.42	201.22	ER	1935	193.8	40
39	LFFB	3002_C2_05ROCKPT 765-C2	05SULLVA 765/345 kV transformer	243210	243213	2	195.26	211.29	ER	1905	305.3	41
40	LFFB	3183_C2_05ROCKPT 765-C	05SULLVA 765/345 kV transformer	243210	243213	2	195.26	211.29	ER	1905	305.3	42
41	LFFB	2929_C2	05SULLVA 765/345 kV transformer	243210	243213	2	195.26	211.29	ER	1905	305.3	43
42	LFFB	2930_C2	05SULLVA 765/345 kV transformer	243210	243213	2	195.26	211.29	ER	1905	305.3	44
43	N-1	05JEFRSO _05ROCKPT _122	05BREED-05DARWIN 345 kV line	243213	243216	1	213.36	226.68	ER	971	129.3	45
44	N-1	05JEFRSO _05ROCKPT _122	05DARWIN-05EUGENE 345 kV line	243216	243221	1	213.36	226.68	ER	971	129.3	46
45	N-1	05JEFRSO _05ROCKPT _122	05SULLVA 765/345 kV transformer	243210	243213	1	211.28	228.62	ER	1650	286.1	47
46	N-1	05JEFRSO _05ROCKPT _122	05SULLVA 765/345 kV transformer	243210	243213	2	221.41	239.58	ER	1680	305.3	48
47	DCTL	AP_C5_19	GERMANTN 138/115 kV transformer	204530	204529	1	254.88	255.67	ER	104	5.32	49
48	LFFB	5031_C2_05KAMMER 765-PP2	05LAYMAN-05CORNER 138 kV line	243533	243490	1	260.75	261.6	ER	284	15.34	50
49	LFFB	5031_C2_05KAMMER 765-PP2	05WOLFCL-05LAYMAN 138 kV line	243589	243533	1	262.48	263.33	ER	284	15.34	51
50	N-1	05JEFRSO _05ROCKPT _122	05BREED-16WHEAT 345 kV line	243213	254539	1	246.17	263.97	ER	956	172.5	52
51	LFFB	2929_C2	05BREED-16WHEAT 345 kV line	243213	254539	1	257.89	275.07	ER	956	174.1	53
52	LFFB	3007_C2	05SULLVA 765/345 kV transformer	243210	243213	2	247.27	278.76	ER	1905	600	54

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. Any potential problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the overloaded element(s) identified.

As a result of the aggregate energy resources in the area, no violations were identified.

Short Circuit

(Summary of impacted circuit breakers)

PJM has completed the short circuit analysis of the **Y2-095** queue project Sullivan 765 kV. Two options were considered during this study: the first option was a direct connection to Sullivan 765 kV substation, while the second option was a direct connection to Breed 345 kV substation. Our analysis found **3 new breakers** for option 1 and **3 new breakers** for option 2, to be over-duty in the ComEd transmission area. **This is originally an AEP project but a ComEd bus is 3 or more buses away.** The new over-duty breakers are listed below.

Option 1: Sullivan 765 Summary of Breakers

Cost estimate: $2.7M - Three 138 kV Circuit Breakers @ $900,000 each

Table 10: PJM Option 1- Connection to Sullivan 765 kV Substation

BUS_NO	BUS	BREAKER	Rating Type	Duty Percent With y2-095_AEP_opt1	Duty Percent Without y2-095_AEP_opt1	Duty Percent Difference	Note
0	DES4638B 138.kV	46 BT3-4 B3	T	103.20%	99.20%	4.00%	New Over-duty
0	DES4638R 138.kV	46 4605	T	101.90%	99.30%	2.60%	New Over-duty
0	DES4638R 710 138.kV	46 11702	T	100.50%	98.40%	2.10%	New Over-duty

Option 2: Breed 345 kV Summary of Breakers

Cost estimate: Estimates not provided for secondary point of interconnection

Table 11: PJM Option 2- Connection to Breed 345 kV Substation

BUS_NO	BUS	BREAKER	Rating Type	Duty Percent With y2-095_AEP_opt2	Duty Percent Without y2-095_AEP_opt2	Duty Percent Difference	Note
0	DES4638B 138.kV	46 BT3-4 B3	T	103.20%	99.20%	4.00%	New Over-duty
0	DES4638R 138.kV	46 4605	T	101.90%	99.30%	2.60%	New Over-duty
0	DES4638R 710 138.kV	46 11702	T	100.50%	98.40%	2.10%	New Over-duty

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation)

Table 8B: PJM Option 1- Connection to Sullivan 765 kV Substation **Y2-116 Multiple Facility Contingency Reinforcements**					
#	**Contingency Name**	**Facility Description**	**Description**	**Schedule**	**Cost**
1	1760_C2_05JEFRSO 765-A	06KYGER-05SPORN 345 kV line	Rebuild miles at an estimated cost of $26,000,000.		$26,000,000
2	2932_C2_05JEFRSO 765-A2	05JEFRSO-05GRNTWN 765 kV line	**Pioneer Project** 1) Reynolds - Greentown765 kV line and a 765/345 kV transformer at Reynolds Cost of Reynolds – Greentown 165 kV line: $185,000,000 Cost of station work at Greentown: $30,000,000 Cost of station work at Reynolds: $55,000,000 2) Reynolds – Sullivan 765 kV line Cost of Reynolds – Sullivan 765 kV line: $300,000,000 Cost of station work at Sullivan: $30,000,000 Total estimated cost for Pioneer project is $600,000,000. Reynolds – Greentown 765 kV segment and the 765/345 kV transformer at Reynolds is slated for an in-service date in 2018 by Midwest ISO. If Y2-116 in-service date is after Reynolds – Greentown segment energizes, then Y2-116 will only be responsible for the cost the remaining Sullivan – Reynolds 765 kV segment and work at Sullivan station. This cost may be further reduced by allocation to other MTXs in PJM interconnection queue. Such allocation will be determined by PJM.		$1,200,000,000

Table 9B: PJM Option 1- Connection to Sullivan 765 kV Substation **Y2-116 Contribution to Previously Identified Overloads**					
#	**Name**	**Facility Description**	**Description**	**Schedule**	**Cost**
1	5031_C2_05KAMMER 765-PP2	05J.FERR-05CLOVRD 765 kV line	The Jacksons Ferry 2397 Amps RTHL Relay Thermal Limit and the Cloverdale Relay 2397 Amps Relay Thermal Limit are the limiting elements. An engineering study needs to be performed to determine if the relay settings at both stations can be adjusted to mitigate these overloads. Otherwise a new relay package would be needed at both stations for estimated cost (2013 Dollars): $600,000.		$600,000
2	6189_C2_05HANG R 765-D1	X1-020 TAP-05DUMONT 765 kV line	Upgrade terminal elements at remote ends at an estimated cost of $1,500,000.		$1,500,000
3	05JEFRSO _05ROCKPT _122	X2-052 TAP-05DUMONT 345 kV line	Upgrade terminal elements at remote ends at an estimated cost of $1,500,000.		$1,500,000
4	361_1_B2	05JEFRSO-05HANG R 765 kV line	Upgrade terminal elements at remote ends at an estimated cost of $1,500,000.		$1,500,000
5	37_B2_TOR12_WOMOP	05J.FERR-05CLOVRD 765 kV line	Same as #1		
6	05JEFRSO _05ROCKPT _122	7PANA-KINCA; R 345 kV line	For the Powerton-to-Pana (L2105) violation, ComEd will need to mitigate sag limitations on ~28 miles of 2338 ACAR. There are also possible limitations associated with an AMEREN facility. No AMEREN upgrades are required		tbd

Table 9B: PJM Option 1- Connection to Sullivan 765 kV Substation Y2-116 Contribution to Previously Identified Overloads					
#	Name	Facility Description	Description	Schedule	Cost
			at this time. The cost for the ComEd portion of the upgrade is $8.3 M; this violation will be further analyzed in the SIS phase.		
7	05JEFRSO _05ROCKPT _122	08NOBLSV-05FALL C 345 kV line	Noblesville - Fall Creek 345 kV line is a tie line between Duke and AEP. The rating of this line is set by the Duke owned conductor. PJM should contact Duke to get an estimate for improving the capability of this facility.		tbd
8	1375_C1	05JEFRSO-05HANG R 765 kV line	Same as #4		
9	05HANG R _05JEFRSO _114	05JEFRSO 765/345 kV transformer	Replace subject transformer at an estimated cost of $3,000,000.		$3,000,000
10	2932_C2_05JEFRSO 765-A2	X1-020 TAP-05DUMONT 765 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
11	7336_C2_05SULLVA 765-A	05SULLVA-05ROCKPT 765 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
12	05MOUNTN _05BELMON _102	05WATERF-05MUSKNG 345 kV line	The overload can be alleviated by rebuilding approximately 4 miles of 345kV line between Muskingum and Waterford stations. Estimated cost: $10,700,000 and it should take 12 months to be completed.	12 months	$10,700,000
13	474_A	05MOUNTN-05BELMON 765 kV line	The Mountaineer 765 kV wavetrap is overloaded for the Belmont - Mountaineer 765 kV line. The approximate cost to replace the wavetrap is $25,000.		$25,000
14	1589_B3_05CLOVRD 765-10_WOMOAB	05MOUNTN-05BELMON 765 kV line	Same as #13		
15	05JEFRSO _05ROCKPT _122	05REYNOL-05OLIVE 345 kV line	Disconnect switch at Reynolds Substation is a limiting element Upgrade disconnect switch at Reynolds. Contact NIPSCO ACSR 1414 conductor is a limiting element Rebuild the 70 miles line. Estimated Cost (2013 Dollars): $105,000,000. The Olive Air Wave Trap is a limiting element Replace the wavetrap. Estimated Cost (2013 Dollars): $100,000. The Olive Relay Trip Limit (RCTL) is a limiting element An engineering study will need to be conducted to determine if the relay trip limit settings can be adjusted to mitigate the overload. Estimated Cost (2013 Dollars): $10,000.		$105,110,000
16	667_B2_TOR1697	05ROCKPT-05JEFRSO 765 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
17	2906_C2_05MARYSV 765-A1	05MOUNTN-05BELMON 765 kV line	Same as #13		
18	2929_C2	05BREED-05DEQUIN 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
19	6430_B2_TOR22_WOMOAB	06KYGER-05SPORN 345 kV line	Rebuild miles at an estimated cost of $26,000,000.		$26,000,000
20	2930_C2	05BREED-05DEQUIN 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
21	6488_A	05ROCKPT-05JEFRSO 765 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
22	05JEFRSO _05ROCKPT _122	05EUGENE-08CAYSUB 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
23	05BELMON _05KAMMER _108	05BELMON 765/500 kV transformer	This violation is crossed out because the contingency is not valid.		
24	6189_C2_05HANG R 765-D1	05JEFRSO 765/345 kV transformer	Same as #9		
25	4689_B2_TOR15257_A	05MEADOW-05REYNOL 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
26	05JEFRSO _05ROCKPT _122	05FALL C-05DESOTO 345 kV line	Perform sag study at an estimated cost of $100,000.		$100,000
27	4690_C2_05OLIVE 345-D	05REYNOL-05OLIVE 345 kV line	Same as #13		
28	4831_C2_05KAMMER 765-NN	05BELMON 765/500 kV transformer	This violation is crossed out because the contingency is not valid.		

Table 9B: PJM Option 1- Connection to Sullivan 765 kV Substation

Y2-116 Contribution to Previously Identified Overloads

#	Name	Facility Description	Description	Schedule	Cost
29	667_B2_TOR1697	05EUGENE-05DEQUIN 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
30	05JEFRSO _05ROCKPT _122	05BREED-7CASEY 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
31	2929_C2	05EUGENE-08CAYSUB 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
32	7336_C2_05SULLVA 765-A	05ROCKPT-05JEFRSO 765 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
33	2929_C2	05BREED-7CASEY 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
34	2930_C2	05BREED-7CASEY 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
35	6490_B2_TOR3002545	05DEQUIN-05MEADOW 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
36	6472_B2_TOR15258	05DEQUIN-05MEADOW 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
37	05JEFRSO _05ROCKPT _122	05BREED-05DEQUIN 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
38	1760_C2_05JEFRSO 765-A	05JEFRSO 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		
39	3002_C2_05ROCKPT 765-C2	05SULLVA 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		
40	3183_C2_05ROCKPT 765-C	05SULLVA 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		
41	2929_C2	05SULLVA 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		
42	2930_C2	05SULLVA 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		
43	05JEFRSO _05ROCKPT _122	05BREED-05DARWIN 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
44	05JEFRSO _05ROCKPT _122	05DARWIN-05EUGENE 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
45	05JEFRSO _05ROCKPT _122	05SULLVA 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		
46	05JEFRSO _05ROCKPT _122	05SULLVA 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		
47	AP_C5_19	GERMANTN 138/115 kV transformer	There is an operating procedure that can alleviate this overload, opening Carroll – Germantown 138 kV. This violation will be further analyzed in the SIS phase.		tbd
48	5031_C2_05KAMMER 765-PP2	05LAYMAN-05CORNER 138 kV line	Rebuild the line. Estimated Cost: $10.62 M.		$10,620,000
49	5031_C2_05KAMMER 765-PP2	05WOLFCL-05LAYMAN 138 kV line	Rebuild the line. Estimated Cost:$11.025 M.		$11,025,000
50	05JEFRSO _05ROCKPT _122	05BREED-16WHEAT 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
51	2929_C2	05BREED-16WHEAT 345 kV line	Pioneer Project - Same as #2 Table 8B ($1.2B)		
52	3007_C2	05SULLVA 765/345 kV transformer	Pioneer Project - Same as #2 Table 8B ($1.2B)		

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. Any potential problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.

No problems identified.

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

To be determined

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

The analysis will be done in the Impact Study

Sensitivity Analysis for Secondary POI – Breed 345 kV Line

Table 12: PJM Option 2 - Connection to Breed 345 kV Substation Y2-116 Contingencies	
Contingency Name	**Description**
6488	CONTINGENCY '6488' OPEN BRANCH FROM BUS 243878 TO BUS 243229 CKT 1 / 243878 05MEADOW 345 243229 05OLIVE 345 1 OPEN BRANCH FROM BUS 243878 TO BUS 243230 CKT 1 / 243878 05MEADOW 345 243230 05REYNOL 345 1 OPEN BRANCH FROM BUS 243229 TO BUS 243230 CKT 1 / 243229 05OLIVE 345 243230 05REYNOL 345 1 OPEN BRANCH FROM BUS 243230 TO BUS 255173 CKT 1 / 243230 05REYNOL 345 255173 17RYNLDS 138 1 END
05BELMON _05KAMMER _108	CONTINGENCY '05BELMON _05KAMMER _108' DISCONNECT BRANCH FROM BUS 242920 TO BUS 242925 CKT 1 /* 765/765KV, AREA 205/205. END
05HANG R _05JEFRSO _114	CONTINGENCY '05HANG R _05JEFRSO _114' DISCONNECT BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 /* 765/765KV, AREA 205/205. END
05JEFRSO _05ROCKPT _122	CONTINGENCY '05JEFRSO _05ROCKPT _122' DISCONNECT BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 /* 765/765KV, AREA 205/205. END
05MOUNTN _05BELMON _102	CONTINGENCY '05MOUNTN _05BELMON _102' DISCONNECT BRANCH FROM BUS 242516 TO BUS 242920 CKT 1 /* 765/765KV, AREA 205/205. END
1375_C1_A	CONTINGENCY '1375_C1_A' OPEN BRANCH FROM BUS 242511 TO BUS 242518 CKT 4 / 242511 05BROADF 765 242518 05BROADF 500 4 OPEN BRANCH FROM BUS 242518 TO BUS 914142 CKT 1 / 242518 05BROADF 500 360106 8SULLIVAN TN 500 1 END
1589_B3_05CLOVRD 765-10_WOMOAB	CONTINGENCY '1589_B3_05CLOVRD 765-10_WOMOAB' OPEN BRANCH FROM BUS 242512 TO BUS 242514 CKT 1 / 242512 05CLOVRD 765 242514 05J.FERR 765 1 OPEN BRANCH FROM BUS 242512 TO BUS 242515 CKT 1 / 242512 05CLOVRD 765 242515 05JOSHUA 765 1 OPEN BRANCH FROM BUS 242512 TO BUS 242524 CKT 10 / 242512 05CLOVRD 765 242524 05CLOVRD 345 10 END

