

Project:	ETAP	Page:	1
Location:	12.6.0H	Date:	08-22-2018
Contract:		SN:	
Engineer:	Study Case: LF	Revision:	Base
Filename: widia		Config.:	Normal

Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design
Generation Category (1): Design
Load Diversity Factor: None

	<u>Swing</u>	<u>V-Control</u>	<u>Load</u>	<u>Total</u>
Number of Buses:	2	0	190	192

	<u>XEMR2</u>	<u>XEMR3</u>	<u>Reactor</u>	<u>Line/Cable</u>	<u>Impedance</u>	<u>Tie PD</u>	<u>Total</u>
Number of Branches:	93	0	0	97	0	0	190

Method of Solution:	Adaptive Newton-Raphson Method
Maximum No. of Iteration:	99
Precision of Solution:	0.0000100
System Frequency:	50.00 Hz
Unit System:	English
Project Filename:	widia
Output Filename:	C:\Users\Luthfi Arif Rahmawan\Downloads\widia\Untitled.lfr

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 2
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Adjustments

<u>Tolerance</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Percent</u>
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable Length:	No		

<u>Temperature Correction</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Degree C</u>
Transmission Line Resistance:	Yes	Individual	
Cable Resistance:	Yes	Individual	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 3
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus Input Data

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus1	0.400	2	100.0	0.0	0.109	0.067						
Bus2	20.000	2	100.0	0.0								
Bus5	0.400	2	100.0	0.0	0.170	0.105						
Bus6	20.000	2	100.0	0.0								
Bus7	0.400	2	100.0	0.0	0.109	0.067						
Bus8	20.000	2	100.0	0.0								
Bus11	0.400	2	100.0	0.0	0.034	0.021						
Bus12	20.000	2	100.0	0.0								
Bus13	0.400	2	100.0	0.0	0.170	0.105						
Bus14	20.000	2	100.0	0.0								
Bus15	0.400	2	100.0	0.0	0.068	0.042						
Bus16	20.000	2	100.0	0.0								
Bus21	0.400	2	100.0	0.0	0.170	0.105						
Bus22	20.000	2	100.0	0.0								
Bus23	0.400	2	100.0	0.0	0.136	0.084						
Bus24	20.000	2	100.0	0.0								
Bus25	0.400	2	100.0	0.0	0.109	0.067						
Bus26	20.000	2	100.0	0.0								
Bus27	0.400	2	100.0	0.0	0.068	0.042						
Bus28	20.000	2	100.0	0.0								
Bus31	0.400	2	100.0	0.0	0.136	0.084						
Bus32	20.000	2	100.0	0.0								
Bus33	0.400	2	100.0	0.0	0.068	0.042						
Bus34	20.000	2	100.0	0.0								
Bus37	0.400	2	100.0	0.0	0.068	0.042						
Bus38	20.000	2	100.0	0.0								
Bus41	0.400	2	100.0	0.0	0.214	0.133						
Bus42	20.000	2	100.0	0.0								
Bus43	0.400	2	100.0	0.0	0.214	0.133						
Bus44	20.000	2	100.0	0.0								
Bus45	0.400	2	100.0	0.0	0.068	0.042						
Bus46	20.000	2	100.0	0.0								
Bus47	0.400	2	100.0	0.0	0.170	0.105						

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 4
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus48	20.000	2	100.0	0.0								
Bus49	0.400	2	100.0	0.0	0.170	0.105						
Bus50	20.000	2	100.0	0.0								
Bus51	0.400	2	100.0	0.0	0.272	0.169						
Bus52	20.000	2	100.0	0.0								
Bus53	0.400	2	100.0	0.0	0.068	0.042						
Bus54	20.000	2	100.0	0.0								
Bus59	0.400	2	100.0	0.0	0.214	0.133						
Bus60	20.000	2	100.0	0.0								
Bus62	20.000	2	100.0	0.0								
Bus63	20.000	2	100.0	0.0								
Bus64	0.400	2	100.0	0.0	0.272	0.169						
Bus67	20.000	2	100.0	0.0								
Bus68	0.400	2	100.0	0.0	0.170	0.105						
Bus80	0.400	2	100.0	0.0	0.170	0.105						
Bus81	0.400	2	100.0	0.0	0.068	0.042						
Bus82	20.000	2	100.0	0.0								
Bus83	20.000	2	100.0	0.0								
Bus84	20.000	2	100.0	0.0								
Bus85	0.400	2	100.0	0.0	0.017	0.011						
Bus86	0.400	2	100.0	0.0	0.109	0.067						
Bus87	20.000	2	100.0	0.0								
Bus88	20.000	2	100.0	0.0								
Bus89	20.000	2	100.0	0.0								
Bus90	0.400	2	100.0	0.0	0.214	0.133						
Bus91	0.400	2	100.0	0.0	0.068	0.042						
Bus92	0.400	2	100.0	0.0	0.068	0.042						
Bus93	0.400	2	100.0	0.0	0.136	0.084						
Bus94	20.000	2	100.0	0.0								
Bus95	20.000	2	100.0	0.0								
Bus96	20.000	2	100.0	0.0								
Bus97	0.400	2	100.0	0.0	0.170	0.105						
Bus98	0.400	2	100.0	0.0	0.068	0.042						
Bus99	0.400	2	100.0	0.0	0.068	0.042						
Bus100	20.000	2	100.0	0.0								

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 5
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus101	20.000	2	100.0	0.0								
Bus102	20.000	2	100.0	0.0								
Bus103	0.400	2	100.0	0.0	0.017	0.011						
Bus108	0.400	2	100.0	0.0	0.214	0.133						
Bus109	20.000	2	100.0	0.0								
Bus110	20.000	2	100.0	0.0								
Bus111	0.400	2	100.0	0.0	0.170	0.105						
Bus116	0.400	2	100.0	0.0	0.068	0.042						
Bus117	20.000	2	100.0	0.0								
Bus118	20.000	2	100.0	0.0								
Bus119	0.400	2	100.0	0.0	0.068	0.042						
Bus121	20.000	2	100.0	0.0								
Bus122	0.400	2	100.0	0.0	0.109	0.067						
Bus123	20.000	2	100.0	0.0								
Bus124	0.400	2	100.0	0.0	0.136	0.084						
Bus125	20.000	2	100.0	0.0								
Bus126	0.400	2	100.0	0.0	0.214	0.133						
Bus145	0.400	2	100.0	0.0	0.136	0.084						
Bus146	0.400	2	100.0	0.0	0.017	0.011						
Bus147	20.000	2	100.0	0.0								
Bus148	20.000	2	100.0	0.0								
Bus149	0.400	2	100.0	0.0	0.214	0.133						
Bus150	0.400	2	100.0	0.0	0.034	0.021						
Bus151	0.400	2	100.0	0.0	0.170	0.105						
Bus152	0.400	2	100.0	0.0	0.170	0.105						
Bus153	20.000	2	100.0	0.0								
Bus154	20.000	2	100.0	0.0								
Bus155	20.000	2	100.0	0.0								
Bus156	20.000	2	100.0	0.0								
Bus157	20.000	2	100.0	0.0								
Bus158	0.400	2	100.0	0.0	0.136	0.084						
Bus163	0.400	2	100.0	0.0	0.068	0.042						
Bus164	20.000	2	100.0	0.0								
Bus165	20.000	2	100.0	0.0								
Bus166	0.400	2	100.0	0.0	0.272	0.169						

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 6
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus177	0.400	2	100.0	0.0	0.068	0.042						
Bus178	0.400	2	100.0	0.0	0.214	0.133						
Bus179	0.400	2	100.0	0.0	0.109	0.067						
Bus180	0.400	2	100.0	0.0	0.136	0.084						
Bus181	20.000	2	100.0	0.0								
Bus182	20.000	2	100.0	0.0								
Bus183	20.000	2	100.0	0.0								
Bus184	20.000	2	100.0	0.0								
Bus185	20.000	2	100.0	0.0								
Bus186	0.400	2	100.0	0.0	0.034	0.021						
Bus189	0.400	2	100.0	0.0	0.068	0.042						
Bus190	20.000	2	100.0	0.0								
Bus194	0.400	2	100.0	0.0	0.068	0.042						
Bus195	20.000	2	100.0	0.0								
Bus196	20.000	2	100.0	0.0								
Bus197	0.400	2	100.0	0.0	0.068	0.042						
Bus214	0.400	2	100.0	0.0	0.214	0.133						
Bus215	0.400	2	100.0	0.0	0.068	0.042						
Bus216	20.000	2	100.0	0.0								
Bus217	20.000	2	100.0	0.0								
Bus224	0.400	2	100.0	0.0	0.068	0.042						
Bus225	20.000	2	100.0	0.0								
Bus226	20.000	2	100.0	0.0								
Bus227	0.400	2	100.0	0.0	0.068	0.042						
Bus230	20.000	2	100.0	0.0								
Bus231	0.400	2	100.0	0.0	0.068	0.042						
Bus232	20.000	2	100.0	0.0								
Bus233	0.400	2	100.0	0.0	0.068	0.042						
Bus234	20.000	2	100.0	0.0								
Bus235	0.400	2	100.0	0.0	0.068	0.042						
Bus236	20.000	2	100.0	0.0								
Bus237	0.400	2	100.0	0.0	0.068	0.042						
Bus244	0.400	2	100.0	0.0	0.109	0.067						
Bus245	0.400	2	100.0	0.0	0.068	0.042						
Bus246	20.000	2	100.0	0.0								

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 7
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus247	20.000	2	100.0	0.0								
Bus248	20.000	2	100.0	0.0								
Bus249	0.400	2	100.0	0.0	0.214	0.133						
Bus264	0.400	2	100.0	0.0	0.068	0.042						
Bus265	0.400	2	100.0	0.0	0.170	0.105						
Bus266	20.000	2	100.0	0.0								
Bus267	20.000	2	100.0	0.0								
Bus268	0.400	2	100.0	0.0	0.068	0.042						
Bus269	0.400	2	100.0	0.0	0.068	0.042						
Bus270	0.400	2	100.0	0.0	0.170	0.105						
Bus271	0.400	2	100.0	0.0	0.068	0.042						
Bus272	20.000	2	100.0	0.0								
Bus273	20.000	2	100.0	0.0								
Bus274	20.000	2	100.0	0.0								
Bus275	20.000	2	100.0	0.0								
Bus276	20.000	2	100.0	0.0								
Bus277	0.400	2	100.0	0.0	0.068	0.042						
Bus282	0.400	2	100.0	0.0	0.068	0.042						
Bus283	20.000	2	100.0	0.0								
Bus284	20.000	2	100.0	0.0								
Bus285	0.400	2	100.0	0.0	0.170	0.105						
Bus291	0.400	2	100.0	0.0	0.034	0.021						
Bus292	0.400	2	100.0	0.0	0.034	0.021						
Bus293	20.000	2	100.0	0.0								
Bus294	20.000	2	100.0	0.0								
Bus295	20.000	2	100.0	0.0								
Bus296	0.400	2	100.0	0.0	0.034	0.021						
Bus299	0.400	2	100.0	0.0	0.109	0.067						
Bus300	20.000	2	100.0	0.0								
Bus317	0.400	2	100.0	0.0	0.034	0.021						
Bus318	0.400	2	100.0	0.0	0.068	0.042						
Bus319	20.000	2	100.0	0.0								
Bus320	20.000	2	100.0	0.0								
Bus321	0.400	2	100.0	0.0	0.068	0.042						
Bus322	0.400	2	100.0	0.0	0.034	0.021						

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus323	0.400	2	100.0	0.0	0.034	0.021						
Bus324	0.400	2	100.0	0.0	0.034	0.021						
Bus325	20.000	2	100.0	0.0								
Bus326	20.000	2	100.0	0.0								
Bus327	20.000	2	100.0	0.0								
Bus328	20.000	2	100.0	0.0								
Bus329	20.000	2	100.0	0.0								
Bus330	0.400	2	100.0	0.0	0.034	0.021						
Bus331	0.400	2	100.0	0.0	0.068	0.042						
Bus332	20.000	2	100.0	0.0								
Bus335	20.000	1	100.0	0.0								
Bus336	150.000	1	100.0	0.0								
Bus337	20.000	2	100.0	0.0								
Bus338	20.000	2	100.0	0.0								
Bus339	20.000	2	100.0	0.0								
Bus352	150.000	2	100.0	0.0								
Bus353	20.000	2	100.0	0.0								
Bus354	20.000	2	100.0	0.0								
Line147~	20.000		100.0	0.0								
Total Number of Buses: 192					9.965	6.176	0.000	0.000	0.000	0.000	0.000	0.000

Generation Bus				Voltage		Generation			Mvar Limits	
ID	kV	Type	Sub-sys	% Mag.	Angle	MW	Mvar	% PF	Max	Min
Bus336	150.000	Swing	1	100.0	0.0					
Bus352	150.000	Swing	2	100.0	0.0					
						0.000	0.000			

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 9
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Line/Cable Input Data

Line/Cable		Ohms or Siemens/1000 ft per Conductor (Cable) or per Phase (Line)								
		Library	Size	Length		#/Phase	T (°C)	R	X	Y
				Adj. (ft)	% Tol.					
ID										
Line1		147.	239.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line2		147.	633.2	0.0	1	75	0.082157	0.092483	0.0000015	
Line3		147.	1312.3	0.0	1	75	0.082157	0.092483	0.0000015	
Line5		147.	223.1	0.0	1	75	0.082157	0.092483	0.0000015	
Line6		147.	541.3	0.0	1	75	0.082157	0.092483	0.0000015	
Line7		147.	344.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line8		147.	416.7	0.0	1	75	0.082157	0.092483	0.0000015	
Line10		147.	649.6	0.0	1	75	0.082157	0.092483	0.0000015	
Line12		147.	734.9	0.0	1	75	0.082157	0.092483	0.0000015	
Line13		147.	305.1	0.0	1	75	0.082157	0.092483	0.0000015	
Line14		147.	177.2	0.0	1	75	0.082157	0.092483	0.0000015	
Line16		147.	88582.7	0.0	1	75	0.082157	0.092483	0.0000015	
Line18		147.	649.6	0.0	1	75	0.082157	0.092483	0.0000015	
Line19		147.	278.9	0.0	1	75	0.082157	0.092483	0.0000015	
Line20		147.	715.2	0.0	1	75	0.082157	0.092483	0.0000015	
Line21		147.	1276.2	0.0	1	75	0.082157	0.092483	0.0000015	
Line22		147.	1643.7	0.0	1	75	0.082157	0.092483	0.0000015	
Line23		147.	1082.7	0.0	1	75	0.082157	0.092483	0.0000015	
Line24		147.	633.2	0.0	1	75	0.082157	0.092483	0.0000015	
Line26		147.	636.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line27		147.	2237.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line28		147.	1302.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line29		147.	1253.3	0.0	1	75	0.082157	0.092483	0.0000015	
Line35		147.	1328.7	0.0	1	75	0.082157	0.092483	0.0000015	
Line36		147.	321.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line37		147.	380.6	0.0	1	75	0.082157	0.092483	0.0000015	
Line38		147.	337.9	0.0	1	75	0.082157	0.092483	0.0000015	
Line39		147.	337.9	0.0	1	75	0.082157	0.092483	0.0000015	
Line40		147.	239.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line41		147.	1118.8	0.0	1	75	0.082157	0.092483	0.0000015	
Line42		147.	111.5	0.0	1	75	0.082157	0.092483	0.0000015	
Line43		147.	311.7	0.0	1	75	0.082157	0.092483	0.0000015	
Line44		147.	311.7	0.0	1	75	0.082157	0.092483	0.0000015	
Line45		147.	19.7	0.0	1	75	0.082157	0.092483	0.0000015	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 10
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Ohms or Siemens/1000 ft per Conductor (Cable) or per Phase (Line)

Line/Cable		Library	Size	Length		#/Phase	T (°C)	R	X	Y
				Adj. (ft)	% Tol.					
Line46			147.	42.7	0.0	1	75	0.082157	0.092483	0.0000015
Line48			147.	200.1	0.0	1	75	0.082157	0.092483	0.0000015
Line49			147.	731.6	0.0	1	75	0.082157	0.092483	0.0000015
Line50			147.	16.4	0.0	1	75	0.082157	0.092483	0.0000015
Line52			147.	662.7	0.0	1	75	0.082157	0.092483	0.0000015
Line53			147.	652.9	0.0	1	75	0.082157	0.092483	0.0000015
Line54			147.	620.1	0.0	1	75	0.082157	0.092483	0.0000015
Line55			147.	679.1	0.0	1	75	0.082157	0.092483	0.0000015
Line62			147.	18.4	0.0	1	75	0.082157	0.092483	0.0000015
Line63			147.	1250.0	0.0	1	75	0.082157	0.092483	0.0000015
Line64			147.	511.8	0.0	1	75	0.082157	0.092483	0.0000015
Line65			147.	981.0	0.0	1	75	0.082157	0.092483	0.0000015
Line66			147.	410.1	0.0	1	75	0.082157	0.092483	0.0000015
Line67			147.	679.1	0.0	1	75	0.082157	0.092483	0.0000015
Line69			147.	1079.4	0.0	1	75	0.082157	0.092483	0.0000015
Line70			147.	315.0	0.0	1	75	0.082157	0.092483	0.0000015
Line71			147.	282.2	0.0	1	75	0.082157	0.092483	0.0000015
Line76			147.	666.0	0.0	1	75	0.082157	0.092483	0.0000015
Line77			147.	1128.6	0.0	1	75	0.082157	0.092483	0.0000015
Line78			147.	433.1	0.0	1	75	0.082157	0.092483	0.0000015
Line79			147.	1023.6	0.0	1	75	0.082157	0.092483	0.0000015
Line80			147.	4593.2	0.0	1	75	0.082157	0.092483	0.0000015
Line83			147.	511.8	0.0	1	75	0.082157	0.092483	0.0000015
Line85			147.	836.6	0.0	1	75	0.082157	0.092483	0.0000015
Line93			147.	659.4	0.0	1	75	0.082157	0.092483	0.0000015
Line94			147.	639.8	0.0	1	75	0.082157	0.092483	0.0000015
Line95			147.	603.7	0.0	1	75	0.082157	0.092483	0.0000015
Line97			147.	866.1	0.0	1	75	0.082157	0.092483	0.0000015
Line99			147.	465.9	0.0	1	75	0.082157	0.092483	0.0000015
Line100			147.	662.7	0.0	1	75	0.082157	0.092483	0.0000015
Line101			147.	272.3	0.0	1	75	0.082157	0.092483	0.0000015
Line102			147.	285.4	0.0	1	75	0.082157	0.092483	0.0000015
Line105			147.	121.4	0.0	1	75	0.082157	0.092483	0.0000015
Line106			147.	157.5	0.0	1	75	0.082157	0.092483	0.0000015
Line107			147.	275.6	0.0	1	75	0.082157	0.092483	0.0000015
Line108			147.	32808.4	0.0	1	75	0.082157	0.092483	0.0000015

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 11
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Ohms or Siemens/1000 ft per Conductor (Cable) or per Phase (Line)									
Line/Cable									
ID	Library	Size	Length		#/Phase	T (°C)	R	X	Y
			Adj. (ft)	% Tol.					
Line115		147.	190.3	0.0	1	75	0.082157	0.092483	0.0000015
Line116		147.	203.4	0.0	1	75	0.082157	0.092483	0.0000015
Line117		147.	607.0	0.0	1	75	0.082157	0.092483	0.0000015
Line118		147.	12467.2	0.0	1	75	0.082157	0.092483	0.0000015
Line119		147.	13123.4	0.0	1	75	0.082157	0.092483	0.0000015
Line120		147.	187.0	0.0	1	75	0.082157	0.092483	0.0000015
Line121		147.	173.9	0.0	1	75	0.082157	0.092483	0.0000015
Line123		147.	193.6	0.0	1	75	0.082157	0.092483	0.0000015
Line124		147.	180.4	0.0	1	75	0.082157	0.092483	0.0000015
Line127		147.	236.2	0.0	1	75	0.082157	0.092483	0.0000015
Line128		147.	259.2	0.0	1	75	0.082157	0.092483	0.0000015
Line129		147.	8530.2	0.0	1	75	0.082157	0.092483	0.0000015
Line137		147.	206.7	0.0	1	75	0.082157	0.092483	0.0000015
Line138		147.	301.8	0.0	1	75	0.082157	0.092483	0.0000015
Line139		147.	1174.5	0.0	1	75	0.082157	0.092483	0.0000015
Line140		147.	275.6	0.0	1	75	0.082157	0.092483	0.0000015
Line141		147.	318.2	0.0	1	75	0.082157	0.092483	0.0000015
Line142		147.	341.2	0.0	1	75	0.082157	0.092483	0.0000015
Line143		147.	203.4	0.0	1	75	0.082157	0.092483	0.0000015
Line144		147.	3208.7	0.0	1	75	0.082157	0.092483	0.0000015
Line148		147.	18372.7	0.0	1	75	0.082157	0.092483	0.0000015
Line149		147.	344.5	0.0	1	75	0.082157	0.092483	0.0000015
Line150		147.	636.5	0.0	1	75	0.082157	0.092483	0.0000015
Line151		147.	19.7	0.0	1	75	0.082157	0.092483	0.0000015
Line158		147.	32.8	0.0	1	75	0.082157	0.092483	0.0000015
Line159		147.	1640.4	0.0	1	75	0.082157	0.092483	0.0000015
Line147		147.	328.1	0.0	1	75	0.082157	0.092483	0.0000015

Line / Cable resistances are listed at the specified temperatures.