Table 12: PJM Option 2 - Connection to Breed 345 kV Substation Y2-116 Contingencies	
Contingency Name	**Description**
1760_C2_05JEFRSO 765-A	CONTINGENCY '1760_C2_05JEFRSO 765-A' OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
2877_C2_05OLIVE 345-B1	CONTINGENCY '2877_C2_05OLIVE 345-B1' OPEN BRANCH FROM BUS 243215 TO BUS 243229 CKT 1 / 243215 05COOK 345 243229 05OLIVE 345 1 OPEN BRANCH FROM BUS 243229 TO BUS 243353 CKT 2 / 243229 05OLIVE 345 243353 05OLIVE 138 2 OPEN BRANCH FROM BUS 243327 TO BUS 243353 CKT 1 / 243327 05LAPORT 138 243353 05OLIVE 138 1 END
2906_C2_05MARYSV 765-A1	CONTINGENCY '2906_C2_05MARYSV 765-A1' OPEN BRANCH FROM BUS 242926 TO BUS 242928 CKT 1 / 242926 05MALIS 765 242928 05MARYSV 765 1 OPEN BRANCH FROM BUS 242928 TO BUS 242939 CKT 1 / 242928 05MARYSV 765 242939 05MARYSV 345 1 OPEN BRANCH FROM BUS 239133 TO BUS 242939 CKT 1 / 239133 02TANGY 345 242939 05MARYSV 345 1 END
2929_C2	CONTINGENCY '2929_C2' OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END
2930_C2	CONTINGENCY '2930_C2' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 248000 CKT 1 / 243208 05JEFRSO 765 248000 06CLIFTY 345 1 END
2932_C2_05JEFRSO 765-A2	CONTINGENCY '2932_C2_05JEFRSO 765-A2' OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 248000 CKT 1 / 243208 05JEFRSO 765 248000 06CLIFTY 345 1 END
2979_C2_X1-020_X2-052	CONTINGENCY '2979_C2_X1-020_X2-052' OPEN BRANCH FROM BUS 243206 TO BUS 907020 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1 OPEN BRANCH FROM BUS 243206 TO BUS 243219 CKT 2 / 243206 05DUMONT 765 243219 05DUMONT 345 2 OPEN BRANCH FROM BUS 243219 TO BUS 909180 CKT 2 / 243219 05DUMONT 345

Table 12: PJM Option 2 - Connection to Breed 345 kV Substation Y2-116 Contingencies	
Contingency Name	**Description**
	243229 05OLIVE 345 2 END
345-L8002___-S	CONTINGENCY '345-L8002___-S' / CONTINGENCY # 735 TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 / PONTI; B 345 BLUEM; B 345 END
361_1_B2	CONTINGENCY '361_1_B2' OPEN BRANCH FROM BUS 243206 TO BUS 299951 CKT 1 /* 243206 05DUMONT 765 299951 05SORENS 765 1 END
37_B2_TOR12_WOMOP	CONTINGENCY '37_B2_TOR12_WOMOP' OPEN BRANCH FROM BUS 242920 TO BUS 242925 CKT 1 / 242920 05BELMON 765 242925 05KAMMER 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 242516 CKT 1 / 242920 05BELMON 765 242516 05MOUNTN 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 235102 CKT 1 / 242920 05BELMON 765 235102 BELMONT 500 1 END
4689_B2_TOR15257	CONTINGENCY '4689_B2_TOR15257' OPEN BRANCH FROM BUS 243878 TO BUS 243229 CKT 1 / 243878 05MEADOW 345 243229 05OLIVE 345 1 END
4690_C2_05OLIVE 345-D	CONTINGENCY '4690_C2_05OLIVE 345-D' OPEN BRANCH FROM BUS 243878 TO BUS 243229 CKT 1 / 243878 05MEADOW 345 243229 05OLIVE 345 1 OPEN BRANCH FROM BUS 243229 TO BUS 274804 CKT 1 / 243229 05OLIVE 345 274804 UPNOR;RP 345 1 END
474_A	CONTINGENCY '474_A' OPEN BRANCH FROM BUS 242931 TO BUS 248101 CKT 1 / 242931 05BEVERL 345 242946 05TIDD 345 1 OPEN BRANCH FROM BUS 242937 TO BUS 242940 CKT 1 / 242937 05KAMMER 345 242940 05MUSKNG 345 1 END
5031_C2_05KAMMER 765-PP2	CONTINGENCY '5031_C2_05KAMMER 765-PP2' OPEN BRANCH FROM BUS 242920 TO BUS 242925 CKT 1 / 242920 05BELMON 765 242925 05KAMMER 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 242516 CKT 1 / 242920 05BELMON 765 242516 05MOUNTN 765 1 OPEN BRANCH FROM BUS 242920 TO BUS 235102 CKT 1 / 242920 05BELMON 765 235102 BELMONT 500 1 OPEN BRANCH FROM BUS 242925 TO BUS 235117 CKT 1 / 242925 05KAMMER 765 235117 KAMMER 500 1 OPEN BRANCH FROM BUS 235111 TO BUS 235117 CKT 1 / 235111 502 JUNCTION 500 235117 KAMMER 500 1

Table 12: PJM Option 2 - Connection to Breed 345 kV Substation Y2-116 Contingencies	
Contingency Name	**Description**
	END
6189_C2_05HANG R 765-D1	CONTINGENCY '6189_C2_05HANG R 765-D1' OPEN BRANCH FROM BUS 242921 TO BUS 242924 CKT 1 / 242921 05CORNU 765 242924 05HANG R 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
6430_B2_TOR22_WOMOAB	CONTINGENCY '6430_B2_TOR22_WOMOAB' OPEN BRANCH FROM BUS 242529 TO BUS 242528 CKT 1 / 242529 05TRISTA 345 248005 06KYGER 345 1 OPEN BRANCH FROM BUS 242528 TO BUS 248005 CKT 1 / 242529 05TRISTA 345 248005 06KYGER 345 1 OPEN BRANCH FROM BUS 242529 TO BUS 242835 CKT 1 / 242529 05TRISTA 345 242835 05TRISTA 138 1 END
6472_B2_TOR15258	CONTINGENCY '6472_B2_TOR15258' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1 END
6489_B2_TOR16002	CONTINGENCY '6489_B2_TOR16002' OPEN BRANCH FROM BUS 243878 TO BUS 243230 CKT 1 / 243878 05MEADOW 345 243230 05REYNOL 345 1 OPEN BRANCH FROM BUS 243229 TO BUS 243230 CKT 1 / 243229 05OLIVE 345 243230 05REYNOL 345 1 OPEN BRANCH FROM BUS 243230 TO BUS 255173 CKT 1 / 243230 05REYNOL 345 255173 17RYNLDS 138 1 END
6490_B2_TOR3002545	CONTINGENCY '6490_B2_TOR3002545' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 2 / 243217 05DEQUIN 345 243878 05MEADOW 345 2 END
664_B3	CONTINGENCY '664_B3' OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 1 / 243210 05SULLVA 765 243213 05BREED 345 1 END
665_B3	CONTINGENCY '665_B3' OPEN BRANCH FROM BUS 243210 TO BUS 243213 CKT 2 / 243210 05SULLVA 765 243213 05BREED 345 2 END
667_B2_TOR1697	CONTINGENCY '667_B2_TOR1697' OPEN BRANCH FROM BUS 243213 TO BUS 243217 CKT 1 / 243213 05BREED 345 243217

Table 12: PJM Option 2 - Connection to Breed 345 kV Substation
Y2-116 Contingencies

Contingency Name	Description
	05DEQUIN 345 1 END
AP_C5_19	CONTINGENCY 'AP_C5_19' /BRIGHTON LOOP OPEN BRANCH FROM BUS 200003 TO BUS 235105 CKT 1 OPEN BRANCH FROM BUS 200003 TO BUS 200004 CKT 1 END

Table 13: PJM Option 2 - Connection to Breed 345 kV Substation

Y2-116 Generator Deliverability

	Contingency			Bus			Loading		Rating			
#	Type	Name	Facility Description	From	To	Cir.	Initial	Final	Type	MVA	MW Cont.	FG App.
1	N-1	664_B3	05SULLVA 765/345 kV transformer	243213	243210	2	91.08	102.44	ER	1680	190.9	3
2	N-1	665_B3	05SULLVA 765/345 kV transformer	243213	243210	1	91.75	103.2	ER	1650	188.9	4

Table 14: PJM Option 2 - Connection to Breed 345 kV Substation

Y2-116 Multiple Facility Contingency

	Contingency			Bus			Loading		Rating			
#	Type	Name	Facility Description	From	To	Cir.	Initial	Final	Type	MVA	MW Cont.	FG App.
1	LFFB	2932_C2_05JEFRSO 765-A2	05JEFRSO-05GRNTWN 765 kV line	243208	243207	1	97.04	100.44	ER	4094	139.2	1

Table 15: PJM Option 2 - Connection to Breed 345 kV Substation

Y2-116 Contribution to Previously Identified Overloads

	Contingency		Facility	Bus			Loading		Rating		MW	FG
#	Type	Name	Description	From	To	Cir.	Initial	Final	Type	MVA	Cont.	App.
1	LFFB	5031_C2_05KAMMER 765-PP2	05J.FERR-05CLOVRD 765 kV line	242514	242512	1	101.16	101.42	ER	4055	68.87	2
2	LFFB	6189_C2_05HANG R 765-D1	X1-020 TAP-05DUMONT 765 kV line	907020	243206	1	103.91	105.97	ER	4094	84.31	5
3	N-1	05JEFRSO _05ROCKPT _122	X2-052 TAP-05DUMONT 345 kV line	909180	243219	2	106.91	109.73	ER	1409	39.76	6
4	N-1	361_1_B2	05JEFRSO-05HANG R 765 kV line	243208	242924	1	109.27	111.95	ER	4055	126.5	7
5	N-1	37_B2_TOR12_WOMOP	05J.FERR-05CLOVRD 765 kV line	242514	242512	1	114.19	114.5	ER	3176	61.18	8
6	N-1	05JEFRSO _05ROCKPT _122	7PANA-KINCA; R 345 kV line	347945	270797	1	112.7	115.6	ER	1195	34.71	9
7	N-1	05HANG R _05JEFRSO _114	05JEFRSO 765/345 kV transformer	243208	248000	1	113.66	118.93	ER	1935	102.2	10
8	BUS	1375_C1_A	05JEFRSO-	243208	242924	1	116.09	118.97	ER	4253	122.7	11

Table 15: PJM Option 2 - Connection to Breed 345 kV Substation

Y2-116 Contribution to Previously Identified Overloads

#	Type	Contingency Name	Facility Description	Bus From	Bus To	Cir.	Loading Initial	Loading Final	Rating Type	Rating MVA	MW Cont.	FG App.
			05HANG R 765 kV line									
9	N-1	05JEFRSO _05ROCKPT _122	08NOBLSV-05FALL C 345 kV line	249515	243222	1	115.79	119.75	ER	956	37.88	12
10	LFFB	2932_C2_05JEFRSO 765-A2	X1-020 TAP-05DUMONT 765 kV line	907020	243206	1	118.48	121.59	ER	4094	127.6	13
11	LFFB	2979_C2_X1-020_X2-052	05OLIVE-05COOK 345 kV line	243229	243215	1	125.99	126.37	ER	1409	35.44	14
12	N-1	05MOUNTN _05BELMON _102	05WATERF-05MUSKNG 345 kV line	242947	242940	2	126.38	126.58	ER	2572	31.16	15
13	DCTL	474_A	05MOUNTN-05BELMON 765 kV line	242516	242920	1	132.3	132.6	ER	4253	82.84	16
14	N-1	1589_B3_05CLOVRD 765-10_WOMOAB	05MOUNTN-05BELMON 765 kV line	242516	242920	1	134.67	134.98	ER	4055	81.41	17
15	N-1	667_B2_TOR1697	05ROCKPT-05JEFRSO 765 kV line	243209	243208	1	132.98	138.24	ER	4055	213.2	18
16	N-1	4689_B2_TOR15257	05REYNOL-05OLIVE 345 kV line	243230	243229	1	133.98	138.29	ER	972	41.9	19
17	DCTL	6488	05ROCKPT-05JEFRSO 765 kV line	243209	243208	1	138.34	143.29	ER	4253	210.6	20
18	LFFB	2906_C2_05MARYSV 765-A1	05MOUNTN-05BELMON 765 kV line	242516	242920	1	143.62	143.95	ER	4253	90.8	21
19	LFFB	2929_C2	05BREED-05DEQUIN 345 kV line	243213	243217	1	137.76	144.11	ER	1272	80.74	22
20	N-1	6430_B2_TOR22_WOMOAB	06KYGER-05SPORN 345 kV line	248005	242528	2	145.07	145.47	ER	1438	35.75	23
21	N-1	6489_B2_TOR16002	05MEADOW-05OLIVE 345 kV line	243878	243229	1	141.17	145.63	ER	971	43.34	24
22	LFFB	2930_C2	05BREED-05DEQUIN 345 kV line	243213	243217	1	139.32	145.78	ER	1272	82.17	25
23	N-1	05JEFRSO _05ROCKPT _122	05EUGENE-08CAYSUB 345 kV line	243221	249504	1	140.19	148.07	ER	1386	117.1	26
24	N-1	05BELMON _05KAMMER _108	05BELMON 765/500 kV transformer	242920	235102	1	151.12	151.59	ER	2094	60.05	27
25	LFFB	6189_C2_05HANG R 765-D1	05JEFRSO 765/345 kV transformer	243208	248000	1	146.28	153.09	ER	1935	102.2	28
26	LFFB	2877_C2_05OLIVE 345-B1	05OLIVE-X2-052 TAP 345 kV line	243229	909180	2	158.14	158.59	ER	1409	42.23	29
27	N-1	05JEFRSO _05ROCKPT _122	05FALL C-05DESOTO 345 kV line	243222	243218	1	156.03	161.56	ER	1016	56.17	30
28	N-1	4689_B2_TOR15257	05MEADOW-05REYNOL 345 kV line	243878	243230	1	157.77	162.57	ER	971	46.61	31
29	LFFB	4690_C2_05OLIVE 345-D	05REYNOL-05OLIVE 345 kV line	243230	243229	1	162.35	163.05	ER	972	41.7	32
30	N-1	345-L8002___-S	7BROKAW T1-PONTI; R 345 kV line	348847	270853	1	168.62	170.82	ER	1441	31.7	33
31	N-1	667_B2_TOR1697	05EUGENE-05DEQUIN 345 kV	243221	243217	1	169.12	173.43	ER	971	41.81	34

Table 15: PJM Option 2 - Connection to Breed 345 kV Substation

Y2-116 Contribution to Previously Identified Overloads

#	Type	Contingency Name	Facility Description	Bus From	Bus To	Cir.	Loading Initial	Loading Final	Rating Type	Rating MVA	MW Cont.	FG App.
			line									
32	N-1	05JEFRSO _05ROCKPT _122	05BREED-7CASEY 345 kV line	243213	346809	1	164.09	178.28	ER	1466	208	35
33	LFFB	2929_C2	05EUGENE-08CAYSUB 345 kV line	243221	249504	1	170.56	179.06	ER	1386	117.8	36
34	LFFB	2929_C2	05BREED-7CASEY 345 kV line	243213	346809	1	170.19	184.37	ER	1466	207.8	37
35	LFFB	2930_C2	05BREED-7CASEY 345 kV line	243213	346809	1	171.74	185.96	ER	1466	208.5	38
36	N-1	05JEFRSO _05ROCKPT _122	05BREED-05DEQUIN 345 kV line	243213	243217	1	179.44	187.84	ER	971	81.64	39
37	N-1	6490_B2_TOR3002545	05DEQUIN-05MEADOW 345 kV line	243217	243878	1	182.77	188.77	ER	971	58.25	40
38	N-1	6472_B2_TOR15258	05DEQUIN-05MEADOW 345 kV line	243217	243878	2	182.77	188.77	ER	971	58.25	41
39	LFFB	2877_C2_05OLIVE 345-B1	X2-052 TAP-05DUMONT 345 kV line	909180	243219	2	190.03	190.49	ER	1409	42.23	42
40	LFFB	1760_C2_05JEFRSO 765-A	05JEFRSO 765/345 kV transformer	243208	248000	1	186.72	194.36	ER	1935	151.1	43
41	N-1	05JEFRSO _05ROCKPT _122	05DARWIN-05EUGENE 345 kV line	243216	243221	1	213.36	226.68	ER	971	129.3	44
42	N-1	05JEFRSO _05ROCKPT _122	05BREED-05DARWIN 345 kV line	243213	243216	1	213.36	226.68	ER	971	129.3	45
43	DCTL	AP_C5_19	GERMANTN 138/115 kV transformer	204530	204529	1	254.89	255.68	ER	104	5.32	46
44	LFFB	5031_C2_05KAMMER 765-PP2	05LAYMAN-05CORNER 138 kV line	243533	243490	1	260.74	261.59	ER	284	15.23	47
45	LFFB	5031_C2_05KAMMER 765-PP2	05WOLFCL-05LAYMAN 138 kV line	243589	243533	1	262.47	263.32	ER	284	15.23	48
46	N-1	05JEFRSO _05ROCKPT _122	05BREED-16WHEAT 345 kV line	243213	254539	1	246.17	263.98	ER	956	172.5	49
47	LFFB	2929_C2	05BREED-16WHEAT 345 kV line	243213	254539	1	257.88	275.06	ER	956	174.1	50

Flowgate Tables

Appendix 1

Bus Number	Bus Name	Full Contribution
242807	05SPORNA	-41.8
243382	05TANNER	18.61
251934	08BCKJD2	8.01
251935	08BCKJD3	10.9
251936	08BCKJD4	12.77
251937	08BCKJD5	20.28
251938	08BCKJD6	42.33
251939	08BECJD1	8.01
253188	09OHGEN1	2.91
253189	09OHGEN2	2.74
253191	09OHGEN4	3.27
341853	1JKCT 2G	5.08
341860	1JKCT 4G	3.89
341866	1JKCT 6G	3.89
244761	RACINE	-2.34
884780	S-058 C	17.8
884781	S-058 E	58.69
247508	U2-090 C	1.39
247915	U2-090 E	9.28
247543	V3-007 C	1.39
247919	V3-007 E	9.28
247544	V3-008 C	1.39
247920	V3-008 E	9.28
247545	V3-009 C	1.39
247921	V3-009 E	9.28
LTF	V3-012	18.59
900261	V4-033 C1	1.06
900271	V4-033 C2	1.06
900262	V4-033 E1	7.11
900272	V4-033 E2	7.11
904722	V4-073 E	.09
LTF	W2-033	53.93
902332	W2-040 E	.77
903942	W3-170 E	.61
905041	W4-004 C	.6
905042	W4-004 E	4.03
905081	W4-008 C	.6
905082	W4-008 E	4.03
905272	W4-036 E	.61
LTF	X2-042	35.02