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 12
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

2-Winding Transformer Input Data

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T1	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T3	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T4	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T6	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T7	3-Phase	30.000	150.000	20.000	12.50	45.00	0	0	0	0	0	12.5000	Dyn	0.000
T8	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T10	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T11	3-Phase	0.200	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T12	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T13	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T15	3-Phase	0.200	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T16	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T18	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T20	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T21	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T22	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T23	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T24	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T25	3-Phase	0.400	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T26	3-Phase	0.400	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T29	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T31	3-Phase	0.400	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T33	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T40	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T41	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T42	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T43	3-Phase	0.025	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T44	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T45	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T46	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T47	3-Phase	0.200	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T48	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T49	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T50	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 13
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T51	3-Phase	0.025	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T54	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T55	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T58	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T59	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T61	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T62	3-Phase	0.200	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T63	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T73	3-Phase	0.200	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T74	3-Phase	0.025	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T75	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T76	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T77	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T78	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T79	3-Phase	0.200	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T82	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T83	3-Phase	0.400	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T89	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T90	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T91	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T92	3-Phase	0.200	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T93	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T95	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T98	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T99	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T108	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T109	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T113	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T114	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T116	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T117	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T118	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T119	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T123	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T124	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T125	3-Phase	0.315	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 14
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T133	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T134	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T135	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T136	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T137	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T138	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T139	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T142	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T143	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T147	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T148	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T149	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T151	3-Phase	0.160	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T160	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T161	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T162	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T163	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T164	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T165	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T166	3-Phase	0.050	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T167	3-Phase	0.100	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
T174	3-Phase	60.000	150.000	20.000	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000
TAS	3-Phase	0.250	20.000	0.400	4.00	45.00	0	0	0	0	0	4.0000	Dyn	0.000

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 15
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T1	2W XFMR	Bus2	Bus1	55.54	2499.38	2500.00	
T3	2W XFMR	Bus6	Bus5	35.55	1599.61	1600.00	
T4	2W XFMR	Bus8	Bus7	55.54	2499.38	2500.00	
T6	2W XFMR	Bus12	Bus11	177.73	7998.03	8000.00	
T7	2W XFMR	Bus336	Bus335	0.93	41.66	41.67	
T8	2W XFMR	Bus16	Bus15	88.87	3999.01	4000.00	
T10	2W XFMR	Bus22	Bus21	35.55	1599.61	1600.00	
T11	2W XFMR	Bus24	Bus23	44.43	1999.51	2000.00	
T12	2W XFMR	Bus26	Bus25	55.54	2499.38	2500.00	
T13	2W XFMR	Bus28	Bus27	88.87	3999.01	4000.00	
T15	2W XFMR	Bus32	Bus31	44.43	1999.51	2000.00	
T16	2W XFMR	Bus34	Bus33	88.87	3999.01	4000.00	
T18	2W XFMR	Bus38	Bus37	88.87	3999.01	4000.00	
T20	2W XFMR	Bus42	Bus41	28.21	1269.53	1269.84	
T21	2W XFMR	Bus44	Bus43	28.21	1269.53	1269.84	
T22	2W XFMR	Bus46	Bus45	88.87	3999.01	4000.00	
T23	2W XFMR	Bus48	Bus47	35.55	1599.61	1600.00	
T24	2W XFMR	Bus50	Bus49	35.55	1599.61	1600.00	
T25	2W XFMR	Bus52	Bus51	22.22	999.75	1000.00	
T26	2W XFMR	Bus54	Bus53	22.22	999.75	1000.00	
T29	2W XFMR	Bus62	Bus59	28.21	1269.53	1269.84	
T31	2W XFMR	Bus63	Bus64	22.22	999.75	1000.00	
T33	2W XFMR	Bus67	Bus68	35.55	1599.61	1600.00	
T40	2W XFMR	Bus84	Bus80	35.55	1599.61	1600.00	
T41	2W XFMR	Bus83	Bus81	88.87	3999.01	4000.00	
T42	2W XFMR	Bus82	Bus91	88.87	3999.01	4000.00	
T43	2W XFMR	Bus89	Bus85	355.47	15996.05	16000.00	
T44	2W XFMR	Bus88	Bus86	55.54	2499.38	2500.00	
T45	2W XFMR	Bus87	Bus90	28.21	1269.53	1269.84	
T46	2W XFMR	Bus96	Bus92	88.87	3999.01	4000.00	
T47	2W XFMR	Bus95	Bus93	44.43	1999.51	2000.00	
T48	2W XFMR	Bus94	Bus97	35.55	1599.61	1600.00	
T49	2W XFMR	Bus102	Bus98	88.87	3999.01	4000.00	
T50	2W XFMR	Bus101	Bus99	88.87	3999.01	4000.00	
T51	2W XFMR	Bus100	Bus103	355.47	15996.05	16000.00	
T54	2W XFMR	Bus109	Bus108	28.21	1269.53	1269.84	
T55	2W XFMR	Bus110	Bus111	35.55	1599.61	1600.00	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 16
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T58	2W XFMR	Bus117	Bus116	88.87	3999.01	4000.00	
T59	2W XFMR	Bus118	Bus119	88.87	3999.01	4000.00	
T61	2W XFMR	Bus121	Bus122	55.54	2499.38	2500.00	
T62	2W XFMR	Bus123	Bus124	44.43	1999.51	2000.00	
T63	2W XFMR	Bus125	Bus126	28.21	1269.53	1269.84	
T73	2W XFMR	Bus148	Bus145	44.43	1999.51	2000.00	
T74	2W XFMR	Bus147	Bus146	355.47	15996.05	16000.00	
T75	2W XFMR	Bus156	Bus149	28.21	1269.53	1269.84	
T76	2W XFMR	Bus155	Bus150	177.73	7998.03	8000.00	
T77	2W XFMR	Bus154	Bus151	35.55	1599.61	1600.00	
T78	2W XFMR	Bus153	Bus152	35.55	1599.61	1600.00	
T79	2W XFMR	Bus157	Bus158	44.43	1999.51	2000.00	
T82	2W XFMR	Bus164	Bus163	88.87	3999.01	4000.00	
T83	2W XFMR	Bus165	Bus166	22.22	999.75	1000.00	
T89	2W XFMR	Bus184	Bus177	88.87	3999.01	4000.00	
T90	2W XFMR	Bus183	Bus178	28.21	1269.53	1269.84	
T91	2W XFMR	Bus182	Bus179	55.54	2499.38	2500.00	
T92	2W XFMR	Bus181	Bus180	44.43	1999.51	2000.00	
T93	2W XFMR	Bus185	Bus186	177.73	7998.03	8000.00	
T95	2W XFMR	Bus190	Bus189	88.87	3999.01	4000.00	
T98	2W XFMR	Bus195	Bus194	88.87	3999.01	4000.00	
T99	2W XFMR	Bus196	Bus197	88.87	3999.01	4000.00	
T108	2W XFMR	Bus217	Bus214	28.21	1269.53	1269.84	
T109	2W XFMR	Bus216	Bus215	88.87	3999.01	4000.00	
T113	2W XFMR	Bus225	Bus224	88.87	3999.01	4000.00	
T114	2W XFMR	Bus226	Bus227	88.87	3999.01	4000.00	
T116	2W XFMR	Bus230	Bus231	88.87	3999.01	4000.00	
T117	2W XFMR	Bus232	Bus233	88.87	3999.01	4000.00	
T118	2W XFMR	Bus234	Bus235	88.87	3999.01	4000.00	
T119	2W XFMR	Bus236	Bus237	88.87	3999.01	4000.00	
T123	2W XFMR	Bus247	Bus244	55.54	2499.38	2500.00	
T124	2W XFMR	Bus246	Bus245	88.87	3999.01	4000.00	
T125	2W XFMR	Bus248	Bus249	28.21	1269.53	1269.84	
T133	2W XFMR	Bus267	Bus264	88.87	3999.01	4000.00	
T134	2W XFMR	Bus266	Bus265	35.55	1599.61	1600.00	
T135	2W XFMR	Bus275	Bus268	88.87	3999.01	4000.00	
T136	2W XFMR	Bus274	Bus269	88.87	3999.01	4000.00	
T137	2W XFMR	Bus273	Bus270	35.55	1599.61	1600.00	
T138	2W XFMR	Bus272	Bus271	88.87	3999.01	4000.00	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 17
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T139	2W XFMR	Bus276	Bus277	88.87	3999.01	4000.00	
T142	2W XFMR	Bus283	Bus282	88.87	3999.01	4000.00	
T143	2W XFMR	Bus284	Bus285	35.55	1599.61	1600.00	
T147	2W XFMR	Bus295	Bus296	177.73	7998.03	8000.00	
T148	2W XFMR	Bus294	Bus291	177.73	7998.03	8000.00	
T149	2W XFMR	Bus293	Bus292	177.73	7998.03	8000.00	
T151	2W XFMR	Bus300	Bus299	55.54	2499.38	2500.00	
T160	2W XFMR	Bus320	Bus317	177.73	7998.03	8000.00	
T161	2W XFMR	Bus319	Bus318	88.87	3999.01	4000.00	
T162	2W XFMR	Bus328	Bus321	88.87	3999.01	4000.00	
T163	2W XFMR	Bus327	Bus322	177.73	7998.03	8000.00	
T164	2W XFMR	Bus326	Bus323	177.73	7998.03	8000.00	
T165	2W XFMR	Bus325	Bus324	177.73	7998.03	8000.00	
T166	2W XFMR	Bus329	Bus330	177.73	7998.03	8000.00	
T167	2W XFMR	Bus332	Bus331	88.87	3999.01	4000.00	
T174	2W XFMR	Bus352	Bus354	0.15	6.67	6.67	
TAS	2W XFMR	Bus14	Bus13	35.55	1599.61	1600.00	
Line1	Line	Bus2	Bus6	0.49	0.55	0.74	0.0001444
Line2	Line	Bus6	Bus8	1.30	1.46	1.96	0.0003817
Line3	Line	Bus8	Bus12	2.70	3.03	4.06	0.0007912
Line5	Line	Bus14	Bus16	0.46	0.52	0.69	0.0001345
Line6	Line	Bus338	Bus26	1.11	1.25	1.67	0.0003264
Line7	Line	Bus338	Bus22	0.71	0.80	1.07	0.0002077
Line8	Line	Bus22	Bus24	0.86	0.96	1.29	0.0002512
Line10	Line	Bus26	Bus28	1.33	1.50	2.01	0.0003916
Line12	Line	Bus28	Bus32	1.51	1.70	2.27	0.0004431
Line13	Line	Bus34	Bus337	0.63	0.71	0.94	0.0001840
Line14	Line	Bus337	Bus50	0.36	0.41	0.55	0.0001068
Line16	Line	Bus38	Bus34	181.94	204.81	273.95	0.0534052
Line18	Line	Bus42	Bus38	1.33	1.50	2.01	0.0003916
Line19	Line	Bus12	Bus42	0.57	0.64	0.86	0.0001681
Line20	Line	Bus42	Bus44	1.47	1.65	2.21	0.0004312
Line21	Line	Bus46	Bus44	2.62	2.95	3.95	0.0007694
Line22	Line	Bus44	Bus48	3.38	3.80	5.08	0.0009910
Line23	Line	Bus50	Bus52	2.22	2.50	3.35	0.0006527
Line24	Line	Bus54	Bus52	1.30	1.46	1.96	0.0003817
Line26	Line	Bus60	Bus84	1.31	1.47	1.97	0.0003837
Line27	Line	Bus24	Bus62	4.60	5.17	6.92	0.0013490
Line28	Line	Bus60	Bus63	2.68	3.01	4.03	0.0007853

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 18
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
Line29	Line	Bus63	Bus67	2.57	2.90	3.88	0.0007556
Line35	Line	Bus83	Bus82	2.73	3.07	4.11	0.0008011
Line36	Line	Bus84	Bus83	0.66	0.74	0.99	0.0001938
Line37	Line	Bus82	Bus89	0.78	0.88	1.18	0.0002294
Line38	Line	Bus88	Bus87	0.69	0.78	1.05	0.0002037
Line39	Line	Bus89	Bus88	0.69	0.78	1.05	0.0002037
Line40	Line	Bus95	Bus94	0.49	0.55	0.74	0.0001444
Line41	Line	Bus96	Bus95	2.30	2.59	3.46	0.0006745
Line42	Line	Bus87	Bus96	0.23	0.26	0.34	0.0000673
Line43	Line	Bus94	Bus102	0.64	0.72	0.96	0.0001879
Line44	Line	Bus101	Bus100	0.64	0.72	0.96	0.0001879
Line45	Line	Bus339	Bus101	0.04	0.05	0.06	0.0000119
Line46	Line	Bus339	Bus109	0.09	0.10	0.13	0.0000257
Line48	Line	Bus109	Bus110	0.41	0.46	0.62	0.0001207
Line49	Line	Bus100	Bus121	1.50	1.69	2.26	0.0004411
Line50	Line	Bus100	Bus353	0.03	0.04	0.05	0.0000099
Line52	Line	Bus117	Bus118	1.36	1.53	2.05	0.0003995
Line53	Line	Bus121	Bus117	1.34	1.51	2.02	0.0003936
Line54	Line	Bus117	Bus123	1.27	1.43	1.92	0.0003738
Line55	Line	Bus123	Bus125	1.39	1.57	2.10	0.0004094
Line62	Line	Bus147	Bus148	0.04	0.04	0.06	0.0000111
Line63	Line	Bus148	Bus157	2.57	2.89	3.87	0.0007536
Line64	Line	Bus154	Bus153	1.05	1.18	1.58	0.0003086
Line65	Line	Bus155	Bus154	2.01	2.27	3.03	0.0005914
Line66	Line	Bus156	Bus155	0.84	0.95	1.27	0.0002472
Line67	Line	Bus157	Bus156	1.39	1.57	2.10	0.0004094
Line69	Line	Bus164	Bus165	2.22	2.50	3.34	0.0006508
Line70	Line	Bus165	Bus153	0.65	0.73	0.97	0.0001899
Line71	Line	Bus153	Bus185	0.58	0.65	0.87	0.0001701
Line76	Line	Bus182	Bus181	1.37	1.54	2.06	0.0004015
Line77	Line	Bus183	Bus182	2.32	2.61	3.49	0.0006804
Line78	Line	Bus184	Bus183	0.89	1.00	1.34	0.0002611
Line79	Line	Bus185	Bus184	2.10	2.37	3.17	0.0006171
Line80	Line	Bus183	Bus190	9.43	10.62	14.20	0.0027692
Line83	Line	Bus195	Bus181	1.05	1.18	1.58	0.0003086
Line85	Line	Bus195	Bus196	1.72	1.93	2.59	0.0005044
Line93	Line	Bus216	Bus217	1.35	1.52	2.04	0.0003976
Line94	Line	Bus217	Bus225	1.31	1.48	1.98	0.0003857
Line95	Line	Bus216	Bus196	1.24	1.40	1.87	0.0003639

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 19
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
Line97	Line	Bus225	Bus226	1.78	2.00	2.68	0.0005222
Line99	Line	Bus230	Bus225	0.96	1.08	1.44	0.0002809
Line100	Line	Bus230	Bus232	1.36	1.53	2.05	0.0003995
Line101	Line	Bus232	Bus234	0.56	0.63	0.84	0.0001642
Line102	Line	Bus236	Bus230	0.59	0.66	0.88	0.0001721
Line105	Line	Bus246	Bus247	0.25	0.28	0.38	0.0000732
Line106	Line	Bus247	Bus248	0.32	0.36	0.49	0.0000949
Line107	Line	Bus248	Bus236	0.57	0.64	0.85	0.0001661
Line108	Line	Bus195	Bus266	67.39	75.86	101.46	0.0197797
Line115	Line	Bus266	Bus267	0.39	0.44	0.59	0.0001147
Line116	Line	Bus267	Bus276	0.42	0.47	0.63	0.0001226
Line117	Line	Bus273	Bus272	1.25	1.40	1.88	0.0003659
Line118	Line	Bus274	Bus273	25.61	28.83	38.56	0.0075163
Line119	Line	Bus275	Bus274	26.95	30.34	40.59	0.0079119
Line120	Line	Bus276	Bus275	0.38	0.43	0.58	0.0001127
Line121	Line	Bus284	Bus275	0.36	0.40	0.54	0.0001048
Line123	Line	Bus283	Bus284	0.40	0.45	0.60	0.0001167
Line124	Line	Bus284	Bus293	0.37	0.42	0.56	0.0001088
Line127	Line	Bus294	Bus293	0.49	0.55	0.73	0.0001424
Line128	Line	Bus294	Bus295	0.53	0.60	0.80	0.0001563
Line129	Line	Bus272	Bus300	17.52	19.72	26.38	0.0051427
Line137	Line	Bus319	Bus320	0.42	0.48	0.64	0.0001246
Line138	Line	Bus320	Bus329	0.62	0.70	0.93	0.0001820
Line139	Line	Bus325	Bus332	2.41	2.72	3.63	0.0007081
Line140	Line	Bus326	Bus325	0.57	0.64	0.85	0.0001661
Line141	Line	Bus327	Bus326	0.65	0.74	0.98	0.0001919
Line142	Line	Bus328	Bus327	0.70	0.79	1.06	0.0002057
Line143	Line	Bus329	Bus328	0.42	0.47	0.63	0.0001226
Line144	Line	Bus300	Bus319	6.59	7.42	9.92	0.0019345
Line148	Line	Bus32	Bus337	37.74	42.48	56.82	0.0110766
Line149	Line	Bus16	Bus338	0.71	0.80	1.07	0.0002077
Line150	Line	Bus62	Bus60	1.31	1.47	1.97	0.0003837
Line151	Line	Bus102	Bus339	0.04	0.05	0.06	0.0000119
Line158	Line	Bus353	Bus354	0.07	0.08	0.10	0.0000198
Line159	Line	Bus353	Bus147	3.37	3.79	5.07	0.0009890
Line147	Line	Line147~	Bus14	0.67	0.76	1.01	0.0001978

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 20
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

LOAD FLOW REPORT

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus1	0.400	91.166	-3.2	0	0	0.109	0.067	Bus2	-0.109	-0.067	202.7	85.0	
Bus2	20.000	93.127	-1.4	0	0	0	0	Bus6	-0.109	-0.072	4.1	83.3	
								Bus1	0.109	0.072	4.1	83.3	
Bus5	0.400	91.167	-3.2	0	0	0.170	0.105	Bus6	-0.170	-0.105	316.6	85.0	
Bus6	20.000	93.128	-1.4	0	0	0	0	Bus2	0.109	0.072	4.1	83.3	
								Bus8	-0.279	-0.185	10.4	83.3	
								Bus5	0.170	0.113	6.3	83.3	
Bus7	0.400	91.174	-3.2	0	0	0.109	0.067	Bus8	-0.109	-0.067	202.6	85.0	
Bus8	20.000	93.135	-1.4	0	0	0	0	Bus6	0.279	0.185	10.4	83.4	
								Bus12	-0.388	-0.257	14.4	83.3	
								Bus7	0.109	0.072	4.1	83.3	
Bus11	0.400	91.194	-3.2	0	0	0.034	0.021	Bus12	-0.034	-0.021	63.3	85.0	
Bus12	20.000	93.155	-1.4	0	0	0	0	Bus8	0.388	0.257	14.4	83.4	
								Bus42	-0.422	-0.279	15.7	83.4	
								Bus11	0.034	0.023	1.3	83.3	
Bus13	0.400	96.574	-2.2	0	0	0.170	0.105	Bus14	-0.170	-0.105	298.9	85.0	
Bus14	20.000	98.421	-0.6	0	0	0	0	Bus16	-0.170	-0.112	6.0	83.5	
								Line147~	0.000	0.000	0.0	0.0	
								Bus13	0.170	0.112	6.0	83.5	
Bus15	0.400	96.576	-2.2	0	0	0.068	0.042	Bus16	-0.068	-0.042	119.6	85.0	
Bus16	20.000	98.423	-0.6	0	0	0	0	Bus14	0.170	0.112	6.0	83.6	
								Bus338	-0.238	-0.157	8.4	83.5	
								Bus15	0.068	0.045	2.4	83.5	
Bus21	0.400	96.608	-2.2	0	0	0.170	0.105	Bus22	-0.170	-0.105	298.8	85.0	
Bus22	20.000	98.455	-0.6	0	0	0	0	Bus338	2.348	1.515	81.9	84.0	
								Bus24	-2.518	-1.628	87.9	84.0	
								Bus21	0.170	0.112	6.0	83.5	
Bus23	0.400	96.647	-2.2	0	0	0.136	0.084	Bus24	-0.136	-0.084	239.0	85.0	
Bus24	20.000	98.492	-0.5	0	0	0	0	Bus22	2.519	1.628	87.9	84.0	
								Bus62	-2.655	-1.718	92.7	84.0	
								Bus23	0.136	0.090	4.8	83.5	
Bus25	0.400	96.537	-2.2	0	0	0.109	0.067	Bus26	-0.109	-0.067	191.4	85.0	
Bus26	20.000	98.384	-0.6	0	0	0	0	Bus338	-2.108	-1.358	73.6	84.1	
								Bus28	1.999	1.286	69.8	84.1	
								Bus25	0.109	0.072	3.8	83.5	
Bus27	0.400	96.489	-2.2	0	0	0.068	0.042	Bus28	-0.068	-0.042	119.7	85.0	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 21
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus28	20.000	98.338	-0.6	0	0	0	0	Bus26	-1.999	-1.286	69.8	84.1	
								Bus32	1.931	1.241	67.4	84.1	
								Bus27	0.068	0.045	2.4	83.5	
Bus31	0.400	96.437	-2.2	0	0	0.136	0.084	Bus32	-0.136	-0.084	239.5	85.0	
Bus32	20.000	98.287	-0.6	0	0	0	0	Bus28	-1.930	-1.240	67.4	84.1	
								Bus337	1.794	1.150	62.6	84.2	
								Bus31	0.136	0.090	4.8	83.5	
Bus33	0.400	95.210	-2.4	0	0	0.068	0.042	Bus34	-0.068	-0.042	121.3	85.0	
Bus34	20.000	97.085	-0.8	0	0	0	0	Bus337	-1.265	-0.807	44.6	84.3	
								Bus38	1.197	0.762	42.2	84.4	
								Bus33	0.068	0.045	2.4	83.4	
Bus37	0.400	91.227	-3.2	0	0	0.068	0.042	Bus38	-0.068	-0.042	126.6	85.0	
Bus38	20.000	93.187	-1.4	0	0	0	0	Bus34	-1.158	-0.766	43.0	83.4	
								Bus42	1.090	0.720	40.5	83.4	
								Bus37	0.068	0.045	2.5	83.3	
Bus41	0.400	91.199	-3.2	0	0	0.214	0.133	Bus42	-0.214	-0.133	398.8	85.0	
Bus42	20.000	93.159	-1.4	0	0	0	0	Bus38	-1.089	-0.721	40.5	83.4	
								Bus12	0.422	0.279	15.7	83.4	
								Bus44	0.453	0.299	16.8	83.5	
Bus43	0.400	91.186	-3.2	0	0	0.214	0.133	Bus41	0.214	0.142	8.0	83.3	
								Bus44	-0.214	-0.133	398.9	85.0	
								Bus42	-0.453	-0.299	16.8	83.4	
Bus44	20.000	93.147	-1.4	0	0	0	0	Bus46	0.068	0.045	2.5	83.7	
								Bus48	0.170	0.112	6.3	83.5	
								Bus43	0.214	0.142	8.0	83.3	
Bus45	0.400	91.183	-3.2	0	0	0.068	0.042	Bus46	-0.068	-0.042	126.6	85.0	
Bus46	20.000	93.144	-1.4	0	0	0	0	Bus44	-0.068	-0.045	2.5	83.3	
								Bus45	0.068	0.045	2.5	83.3	
								Bus48	-0.170	-0.105	316.6	85.0	
Bus47	0.400	91.175	-3.2	0	0	0.170	0.105	Bus44	-0.170	-0.113	6.3	83.3	
Bus48	20.000	93.136	-1.4	0	0	0	0	Bus47	0.170	0.113	6.3	83.3	
								Bus50	-0.170	-0.105	303.2	85.0	
								Bus337	-0.510	-0.334	18.1	83.7	
Bus49	0.400	95.221	-2.4	0	0	0.170	0.105	Bus52	0.340	0.222	12.1	83.8	
								Bus49	0.170	0.112	6.1	83.4	
								Bus52	-0.272	-0.169	485.1	85.0	
Bus50	20.000	97.096	-0.8	0	0	0	0	Bus50	-0.340	-0.222	12.1	83.7	
								Bus54	0.068	0.042	2.4	84.8	
								Bus51	0.272	0.180	9.7	83.4	
Bus51	0.400	95.208	-2.4	0	0	0.272	0.169						
Bus52	20.000	97.082	-0.8	0	0	0	0						