LTF	X3-021	11.46
900404	X3-028 C	177.9
LTF	X3-096	18.64
LTF	X3-097	26.43
LTF	X3-098	25.05
LTF	X4-041	24.75
LTF	Y1-002	19.44
LTF	Y1-004	20.69
LTF	Y1-007	14.36
913342	Y1-054 E	1.52
LTF	Y2-004	12.23
LTF	Y2-005	12.23
LTF	Y2-006	17.76
LTF	Y2-007	24.47
LTF	Y2-008	33.9
LTF	Y2-030	11.76
LTF	Y2-031	11.76
LTF	Y2-032	11.76
LTF	Y2-033	10.87
LTF	Y2-040	11.46
LTF	Y2-049	9.41
LTF	Y2-056	16.36
LTF	Y2-068	132.62
LTF	Y2-082	33.61
914381	Y2-095 OP1	61.56
914532	Y2-111 E	.64
LTF	Y2-114	15.92
LTF	Y2-115	14.65
914561	Y2-116 OP1	30.5

Appendix 2

Bus Number	Bus Name	Full Contribution
243764	05BSG1	39.06
242900	05CRG1L	.85
242902	05CRG2L	.85
242904	05CRG3L	36.17
243859	05FR11_E	8.61
243862	05FR12_E	8.46
243864	05FR21_E	9.04
247924	05FRCS22_E	8.66
247925	05FRCS-3_E	17.54
247926	05FRCS-4_E	13.19
246909	05MLCS1_E	17.44
247930	05MLCS-2_E	17.44
246759	05SOLIDA	24.6
243382	05TANNER	32.4
246895	05VACITY	2.28
242850	05WOLFH1	.59
242851	05WOLFH2	.38
251934	08BCKJD2	10.57
251935	08BCKJD3	14.41
251936	08BCKJD4	16.89
251937	08BCKJD5	26.76
251938	08BCKJD6	46.79
251939	08BECJD1	10.57
341853	1JKCT 2G	12.01
341860	1JKCT 4G	9.19
341866	1JKCT 6G	9.19
341936	1LAUR 1G	9.1
244159	BUCK	1.21
244160	BYLLESBY	3.23
244221	INDDRVL	.19
990901	L-005 E	13.05
296335	R-033 1	11.48
296336	R-033 2	11.48
296346	R-033 3	8.32
296348	R-033 4	8.32
244761	RACINE	4.93
292417	T-127 E	17.46
292735	T-183 C	4.37
292736	T-183 E	17.46
292741	T-184 C	4.37
292742	T-184 E	17.46
274853	TWING;U1	17.3
274854	TWING;U2	17.3
887741	U1-087 C	2.14
887742	U1-087 E	14.34

887751	U1-088 C	1.43
887752	U1-088 E	9.56
247538	U2-062 C	2.66
247912	U2-062 E	17.83
247508	U2-090 C	2.86
247915	U2-090 E	19.15
247931	U3-002 E	19.09
891021	U4-003 C	2.84
891022	U4-003 E	18.99
891211	U4-037 C	2.89
891212	U4-037 E	19.36
891221	U4-038 C	1.42
891222	U4-038 E	9.53
891231	U4-039 C1	2.54
891241	U4-039 C2	2.54
891251	U4-039 C3	2.54
891261	U4-039 C4	2.54
891232	U4-039 E1	16.98
891242	U4-039 E2	16.98
891252	U4-039 E3	16.98
891262	U4-039 E4	16.98
893031	V2-008	66.46
247543	V3-007 C	2.86
247919	V3-007 E	19.15
247544	V3-008 C	2.86
247920	V3-008 E	19.15
247545	V3-009 C	2.86
247921	V3-009 E	19.15
LTF	V3-012	89.98
894781	V3-053 C	2.12
894782	V3-053 E	14.22
900261	V4-033 C1	2.15
900271	V4-033 C2	2.15
900262	V4-033 E1	14.38
900272	V4-033 E2	14.38
902332	W2-040 E	1.35
902352	W2-048 E	6.92
903942	W3-170 E	1.31
905041	W4-004 C	1.3
905042	W4-004 E	8.67
905071	W4-005 C	5.
905072	W4-005 E	33.49
905081	W4-008 C	1.3
905082	W4-008 E	8.67
905272	W4-036 E	1.31
244873	WINFIELD	2.06
909001	X2-006 C1OP1	50.26

909002	X2-006 C2OP1	40.21
909062	X2-022 E OP1	20.92
LTF	X2-042	85.81
909222	X2-060 E	-8.47
LTF	X3-020	25.06
LTF	X3-021	67.97
900404	X3-028 C	404.56
910731	X3-046 1	1.75
910741	X3-046 2	1.75
910751	X3-051	77.26
LTF	X3-096	60.29
LTF	X3-097	85.49
LTF	X3-098	81.04
912161	X4-025	9.77
LTF	X4-041	80.06
LTF	Y1-002	75.08
LTF	Y1-004	111.56
913031	Y1-006 C	1.37
913032	Y1-006 E	9.18
LTF	Y1-007	77.47
913321	Y1-048 OP1	-2.19
913342	Y1-054 E	2.25
913432	Y1-068 E	-5.65
LTF	Y2-004	40.69
LTF	Y2-005	40.69
LTF	Y2-006	40.86
LTF	Y2-007	81.39
LTF	Y2-008	81.9
LTF	Y2-033	56.7
LTF	Y2-034	43.25
LTF	Y2-040	67.97
LTF	Y2-049	55.82
LTF	Y2-056	62.42
LTF	Y2-068	429.
LTF	Y2-082	146.07
914321	Y2-084 C OP1	.37
914322	Y2-084 E OP1	6.67
914341	Y2-086	8.74
914381	Y2-095 OP1	139.98
LTF	Y2-114	79.04
LTF	Y2-115	76.27
914561	Y2-116 OP1	69.35

Appendix 3

Bus Number	Bus Name	Full Contribution
243442	05RKG1	14.37
243443	05RKG2	14.16
LTF	V3-012	24.12
LTF	X2-042	45.01
900404	X3-028 C	1051.47
LTF	X3-096	32.7
LTF	X3-097	46.37
LTF	X3-098	43.95
LTF	X4-041	43.42
LTF	Y1-004	25.21
LTF	Y2-006	26.71
LTF	Y2-007	45.18
LTF	Y2-008	45.38
LTF	Y2-068	232.67
914381	Y2-095 OP1	363.81
914561	Y2-116 OP1	180.25

Appendix 4

Bus Number	Bus Name	Full Contribution
243243	05ANDCT	.43
243442	05RKG1	7.
243443	05RKG2	6.9
246427	BERRIENS	-.76
246431	BUCHANAN	-.43
274679	SLINE;3U	-19.7
246416	TWBRANCH	-.48
247510	U3-002 C	.12
247931	U3-002 E	34.85
891221	U4-038 C	2.93
891222	U4-038 E	19.59
891231	U4-039 C1	8.79
891241	U4-039 C2	8.79
891251	U4-039 C3	8.79
891261	U4-039 C4	8.79
891232	U4-039 E1	58.81
891242	U4-039 E2	58.81
891252	U4-039 E3	58.81
891262	U4-039 E4	58.81
LTF	V3-012	31.33
LTF	W2-033	52.1
905041	W4-004 C	1.2
905042	W4-004 E	8.06
905081	W4-008 C	1.2
905082	W4-008 E	8.06
907021	X1-020 C	127.18
907022	X1-020 E	851.16
LTF	X2-042	86.95
900404	X3-028 C	579.85
LTF	Y1-004	40.93
LTF	Y1-007	28.42
LTF	Y2-006	41.98
LTF	Y2-008	85.65
LTF	Y2-030	25.34
LTF	Y2-031	25.34
LTF	Y2-032	25.34
LTF	Y2-068	97.48
914381	Y2-095 OP1	200.63
LTF	Y2-114	25.25
LTF	Y2-115	26.17
914561	Y2-116 OP1	99.4

Appendix 5

Bus Number	Bus Name	Full Contribution
243440	05CKG1	1.72
243858	05FR11_C	.08
243861	05FR12_C	.08
243863	05FR21_C	.08
243866	05FRCS22_C	.08
243870	05FRCS-3_C	.16
243873	05FRCS-4_C	.12
246908	05MLCS1_C	.19
246910	05MLCS-2_C	.19
243442	05RKG1	2.06
243443	05RKG2	2.03
274654	BRAID;1U	1.49
274655	BRAID;2U	1.46
274751	CRETE;1U	.13
274752	CRETE;2U	.13
274753	CRETE;3U	.13
274754	CRETE;4U	.13
246422	MAYFLWER	.01
290294	S-036 C1	1.79
290298	S-037 C1	1.79
292416	T-127 C	.19
292735	T-183 C	7.86
292741	T-184 C	7.86
274802	U PAR;5U	.08
274803	U PAR;6U	.08
887641	U1-049 C	.66
887741	U1-087 C	3.29
887751	U1-088 C	2.2
891021	U4-003 C	5.11
891171	U4-033	.08
274814	UPNOR;0U	.1
274805	UPNOR;1U	.1
274806	UPNOR;2U	.1
274807	UPNOR;3U	.1
274808	UPNOR;4U	.1
274809	UPNOR;5U	.1
274810	UPNOR;6U	.1
274811	UPNOR;7U	.1
274812	UPNOR;8U	.1
274813	UPNOR;9U	.1
274815	UPNOR;XU	.1
274816	UPNOR;YU	.1
LTF	V3-012	11.17
900391	V4-048	.03
900401	V4-049	.03

907121	X1-042	.
LTF	X2-042	25.68
909181	X2-052	410.55
LTF	X3-020	9.09
900404	X3-028 C	231.84
LTF	X3-096	21.88
LTF	X3-097	31.02
LTF	X3-098	29.41
LTF	X4-041	29.05
LTF	Y1-002	35.68
LTF	Y1-004	9.52
LTF	Y2-004	15.22
LTF	Y2-005	15.22
LTF	Y2-006	10.41
LTF	Y2-007	30.44
LTF	Y2-008	26.2
LTF	Y2-056	22.03
LTF	Y2-068	155.67
LTF	Y2-082	57.9
914321	Y2-084 C OP1	.56
914381	Y2-095 OP1	80.22
LTF	Y2-114	10.1
914561	Y2-116 OP1	39.74

Appendix 6

Bus Number	Bus Name	Full Contribution
243441	05CKG2	4.05
243858	05FR11_C	.08
243861	05FR12_C	.08
243863	05FR21_C	.08
243866	05FRCS22_C	.08
243870	05FRCS-3_C	.16
243873	05FRCS-4_C	.12
246908	05MLCS1_C	.16
246910	05MLCS-2_C	.16
243442	05RKG1	8.88
243443	05RKG2	8.74
274654	BRAID;1U	4.3
274655	BRAID;2U	4.2
274865	CAYUG;1U C1	4.68
274863	CAYUG;1U E1	18.71
274866	CAYUG;2U C2	4.68
274670	CRAWF;7G	1.37
274671	CRAWF;7Y	1.38
274672	CRAWF;8U	48.97
274658	DRESD;2U	3.41
274659	DRESD;3U	3.41
274757	ELWOO;1P	2.18
274758	ELWOO;2P	2.73
274837	EQUIS; B	.15
274836	EQUIS; R	.24
274673	FISK ;9U	50.04
274708	KENDA;3C	.62
274709	KENDA;3S	.42
274710	KENDA;4C	.62
274711	KENDA;4S	.42
274650	KINCA;1U	2.12
274651	KINCA;2U	2.12
274660	LASCO;1U	4.09
274661	LASCO;2U	4.09
274770	LINC G1	.27
274771	LINC G2	.27
274772	LINC G3	.27
274773	LINC G4	.27
274774	LINC G5	.27
274775	LINC G6	.27
274776	LINC G7	.27
274777	LINC G8	.27
274847	N-015 C	.11
293664	O-024 C	.07
293666	O-024 C	.15

294391	P-010 C	.14
882311	Q-066	.32
296308	R-030 C1	5.17
296271	R-030 C2	5.17
296125	R-030 C3	5.23
274839	R-035	.18
290261	S-027 C	.15
290265	S-028 C	.15
290294	S-036 C1	5.38
290298	S-037 C1	5.38
884780	S-058 C	111.29
884781	S-058 E	366.93
884891	S-062 C1	5.14
884901	S-062 C2	5.11
884911	S-062 C3	5.14
886001	T-105 C	10.91
292416	T-127 C	.16
292735	T-183 C	6.74
292741	T-184 C	6.74
274802	U PAR;5U	.18
274803	U PAR;6U	.18
887641	U1-049 C	2.
887741	U1-087 C	3.34
887751	U1-088 C	2.23
890570	U3-026 C1	39.11
890571	U3-026 C2	39.11
890561	U3-031	.15
891021	U4-003 C	4.38
891211	U4-037 C	4.04
891221	U4-038 C	2.04
891231	U4-039 C1	4.48
891241	U4-039 C2	4.48
891251	U4-039 C3	4.48
891261	U4-039 C4	4.48
892051	V1-022 1	29.3
892061	V1-022 2	29.3
292068	V1-024	.07
292069	V1-025	.07
893031	V2-008	92.79
LTF	V3-012	46.73
900391	V4-048	.07
900401	V4-049	.07
903811	W3-135	.04
905071	W4-005 C	7.1
905251	W4-033 C1	.01
905491	W4-086	.32
905501	W4-087	.57

907021	X1-020 C	38.53
907141	X1-045	.46
LTF	X2-042	113.46
910541	X3-005 C	.58
LTF	X3-020	31.38
LTF	X3-021	56.97
900404	X3-028 C	815.22
910711	X3-045 1	2.46
910721	X3-045 2	2.46
LTF	X3-096	75.48
LTF	X3-097	107.03
LTF	X3-098	101.46
LTF	X4-029D	27.33
LTF	X4-041	100.24
LTF	Y1-002	104.35
LTF	Y1-004	42.4
913011	Y1-005 1	26.94
913021	Y1-005 2	26.94
LTF	Y1-007	29.45
LTF	Y1-041	27.33
LTF	Y2-004	51.62
LTF	Y2-005	51.62
LTF	Y2-006	55.55
LTF	Y2-007	103.24
LTF	Y2-008	112.46
LTF	Y2-030	27.83
LTF	Y2-031	27.83
LTF	Y2-032	27.83
LTF	Y2-040	56.97
LTF	Y2-049	46.78
LTF	Y2-056	82.
LTF	Y2-068	537.09
LTF	Y2-082	180.64
914321	Y2-084 C OP1	.57
914381	Y2-095 OP1	282.07
914551	Y2-113 1	.97
914552	Y2-113 2	.97
LTF	Y2-114	39.24
LTF	Y2-115	32.59
914561	Y2-116 OP1	139.75

Appendix 7

Bus Number	Bus Name	Full Contribution
243764	05BSG1	35.84
243763	05BSG2	2.5
242570	05BUCHAN	.26
242900	05CRG1L	.81
242902	05CRG2L	.81
242904	05CRG3L	34.23
246759	05SOLIDA	22.41
246895	05VACITY	2.16
242850	05WOLFH1	.56
242851	05WOLFH2	.36
341853	1JKCT 2G	10.82
341860	1JKCT 4G	8.28
341866	1JKCT 6G	8.28
341936	1LAUR 1G	8.34
270000	20FOOTHL	1.05
270001	20ZELDA	1.56
244221	INDDRVL	.18
884780	S-058 C	64.93
884781	S-058 E	214.09
LTF	V3-012	82.64
903931	W3-162	.06
909001	X2-006 C1OP1	46.26
909002	X2-006 C2OP1	37.
LTF	X2-042	75.88
LTF	X3-020	22.35
LTF	X3-021	57.4
900404	X3-028 C	359.63
910751	X3-051	69.12
LTF	X3-096	53.76
LTF	X3-097	76.23
LTF	X3-098	72.25
912161	X4-025	8.76
LTF	X4-041	71.39
LTF	Y1-002	65.32
LTF	Y1-004	103.13
913031	Y1-006 C	1.31
LTF	Y1-007	71.62
913321	Y1-048 OP1	-2.02
LTF	Y2-004	36.3
LTF	Y2-005	36.3
LTF	Y2-006	36.2
LTF	Y2-007	72.6
LTF	Y2-008	72.65
LTF	Y2-030	21.22
LTF	Y2-031	21.22

LTF	Y2-032	21.22
LTF	Y2-033	52.59
LTF	Y2-034	41.42
LTF	Y2-035	22.21
LTF	Y2-036	22.21
LTF	Y2-040	57.4
LTF	Y2-049	47.14
LTF	Y2-056	54.84
LTF	Y2-068	382.5
LTF	Y2-082	125.69
914341	Y2-086	8.12
914381	Y2-095 OP1	124.43
LTF	Y2-114	72.95
LTF	Y2-115	70.63
914561	Y2-116 OP1	61.65