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 22
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus53	0.400	96.626	-1.2	0	0	0.068	0.042	Bus54	-0.068	-0.042	119.5	85.0	
Bus54	20.000	97.081	-0.8	0	0	0	0	Bus52	-0.068	-0.043	2.4	84.6	
								Bus53	0.068	0.043	2.4	84.6	
Bus59	0.400	96.865	-2.1	0	0	0.214	0.133	Bus62	-0.214	-0.133	375.5	85.0	
Bus60	20.000	98.772	-0.5	0	0	0	0	Bus84	-3.318	-2.155	115.6	83.9	
								Bus63	0.442	0.290	15.5	83.6	
								Bus62	2.876	1.865	100.2	83.9	
Bus62	20.000	98.707	-0.5	0	0	0	0	Bus24	2.660	1.722	92.7	83.9	
								Bus60	-2.874	-1.863	100.2	83.9	
								Bus59	0.214	0.141	7.5	83.5	
Bus63	20.000	98.752	-0.5	0	0	0	0	Bus60	-0.442	-0.291	15.5	83.6	
								Bus67	0.170	0.111	5.9	83.7	
								Bus64	0.272	0.179	9.5	83.5	
Bus64	0.400	96.911	-2.1	0	0	0.272	0.169	Bus63	-0.272	-0.169	476.6	85.0	
Bus67	20.000	98.744	-0.5	0	0	0	0	Bus63	-0.170	-0.112	6.0	83.5	
								Bus68	0.170	0.112	6.0	83.5	
Bus68	0.400	96.904	-2.1	0	0	0.170	0.105	Bus67	-0.170	-0.105	297.9	85.0	
Bus80	0.400	97.010	-2.1	0	0	0.170	0.105	Bus84	-0.170	-0.105	297.6	85.0	
Bus81	0.400	97.051	-2.1	0	0	0.068	0.042	Bus83	-0.068	-0.042	119.0	85.0	
Bus82	20.000	99.059	-0.5	0	0	0	0	Bus83	3.565	2.320	123.9	83.8	
								Bus89	-3.633	-2.365	126.3	83.8	
								Bus91	0.068	0.045	2.4	83.5	
Bus83	20.000	98.889	-0.5	0	0	0	0	Bus82	-3.560	-2.315	124.0	83.8	
								Bus84	3.492	2.270	121.6	83.8	
								Bus81	0.068	0.045	2.4	83.5	
Bus84	20.000	98.848	-0.5	0	0	0	0	Bus60	3.320	2.157	115.6	83.9	
								Bus83	-3.490	-2.269	121.6	83.8	
								Bus80	0.170	0.112	6.0	83.5	
Bus85	0.400	97.276	-2.0	0	0	0.017	0.011	Bus89	-0.017	-0.011	29.7	85.0	
Bus86	0.400	97.321	-2.0	0	0	0.109	0.067	Bus88	-0.109	-0.067	189.8	85.0	
Bus87	20.000	99.199	-0.4	0	0	0	0	Bus88	3.763	2.452	130.7	83.8	
								Bus96	-3.977	-2.593	138.2	83.8	
								Bus90	0.214	0.141	7.5	83.5	
Bus88	20.000	99.153	-0.4	0	0	0	0	Bus87	-3.761	-2.451	130.7	83.8	
								Bus89	3.653	2.379	126.9	83.8	
								Bus86	0.109	0.072	3.8	83.5	
Bus89	20.000	99.109	-0.5	0	0	0	0	Bus82	3.634	2.366	126.3	83.8	
								Bus88	-3.651	-2.378	126.9	83.8	
								Bus85	0.017	0.011	0.6	83.5	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 23
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus90	0.400	97.367	-2.0	0	0	0.214	0.133	Bus87	-0.214	-0.133	373.6	85.0	
Bus91	0.400	97.225	-2.1	0	0	0.068	0.042	Bus82	-0.068	-0.042	118.8	85.0	
Bus92	0.400	97.384	-2.0	0	0	0.068	0.042	Bus96	-0.068	-0.042	118.6	85.0	
Bus93	0.400	97.549	-2.0	0	0	0.136	0.084	Bus95	-0.136	-0.084	236.7	85.0	
Bus94	20.000	99.413	-0.4	0	0	0	0	Bus95	4.189	2.735	145.3	83.7	
								Bus102	-4.359	-2.847	151.2	83.7	
								Bus97	0.170	0.112	5.9	83.5	
Bus95	20.000	99.377	-0.4	0	0	0	0	Bus94	-4.187	-2.734	145.3	83.7	
								Bus96	4.051	2.644	140.5	83.7	
								Bus93	0.136	0.090	4.7	83.5	
Bus96	20.000	99.215	-0.4	0	0	0	0	Bus95	-4.046	-2.639	140.5	83.8	
								Bus87	3.978	2.594	138.2	83.8	
								Bus92	0.068	0.045	2.4	83.5	
Bus97	0.400	97.586	-2.0	0	0	0.170	0.105	Bus94	-0.170	-0.105	295.8	85.0	
Bus98	0.400	97.636	-2.0	0	0	0.068	0.042	Bus102	-0.068	-0.042	118.3	85.0	
Bus99	0.400	97.642	-2.0	0	0	0.068	0.042	Bus101	-0.068	-0.042	118.3	85.0	
Bus100	20.000	99.523	-0.4	0	0	0	0	Bus101	4.884	3.194	169.3	83.7	
								Bus121	0.596	0.390	20.7	83.6	
								Bus353	-5.496	-3.596	190.5	83.7	
								Bus103	0.017	0.011	0.6	83.5	
Bus101	20.000	99.468	-0.4	0	0	0	0	Bus100	-4.881	-3.192	169.3	83.7	
								Bus339	4.813	3.147	166.9	83.7	
								Bus99	0.068	0.045	2.4	83.5	
Bus102	20.000	99.462	-0.4	0	0	0	0	Bus94	4.361	2.849	151.2	83.7	
								Bus339	-4.429	-2.894	153.5	83.7	
								Bus98	0.068	0.045	2.4	83.5	
Bus103	0.400	97.698	-2.0	0	0	0.017	0.011	Bus100	-0.017	-0.011	29.5	85.0	
Bus108	0.400	97.638	-2.0	0	0	0.214	0.133	Bus109	-0.214	-0.133	372.5	85.0	
Bus109	20.000	99.464	-0.4	0	0	0	0	Bus339	-0.385	-0.253	13.4	83.5	
								Bus110	0.170	0.112	5.9	83.5	
								Bus108	0.214	0.141	7.5	83.5	
Bus110	20.000	99.463	-0.4	0	0	0	0	Bus109	-0.170	-0.112	5.9	83.5	
								Bus111	0.170	0.112	5.9	83.5	
Bus111	0.400	97.637	-2.0	0	0	0.170	0.105	Bus110	-0.170	-0.105	295.7	85.0	
Bus116	0.400	97.670	-2.0	0	0	0.068	0.042	Bus117	-0.068	-0.042	118.2	85.0	
Bus117	20.000	99.496	-0.4	0	0	0	0	Bus118	0.068	0.044	2.4	83.7	
								Bus121	-0.487	-0.319	16.9	83.6	
								Bus123	0.351	0.230	12.2	83.6	
								Bus116	0.068	0.045	2.4	83.5	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 24
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus118	20.000	99.494	-0.4	0	0	0	0	Bus117	-0.068	-0.045	2.4	83.5	
								Bus119	0.068	0.045	2.4	83.5	
								Bus118	-0.068	-0.042	118.2	85.0	
Bus119	0.400	97.669	-2.0	0	0	0.068	0.042	Bus100	-0.596	-0.391	20.7	83.6	
Bus121	20.000	99.507	-0.4	0	0	0	0	Bus117	0.487	0.319	16.9	83.6	
								Bus122	0.109	0.072	3.8	83.5	
								Bus121	-0.109	-0.067	189.1	85.0	
Bus122	0.400	97.682	-2.0	0	0	0.109	0.067	Bus117	-0.351	-0.230	12.2	83.6	
Bus123	20.000	99.488	-0.4	0	0	0	0	Bus125	0.214	0.141	7.4	83.6	
								Bus124	0.136	0.090	4.7	83.5	
								Bus123	-0.136	-0.084	236.5	85.0	
Bus124	0.400	97.663	-2.0	0	0	0.136	0.084	Bus123	-0.214	-0.141	7.4	83.5	
Bus125	20.000	99.483	-0.4	0	0	0	0	Bus126	0.214	0.141	7.4	83.5	
								Bus125	-0.214	-0.133	372.5	85.0	
								Bus148	-0.136	-0.084	237.1	85.0	
Bus126	0.400	97.657	-2.0	0	0	0.214	0.133	Bus147	-0.017	-0.011	29.6	85.0	
Bus145	0.400	97.420	-2.0	0	0	0.136	0.084	Bus148	4.616	3.023	160.5	83.7	
Bus146	0.400	97.423	-2.0	0	0	0.017	0.011	Bus353	-4.633	-3.034	161.1	83.7	
Bus147	20.000	99.253	-0.4	0	0	0	0	Bus146	0.017	0.011	0.6	83.5	
								Bus147	-4.616	-3.023	160.5	83.7	
								Bus157	4.480	2.933	155.7	83.7	
Bus148	20.000	99.250	-0.4	0	0	0	0	Bus145	0.136	0.090	4.7	83.5	
								Bus156	-0.214	-0.133	374.6	85.0	
								Bus155	-0.034	-0.021	59.5	85.0	
Bus149	0.400	97.106	-2.1	0	0	0.214	0.133	Bus154	-0.170	-0.105	297.9	85.0	
Bus150	0.400	97.044	-2.1	0	0	0.034	0.021	Bus153	-0.170	-0.105	298.1	85.0	
Bus151	0.400	96.897	-2.1	0	0	0.170	0.105	Bus154	-3.905	-2.547	136.4	83.8	
Bus152	0.400	96.823	-2.1	0	0	0.170	0.105	Bus165	0.340	0.224	11.9	83.6	
Bus153	20.000	98.665	-0.5	0	0	0	0	Bus185	3.394	2.211	118.5	83.8	
								Bus152	0.170	0.112	6.0	83.5	
								Bus153	3.907	2.549	136.4	83.8	
Bus154	20.000	98.737	-0.5	0	0	0	0	Bus155	-4.077	-2.661	142.3	83.7	
								Bus151	0.170	0.112	6.0	83.5	
								Bus154	4.082	2.666	142.3	83.7	
Bus155	20.000	98.882	-0.5	0	0	0	0	Bus156	-4.116	-2.689	143.5	83.7	
								Bus150	0.034	0.022	1.2	83.5	
								Bus155	4.118	2.691	143.5	83.7	
Bus156	20.000	98.942	-0.5	0	0	0	0	Bus157	-4.332	-2.832	151.0	83.7	
								Bus149	0.214	0.141	7.5	83.5	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 25
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus157	20.000	99.048	-0.5	0	0	0	0	Bus148	-4.472	-2.926	155.8	83.7	
								Bus156	4.336	2.836	151.0	83.7	
								Bus158	0.136	0.090	4.8	83.5	
Bus158	0.400	97.214	-2.1	0	0	0.136	0.084	Bus157	-0.136	-0.084	237.6	85.0	
Bus163	0.400	96.817	-2.1	0	0	0.068	0.042	Bus164	-0.068	-0.042	119.3	85.0	
Bus164	20.000	98.659	-0.5	0	0	0	0	Bus165	-0.068	-0.045	2.4	83.5	
								Bus163	0.068	0.045	2.4	83.5	
								Bus164	0.068	0.044	2.4	83.8	
Bus165	20.000	98.661	-0.5	0	0	0	0	Bus153	-0.340	-0.224	11.9	83.6	
								Bus166	0.272	0.179	9.5	83.5	
								Bus165	-0.272	-0.169	477.1	85.0	
Bus166	0.400	96.819	-2.1	0	0	0.272	0.169	Bus184	-0.068	-0.042	119.5	85.0	
Bus177	0.400	96.661	-2.2	0	0	0.068	0.042	Bus183	-0.214	-0.133	376.5	85.0	
Bus178	0.400	96.609	-2.2	0	0	0.214	0.133	Bus182	-0.109	-0.067	191.5	85.0	
Bus179	0.400	96.484	-2.2	0	0	0.109	0.067	Bus181	-0.136	-0.084	239.5	85.0	
Bus180	0.400	96.413	-2.2	0	0	0.136	0.084	Bus182	-2.890	-1.878	101.3	83.8	
								Bus195	2.754	1.788	96.5	83.9	
								Bus180	0.136	0.090	4.8	83.5	
Bus181	20.000	98.263	-0.6	0	0	0	0	Bus181	2.892	1.880	101.3	83.8	
								Bus183	-3.001	-1.952	105.1	83.8	
								Bus179	0.109	0.072	3.8	83.5	
Bus182	20.000	98.332	-0.6	0	0	0	0	Bus182	3.004	1.954	105.1	83.8	
								Bus184	-3.286	-2.138	114.9	83.8	
								Bus190	0.068	0.042	2.3	85.0	
Bus183	20.000	98.455	-0.6	0	0	0	0	Bus178	0.214	0.141	7.5	83.5	
								Bus183	3.288	2.139	114.9	83.8	
								Bus185	-3.356	-2.184	117.3	83.8	
Bus184	20.000	98.506	-0.5	0	0	0	0	Bus177	0.068	0.045	2.4	83.5	
								Bus153	-3.393	-2.210	118.5	83.8	
								Bus184	3.359	2.188	117.3	83.8	
Bus185	20.000	98.631	-0.5	0	0	0	0	Bus186	0.034	0.022	1.2	83.5	
								Bus185	-0.034	-0.021	59.7	85.0	
								Bus190	-0.068	-0.042	119.5	85.0	
Bus186	0.400	96.788	-2.1	0	0	0.034	0.021	Bus183	-0.068	-0.045	2.4	83.5	
Bus189	0.400	96.597	-2.2	0	0	0.068	0.042	Bus189	0.068	0.045	2.4	83.5	
Bus190	20.000	98.444	-0.6	0	0	0	0	Bus195	-0.068	-0.042	119.8	85.0	
								Bus181	-2.753	-1.787	96.5	83.9	
								Bus196	1.151	0.757	40.5	83.6	
Bus194	0.400	96.361	-2.2	0	0	0.068	0.042	Bus266	1.533	0.986	53.6	84.1	
Bus195	20.000	98.212	-0.6	0	0	0	0						