Appendix 8

Bus Number	Bus Name	Full Contribution
243442	05RKG1	1.8
243443	05RKG2	1.78
274865	CAYUG;1U C1	-3.26
274866	CAYUG;2U C2	-3.26
LTF	V3-012	34.82
LTF	X2-042	19.41
LTF	X3-020	12.16
900404	X3-028 C	202.48
LTF	X3-096	29.26
LTF	X3-097	41.48
LTF	X3-098	39.32
LTF	X4-041	38.85
LTF	Y1-004	35.64
LTF	Y1-007	24.75
LTF	Y1-090	7.09
LTF	Y2-004	20.18
LTF	Y2-005	20.18
LTF	Y2-006	10.15
LTF	Y2-007	40.35
LTF	Y2-008	19.05
LTF	Y2-033	18.35
LTF	Y2-034	9.68
LTF	Y2-068	208.17
914381	Y2-095 OP1	70.06
LTF	Y2-114	29.5
LTF	Y2-115	26.79
914561	Y2-116 OP1	34.71

Appendix 9

Bus Number	Bus Name	Full Contribution
243243	05ANDCT	.26
243858	05FR11_C	.03
243861	05FR12_C	.02
243863	05FR21_C	.03
243866	05FRCS22_C	.03
243870	05FRCS-3_C	.05
243873	05FRCS-4_C	.04
243442	05RKG1	1.97
243443	05RKG2	1.94
887741	U1-087 C	1.05
887751	U1-088 C	.7
LTF	V3-012	13.67
LTF	X2-042	55.45
LTF	X3-020	7.48
900404	X3-028 C	220.96
LTF	X3-096	18.
LTF	X3-097	25.53
LTF	X3-098	24.2
LTF	X4-041	23.91
LTF	Y1-002	5.82
LTF	Y1-004	14.07
LTF	Y1-007	9.77
LTF	Y2-004	12.6
LTF	Y2-005	12.6
LTF	Y2-006	24.77
LTF	Y2-007	25.19
LTF	Y2-008	55.93
LTF	Y2-033	7.43
LTF	Y2-056	7.89
LTF	Y2-068	128.09
914321	Y2-084 C OP1	.18
914381	Y2-095 OP1	76.45
LTF	Y2-114	11.73
LTF	Y2-115	10.55
914561	Y2-116 OP1	37.88

Appendix 10

Bus Number	Bus Name	Full Contribution
243243	05ANDCT	.49
243858	05FR11_C	.07
243859	05FR11_E	12.4
243861	05FR12_C	.07
243862	05FR12_E	12.2
243863	05FR21_C	.08
243864	05FR21_E	13.04
243866	05FRCS22_C	.07
247924	05FRCS22_E	12.48
243870	05FRCS-3_C	.15
247925	05FRCS-3_E	25.28
243873	05FRCS-4_C	.11
247926	05FRCS-4_E	19.01
246908	05MLCS1_C	.15
246909	05MLCS1_E	24.6
246910	05MLCS-2_C	.15
247930	05MLCS-2_E	24.6
243442	05RKG1	8.66
243443	05RKG2	8.53
274848	CAMPG;RU	.09
274865	CAYUG;1U C1	4.05
274863	CAYUG;1U E1	16.21
274866	CAYUG;2U C2	4.05
274864	CAYUG;2U E2	16.21
274849	CRESC;1U	7.14
294702	CRESC;2U	6.3
274659	DRESD;3U	2.91
274650	KINCA;1U	1.93
274651	KINCA;2U	1.93
990901	L-005 E	15.77
274770	LINC G1	.22
274771	LINC G2	.22
274772	LINC G3	.22
274773	LINC G4	.22
274774	LINC G5	.22
274775	LINC G6	.22
274776	LINC G7	.22
274777	LINC G8	.22
293664	O-024 C	.06
293666	O-024 C	.13
293665	O-024 E	10.97
293667	O-024 E	21.74
274851	O-035 C	.05
293771	O-035 E	7.87
294700	P-040 C	.52

294701	P-040 E	2.1
274678	POWER;6U	2.38
296308	R-030 C1	4.52
296271	R-030 C2	4.52
296125	R-030 C3	4.57
296309	R-030 E1	18.06
296272	R-030 E2	18.06
296128	R-030 E3	18.28
290261	S-027 C	.13
290265	S-028 C	.13
884780	S-058 C	91.9
884781	S-058 E	302.99
886001	T-105 C	9.45
886002	T-105 E	37.81
292416	T-127 C	.15
292417	T-127 E	24.63
886211	T-143 C1	3.29
886221	T-143 C2	3.29
886212	T-143 E1	13.16
886222	T-143 E2	13.16
292735	T-183 C	6.16
292736	T-183 E	24.63
292741	T-184 C	6.16
292742	T-184 E	24.63
274853	TWING;U1	21.8
274854	TWING;U2	21.8
887741	U1-087 C	3.09
887742	U1-087 E	20.67
887751	U1-088 C	2.06
887752	U1-088 E	13.78
247510	U3-002 C	.09
247931	U3-002 E	25.55
890570	U3-026 C1	32.29
890571	U3-026 C2	32.29
890561	U3-031	.12
891021	U4-003 C	4.
891022	U4-003 E	26.79
891211	U4-037 C	3.67
891212	U4-037 E	24.59
891221	U4-038 C	1.96
891222	U4-038 E	13.12
891231	U4-039 C1	4.13
891241	U4-039 C2	4.13
891251	U4-039 C3	4.13
891261	U4-039 C4	4.13
891232	U4-039 E1	27.62
891242	U4-039 E2	27.62

891252	U4-039 E3	27.62
891262	U4-039 E4	27.62
893031	V2-008	84.44
LTF	V3-012	55.57
902352	W2-048 E	8.79
905071	W4-005 C	6.33
905072	W4-005 E	42.4
907021	X1-020 C	32.99
907022	X1-020 E	220.75
909062	X2-022 E OP1	26.57
LTF	X2-042	111.94
LTF	X3-020	29.84
LTF	X3-021	52.2
900404	X3-028 C	792.3
910721	X3-045 2	2.11
LTF	X3-096	71.79
LTF	X3-097	101.79
LTF	X3-098	96.49
LTF	X4-041	95.33
LTF	Y1-002	89.57
LTF	Y1-004	57.62
LTF	Y1-007	40.01
LTF	Y2-004	49.02
LTF	Y2-005	49.02
LTF	Y2-006	55.09
LTF	Y2-007	98.03
LTF	Y2-008	110.68
LTF	Y2-030	28.63
LTF	Y2-031	28.63
LTF	Y2-032	28.63
LTF	Y2-033	29.96
LTF	Y2-040	52.2
LTF	Y2-049	42.87
LTF	Y2-056	71.57
LTF	Y2-068	510.79
LTF	Y2-082	156.05
914321	Y2-084 C OP1	.53
914322	Y2-084 E OP1	9.61
914381	Y2-095 OP1	274.13
LTF	Y2-114	46.65
LTF	Y2-115	41.13
914561	Y2-116 OP1	135.82

Appendix 11

Bus Number	Bus Name	Full Contribution
243441	05CKG2	2.77
243858	05FR11_C	.05
243861	05FR12_C	.05
243863	05FR21_C	.05
243866	05FRCS22_C	.05
243870	05FRCS-3_C	.1
243873	05FRCS-4_C	.08
246908	05MLCS1_C	.1
246910	05MLCS-2_C	.1
243442	05RKG1	9.99
243443	05RKG2	9.84
251935	08BCKJD3	-3.42
251936	08BCKJD4	-4.
251938	08BCKJD6	-54.62
274654	BRAID;1U	2.81
274655	BRAID;2U	2.75
274751	CRETE;1U	.18
274752	CRETE;2U	.18
274753	CRETE;3U	.18
274754	CRETE;4U	.18
274673	FISK ;9U	32.7
274826	FISK ;BP	.24
274827	FISK ;RP	.17
274708	KENDA;3C	.41
274709	KENDA;3S	.27
274710	KENDA;4C	.41
274711	KENDA;4S	.27
274660	LASCO;1U	2.67
274661	LASCO;2U	2.67
274770	LINC G1	.18
274771	LINC G2	.18
274772	LINC G3	.18
274773	LINC G4	.18
274774	LINC G5	.18
274775	LINC G6	.18
274776	LINC G7	.18
274777	LINC G8	.18
293540	O-012 C	.05
882311	Q-066	.21
274839	R-035	.12
293968	RIVER_G1	.36
293969	RIVER_G2	.36
290294	S-036 C1	3.52
290298	S-037 C1	3.52
884780	S-058 C	73.81

884781	S-058 E	243.36
884891	S-062 C1	3.36
884901	S-062 C2	3.34
884911	S-062 C3	3.36
274793	SECHI;0U	.09
274794	SECHI;1U	.09
274795	SECHI;2U	.09
274788	SECHI;5U	.09
274789	SECHI;6U	.09
274790	SECHI;7U	.09
274791	SECHI;8U	.09
274792	SECHI;9U	.09
274679	SLINE;3U	19.85
274680	SLINE;4U	32.04
292416	T-127 C	.1
292735	T-183 C	4.34
292741	T-184 C	4.34
274798	U PAR;1U	.12
274799	U PAR;2U	.12
274800	U PAR;3U	.12
274801	U PAR;4U	.12
274802	U PAR;5U	.12
274803	U PAR;6U	.12
887641	U1-049 C	1.31
293964	U1-054 1	.03
293965	U1-054 2	.04
887741	U1-087 C	2.14
887751	U1-088 C	1.43
890570	U3-026 C1	25.94
890571	U3-026 C2	25.94
890561	U3-031	.1
891021	U4-003 C	2.82
891171	U4-033	.09
891231	U4-039 C1	3.74
891241	U4-039 C2	3.74
891251	U4-039 C3	3.74
891261	U4-039 C4	3.74
274814	UPNOR;0U	.1
274805	UPNOR;1U	.1
274806	UPNOR;2U	.1
274807	UPNOR;3U	.1
274808	UPNOR;4U	.1
274809	UPNOR;5U	.1
274810	UPNOR;6U	.1
274811	UPNOR;7U	.1
274812	UPNOR;8U	.1
274813	UPNOR;9U	.1

274815	UPNOR;XU	.1
274816	UPNOR;YU	.1
892051	V1-022 1	19.12
892061	V1-022 2	19.12
292068	V1-024	.05
292069	V1-025	.05
900391	V4-048	.05
900401	V4-049	.05
LTF	W3-083	12.69
905501	W4-087	.37
907021	X1-020 C	32.98
LTF	X2-042	12.24
909181	X2-052	69.17
910541	X3-005 C	.38
LTF	X3-020	16.43
LTF	X3-021	32.04
900404	X3-028 C	753.06
LTF	X3-096	39.53
LTF	X3-097	56.06
LTF	X3-098	53.14
LTF	X4-029D	15.96
LTF	X4-041	52.5
LTF	Y1-002	65.36
913011	Y1-005 1	17.6
913021	Y1-005 2	17.6
LTF	Y1-041	15.96
LTF	Y2-004	28.32
LTF	Y2-005	28.32
LTF	Y2-007	56.63
LTF	Y2-008	14.42
LTF	Y2-040	32.04
LTF	Y2-049	26.31
LTF	Y2-056	47.87
LTF	Y2-068	281.3
LTF	Y2-082	112.18
914321	Y2-084 C OP1	.37
914381	Y2-095 OP1	260.56
914561	Y2-116 OP1	129.1

Appendix 12

Bus Number	Bus Name	Full Contribution
243243	05ANDCT	.45
243442	05RKG1	11.23
243443	05RKG2	11.06
247510	U3-002 C	.14
247931	U3-002 E	39.82
891221	U4-038 C	3.39
891222	U4-038 E	22.69
891231	U4-039 C1	10.37
891241	U4-039 C2	10.37
891251	U4-039 C3	10.37
891261	U4-039 C4	10.37
891232	U4-039 E1	69.4
891242	U4-039 E2	69.4
891252	U4-039 E3	69.4
891262	U4-039 E4	69.4
LTF	V3-012	30.92
907021	X1-020 C	141.15
907022	X1-020 E	944.6
LTF	X2-042	92.13
900404	X3-028 C	898.63
LTF	X3-096	30.43
LTF	X3-097	43.16
LTF	X3-098	40.91
LTF	X4-041	40.42
LTF	Y1-004	35.58
LTF	Y1-007	24.71
LTF	Y2-006	45.31
LTF	Y2-007	41.46
LTF	Y2-008	91.76
LTF	Y2-068	216.55
914381	Y2-095 OP1	310.92
LTF	Y2-114	25.48
LTF	Y2-115	24.57
914561	Y2-116 OP1	154.05

Appendix 13

Bus Number	Bus Name	Full Contribution
900404	X3-028 C	3500.
914381	Y2-095 OP1	1211.
914561	Y2-116 OP1	600.

Appendix 14

Bus Number	Bus Name	Full Contribution
238545	02ASHTG5	-14.04
238554	02AVONG7	-5.14
238555	02AVONG9	-32.96
238995	02NCUNTD	-.39
239006	02NILEG1	-7.22
239007	02NILEG2	-7.16
239022	02NWCAG3	-5.93
239023	02NWCAG4	-5.91
239024	02NWCAG5	-9.04
242892	05AMG2	2.42
243764	05BSG1	31.78
242904	05CRG3L	18.4
243654	05CVG3	-13.23
242650	05GLENL1	7.3
242651	05GLENL2	19.06
242896	05KRG1L	23.35
242898	05KRG2L	23.35
242894	05MTG1	3.68
243045	05MUSKNG	-84.72
243084	05RUTLAN	.14
246759	05SOLIDA	21.4
242807	05SPORNA	107.33
243382	05TANNER	15.2
242838	05TWELVE	1.29
242947	05WATERF	12.58
251934	08BCKJD2	5.79
251935	08BCKJD3	7.92
251936	08BCKJD4	9.28
251937	08BCKJD5	14.66
251938	08BCKJD6	29.58
251939	08BECJD1	5.79
254007	15ELRMA1	-6.17
254008	15ELRMA2	-6.3
254009	15ELRMA3	-6.83
254010	15ELRMA4	-11.
341853	1JKCT 2G	5.86
341860	1JKCT 4G	4.48
341866	1JKCT 6G	4.48
341936	1LAUR 1G	4.38
292067	FDNS	.24
247535	R-076	.28
892311	V1-035	6.19
LTF	V3-012	38.45
LTF	W2-033	36.08
903761	W3-128	372.01

235577	WILLOW I 1	-3.86
235578	WILLOW I 2	-11.93
909001	X2-006 C1OP1	39.22
909002	X2-006 C2OP1	31.37
LTF	X2-042	35.1
900404	X3-028 C	188.72
910751	X3-051	58.56
LTF	X3-096	24.56
LTF	X3-097	34.82
LTF	X3-098	33.01
912161	X4-025	8.6
LTF	X4-041	32.61
LTF	Y1-002	23.17
LTF	Y1-004	48.3
913031	Y1-006 C	.74
LTF	Y1-007	33.54
913331	Y1-049	.46
LTF	Y2-004	16.51
LTF	Y2-005	16.51
LTF	Y2-006	18.19
LTF	Y2-007	33.02
LTF	Y2-008	36.15
LTF	Y2-033	26.3
LTF	Y2-034	24.51
LTF	Y2-056	21.25
LTF	Y2-068	174.75
LTF	Y2-082	30.86
914341	Y2-086	4.74
914381	Y2-095 OP1	65.3
LTF	Y2-114	36.66
LTF	Y2-115	35.72
914561	Y2-116 OP1	32.35

Appendix 15

Bus Number	Bus Name	Full Contribution
243764	05BSG1	60.46
242904	05CRG3L	38.21
243859	05FR11_E	3.11
243862	05FR12_E	3.06
243864	05FR21_E	3.27
247924	05FRCS22_E	3.13
247925	05FRCS-3_E	6.34
247926	05FRCS-4_E	4.77
242650	05GLENL1	13.59
242651	05GLENL2	35.48
243186	05GVG1	8.76
243187	05GVG2	8.76
242896	05KRG1L	36.96
242898	05KRG2L	36.96
242894	05MTG1	9.58
246759	05SOLIDA	39.81
242807	05SPORNA	116.23
243382	05TANNER	39.72
251934	08BCKJD2	13.63
251935	08BCKJD3	18.59
251936	08BCKJD4	21.78
251937	08BCKJD5	34.5
251938	08BCKJD6	62.37
251939	08BECJD1	13.63
253188	09OHGEN1	6.8
253189	09OHGEN2	6.42
253191	09OHGEN4	7.56
341853	1JKCT 2G	14.34
341860	1JKCT 4G	10.97
341866	1JKCT 6G	10.97
341936	1LAUR 1G	10.24
235564	ALBRIGHT 1	-9.38
235565	ALBRIGHT 2	-9.38
235566	ALBRIGHT 3	-17.61
244159	BUCK	1.43
244160	BYLLESBY	3.81
292067	FDNS	.41
244891	LONDONHY	3.14
244861	MARMETHY	3.45
244761	RACINE	8.91
235575	RIVESVILLE 5	-5.07
235576	RIVESVILLE 6	-12.45
244467	SUMMERVL	11.91
887741	U1-087 C	2.43
887742	U1-087 E	16.29

887751	U1-088 C	1.62
887752	U1-088 E	10.86
247538	U2-062 C	3.09
247912	U2-062 E	20.73
247508	U2-090 C	3.38
247915	U2-090 E	22.63
247931	U3-002 E	22.06
891221	U4-038 C	1.64
891222	U4-038 E	10.97
891231	U4-039 C1	2.93
891241	U4-039 C2	2.93
891251	U4-039 C3	2.93
891261	U4-039 C4	2.93
891232	U4-039 E1	19.61
891242	U4-039 E2	19.61
891252	U4-039 E3	19.61
891262	U4-039 E4	19.61
892311	V1-035	9.79
247543	V3-007 C	3.38
247919	V3-007 E	22.63
247544	V3-008 C	3.38
247920	V3-008 E	22.63
247545	V3-009 C	3.38
247921	V3-009 E	22.63
LTF	V3-012	93.9
894781	V3-053 C	2.44
894782	V3-053 E	16.36
900261	V4-033 C1	2.55
900271	V4-033 C2	2.55
900262	V4-033 E1	17.07
900272	V4-033 E2	17.07
904722	V4-073 E	.2
LTF	W2-033	34.89
902332	W2-040 E	1.65
903761	W3-128	105.94
903942	W3-170 E	1.7
905041	W4-004 C	1.53
905042	W4-004 E	10.26
905081	W4-008 C	1.53
905082	W4-008 E	10.26
905272	W4-036 E	1.7
235577	WILLOW I 1	-12.82
235578	WILLOW I 2	-39.66
244873	WINFIELD	4.
909001	X2-006 C1OP1	76.95
909002	X2-006 C2OP1	61.56
LTF	X2-042	96.97

LTF	X3-020	28.31
LTF	X3-021	48.38
900404	X3-028 C	494.17
910751	X3-051	157.35
LTF	X3-096	68.1
LTF	X3-097	96.57
LTF	X3-098	91.54
912161	X4-025	15.21
LTF	X4-041	90.44
LTF	Y1-002	81.04
LTF	Y1-004	114.69
913031	Y1-006 C	1.48
913032	Y1-006 E	9.9
LTF	Y1-007	79.65
913331	Y1-049	.88
913342	Y1-054 E	2.84
LTF	Y2-004	45.84
LTF	Y2-005	45.84
LTF	Y2-006	48.57
LTF	Y2-007	91.68
LTF	Y2-008	96.78
LTF	Y2-030	28.95
LTF	Y2-031	28.95
LTF	Y2-032	28.95
LTF	Y2-033	60.97
LTF	Y2-034	49.79
LTF	Y2-035	26.7
LTF	Y2-036	26.7
LTF	Y2-040	48.38
LTF	Y2-049	39.73
LTF	Y2-056	68.02
LTF	Y2-068	484.59
LTF	Y2-082	143.47
914321	Y2-084 C OP1	.42
914322	Y2-084 E OP1	7.57
914341	Y2-086	10.19
914381	Y2-095 OP1	170.98
914532	Y2-111 E	1.51
LTF	Y2-114	86.72
LTF	Y2-115	83.26
914561	Y2-116 OP1	84.71

Appendix 16

Bus Number	Bus Name	Full Contribution
242893	05AMG3	7.59
243764	05BSG1	59.39
242904	05CRG3L	39.51
242922	05FLTLCK	5.05
242650	05GLENL1	11.81
242651	05GLENL2	30.84
243186	05GVG1	8.69
243187	05GVG2	8.69
242896	05KRG1L	34.01
242898	05KRG2L	34.01
242894	05MTG1	9.49
246759	05SOLIDA	38.74
242807	05SPORNA	103.43
243382	05TANNER	38.25
251934	08BCKJD2	12.95
251935	08BCKJD3	17.68
251936	08BCKJD4	20.72
251937	08BCKJD5	32.8
251938	08BCKJD6	59.13
251939	08BECJD1	12.95
253188	09OHGEN1	6.42
253189	09OHGEN2	6.06
253191	09OHGEN4	7.15
341853	1JKCT 2G	14.02
341860	1JKCT 4G	10.73
341866	1JKCT 6G	10.73
341936	1LAUR 1G	10.22
235564	ALBRIGHT 1	-8.77
235565	ALBRIGHT 2	-8.77
235566	ALBRIGHT 3	-16.47
274865	CAYUG;1U C1	3.51
274863	CAYUG;1U E1	14.04
274866	CAYUG;2U C2	3.51
292535	CE23CL12	.46
292536	CE23EL12	1.85
292067	FDNS	.39
293120	N-021 C	.14
293130	N-022 C	.25
293140	N-023 C	.25
293150	N-024 C	.25
293160	N-025 C	.25
293190	O-003 C	.21
293513	O-009 C1	2.4
293514	O-009 C2	1.22
293515	O-009 C3	1.34

294500	P-020 C	4.91
295103	P-024 C	.47
295106	P-025 C	.47
294670	P-037 C	3.28
294700	P-040 C	.47
290089	Q-039 C	3.45
882331	Q-067B	.4
295990	R-016 C1	1.46
295992	R-016 C2	1.46
296308	R-030 C1	3.91
296271	R-030 C2	3.91
296125	R-030 C3	3.96
296335	R-033 1	20.38
296336	R-033 2	20.38
296346	R-033 3	14.76
296348	R-033 4	14.76
296827	R-079 C1	3.45
296741	R-079 C2	3.45
235575	RIVESVILLE 5	-4.79
235576	RIVESVILLE 6	-11.76
247536	S-071 C	2.9
885861	T-074 1	.92
885862	T-074 2	.92
885961	T-099 C	2.32
886001	T-105 C	8.19
886211	T-143 C1	2.92
886221	T-143 C2	2.92
886261	T-148 C	2.32
292735	T-183 C	4.84
292741	T-184 C	4.84
887741	U1-087 C	2.39
887751	U1-088 C	1.6
247538	U2-062 C	3.
247508	U2-090 C	3.28
890511	U3-021 1	5.77
890521	U3-021 2	5.77
891021	U4-003 C	3.14
891131	U4-027	11.72
891211	U4-037 C	3.18
891221	U4-038 C	1.6
891231	U4-039 C1	2.87
891241	U4-039 C2	2.87
891251	U4-039 C3	2.87
891261	U4-039 C4	2.87
892051	V1-022 1	12.58
892061	V1-022 2	12.58
892311	V1-035	9.01

893031	V2-008	73.32
247543	V3-007 C	3.28
247544	V3-008 C	3.28
247545	V3-009 C	3.28
LTF	V3-012	95.54
894581	V3-015 C	4.46
894781	V3-053 C	2.38
900261	V4-033 C1	2.47
900271	V4-033 C2	2.47
900371	V4-046	2.32
900381	V4-047	2.32
LTF	W2-033	30.47
902491	W2-079 C	.85
903432	W3-046	6.2
903442	W3-046	5.74
903452	W3-046	6.2
903462	W3-046	5.74
903761	W3-128	77.24
903791	W3-132 C	.86
905041	W4-004 C	1.49
905071	W4-005 C	5.47
905081	W4-008 C	1.49
905471	W4-084	.46
905491	W4-086	.24
235577	WILLOW I 1	-12.53
235578	WILLOW I 2	-38.77
907021	X1-020 C	23.37
907141	X1-045	.34
907361	X1-087	2.2
909001	X2-006 C1OP1	76.05
909002	X2-006 C2OP1	60.84
909041	X2-019 C	20.72
LTF	X2-042	95.69
LTF	X3-020	28.03
LTF	X3-021	50.38
900404	X3-028 C	485.41
910711	X3-045 1	1.83
910721	X3-045 2	1.84
910731	X3-046 1	1.89
910741	X3-046 2	1.89
910751	X3-051	155.93
LTF	X3-096	67.42
LTF	X3-097	95.61
LTF	X3-098	90.62
912161	X4-025	14.44
LTF	X4-041	89.53
LTF	Y1-002	79.87

LTF	Y1-004	117.29
913031	Y1-006 C	1.54
LTF	Y1-007	81.45
913331	Y1-049	.8
LTF	Y2-004	45.43
LTF	Y2-005	45.43
LTF	Y2-006	47.5
LTF	Y2-007	90.86
LTF	Y2-008	94.83
LTF	Y2-030	28.26
LTF	Y2-031	28.26
LTF	Y2-032	28.26
LTF	Y2-033	61.83
LTF	Y2-034	50.92
LTF	Y2-035	27.3
LTF	Y2-036	27.3
LTF	Y2-040	50.38
LTF	Y2-049	41.37
LTF	Y2-056	67.25
LTF	Y2-068	479.75
LTF	Y2-082	142.65
914321	Y2-084 C OP1	.41
914341	Y2-086	10.27
914381	Y2-095 OP1	167.95
914461	Y2-103	41.39
914551	Y2-113 1	.72
914552	Y2-113 2	.72
LTF	Y2-114	87.53
LTF	Y2-115	84.22
914561	Y2-116 OP1	83.21

Appendix 17

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.09
243861	05FR12_C	.09
243863	05FR21_C	.09
243866	05FRCS22_C	.09
243870	05FRCS-3_C	.18
243873	05FRCS-4_C	.14
246908	05MLCS1_C	.21
246910	05MLCS-2_C	.21
243442	05RKG1	2.29
243443	05RKG2	2.26
292416	T-127 C	.21
292735	T-183 C	8.85
292741	T-184 C	8.85
887741	U1-087 C	3.73
887751	U1-088 C	2.48
891021	U4-003 C	5.75
LTF	V3-012	11.64
LTF	W2-033	6.92
LTF	X2-042	34.75
LTF	X3-020	5.86
900404	X3-028 C	257.18
LTF	X3-096	14.09
LTF	X3-097	19.98
LTF	X3-098	18.94
LTF	X4-041	18.71
LTF	Y1-004	12.88
LTF	Y1-007	8.95
LTF	Y2-004	9.69
LTF	Y2-005	9.69
LTF	Y2-006	14.7
LTF	Y2-007	19.38
LTF	Y2-008	34.75
LTF	Y2-033	6.76
LTF	Y2-068	100.26
914321	Y2-084 C OP1	.64
914381	Y2-095 OP1	88.98
LTF	Y2-114	9.75
LTF	Y2-115	9.19
914561	Y2-116 OP1	44.09

Appendix 18

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.04
243861	05FR12_C	.04
243863	05FR21_C	.04
243866	05FRCS22_C	.04
243870	05FRCS-3_C	.08
243873	05FRCS-4_C	.06
246908	05MLCS1_C	.07
246910	05MLCS-2_C	.07
243442	05RKG1	20.03
243443	05RKG2	19.73
274848	CAMPG;RU	.04
274865	CAYUG;1U C1	1.69
274863	CAYUG;1U E1	6.76
274866	CAYUG;2U C2	1.69
274699	CORDO;1C	.2
274701	CORDO;1S	.22
274700	CORDO;2C	.2
274650	KINCA;1U	1.39
274651	KINCA;2U	1.39
293664	O-024 C	.03
293666	O-024 C	.06
274851	O-035 C	.02
294400	P-011 C1	.03
294409	P-011 C2	.03
294700	P-040 C	.21
290089	Q-039 C	1.56
274662	QUAD ;1U	1.18
274663	QUAD ;2U	1.18
296308	R-030 C1	2.11
296271	R-030 C2	2.11
296125	R-030 C3	2.13
290261	S-027 C	.07
290265	S-028 C	.07
886001	T-105 C	3.94
292416	T-127 C	.07
886211	T-143 C1	1.28
886221	T-143 C2	1.28
292735	T-183 C	2.87
292741	T-184 C	2.87
887741	U1-087 C	1.58
887751	U1-088 C	1.06
891021	U4-003 C	1.87
891131	U4-027	5.19
891211	U4-037 C	2.6
893031	V2-008	60.83

LTF	V3-012	33.32
905071	W4-005 C	3.78
LTF	X2-042	69.22
LTF	X3-020	25.55
900404	X3-028 C	1544.06
910731	X3-046 1	.83
910741	X3-046 2	.83
LTF	X3-096	61.47
LTF	X3-097	87.16
LTF	X3-098	82.62
LTF	X4-041	81.62
LTF	Y1-004	29.68
LTF	Y2-004	42.73
LTF	Y2-005	42.73
LTF	Y2-006	40.79
LTF	Y2-007	85.47
LTF	Y2-008	70.19
LTF	Y2-068	437.37
914321	Y2-084 C OP1	.27
914381	Y2-095 OP1	534.24
LTF	Y2-114	28.49
LTF	Y2-115	24.09
914561	Y2-116 OP1	264.7

Appendix 19

Bus Number	Bus Name	Full Contribution
243764	05BSG1	58.48
242904	05CRG3L	37.72
242650	05GLENL1	13.22
242651	05GLENL2	34.53
243186	05GVG1	9.12
243187	05GVG2	9.12
242896	05KRG1L	34.83
242898	05KRG2L	34.83
242894	05MTG1	9.69
246759	05SOLIDA	38.07
242807	05SPORNA	97.16
244159	BUCK	1.4
244160	BYLLESBY	3.74
292067	FDNS	.4
244891	LONDONHY	2.97
244861	MARMETHY	3.28
244761	RACINE	7.7
235575	RIVESVILLE 5	-5.31
235576	RIVESVILLE 6	-13.05
884780	S-058 C	103.43
884781	S-058 E	341.03
886001	T-105 C	4.62
886002	T-105 E	18.47
890570	U3-026 C1	36.35
890571	U3-026 C2	36.35
891231	U4-039 C1	3.48
891241	U4-039 C2	3.48
891251	U4-039 C3	3.48
891261	U4-039 C4	3.48
891232	U4-039 E1	23.33
891242	U4-039 E2	23.33
891252	U4-039 E3	23.33
891262	U4-039 E4	23.33
892311	V1-035	9.23
LTF	V3-012	98.08
LTF	W2-033	28.42
235577	WILLOW I 1	-13.61
235578	WILLOW I 2	-42.13
244873	WINFIELD	3.85
907021	X1-020 C	29.85
907022	X1-020 E	199.74
909001	X2-006 C1OP1	75.11
909002	X2-006 C2OP1	60.09
LTF	X2-042	104.45
LTF	X3-020	31.92

LTF	X3-021	53.88
900404	X3-028 C	537.77
910751	X3-051	173.52
LTF	X3-096	76.78
LTF	X3-097	108.87
LTF	X3-098	103.2
912161	X4-025	13.68
LTF	X4-029D	27.54
LTF	X4-041	101.95
LTF	Y1-002	101.47
LTF	Y1-004	117.9
913031	Y1-006 C	1.46
913032	Y1-006 E	9.74
LTF	Y1-007	81.88
LTF	Y1-041	27.54
LTF	Y2-004	52.
LTF	Y2-005	52.
LTF	Y2-006	52.19
LTF	Y2-007	103.99
LTF	Y2-008	104.65
LTF	Y2-030	28.87
LTF	Y2-031	28.87
LTF	Y2-032	28.87
LTF	Y2-033	62.69
LTF	Y2-034	49.37
LTF	Y2-035	26.47
LTF	Y2-036	26.47
LTF	Y2-040	53.88
LTF	Y2-049	44.25
LTF	Y2-056	82.63
LTF	Y2-068	546.3
LTF	Y2-082	179.23
914341	Y2-086	9.94
914381	Y2-095 OP1	186.07
LTF	Y2-114	90.67
LTF	Y2-115	86.3
914561	Y2-116 OP1	92.19

Appendix 20

Bus Number	Bus Name	Full Contribution
243442	05RKG1	4.2
243443	05RKG2	4.13
LTF	V3-012	12.07
LTF	X2-042	11.94
900404	X3-028 C	471.
LTF	X3-096	15.29
LTF	X3-097	21.69
LTF	X3-098	20.55
LTF	X4-041	20.31
LTF	Y1-004	12.73
LTF	Y1-007	8.84
LTF	Y2-004	10.56
LTF	Y2-005	10.56
LTF	Y2-006	11.94
LTF	Y2-007	21.13
LTF	Y2-008	12.05
LTF	Y2-068	108.81
914321	Y2-084 C OP1	.5
914322	Y2-084 E OP1	9.11
914381	Y2-095 OP1	162.96
LTF	Y2-114	10.19
LTF	Y2-115	9.39
914561	Y2-116 OP1	80.74

Appendix 21

Bus Number	Bus Name	Full Contribution
243045	05MUSKNG	-30.49
242807	05SPORNA	-73.58
243382	05TANNER	28.25
251934	08BCKJD2	12.61
251935	08BCKJD3	17.15
251936	08BCKJD4	20.1
251937	08BCKJD5	31.93
251938	08BCKJD6	67.13
251939	08BECJD1	12.61
251940	08BKJGT1	.15
251941	08BKJGT2	.15
251942	08BKJGT3	.15
251943	08BKJGT4	.15
251957	08MADSN6	.23
251958	08MADSN7	.23
251959	08MADSN8	.23
251968	08ZIMRHP	2.22
251969	08ZIMRLP	1.22
253166	09KN GEN	1.97
253188	09OHGEN1	4.61
253189	09OHGEN2	4.35
253191	09OHGEN4	5.19
341853	1JKCT 2G	7.84
341860	1JKCT 4G	6.
341866	1JKCT 6G	6.
341936	1LAUR 1G	4.1
247500	R-003 C	1.36
884780	S-058 C	28.57
884781	S-058 E	94.21
247536	S-071 C	1.66
292735	T-183 C	2.02
292741	T-184 C	2.02
887741	U1-087 C	1.02
887751	U1-088 C	.68
247538	U2-062 C	1.81
247508	U2-090 C	2.1
891021	U4-003 C	1.31
891221	U4-038 C	.78
891231	U4-039 C1	1.2
891241	U4-039 C2	1.2
891251	U4-039 C3	1.2
891261	U4-039 C4	1.2
247543	V3-007 C	2.1
247544	V3-008 C	2.1
247545	V3-009 C	2.1

LTF	V3-012	27.89
894581	V3-015 C	2.15
894781	V3-053 C	1.33
900261	V4-033 C1	1.61
900271	V4-033 C2	1.61
LTF	W2-033	87.57
905041	W4-004 C	.91
905081	W4-008 C	.91
LTF	X2-042	49.67
LTF	X3-020	11.08
LTF	X3-021	18.04
900404	X3-028 C	210.49
LTF	X3-096	26.64
LTF	X3-097	37.78
LTF	X3-098	35.81
LTF	X4-029D	8.47
LTF	X4-041	35.38
LTF	Y1-002	30.91
LTF	Y1-004	31.51
LTF	Y1-007	21.88
LTF	Y1-041	8.47
LTF	Y2-004	17.39
LTF	Y2-005	17.39
LTF	Y2-006	25.12
LTF	Y2-007	34.79
LTF	Y2-008	47.98
LTF	Y2-030	16.6
LTF	Y2-031	16.6
LTF	Y2-032	16.6
LTF	Y2-033	16.6
LTF	Y2-040	18.04
LTF	Y2-049	14.82
LTF	Y2-056	25.4
LTF	Y2-068	189.59
LTF	Y2-082	54.15
914321	Y2-084 C OP1	.17
914381	Y2-095 OP1	72.83
LTF	Y2-114	24.15
LTF	Y2-115	22.37
914561	Y2-116 OP1	36.08

Appendix 22

Bus Number	Bus Name	Full Contribution
243442	05RKG1	4.27
243443	05RKG2	4.21
LTF	V3-012	12.68
LTF	X2-042	13.66
900404	X3-028 C	479.33
LTF	X3-096	16.41
LTF	X3-097	23.27
LTF	X3-098	22.06
LTF	X4-041	21.79
LTF	Y1-004	13.25
LTF	Y1-007	9.2
LTF	Y2-004	11.33
LTF	Y2-005	11.33
LTF	Y2-006	12.76
LTF	Y2-007	22.66
LTF	Y2-008	13.74
LTF	Y2-068	116.76
914321	Y2-084 C OP1	.49
914322	Y2-084 E OP1	8.95
914381	Y2-095 OP1	165.85
LTF	Y2-114	10.7
LTF	Y2-115	9.79
914561	Y2-116 OP1	82.17

Appendix 23

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.09
243859	05FR11_E	16.01
243861	05FR12_C	.09
243862	05FR12_E	15.74
243863	05FR21_C	.1
243864	05FR21_E	16.82
243866	05FRCS22_C	.1
247924	05FRCS22_E	16.11
243870	05FRCS-3_C	.19
247925	05FRCS-3_E	32.63
243873	05FRCS-4_C	.14
247926	05FRCS-4_E	24.53
246908	05MLCS1_C	.19
246909	05MLCS1_E	32.67
246910	05MLCS-2_C	.19
247930	05MLCS-2_E	32.67
243442	05RKG1	19.98
243443	05RKG2	19.68
274650	KINCA;1U	1.42
274651	KINCA;2U	1.42
292416	T-127 C	.19
292417	T-127 E	32.71
292735	T-183 C	8.18
292736	T-183 E	32.71
292741	T-184 C	8.18
292742	T-184 E	32.71
887741	U1-087 C	3.99
887742	U1-087 E	26.68
887751	U1-088 C	2.66
887752	U1-088 E	17.78
891021	U4-003 C	5.31
891022	U4-003 E	35.57
891211	U4-037 C	2.66
891212	U4-037 E	17.82
893031	V2-008	62.15
LTF	V3-012	34.87
902352	W2-048 E	6.37
909062	X2-022 E OP1	19.26
LTF	X2-042	80.21
LTF	X3-020	26.18
900404	X3-028 C	1531.92
LTF	X3-096	62.98
LTF	X3-097	89.3
LTF	X3-098	84.65
LTF	X4-041	83.63

LTF	Y1-004	31.58
LTF	Y2-004	43.76
LTF	Y2-005	43.76
LTF	Y2-006	43.67
LTF	Y2-007	87.52
LTF	Y2-008	81.16
LTF	Y2-068	448.12
914321	Y2-084 C OP1	.68
914322	Y2-084 E OP1	12.4
914381	Y2-095 OP1	530.04
LTF	Y2-114	29.76
LTF	Y2-115	25.35
914561	Y2-116 OP1	262.61

Appendix 24

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.09
243861	05FR12_C	.09
243863	05FR21_C	.09
243866	05FRCS22_C	.09
243870	05FRCS-3_C	.18
243873	05FRCS-4_C	.13
246908	05MLCS1_C	.15
246910	05MLCS-2_C	.15
243442	05RKG1	6.08
243443	05RKG2	5.99
274848	CAMPG;RU	.05
274865	CAYUG;1U C1	2.1
274863	CAYUG;1U E1	8.42
274866	CAYUG;2U C2	2.1
274699	CORDO;1C	.2
274701	CORDO;1S	.22
274700	CORDO;2C	.2
274659	DRESD;3U	1.12
274650	KINCA;1U	1.48
274651	KINCA;2U	1.48
293513	O-009 C1	1.11
293514	O-009 C2	.56
293515	O-009 C3	.62
293664	O-024 C	.04
293666	O-024 C	.07
293712	O-029 C	.03
293713	O-029 C	.02
293714	O-029 C	.01
274851	O-035 C	.02
294400	P-011 C1	.03
294409	P-011 C2	.03
294670	P-037 C	1.56
294700	P-040 C	.24
274677	POWER;5U	.94
274678	POWER;6U	.94
290089	Q-039 C	1.8
274662	QUAD ;1U	1.19
274663	QUAD ;2U	1.19
296308	R-030 C1	2.6
296271	R-030 C2	2.6
296125	R-030 C3	2.63
296335	R-033 1	8.71
296336	R-033 2	8.71
296346	R-033 3	6.31
296348	R-033 4	6.31

290261	S-027 C	.08
290265	S-028 C	.08
884780	S-058 C	22.8
884781	S-058 E	75.17
886001	T-105 C	4.91
292416	T-127 C	.15
886211	T-143 C1	1.52
886221	T-143 C2	1.52
292735	T-183 C	6.53
292741	T-184 C	6.53
887741	U1-087 C	3.69
887751	U1-088 C	2.46
891021	U4-003 C	4.25
891131	U4-027	5.91
891211	U4-037 C	2.81
893031	V2-008	65.06
LTF	V2-031	8.36
LTF	V2-032	8.23
LTF	V3-012	16.41
905071	W4-005 C	4.47
905471	W4-084	.2
LTF	X3-020	22.93
900404	X3-028 C	683.03
910721	X3-045 2	.81
910731	X3-046 1	.84
910741	X3-046 2	.84
LTF	X3-096	55.16
LTF	X3-097	78.21
LTF	X3-098	74.14
LTF	X4-029D	8.39
LTF	X4-041	73.24
LTF	Y1-002	20.94
LTF	Y1-004	10.59
LTF	Y1-041	8.39
LTF	Y1-090	13.38
LTF	Y2-004	38.51
LTF	Y2-005	38.51
LTF	Y2-007	77.03
LTF	Y2-056	25.16
LTF	Y2-068	392.46
LTF	Y2-082	16.34
914321	Y2-084 C OP1	.63
914381	Y2-095 OP1	236.33
LTF	Y2-114	15.25
LTF	Y2-115	11.45
914561	Y2-116 OP1	117.09

Appendix 25

Bus Number	Bus Name	Full Contribution
242893	05AMG3	4.86
243764	05BSG1	38.44
242904	05CRG3L	24.18
242922	05FLTLCK	3.34
243186	05GVG1	5.62
243187	05GVG2	5.62
242896	05KRG1L	21.94
242898	05KRG2L	21.94
242894	05MTG1	6.07
246759	05SOLIDA	25.35
242807	05SPORNA	71.05
251934	08BCKJD2	9.66
251935	08BCKJD3	13.17
251936	08BCKJD4	15.43
251937	08BCKJD5	24.46
251938	08BCKJD6	43.52
251939	08BECJD1	9.66
341853	1JKCT 2G	9.94
341860	1JKCT 4G	7.61
341866	1JKCT 6G	7.61
235564	ALBRIGHT 1	-7.92
235565	ALBRIGHT 2	-7.92
235566	ALBRIGHT 3	-14.86
292067	FDNS	.25
235575	RIVESVILLE 5	-4.76
235576	RIVESVILLE 6	-11.7
884780	S-058 C	63.74
884781	S-058 E	210.14
892311	V1-035	5.81
LTF	V3-012	65.48
LTF	W2-033	16.09
LTF	W3-083	13.17
235577	WILLOW I 1	-19.72
235578	WILLOW I 2	-61.02
909001	X2-006 C1OP1	48.93
909002	X2-006 C2OP1	39.15
LTF	X2-042	72.33
LTF	X3-020	20.76
LTF	X3-021	49.9
900404	X3-028 C	356.09
910751	X3-051	103.23
LTF	X3-096	49.95
LTF	X3-097	70.83
LTF	X3-098	67.14
912161	X4-025	9.86

LTF	X4-029D	17.47
LTF	X4-041	66.33
LTF	Y1-002	64.12
LTF	Y1-004	78.8
LTF	Y1-007	54.72
LTF	Y1-041	17.47
LTF	Y2-004	33.64
LTF	Y2-005	33.64
LTF	Y2-006	35.4
LTF	Y2-007	67.28
LTF	Y2-008	70.53
LTF	Y2-030	20.37
LTF	Y2-031	20.37
LTF	Y2-032	20.37
LTF	Y2-033	40.9
LTF	Y2-034	30.36
LTF	Y2-035	16.28
LTF	Y2-036	16.28
LTF	Y2-040	49.9
LTF	Y2-049	40.98
LTF	Y2-056	52.42
LTF	Y2-068	355.42
LTF	Y2-069	14.07
LTF	Y2-070	14.07
LTF	Y2-071	14.07
LTF	Y2-072	14.07
LTF	Y2-082	121.04
914341	Y2-086	6.64
914381	Y2-095 OP1	123.21
LTF	Y2-114	58.76
LTF	Y2-115	55.97
914561	Y2-116 OP1	61.04

Appendix 26

Bus Number	Bus Name	Full Contribution
243441	05CKG2	2.77
243858	05FR11_C	.05
243859	05FR11_E	8.6
243861	05FR12_C	.05
243862	05FR12_E	8.45
243863	05FR21_C	.05
243864	05FR21_E	9.04
243866	05FRCS22_C	.05
247924	05FRCS22_E	8.65
243870	05FRCS-3_C	.1
247925	05FRCS-3_E	17.52
243873	05FRCS-4_C	.08
247926	05FRCS-4_E	13.18
246908	05MLCS1_C	.1
246909	05MLCS1_E	17.33
246910	05MLCS-2_C	.1
247930	05MLCS-2_E	17.33
243442	05RKG1	9.99
243443	05RKG2	9.84
251938	08BCKJD6	228.76
274770	LINC G1	.18
274771	LINC G2	.18
274772	LINC G3	.18
274773	LINC G4	.18
274774	LINC G5	.18
274775	LINC G6	.18
274776	LINC G7	.18
274777	LINC G8	.18
293969	RIVER_G2	.36
884780	S-058 C	73.81
884781	S-058 E	243.36
274793	SECHI;0U	.09
274794	SECHI;1U	.09
274795	SECHI;2U	.09
274788	SECHI;5U	.09
274789	SECHI;6U	.09
274790	SECHI;7U	.09
274791	SECHI;8U	.09
274792	SECHI;9U	.09
274679	SLINE;3U	19.85
274680	SLINE;4U	32.04
292416	T-127 C	.1
292417	T-127 E	17.35
292735	T-183 C	4.34
292736	T-183 E	17.35

292741	T-184 C	4.34
292742	T-184 E	17.35
293965	U1-054 2	.04
887741	U1-087 C	2.14
887742	U1-087 E	14.33
887751	U1-088 C	1.43
887752	U1-088 E	9.55
890570	U3-026 C1	25.94
890571	U3-026 C2	25.94
890561	U3-031	.1
891021	U4-003 C	2.82
891022	U4-003 E	18.87
891231	U4-039 C1	3.74
891241	U4-039 C2	3.74
891251	U4-039 C3	3.74
891261	U4-039 C4	3.74
891232	U4-039 E1	25.01
891242	U4-039 E2	25.01
891252	U4-039 E3	25.01
891262	U4-039 E4	25.01
LTF	W3-083	12.69
905501	W4-087	.37
907021	X1-020 C	32.98
907022	X1-020 E	220.71
LTF	X2-042	12.24
909181	X2-052	69.17
910541	X3-005 C	.38
910542	X3-005 E	.62
LTF	X3-020	16.43
LTF	X3-021	32.04
900404	X3-028 C	753.06
LTF	X3-096	39.53
LTF	X3-097	56.06
LTF	X3-098	53.14
LTF	X4-029D	15.96
LTF	X4-041	52.5
LTF	Y1-002	65.36
LTF	Y1-041	15.96
LTF	Y2-004	28.32
LTF	Y2-005	28.32
LTF	Y2-007	56.63
LTF	Y2-008	14.42
LTF	Y2-040	32.04
LTF	Y2-049	26.31
LTF	Y2-056	47.87
LTF	Y2-068	281.3
LTF	Y2-082	112.18

914321	Y2-084 C OP1	.37
914322	Y2-084 E OP1	6.66
914381	Y2-095 OP1	260.56
914561	Y2-116 OP1	129.1

Appendix 27

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.15
243861	05FR12_C	.14
243863	05FR21_C	.15
243866	05FRCS22_C	.15
243870	05FRCS-3_C	.3
243873	05FRCS-4_C	.22
246908	05MLCS1_C	.36
246910	05MLCS-2_C	.36
292416	T-127 C	.36
292735	T-183 C	15.41
292741	T-184 C	15.41
887741	U1-087 C	6.13
887751	U1-088 C	4.09
891021	U4-003 C	10.02
LTF	V3-012	13.1
LTF	W2-033	10.8
LTF	X2-042	42.77
900404	X3-028 C	237.41
LTF	X3-096	12.24
LTF	X3-097	17.36
LTF	X3-098	16.46
LTF	X4-041	16.26
LTF	Y1-004	15.35
LTF	Y1-007	10.66
LTF	Y2-004	8.36
LTF	Y2-005	8.36
LTF	Y2-006	17.31
LTF	Y2-007	16.73
LTF	Y2-008	42.66
LTF	Y2-033	8.03
LTF	Y2-068	87.12
914321	Y2-084 C OP1	1.05
914381	Y2-095 OP1	82.14
LTF	Y2-114	10.86
LTF	Y2-115	10.58
914561	Y2-116 OP1	40.7

Appendix 28

Bus Number	Bus Name	Full Contribution
243243	05ANDCT	.69
243858	05FR11_C	.03
243861	05FR12_C	.03
243863	05FR21_C	.03
243866	05FRCS22_C	.03
243870	05FRCS-3_C	.06
243873	05FRCS-4_C	.04
246908	05MLCS1_C	.05
246910	05MLCS-2_C	.05
243442	05RKG1	2.92
243443	05RKG2	2.87
292416	T-127 C	.05
292735	T-183 C	2.12
292741	T-184 C	2.12
887741	U1-087 C	1.21
887751	U1-088 C	.81
247510	U3-002 C	.04
891021	U4-003 C	1.38
LTF	V3-012	23.53
905041	W4-004 C	1.52
905081	W4-008 C	1.52
LTF	X2-042	83.05
LTF	X3-020	10.36
900404	X3-028 C	327.6
LTF	X3-096	24.91
LTF	X3-097	35.32
LTF	X3-098	33.48
LTF	X4-041	33.08
LTF	Y1-004	25.76
LTF	Y1-007	17.89
LTF	Y1-090	6.04
LTF	Y2-004	17.32
LTF	Y2-005	17.32
LTF	Y2-006	55.03
LTF	Y2-007	34.64
LTF	Y2-008	83.56
LTF	Y2-030	7.45
LTF	Y2-031	7.45
LTF	Y2-032	7.45
LTF	Y2-033	13.59
LTF	Y2-056	7.08
LTF	Y2-068	177.26
914321	Y2-084 C OP1	.21
914381	Y2-095 OP1	113.35
LTF	Y2-114	19.99

LTF	Y2-115	18.55
914561	Y2-116 OP1	56.16

Appendix 29

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.12
243859	05FR11_E	19.8
243861	05FR12_C	.12
243862	05FR12_E	19.47
243863	05FR21_C	.12
243864	05FR21_E	20.81
243866	05FRCS22_C	.12
247924	05FRCS22_E	19.93
243870	05FRCS-3_C	.24
247925	05FRCS-3_E	40.36
243873	05FRCS-4_C	.18
247926	05FRCS-4_E	30.35
246908	05MLCS1_C	.28
246909	05MLCS1_E	47.43
246910	05MLCS-2_C	.28
247930	05MLCS-2_E	47.43
246427	BERRIENS	-.36
246431	BUCHANAN	-.22
292416	T-127 C	.28
292417	T-127 E	47.49
292735	T-183 C	11.87
292736	T-183 E	47.49
292741	T-184 C	11.87
292742	T-184 E	47.49
887741	U1-087 C	4.93
887742	U1-087 E	33.
887751	U1-088 C	3.29
887752	U1-088 E	22.
891021	U4-003 C	7.72
891022	U4-003 E	51.65
LTF	V3-012	13.24
LTF	W2-033	11.09
LTF	X2-042	41.
LTF	X3-020	6.01
900404	X3-028 C	212.62
LTF	X3-096	14.46
LTF	X3-097	20.5
LTF	X3-098	19.44
LTF	X4-041	19.2
LTF	Y1-004	15.16
LTF	Y1-007	10.53
LTF	Y2-004	9.91
LTF	Y2-005	9.91
LTF	Y2-006	16.37
LTF	Y2-007	19.82

LTF	Y2-008	40.96
LTF	Y2-033	7.96
LTF	Y2-068	102.89
914321	Y2-084 C OP1	.84
914322	Y2-084 E OP1	15.34
914381	Y2-095 OP1	73.57
LTF	Y2-114	11.12
LTF	Y2-115	10.66
914561	Y2-116 OP1	36.45

Appendix 30

Bus Number	Bus Name	Full Contribution
243764	05BSG1	40.13
243186	05GVG1	5.48
243187	05GVG2	5.48
243188	05MLG1	4.06
242894	05MTG1	5.71
243655	05PCG5	12.99
246759	05SOLIDA	26.76
242807	05SPORNA	81.17
243382	05TANNER	38.16
251934	08BCKJD2	12.52
251935	08BCKJD3	17.04
251936	08BCKJD4	19.97
251937	08BCKJD5	31.7
251938	08BCKJD6	55.4
251939	08BECJD1	12.52
253188	09OHGEN1	7.07
253189	09OHGEN2	6.67
253191	09OHGEN4	7.74
235564	ALBRIGHT 1	-10.46
235565	ALBRIGHT 2	-10.46
235566	ALBRIGHT 3	-19.63
247500	R-003 C	3.36
247900	R-003 E	13.43
296454	R-052 C1	2.75
296479	R-052 C2	2.75
296455	R-052 E1	10.98
296480	R-052 E2	10.98
290286	R-052AC	2.72
290287	R-052AE	10.88
244761	RACINE	6.19
235575	RIVESVILLE 5	-6.23
235576	RIVESVILLE 6	-15.32
247536	S-071 C	3.13
247903	S-071 E	12.52
247504	T-142 C	8.28
247908	T-142 E	33.11
247911	U2-041 E	35.12
247538	U2-062 C	3.19
247912	U2-062 E	21.38
247540	U2-072 C	5.25
247914	U2-072 E	35.12
247508	U2-090 C	3.41
247915	U2-090 E	22.79
247931	U3-002 E	22.68
891221	U4-038 C	1.7

891222	U4-038 E	11.35
891231	U4-039 C1	3.01
891241	U4-039 C2	3.01
891251	U4-039 C3	3.01
891261	U4-039 C4	3.01
891232	U4-039 E1	20.17
891242	U4-039 E2	20.17
891252	U4-039 E3	20.17
891262	U4-039 E4	20.17
247543	V3-007 C	3.41
247919	V3-007 E	22.79
247544	V3-008 C	3.41
247920	V3-008 E	22.79
247545	V3-009 C	3.41
247921	V3-009 E	22.79
LTF	V3-012	78.19
894581	V3-015 C	5.1
894582	V3-015 E	34.13
894641	V3-028 C	1.02
894642	V3-028 E	1.67
894781	V3-053 C	2.54
894782	V3-053 E	17.02
900261	V4-033 C1	2.56
900271	V4-033 C2	2.56
900262	V4-033 E1	17.1
900272	V4-033 E2	17.1
904722	V4-073 E	.21
902332	W2-040 E	1.65
902402	W2-057 E	4.95
903281	W3-024 C	2.51
903282	W3-024 E	16.83
LTF	W3-083	18.29
903942	W3-170 E	1.63
905041	W4-004 C	1.53
905042	W4-004 E	10.21
905081	W4-008 C	1.53
905082	W4-008 E	10.21
905272	W4-036 E	1.63
235577	WILLOW I 1	-22.46
235578	WILLOW I 2	-69.49
244873	WINFIELD	2.56
907021	X1-020 C	25.52
907022	X1-020 E	170.76
909001	X2-006 C1OP1	50.56
909002	X2-006 C2OP1	40.45
LTF	X2-042	95.02
910512	X3-002 E	.28

LTF	X3-020	26.93
LTF	X3-021	79.76
910621	X3-030 C	4.13
910622	X3-030 E	27.61
910751	X3-051	105.71
LTF	X3-096	64.78
LTF	X3-097	91.85
LTF	X3-098	87.07
912161	X4-025	11.23
LTF	X4-029D	23.87
LTF	X4-041	86.02
LTF	Y1-002	89.96
LTF	Y1-004	92.11
LTF	Y1-007	63.96
LTF	Y1-041	23.87
913342	Y1-054 E	2.65
913382	Y1-063 E	.55
913392	Y1-064 E	.55
LTF	Y1-090	15.71
LTF	Y2-004	43.6
LTF	Y2-005	43.6
LTF	Y2-006	45.98
LTF	Y2-007	87.2
LTF	Y2-008	91.42
LTF	Y2-030	25.5
LTF	Y2-031	25.5
LTF	Y2-032	25.5
LTF	Y2-033	47.07
LTF	Y2-034	29.64
LTF	Y2-035	15.89
LTF	Y2-036	15.89
LTF	Y2-040	79.76
LTF	Y2-049	65.5
LTF	Y2-056	71.6
LTF	Y2-068	460.91
LTF	Y2-069	21.59
LTF	Y2-070	21.59
LTF	Y2-071	21.59
LTF	Y2-072	21.59
LTF	Y2-082	176.99
914381	Y2-095 OP1	137.95
914532	Y2-111 E	1.6
914542	Y2-112 E	1.57
LTF	Y2-114	68.61
LTF	Y2-115	64.57
914561	Y2-116 OP1	77.49

Appendix 31

Bus Number	Bus Name	Full Contribution
LTF	V3-012	15.39
LTF	W2-033	10.57
LTF	X2-042	52.12
LTF	X3-020	6.63
900404	X3-028 C	212.66
LTF	X3-096	15.94
LTF	X3-097	22.61
LTF	X3-098	21.43
LTF	X4-041	21.17
LTF	Y1-004	17.74
LTF	Y1-007	12.32
LTF	Y2-004	10.92
LTF	Y2-005	10.92
LTF	Y2-006	19.11
LTF	Y2-007	21.83
LTF	Y2-008	51.96
LTF	Y2-033	9.25
LTF	Y2-068	113.43
914321	Y2-084 C OP1	1.2
914381	Y2-095 OP1	73.58
LTF	Y2-114	12.85
LTF	Y2-115	12.36
914561	Y2-116 OP1	36.46

Appendix 32

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.04
243861	05FR12_C	.04
243863	05FR21_C	.04
243866	05FRCS22_C	.04
243870	05FRCS-3_C	.07
243873	05FRCS-4_C	.06
246908	05MLCS1_C	.06
246910	05MLCS-2_C	.06
243442	05RKG1	10.81
243443	05RKG2	10.65
274865	CAYUG;1U C1	-1.73
274866	CAYUG;2U C2	-1.73
292416	T-127 C	.06
292735	T-183 C	2.69
292741	T-184 C	2.69
887741	U1-087 C	1.55
887751	U1-088 C	1.03
891021	U4-003 C	1.75
LTF	V4-050	40.66
LTF	X2-042	38.59
900404	X3-028 C	1213.38
LTF	Y2-006	31.44
LTF	Y2-008	38.2
914321	Y2-084 C OP1	.26
914381	Y2-095 OP1	419.83
914561	Y2-116 OP1	208.01

Appendix 33

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.09
243859	05FR11_E	14.95
243861	05FR12_C	.09
243862	05FR12_E	14.7
243863	05FR21_C	.09
243864	05FR21_E	15.72
243866	05FRCS22_C	.09
247924	05FRCS22_E	15.05
243870	05FRCS-3_C	.18
247925	05FRCS-3_E	30.48
243873	05FRCS-4_C	.14
247926	05FRCS-4_E	22.91
246908	05MLCS1_C	.16
246909	05MLCS1_E	26.42
246910	05MLCS-2_C	.16
247930	05MLCS-2_E	26.42
243442	05RKG1	6.12
243443	05RKG2	6.03
274865	CAYUG;1U C1	2.17
274863	CAYUG;1U E1	8.7
274866	CAYUG;2U C2	2.17
274864	CAYUG;2U E2	8.7
274849	CRESC;1U	3.44
294702	CRESC;2U	3.03
274650	KINCA;1U	1.51
274651	KINCA;2U	1.51
990901	L-005 E	8.03
293665	O-024 E	6.5
293667	O-024 E	12.88
293771	O-035 E	3.79
294401	P-011 E1	5.07
294410	P-011 E2	5.07
294700	P-040 C	.25
294701	P-040 E	1.01
290089	Q-039 C	1.86
290090	Q-039 E	4.79
296308	R-030 C1	2.67
296271	R-030 C2	2.67
296125	R-030 C3	2.71
296309	R-030 E1	10.7
296272	R-030 E2	10.7
296128	R-030 E3	10.83
886001	T-105 C	5.07
886002	T-105 E	20.29
292416	T-127 C	.16

292417	T-127 E	26.46
886211	T-143 C1	1.57
886221	T-143 C2	1.57
886212	T-143 E1	6.3
886222	T-143 E2	6.3
292735	T-183 C	6.61
292736	T-183 E	26.46
292741	T-184 C	6.61
292742	T-184 E	26.46
274853	TWING;U1	14.52
274854	TWING;U2	14.52
887741	U1-087 C	3.72
887742	U1-087 E	24.92
887751	U1-088 C	2.48
887752	U1-088 E	16.61
891021	U4-003 C	4.3
891022	U4-003 E	28.77
891211	U4-037 C	2.86
891212	U4-037 E	19.18
893031	V2-008	66.14
LTF	V2-031	8.46
LTF	V2-032	8.33
LTF	V3-012	16.44
902352	W2-048 E	6.85
905071	W4-005 C	4.56
905072	W4-005 E	30.56
909062	X2-022 E OP1	20.73
LTF	X3-020	23.2
900404	X3-028 C	687.02
LTF	X3-096	55.81
LTF	X3-097	79.14
LTF	X3-098	75.02
LTF	X4-029D	8.79
LTF	X4-041	74.11
LTF	Y1-002	22.68
LTF	Y1-004	10.42
LTF	Y1-041	8.79
LTF	Y1-090	13.53
LTF	Y2-004	38.97
LTF	Y2-005	38.97
LTF	Y2-007	77.95
LTF	Y2-056	26.36
LTF	Y2-068	397.12
LTF	Y2-082	19.55
914321	Y2-084 C OP1	.64
914322	Y2-084 E OP1	11.58
914381	Y2-095 OP1	237.71

LTF	Y2-114	15.29
LTF	Y2-115	11.4
914561	Y2-116 OP1	117.77

Appendix 34

Bus Number	Bus Name	Full Contribution
243442	05RKG1	30.74
243443	05RKG2	30.28
900404	X3-028 C	3450.06
914381	Y2-095 OP1	1193.72
914561	Y2-116 OP1	591.44

Appendix 35

Bus Number	Bus Name	Full Contribution
243859	05FR11_E	6.18
243862	05FR12_E	6.07
243864	05FR21_E	6.49
247924	05FRCS22_E	6.21
247925	05FRCS-3_E	12.59
247926	05FRCS-4_E	9.46
246909	05MLCS1_E	10.67
247930	05MLCS-2_E	10.67
243442	05RKG1	10.81
243443	05RKG2	10.64
274865	CAYUG;1U C1	-1.74
274866	CAYUG;2U C2	-1.74
292417	T-127 E	10.69
292735	T-183 C	2.67
292736	T-183 E	10.69
292741	T-184 C	2.67
292742	T-184 E	10.69
887741	U1-087 C	1.54
887742	U1-087 E	10.29
887751	U1-088 C	1.03
887752	U1-088 E	6.86
891021	U4-003 C	1.74
891022	U4-003 E	11.62
LTF	V4-050	40.75
LTF	X2-042	38.47
900404	X3-028 C	1212.33
LTF	Y2-006	31.39
LTF	Y2-008	38.08
914321	Y2-084 C OP1	.26
914322	Y2-084 E OP1	4.79
914381	Y2-095 OP1	419.47
914561	Y2-116 OP1	207.83

Appendix 36

Bus Number	Bus Name	Full Contribution
243859	05FR11_E	6.23
243862	05FR12_E	6.13
243864	05FR21_E	6.55
247924	05FRCS22_E	6.27
247925	05FRCS-3_E	12.7
247926	05FRCS-4_E	9.55
246909	05MLCS1_E	10.78
247930	05MLCS-2_E	10.78
243442	05RKG1	10.84
243443	05RKG2	10.68
274865	CAYUG;1U C1	-1.73
274866	CAYUG;2U C2	-1.73
292417	T-127 E	10.79
292735	T-183 C	2.7
292736	T-183 E	10.79
292741	T-184 C	2.7
292742	T-184 E	10.79
887741	U1-087 C	1.55
887742	U1-087 E	10.39
887751	U1-088 C	1.03
887752	U1-088 E	6.92
891021	U4-003 C	1.75
891022	U4-003 E	11.73
LTF	V4-050	40.53
LTF	X2-042	39.69
900404	X3-028 C	1216.43
LTF	Y2-006	31.99
LTF	Y2-008	39.27
914321	Y2-084 C OP1	.27
914322	Y2-084 E OP1	4.83
914381	Y2-095 OP1	420.88
914561	Y2-116 OP1	208.53

Appendix 37

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.18
243861	05FR12_C	.17
243863	05FR21_C	.19
243866	05FRCS22_C	.18
243870	05FRCS-3_C	.36
243873	05FRCS-4_C	.27
243442	05RKG1	1.76
243443	05RKG2	1.73
887741	U1-087 C	7.45
887751	U1-088 C	4.97
LTF	V3-012	17.15
LTF	W2-033	13.77
LTF	X2-042	54.54
LTF	X3-020	6.8
900404	X3-028 C	297.19
LTF	X3-096	16.37
LTF	X3-097	23.21
LTF	X3-098	22.
LTF	X4-041	21.74
LTF	Y1-004	20.06
LTF	Y1-007	13.93
LTF	Y2-004	11.18
LTF	Y2-005	11.18
LTF	Y2-006	22.04
LTF	Y2-007	22.37
LTF	Y2-008	54.36
LTF	Y2-030	5.98
LTF	Y2-031	5.98
LTF	Y2-032	5.98
LTF	Y2-033	10.48
LTF	Y2-034	6.15
LTF	Y2-068	116.47
914321	Y2-084 C OP1	1.27
914381	Y2-095 OP1	102.83
LTF	Y2-114	14.25
LTF	Y2-115	13.85
914561	Y2-116 OP1	50.95

Appendix 38

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.18
243861	05FR12_C	.17
243863	05FR21_C	.19
243866	05FRCS22_C	.18
243870	05FRCS-3_C	.36
243873	05FRCS-4_C	.27
243442	05RKG1	1.76
243443	05RKG2	1.73
887741	U1-087 C	7.45
887751	U1-088 C	4.97
LTF	V3-012	17.15
LTF	W2-033	13.77
LTF	X2-042	54.54
LTF	X3-020	6.8
900404	X3-028 C	297.19
LTF	X3-096	16.37
LTF	X3-097	23.21
LTF	X3-098	22.
LTF	X4-041	21.74
LTF	Y1-004	20.06
LTF	Y1-007	13.93
LTF	Y2-004	11.18
LTF	Y2-005	11.18
LTF	Y2-006	22.04
LTF	Y2-007	22.37
LTF	Y2-008	54.36
LTF	Y2-030	5.98
LTF	Y2-031	5.98
LTF	Y2-032	5.98
LTF	Y2-033	10.48
LTF	Y2-034	6.15
LTF	Y2-068	116.47
914321	Y2-084 C OP1	1.27
914381	Y2-095 OP1	102.83
LTF	Y2-114	14.25
LTF	Y2-115	13.85
914561	Y2-116 OP1	50.95

Appendix 39

Bus Number	Bus Name	Full Contribution
243442	05RKG1	4.24
243443	05RKG2	4.18
LTF	V3-012	12.11
LTF	X2-042	12.52
LTF	X3-020	6.71
900404	X3-028 C	476.18
LTF	X3-096	16.14
LTF	X3-097	22.89
LTF	X3-098	21.7
LTF	X4-041	21.44
LTF	Y1-004	12.52
LTF	Y1-007	8.69
LTF	Y2-004	11.16
LTF	Y2-005	11.16
LTF	Y2-006	12.19
LTF	Y2-007	22.33
LTF	Y2-008	12.65
LTF	Y2-033	6.59
LTF	Y2-068	114.87
914321	Y2-084 C OP1	.49
914381	Y2-095 OP1	164.76
LTF	Y2-114	10.24
LTF	Y2-115	9.33
914561	Y2-116 OP1	81.63

Appendix 40

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.05
243859	05FR11_E	8.08
243861	05FR12_C	.05
243862	05FR12_E	7.94
243863	05FR21_C	.05
243864	05FR21_E	8.49
243866	05FRCS22_C	.05
247924	05FRCS22_E	8.13
243870	05FRCS-3_C	.1
247925	05FRCS-3_E	16.46
243873	05FRCS-4_C	.07
247926	05FRCS-4_E	12.38
243442	05RKG1	15.27
243443	05RKG2	15.04
884780	S-058 C	27.96
884781	S-058 E	92.18
887741	U1-087 C	2.01
887742	U1-087 E	13.46
887751	U1-088 C	1.34
887752	U1-088 E	8.97
LTF	V3-012	15.09
LTF	X2-042	36.5
LTF	X3-020	18.59
900404	X3-028 C	1130.19
LTF	X3-096	44.72
LTF	X3-097	63.41
LTF	X3-098	60.11
LTF	X4-041	59.39
LTF	Y1-002	25.43
LTF	Y2-004	31.49
LTF	Y2-005	31.49
LTF	Y2-006	22.01
LTF	Y2-007	62.98
LTF	Y2-008	38.04
LTF	Y2-056	24.93
LTF	Y2-068	318.21
LTF	Y2-082	31.15
914321	Y2-084 C OP1	.34
914322	Y2-084 E OP1	6.26
914381	Y2-095 OP1	391.04
LTF	Y2-114	13.53
914561	Y2-116 OP1	193.75

Appendix 41

Bus Number	Bus Name	Full Contribution
243442	05RKG1	15.87
243443	05RKG2	15.63
900404	X3-028 C	1780.97
914381	Y2-095 OP1	616.22
914561	Y2-116 OP1	305.31

Appendix 42

Bus Number	Bus Name	Full Contribution
243442	05RKG1	15.87
243443	05RKG2	15.63
900404	X3-028 C	1780.97
914381	Y2-095 OP1	616.22
914561	Y2-116 OP1	305.31

Appendix 43

Bus Number	Bus Name	Full Contribution
243442	05RKG1	15.87
243443	05RKG2	15.63
900404	X3-028 C	1780.97
914381	Y2-095 OP1	616.22
914561	Y2-116 OP1	305.31

Appendix 44

Bus Number	Bus Name	Full Contribution
243442	05RKG1	15.87
243443	05RKG2	15.63
900404	X3-028 C	1780.97
914381	Y2-095 OP1	616.22
914561	Y2-116 OP1	305.31

Appendix 45

Bus Number	Bus Name	Full Contribution
243442	05RKG1	6.72
243443	05RKG2	6.62
LTF	V3-012	11.07
LTF	X3-020	7.15
900404	X3-028 C	754.36
LTF	X3-096	17.19
LTF	X3-097	24.38
LTF	X3-098	23.11
LTF	X4-041	22.83
LTF	Y1-004	10.3
LTF	Y1-007	7.15
LTF	Y2-004	11.97
LTF	Y2-005	11.97
LTF	Y2-006	7.38
LTF	Y2-007	23.93
LTF	Y2-068	122.34
914381	Y2-095 OP1	261.01
LTF	Y2-114	9.49
LTF	Y2-115	8.25
914561	Y2-116 OP1	129.32

Appendix 46

Bus Number	Bus Name	Full Contribution
243442	05RKG1	6.72
243443	05RKG2	6.62
LTF	V3-012	11.07
LTF	X3-020	7.15
900404	X3-028 C	754.36
LTF	X3-096	17.19
LTF	X3-097	24.38
LTF	X3-098	23.11
LTF	X4-041	22.83
LTF	Y1-004	10.3
LTF	Y1-007	7.15
LTF	Y2-004	11.97
LTF	Y2-005	11.97
LTF	Y2-006	7.38
LTF	Y2-007	23.93
LTF	Y2-068	122.34
914381	Y2-095 OP1	261.01
LTF	Y2-114	9.49
LTF	Y2-115	8.25
914561	Y2-116 OP1	129.32

Appendix 47

Bus Number	Bus Name	Full Contribution
243442	05RKG1	14.87
243443	05RKG2	14.65
900404	X3-028 C	1669.08
914381	Y2-095 OP1	577.5
914561	Y2-116 OP1	286.13

Appendix 48

Bus Number	Bus Name	Full Contribution
243442	05RKG1	15.87
243443	05RKG2	15.63
900404	X3-028 C	1780.97
914381	Y2-095 OP1	616.22
914561	Y2-116 OP1	305.31

Appendix 49

Bus Number	Bus Name	Full Contribution
315094	1CHESPK1	1.82
315095	1CHESPK2	1.82
315096	1CHESPK3	2.44
315097	1CHESPK4	3.43
315090	1YORKTN1	2.67
315091	1YORKTN2	2.77
224026	C U1	1.3
224027	C U2	1.3
224028	C U3	1.5
224029	C U4	1.5
224030	C U5	1.5
204653	PORT2GEN	-5.78
315446	Q-065	28.92
296335	R-033 1	.38
296336	R-033 2	.38
296346	R-033 3	.28
296348	R-033 4	.28
218360	SEWAREN1	-2.46
218361	SEWAREN2	-2.8
218362	SEWAREN3	-2.54
218363	SEWAREN4	-2.94
218364	SEWAREN6	-2.63
204656	TITUS 1G	-2.47
204657	TITUS 2G	-2.47
204658	TITUS 3G	-2.47
893031	V2-008	5.29
LTF	V2-031	.76
LTF	V2-032	.75
LTF	V3-012	7.68
292630	V3-017	9.96
901451	W1-116 C	.01
901452	W1-116 E	.96
LTF	W2-033	.64
LTF	W3-083	1.29
905321	W4-044	9.96
LTF	W4-049	.91
LTF	W4-050	.91
907991	X1-078	12.45
909001	X2-006 C1OP1	3.26
909002	X2-006 C2OP1	2.61
LTF	X2-042	6.75
LTF	X3-020	2.
LTF	X3-021	5.52
900404	X3-028 C	31.01
910751	X3-051	5.43

910871	X3-076 OP1	8.04
910941	X3-087 C OP1	10.93
910942	X3-087 E OP1	2.5
LTF	X3-096	4.82
LTF	X3-097	6.83
LTF	X3-098	6.48
LTF	X4-029D	1.66
912211	X4-035 OP1	10.9
912221	X4-039	17.31
LTF	X4-041	6.4
LTF	Y1-002	5.96
LTF	Y1-004	9.35
LTF	Y1-007	6.49
LTF	Y1-041	1.66
LTF	Y1-089	.68
LTF	Y1-090	1.17
LTF	Y1-091	.63
LTF	Y2-004	3.25
LTF	Y2-005	3.25
LTF	Y2-006	3.17
LTF	Y2-007	6.51
LTF	Y2-008	6.37
LTF	Y2-030	1.81
LTF	Y2-031	1.81
LTF	Y2-032	1.81
LTF	Y2-033	4.71
LTF	Y2-034	5.56
LTF	Y2-035	2.98
LTF	Y2-036	2.98
LTF	Y2-040	5.52
LTF	Y2-049	4.54
LTF	Y2-056	4.99
LTF	Y2-068	34.28
LTF	Y2-069	1.46
LTF	Y2-070	1.46
LTF	Y2-071	1.46
LTF	Y2-072	1.46
LTF	Y2-082	11.67
914381	Y2-095 OP1	10.73
914401	Y2-097	21.59
LTF	Y2-114	6.93
LTF	Y2-115	6.68
914561	Y2-116 OP1	5.32

Appendix 50

Bus Number	Bus Name	Full Contribution
243859	05FR11_E	1.98
243862	05FR12_E	1.95
243864	05FR21_E	2.09
247924	05FRCS22_E	2.
247925	05FRCS-3_E	4.04
247926	05FRCS-4_E	3.04
243045	05MUSKNG	38.43
242807	05SPORNA	20.71
251934	08BCKJD2	2.68
251935	08BCKJD3	3.64
251936	08BCKJD4	4.27
251937	08BCKJD5	6.78
884780	S-058 C	17.6
884781	S-058 E	58.02
891231	U4-039 C1	.6
891241	U4-039 C2	.6
891251	U4-039 C3	.6
891261	U4-039 C4	.6
891232	U4-039 E1	3.99
891242	U4-039 E2	3.99
891252	U4-039 E3	3.99
891262	U4-039 E4	3.99
893031	V2-008	13.32
LTF	V2-031	1.99
LTF	V2-032	1.96
LTF	V3-012	15.21
LTF	W2-033	2.74
LTF	W3-083	3.65
903691	W3-111 C	.57
903692	W3-111 E	.93
903701	W3-112 C	.57
903702	W3-112 E	.93
903711	W3-113 C	.57
903712	W3-113 E	.93
903761	W3-128	29.63
235577	WILLOW I 1	-8.55
235578	WILLOW I 2	-26.47
907021	X1-020 C	5.02
907022	X1-020 E	33.56
909001	X2-006 C1OP1	9.48
909002	X2-006 C2OP1	7.58
LTF	X2-042	19.28
909181	X2-052	17.05
LTF	X3-020	5.31
LTF	X3-021	17.63

900404	X3-028 C	89.46
910751	X3-051	17.22
LTF	X3-096	12.77
LTF	X3-097	18.11
LTF	X3-098	17.17
LTF	X4-029D	4.71
LTF	X4-041	16.96
LTF	Y1-002	17.84
LTF	Y1-004	17.81
LTF	Y1-007	12.37
LTF	Y1-041	4.71
LTF	Y1-089	1.8
LTF	Y1-090	3.1
LTF	Y1-091	1.68
LTF	Y2-004	8.58
LTF	Y2-005	8.58
LTF	Y2-006	9.25
LTF	Y2-007	17.15
LTF	Y2-008	18.32
LTF	Y2-030	5.18
LTF	Y2-031	5.18
LTF	Y2-032	5.18
LTF	Y2-033	8.97
LTF	Y2-034	5.15
LTF	Y2-035	2.76
LTF	Y2-036	2.76
LTF	Y2-040	17.63
LTF	Y2-049	14.48
LTF	Y2-056	14.14
LTF	Y2-068	90.87
LTF	Y2-069	4.6
LTF	Y2-070	4.6
LTF	Y2-071	4.6
LTF	Y2-072	4.6
LTF	Y2-082	36.05
914381	Y2-095 OP1	30.95
LTF	Y2-114	13.1
LTF	Y2-115	12.28
914561	Y2-116 OP1	15.34

Appendix 51

Bus Number	Bus Name	Full Contribution
243859	05FR11_E	1.98
243862	05FR12_E	1.95
243864	05FR21_E	2.09
247924	05FRCS22_E	2.
247925	05FRCS-3_E	4.04
247926	05FRCS-4_E	3.04
243045	05MUSKNG	38.43
242807	05SPORNA	20.71
251934	08BCKJD2	2.68
251935	08BCKJD3	3.64
251936	08BCKJD4	4.27
251937	08BCKJD5	6.78
884780	S-058 C	17.6
884781	S-058 E	58.02
891231	U4-039 C1	.6
891241	U4-039 C2	.6
891251	U4-039 C3	.6
891261	U4-039 C4	.6
891232	U4-039 E1	3.99
891242	U4-039 E2	3.99
891252	U4-039 E3	3.99
891262	U4-039 E4	3.99
893031	V2-008	13.32
LTF	V2-031	1.99
LTF	V2-032	1.96
LTF	V3-012	15.21
LTF	W2-033	2.74
LTF	W3-083	3.65
903691	W3-111 C	.57
903692	W3-111 E	.93
903701	W3-112 C	.57
903702	W3-112 E	.93
903711	W3-113 C	.57
903712	W3-113 E	.93
903761	W3-128	29.63
235577	WILLOW I 1	-8.55
235578	WILLOW I 2	-26.47
907021	X1-020 C	5.02
907022	X1-020 E	33.56
909001	X2-006 C1OP1	9.48
909002	X2-006 C2OP1	7.58
LTF	X2-042	19.28
909181	X2-052	17.05
LTF	X3-020	5.31
LTF	X3-021	17.63

900404	X3-028 C	89.46
910751	X3-051	17.22
LTF	X3-096	12.77
LTF	X3-097	18.11
LTF	X3-098	17.17
LTF	X4-029D	4.71
LTF	X4-041	16.96
LTF	Y1-002	17.84
LTF	Y1-004	17.81
LTF	Y1-007	12.37
LTF	Y1-041	4.71
LTF	Y1-089	1.8
LTF	Y1-090	3.1
LTF	Y1-091	1.68
LTF	Y2-004	8.58
LTF	Y2-005	8.58
LTF	Y2-006	9.25
LTF	Y2-007	17.15
LTF	Y2-008	18.32
LTF	Y2-030	5.18
LTF	Y2-031	5.18
LTF	Y2-032	5.18
LTF	Y2-033	8.97
LTF	Y2-034	5.15
LTF	Y2-035	2.76
LTF	Y2-036	2.76
LTF	Y2-040	17.63
LTF	Y2-049	14.48
LTF	Y2-056	14.14
LTF	Y2-068	90.87
LTF	Y2-069	4.6
LTF	Y2-070	4.6
LTF	Y2-071	4.6
LTF	Y2-072	4.6
LTF	Y2-082	36.05
914381	Y2-095 OP1	30.95
LTF	Y2-114	13.1
LTF	Y2-115	12.28
914561	Y2-116 OP1	15.34

Appendix 52

Bus Number	Bus Name	Full Contribution
243858	05FR11_C	.04
243861	05FR12_C	.04
243863	05FR21_C	.04
243866	05FRCS22_C	.04
243870	05FRCS-3_C	.08
243873	05FRCS-4_C	.06
246908	05MLCS1_C	.07
246910	05MLCS-2_C	.07
243442	05RKG1	8.96
243443	05RKG2	8.83
274650	KINCA;1U	.92
274651	KINCA;2U	.92
290261	S-027 C	.05
290265	S-028 C	.05
884780	S-058 C	14.85
884781	S-058 E	48.95
292416	T-127 C	.07
292735	T-183 C	2.93
292741	T-184 C	2.93
887741	U1-087 C	1.62
887751	U1-088 C	1.08
891021	U4-003 C	1.91
891211	U4-037 C	1.73
LTF	V1-016	9.42
893031	V2-008	40.5
LTF	V2-031	5.66
LTF	V3-012	6.71
905071	W4-005 C	2.57
LTF	X3-020	15.55
900404	X3-028 C	1006.15
LTF	X3-096	37.41
LTF	X3-097	53.04
LTF	X3-098	50.28
LTF	X4-041	49.68
LTF	Y1-002	13.47
LTF	Y1-090	9.07
LTF	Y2-004	26.15
LTF	Y2-005	26.15
LTF	Y2-007	52.31
LTF	Y2-056	15.76
LTF	Y2-068	266.17
LTF	Y2-082	11.16
914321	Y2-084 C OP1	.28
914381	Y2-095 OP1	348.13
LTF	Y2-114	6.85

914561	Y2-116 OP1	172.48

Appendix 53

Bus Number	Bus Name	Full Contribution
243859	05FR11_E	6.88
243862	05FR12_E	6.76
243864	05FR21_E	7.23
247924	05FRCS22_E	6.92
247925	05FRCS-3_E	14.02
247926	05FRCS-4_E	10.54
246909	05MLCS1_E	12.5
247930	05MLCS-2_E	12.5
243442	05RKG1	9.05
243443	05RKG2	8.91
293665	O-024 E	4.04
293667	O-024 E	8.01
296308	R-030 C1	1.66
296271	R-030 C2	1.66
296125	R-030 C3	1.68
296309	R-030 E1	6.65
296272	R-030 E2	6.65
296128	R-030 E3	6.73
884780	S-058 C	19.37
884781	S-058 E	63.86
292417	T-127 E	12.52
292735	T-183 C	3.13
292736	T-183 E	12.52
292741	T-184 C	3.13
292742	T-184 E	12.52
274853	TWING;U1	8.93
274854	TWING;U2	8.93
887741	U1-087 C	1.71
887742	U1-087 E	11.46
887751	U1-088 C	1.14
887752	U1-088 E	7.64
891021	U4-003 C	2.03
891022	U4-003 E	13.61
891211	U4-037 C	1.85
891212	U4-037 E	12.38
LTF	V1-016	9.35
893031	V2-008	43.06
LTF	V2-031	5.9
LTF	V2-032	5.81
LTF	V3-012	6.78
902352	W2-048 E	4.42
905071	W4-005 C	2.79
905072	W4-005 E	18.67
909062	X2-022 E OP1	13.38
LTF	X3-020	16.2

900404	X3-028 C	1015.6
LTF	X3-096	38.96
LTF	X3-097	55.25
LTF	X3-098	52.37
LTF	X4-029D	6.2
LTF	X4-041	51.74
LTF	Y1-002	17.6
LTF	Y1-041	6.2
LTF	Y1-090	9.45
LTF	Y2-004	27.25
LTF	Y2-005	27.25
LTF	Y2-007	54.5
LTF	Y2-056	18.6
LTF	Y2-068	277.24
LTF	Y2-082	18.8
914321	Y2-084 C OP1	.29
914322	Y2-084 E OP1	5.33
914381	Y2-095 OP1	351.4
LTF	Y2-114	6.94
914561	Y2-116 OP1	174.1

Appendix 54

Bus Number	Bus Name	Full Contribution
900404	X3-028 C	3500.
914381	Y2-095 OP1	1211.
914561	Y2-116 OP1	600.