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 26
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus196	20.000	98.177	-0.6	0	0	0	0	Bus194	0.068	0.045	2.4	83.5	
								Bus195	-1.151	-0.757	40.5	83.6	
								Bus216	1.083	0.712	38.1	83.6	
								Bus197	0.068	0.045	2.4	83.5	
Bus197	0.400	96.325	-2.2	0	0	0.068	0.042	Bus196	-0.068	-0.042	119.9	85.0	
Bus214	0.400	96.276	-2.2	0	0	0.214	0.133	Bus217	-0.214	-0.133	377.8	85.0	
Bus215	0.400	96.301	-2.2	0	0	0.068	0.042	Bus216	-0.068	-0.042	119.9	85.0	
Bus216	20.000	98.153	-0.6	0	0	0	0	Bus217	1.015	0.667	35.7	83.6	
								Bus196	-1.083	-0.712	38.1	83.6	
								Bus215	0.068	0.045	2.4	83.5	
								Bus216	-1.014	-0.667	35.7	83.5	
Bus217	20.000	98.129	-0.6	0	0	0	0	Bus225	0.800	0.526	28.2	83.6	
								Bus214	0.214	0.141	7.6	83.5	
								Bus225	-0.068	-0.042	120.0	85.0	
								Bus217	-0.800	-0.526	28.2	83.6	
Bus224	0.400	96.257	-2.2	0	0	0.068	0.042	Bus225	-0.068	-0.042	120.0	85.0	
								Bus226	0.068	0.044	2.4	83.8	
								Bus230	0.664	0.437	23.4	83.5	
								Bus224	0.068	0.045	2.4	83.5	
Bus225	20.000	98.110	-0.6	0	0	0	0	Bus225	-0.068	-0.045	2.4	83.5	
								Bus227	0.068	0.045	2.4	83.5	
								Bus226	-0.068	-0.042	120.0	85.0	
								Bus225	-0.664	-0.437	23.4	83.5	
Bus226	20.000	98.108	-0.6	0	0	0	0	Bus232	0.136	0.089	4.8	83.6	
								Bus236	0.459	0.303	16.2	83.5	
								Bus231	0.068	0.045	2.4	83.5	
								Bus230	-0.068	-0.042	120.0	85.0	
Bus231	0.400	96.245	-2.2	0	0	0.068	0.042	Bus230	-0.136	-0.090	4.8	83.5	
								Bus234	0.068	0.045	2.4	83.6	
								Bus233	0.068	0.045	2.4	83.5	
								Bus232	-0.068	-0.042	120.0	85.0	
Bus232	20.000	98.095	-0.6	0	0	0	0	Bus232	-0.068	-0.045	2.4	83.5	
								Bus235	0.068	0.045	2.4	83.5	
								Bus234	-0.068	-0.042	120.0	85.0	
								Bus236	-0.459	-0.303	16.2	83.5	
Bus233	0.400	96.242	-2.2	0	0	0.068	0.042	Bus230	0.391	0.258	13.8	83.5	
								Bus248	0.068	0.045	2.4	83.5	
								Bus236	-0.068	-0.042	120.0	85.0	
								Bus247	-0.109	-0.067	192.0	85.0	
Bus234	20.000	98.095	-0.6	0	0	0	0	Bus246	-0.068	-0.042	120.0	85.0	
								Bus237	0.068	0.045	2.4	83.5	
								Bus236	-0.068	-0.042	120.0	85.0	
								Bus244	0.400	96.235	-2.2	0	0
Bus245	0.400	96.235	-2.2	0	0	0.068	0.042	Bus246	-0.068	-0.042	120.0	85.0	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 27
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus246	20.000	98.089	-0.6	0	0	0	0	Bus247	-0.068	-0.045	2.4	83.5	
								Bus245	0.068	0.045	2.4	83.5	
Bus247	20.000	98.089	-0.6	0	0	0	0	Bus246	0.068	0.045	2.4	83.5	
								Bus248	-0.177	-0.117	6.2	83.5	
Bus248	20.000	98.090	-0.6	0	0	0	0	Bus244	0.109	0.072	3.8	83.5	
								Bus247	0.177	0.117	6.2	83.5	
Bus249	0.400	96.236	-2.2	0	0	0.214	0.133	Bus236	-0.391	-0.258	13.8	83.5	
								Bus249	0.214	0.141	7.6	83.5	
Bus264	0.400	94.493	-2.6	0	0	0.068	0.042	Bus248	-0.214	-0.133	378.0	85.0	
Bus265	0.400	94.503	-2.6	0	0	0.170	0.105	Bus267	-0.068	-0.042	122.2	85.0	
Bus266	20.000	96.392	-0.9	0	0	0	0	Bus266	-0.170	-0.105	305.5	85.0	
								Bus195	-1.510	-0.978	53.9	83.9	
Bus267	20.000	96.383	-0.9	0	0	0	0	Bus267	1.340	0.866	47.8	84.0	
								Bus265	0.170	0.113	6.1	83.4	
Bus268	0.400	94.475	-2.6	0	0	0.068	0.042	Bus266	-1.340	-0.866	47.8	84.0	
								Bus276	1.272	0.821	45.3	84.0	
Bus269	0.400	94.084	-2.7	0	0	0.068	0.042	Bus264	0.068	0.045	2.4	83.4	
Bus270	0.400	93.743	-2.7	0	0	0.170	0.105	Bus275	-0.068	-0.042	122.2	85.0	
Bus271	0.400	93.730	-2.7	0	0	0.068	0.042	Bus274	-0.068	-0.042	122.7	85.0	
Bus272	20.000	95.635	-1.0	0	0	0	0	Bus273	-0.170	-0.105	307.9	85.0	
								Bus272	-0.068	-0.042	123.2	85.0	
Bus273	20.000	95.648	-1.0	0	0	0	0	Bus273	-0.552	-0.358	19.9	83.9	
								Bus300	0.484	0.313	17.4	84.0	
Bus274	20.000	95.982	-1.0	0	0	0	0	Bus271	0.068	0.045	2.5	83.4	
								Bus272	0.552	0.358	19.9	83.9	
Bus275	20.000	96.365	-0.9	0	0	0	0	Bus274	-0.722	-0.470	26.0	83.8	
								Bus270	0.170	0.113	6.2	83.4	
Bus276	20.000	96.373	-0.9	0	0	0	0	Bus273	0.724	0.466	25.9	84.1	
								Bus275	-0.792	-0.511	28.4	84.1	
Bus277	0.400	94.484	-2.6	0	0	0.068	0.042	Bus269	0.068	0.045	2.5	83.4	
								Bus274	0.795	0.506	28.2	84.3	
Bus282	0.400	94.473	-2.6	0	0	0.068	0.042	Bus276	-1.203	-0.776	42.9	84.0	
								Bus284	0.340	0.224	12.2	83.5	
Bus283	0.400	94.473	-2.6	0	0	0.068	0.042	Bus268	0.068	0.045	2.4	83.4	
								Bus267	-1.272	-0.821	45.3	84.0	
Bus284	0.400	94.473	-2.6	0	0	0.068	0.042	Bus275	1.204	0.776	42.9	84.0	
								Bus277	0.068	0.045	2.4	83.4	
Bus285	0.400	94.473	-2.6	0	0	0.068	0.042	Bus276	-0.068	-0.042	122.2	85.0	
								Bus283	-0.068	-0.042	122.2	85.0	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 28
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow				XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus283	20.000	96.362	-0.9	0	0	0	0	Bus284	-0.068	-0.045	2.4	83.4	
								Bus282	0.068	0.045	2.4	83.4	
Bus284	20.000	96.363	-0.9	0	0	0	0	Bus275	-0.340	-0.225	12.2	83.5	
								Bus283	0.068	0.045	2.4	83.5	
								Bus293	0.102	0.067	3.7	83.6	
								Bus285	0.170	0.113	6.1	83.4	
Bus285	0.400	94.473	-2.6	0	0	0.170	0.105	Bus284	-0.170	-0.105	305.6	85.0	
Bus291	0.400	94.472	-2.6	0	0	0.034	0.021	Bus294	-0.034	-0.021	61.1	85.0	
Bus292	0.400	94.472	-2.6	0	0	0.034	0.021	Bus293	-0.034	-0.021	61.1	85.0	
Bus293	20.000	96.362	-0.9	0	0	0	0	Bus284	-0.102	-0.067	3.7	83.5	
								Bus294	0.068	0.045	2.4	83.6	
								Bus292	0.034	0.023	1.2	83.4	
Bus294	20.000	96.361	-0.9	0	0	0	0	Bus293	-0.068	-0.045	2.4	83.5	
								Bus295	0.034	0.022	1.2	83.6	
								Bus291	0.034	0.023	1.2	83.4	
Bus295	20.000	96.361	-0.9	0	0	0	0	Bus294	-0.034	-0.023	1.2	83.4	
								Bus296	0.034	0.023	1.2	83.4	
Bus296	0.400	94.471	-2.6	0	0	0.034	0.021	Bus295	-0.034	-0.021	61.1	85.0	
Bus299	0.400	93.573	-2.8	0	0	0.109	0.067	Bus300	-0.109	-0.067	197.4	85.0	
Bus300	20.000	95.482	-1.0	0	0	0	0	Bus272	-0.483	-0.317	17.5	83.6	
								Bus319	0.375	0.245	13.5	83.7	
								Bus299	0.109	0.072	3.9	83.4	
Bus317	0.400	93.525	-2.8	0	0	0.034	0.021	Bus320	-0.034	-0.021	61.7	85.0	
Bus318	0.400	93.527	-2.8	0	0	0.068	0.042	Bus319	-0.068	-0.042	123.5	85.0	
Bus319	20.000	95.437	-1.0	0	0	0	0	Bus320	0.306	0.201	11.1	83.6	
								Bus300	-0.374	-0.246	13.6	83.5	
								Bus318	0.068	0.045	2.5	83.4	
Bus320	20.000	95.434	-1.0	0	0	0	0	Bus319	-0.306	-0.201	11.1	83.6	
								Bus329	0.272	0.179	9.9	83.6	
								Bus317	0.034	0.023	1.2	83.4	
Bus321	0.400	93.520	-2.8	0	0	0.068	0.042	Bus328	-0.068	-0.042	123.5	85.0	
Bus322	0.400	93.518	-2.8	0	0	0.034	0.021	Bus327	-0.034	-0.021	61.7	85.0	
Bus323	0.400	93.516	-2.8	0	0	0.034	0.021	Bus326	-0.034	-0.021	61.7	85.0	
Bus324	0.400	93.515	-2.8	0	0	0.034	0.021	Bus325	-0.034	-0.021	61.7	85.0	
Bus325	20.000	95.425	-1.1	0	0	0	0	Bus332	0.068	0.044	2.5	83.7	
								Bus326	-0.102	-0.067	3.7	83.6	
								Bus324	0.034	0.023	1.2	83.4	
Bus326	20.000	95.426	-1.1	0	0	0	0	Bus325	0.102	0.067	3.7	83.7	
								Bus327	-0.136	-0.089	4.9	83.6	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 29
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus		Voltage		Generation		Load		Load Flow						XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap	
Bus327	20.000	95.427	-1.1	0	0	0	0	Bus323	0.034	0.023	1.2	83.4		
								Bus326	0.136	0.089	4.9	83.7		
								Bus328	-0.170	-0.112	6.2	83.6		
Bus328	20.000	95.430	-1.1	0	0	0	0	Bus322	0.034	0.023	1.2	83.4		
								Bus327	0.170	0.112	6.2	83.6		
								Bus329	-0.238	-0.157	8.6	83.6		
Bus329	20.000	95.431	-1.1	0	0	0	0	Bus321	0.068	0.045	2.5	83.4		
								Bus320	-0.272	-0.179	9.9	83.6		
								Bus328	0.238	0.156	8.6	83.6		
Bus330	0.400	93.522	-2.8	0	0	0.034	0.021	Bus329	-0.034	-0.021	61.7	85.0		
Bus331	0.400	93.512	-2.8	0	0	0.068	0.042	Bus332	-0.068	-0.042	123.5	85.0		
Bus332	20.000	95.422	-1.1	0	0	0	0	Bus325	-0.068	-0.045	2.5	83.4		
								Bus331	0.068	0.045	2.5	83.4		
Bus335	20.000	100.000	0.0	0	0	0	0	Bus336	0.000	0.000	0.0	0.0		
* Bus336	150.000	100.000	0.0	0	0	0	0	Bus335	0.000	0.000	0.0	0.0		
Bus337	20.000	97.099	-0.8	0	0	0	0	Bus34	1.265	0.807	44.6	84.3		
								Bus50	0.510	0.334	18.1	83.7		
Bus338	20.000	98.425	-0.6	0	0	0	0	Bus32	-1.776	-1.141	62.8	84.1		
								Bus26	2.109	1.358	73.6	84.1		
								Bus22	-2.347	-1.515	81.9	84.0		
Bus339	20.000	99.465	-0.4	0	0	0	0	Bus16	0.238	0.157	8.4	83.6		
								Bus101	-4.813	-3.147	166.9	83.7		
								Bus109	0.385	0.253	13.4	83.5		
* Bus352	150.000	100.000	0.0	10.143	6.741	0	0	Bus102	4.429	2.894	153.5	83.7		
								Bus354	10.143	6.741	46.9	83.3		
								Bus353	20.000	99.526	-0.4	0	0	0
Bus354	20.000	99.538	-0.4	0	0	0	0	Bus354	-10.140	-6.641	351.6	83.7		
								Bus147	4.644	3.045	161.1	83.6		
								Bus353	10.141	6.642	351.6	83.7		
Line147~	20.000	98.421	-0.6	0	0	0	0	Bus352	-10.141	-6.642	351.6	83.7		
								Bus14	0.000	0.000	0.0	0.0		

* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)

Indicates a bus with a load mismatch of more than 0.1 MVA

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 30
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus Loading Summary Report

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus1	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	202.7	
Bus2	20.000		0	0	0	0	0	0	0	0	0.131	83.3	4.1	
Bus5	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	316.6	
Bus6	20.000		0	0	0	0	0	0	0	0	0.335	83.3	10.4	
Bus7	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	202.6	
Bus8	20.000		0	0	0	0	0	0	0	0	0.466	83.3	14.4	
Bus11	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	63.3	
Bus12	20.000		0	0	0	0	0	0	0	0	0.506	83.4	15.7	
Bus13	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	298.9	
Bus14	20.000		0	0	0	0	0	0	0	0	0.204	83.5	6.0	
Bus15	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.6	
Bus16	20.000		0	0	0	0	0	0	0	0	0.285	83.5	8.4	
Bus21	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	298.8	
Bus22	20.000		0	0	0	0	0	0	0	0	2.998	84.0	87.9	
Bus23	0.400		0.136	0.084	0	0	0	0	0	0	0.160	85.0	239.0	
Bus24	20.000		0	0	0	0	0	0	0	0	3.162	84.0	92.7	
Bus25	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	191.4	
Bus26	20.000		0	0	0	0	0	0	0	0	2.508	84.1	73.6	
Bus27	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.7	
Bus28	20.000		0	0	0	0	0	0	0	0	2.376	84.1	69.8	
Bus31	0.400		0.136	0.084	0	0	0	0	0	0	0.160	85.0	239.5	
Bus32	20.000		0	0	0	0	0	0	0	0	2.294	84.1	67.4	
Bus33	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	121.3	
Bus34	20.000		0	0	0	0	0	0	0	0	1.501	84.3	44.6	
Bus37	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	126.6	
Bus38	20.000		0	0	0	0	0	0	0	0	1.388	83.4	43.0	
Bus41	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	398.8	
Bus42	20.000		0	0	0	0	0	0	0	0	1.306	83.4	40.5	
Bus43	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	398.9	
Bus44	20.000		0	0	0	0	0	0	0	0	0.543	83.4	16.8	
Bus45	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	126.6	
Bus46	20.000		0	0	0	0	0	0	0	0	0.082	83.3	2.5	
Bus47	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	316.6	
Bus48	20.000		0	0	0	0	0	0	0	0	0.204	83.3	6.3	
Bus49	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	303.2	
Bus50	20.000		0	0	0	0	0	0	0	0	0.610	83.7	18.1	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 31
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus51	0.400		0.272	0.169	0	0	0	0	0	0	0.320	85.0	485.1	
Bus52	20.000		0	0	0	0	0	0	0	0	0.406	83.7	12.1	
Bus53	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.5	
Bus54	20.000		0	0	0	0	0	0	0	0	0.080	84.6	2.4	
Bus59	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	375.5	
Bus60	20.000		0	0	0	0	0	0	0	0	3.957	83.9	115.6	
Bus62	20.000		0	0	0	0	0	0	0	0	3.425	83.9	100.2	
Bus63	20.000		0	0	0	0	0	0	0	0	0.529	83.6	15.5	
Bus64	0.400		0.272	0.169	0	0	0	0	0	0	0.320	85.0	476.6	
Bus67	20.000		0	0	0	0	0	0	0	0	0.204	83.5	6.0	
Bus68	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	297.9	
Bus80	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	297.6	
Bus81	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.0	
Bus82	20.000		0	0	0	0	0	0	0	0	4.335	83.8	126.3	
Bus83	20.000		0	0	0	0	0	0	0	0	4.246	83.8	124.0	
Bus84	20.000		0	0	0	0	0	0	0	0	4.163	83.8	121.6	
Bus85	0.400		0.017	0.011	0	0	0	0	0	0	0.020	85.0	29.7	
Bus86	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	189.8	
Bus87	20.000		0	0	0	0	0	0	0	0	4.748	83.8	138.2	
Bus88	20.000		0	0	0	0	0	0	0	0	4.489	83.8	130.7	
Bus89	20.000		0	0	0	0	0	0	0	0	4.357	83.8	126.9	
Bus90	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	373.6	
Bus91	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	118.8	
Bus92	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	118.6	
Bus93	0.400		0.136	0.084	0	0	0	0	0	0	0.160	85.0	236.7	
Bus94	20.000		0	0	0	0	0	0	0	0	5.206	83.7	151.2	
Bus95	20.000		0	0	0	0	0	0	0	0	5.001	83.7	145.3	
Bus96	20.000		0	0	0	0	0	0	0	0	4.830	83.8	140.5	
Bus97	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	295.8	
Bus98	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	118.3	
Bus99	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	118.3	
Bus100	20.000		0	0	0	0	0	0	0	0	6.568	83.7	190.5	
Bus101	20.000		0	0	0	0	0	0	0	0	5.832	83.7	169.3	
Bus102	20.000		0	0	0	0	0	0	0	0	5.290	83.7	153.5	
Bus103	0.400		0.017	0.011	0	0	0	0	0	0	0.020	85.0	29.5	
Bus108	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	372.5	
Bus109	20.000		0	0	0	0	0	0	0	0	0.460	83.5	13.4	
Bus110	20.000		0	0	0	0	0	0	0	0	0.204	83.5	5.9	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 32
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus111	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	295.7	
Bus116	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	118.2	
Bus117	20.000		0	0	0	0	0	0	0	0	0.582	83.6	16.9	
Bus118	20.000		0	0	0	0	0	0	0	0	0.081	83.5	2.4	
Bus119	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	118.2	
Bus121	20.000		0	0	0	0	0	0	0	0	0.712	83.6	20.7	
Bus122	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	189.1	
Bus123	20.000		0	0	0	0	0	0	0	0	0.419	83.6	12.2	
Bus124	0.400		0.136	0.084	0	0	0	0	0	0	0.160	85.0	236.5	
Bus125	20.000		0	0	0	0	0	0	0	0	0.257	83.5	7.4	
Bus126	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	372.5	
Bus145	0.400		0.136	0.084	0	0	0	0	0	0	0.160	85.0	237.1	
Bus146	0.400		0.017	0.011	0	0	0	0	0	0	0.020	85.0	29.6	
Bus147	20.000		0	0	0	0	0	0	0	0	5.538	83.7	161.1	
Bus148	20.000		0	0	0	0	0	0	0	0	5.518	83.7	160.5	
Bus149	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	374.6	
Bus150	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	59.5	
Bus151	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	297.9	
Bus152	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	298.1	
Bus153	20.000		0	0	0	0	0	0	0	0	4.662	83.8	136.4	
Bus154	20.000		0	0	0	0	0	0	0	0	4.869	83.7	142.3	
Bus155	20.000		0	0	0	0	0	0	0	0	4.916	83.7	143.5	
Bus156	20.000		0	0	0	0	0	0	0	0	5.176	83.7	151.0	
Bus157	20.000		0	0	0	0	0	0	0	0	5.344	83.7	155.8	
Bus158	0.400		0.136	0.084	0	0	0	0	0	0	0.160	85.0	237.6	
Bus163	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.3	
Bus164	20.000		0	0	0	0	0	0	0	0	0.082	83.5	2.4	
Bus165	20.000		0	0	0	0	0	0	0	0	0.407	83.6	11.9	
Bus166	0.400		0.272	0.169	0	0	0	0	0	0	0.320	85.0	477.1	
Bus177	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.5	
Bus178	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	376.5	
Bus179	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	191.5	
Bus180	0.400		0.136	0.084	0	0	0	0	0	0	0.160	85.0	239.5	
Bus181	20.000		0	0	0	0	0	0	0	0	3.447	83.8	101.3	
Bus182	20.000		0	0	0	0	0	0	0	0	3.579	83.8	105.1	
Bus183	20.000		0	0	0	0	0	0	0	0	3.920	83.8	114.9	
Bus184	20.000		0	0	0	0	0	0	0	0	4.004	83.8	117.3	
Bus185	20.000		0	0	0	0	0	0	0	0	4.049	83.8	118.5	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 33
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus186	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	59.7	
Bus189	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.5	
Bus190	20.000		0	0	0	0	0	0	0	0	0.082	83.5	2.4	
Bus194	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.8	
Bus195	20.000		0	0	0	0	0	0	0	0	3.282	83.9	96.5	
Bus196	20.000		0	0	0	0	0	0	0	0	1.377	83.6	40.5	
Bus197	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.9	
Bus214	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	377.8	
Bus215	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	119.9	
Bus216	20.000		0	0	0	0	0	0	0	0	1.296	83.6	38.1	
Bus217	20.000		0	0	0	0	0	0	0	0	1.214	83.5	35.7	
Bus224	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	120.0	
Bus225	20.000		0	0	0	0	0	0	0	0	0.957	83.6	28.2	
Bus226	20.000		0	0	0	0	0	0	0	0	0.082	83.5	2.4	
Bus227	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	120.0	
Bus230	20.000		0	0	0	0	0	0	0	0	0.795	83.5	23.4	
Bus231	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	120.0	
Bus232	20.000		0	0	0	0	0	0	0	0	0.163	83.5	4.8	
Bus233	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	120.0	
Bus234	20.000		0	0	0	0	0	0	0	0	0.082	83.5	2.4	
Bus235	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	120.0	
Bus236	20.000		0	0	0	0	0	0	0	0	0.550	83.5	16.2	
Bus237	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	120.0	
Bus244	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	192.0	
Bus245	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	120.0	
Bus246	20.000		0	0	0	0	0	0	0	0	0.082	83.5	2.4	
Bus247	20.000		0	0	0	0	0	0	0	0	0.212	83.5	6.2	
Bus248	20.000		0	0	0	0	0	0	0	0	0.469	83.5	13.8	
Bus249	0.400		0.214	0.133	0	0	0	0	0	0	0.252	85.0	378.0	
Bus264	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	122.2	
Bus265	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	305.5	
Bus266	20.000		0	0	0	0	0	0	0	0	1.799	83.9	53.9	
Bus267	20.000		0	0	0	0	0	0	0	0	1.595	84.0	47.8	
Bus268	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	122.2	
Bus269	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	122.7	
Bus270	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	307.9	
Bus271	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	123.2	
Bus272	20.000		0	0	0	0	0	0	0	0	0.658	83.9	19.9	

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 34
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus273	20.000		0	0	0	0	0	0	0	0	0.862	83.8	26.0	
Bus274	20.000		0	0	0	0	0	0	0	0	0.943	84.1	28.4	
Bus275	20.000		0	0	0	0	0	0	0	0	1.432	84.0	42.9	
Bus276	20.000		0	0	0	0	0	0	0	0	1.514	84.0	45.3	
Bus277	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	122.2	
Bus282	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	122.2	
Bus283	20.000		0	0	0	0	0	0	0	0	0.082	83.4	2.4	
Bus284	20.000		0	0	0	0	0	0	0	0	0.408	83.5	12.2	
Bus285	0.400		0.170	0.105	0	0	0	0	0	0	0.200	85.0	305.6	
Bus291	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.1	
Bus292	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.1	
Bus293	20.000		0	0	0	0	0	0	0	0	0.122	83.5	3.7	
Bus294	20.000		0	0	0	0	0	0	0	0	0.082	83.5	2.4	
Bus295	20.000		0	0	0	0	0	0	0	0	0.041	83.4	1.2	
Bus296	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.1	
Bus299	0.400		0.109	0.067	0	0	0	0	0	0	0.128	85.0	197.4	
Bus300	20.000		0	0	0	0	0	0	0	0	0.578	83.6	17.5	
Bus317	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.7	
Bus318	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	123.5	
Bus319	20.000		0	0	0	0	0	0	0	0	0.448	83.5	13.6	
Bus320	20.000		0	0	0	0	0	0	0	0	0.367	83.6	11.1	
Bus321	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	123.5	
Bus322	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.7	
Bus323	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.7	
Bus324	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.7	
Bus325	20.000		0	0	0	0	0	0	0	0	0.122	83.6	3.7	
Bus326	20.000		0	0	0	0	0	0	0	0	0.163	83.6	4.9	
Bus327	20.000		0	0	0	0	0	0	0	0	0.204	83.6	6.2	
Bus328	20.000		0	0	0	0	0	0	0	0	0.285	83.6	8.6	
Bus329	20.000		0	0	0	0	0	0	0	0	0.326	83.6	9.9	
Bus330	0.400		0.034	0.021	0	0	0	0	0	0	0.040	85.0	61.7	
Bus331	0.400		0.068	0.042	0	0	0	0	0	0	0.080	85.0	123.5	
Bus332	20.000		0	0	0	0	0	0	0	0	0.082	83.4	2.5	
Bus335	20.000		0	0	0	0	0	0	0	0	0	0.0	0.0	
Bus336	150.000		0	0	0	0	0	0	0	0	0	0.0	0.0	
Bus337	20.000		0	0	0	0	0	0	0	0	2.111	84.1	62.8	
Bus338	20.000		0	0	0	0	0	0	0	0	2.794	84.0	81.9	
Bus339	20.000		0	0	0	0	0	0	0	0	5.751	83.7	166.9	

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus352	150.000		0	0	0	0	0	0	0	0	12.179	83.3	46.9	
Bus353	20.000		0	0	0	0	0	0	0	0	12.121	83.7	351.6	
Bus354	20.000		0	0	0	0	0	0	0	0	12.123	83.7	351.6	

* Indicates operating load of a bus exceeds the bus critical limit (100.0% of the Continuous Ampere rating).

Indicates operating load of a bus exceeds the bus marginal limit (95.0% of the Continuous Ampere rating).

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 36
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Branch Loading Summary Report

CKT / Branch		Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%
T1	Transformer				0.160	0.131	81.7	0.128	80.0
T3	Transformer				0.250	0.204	81.7	0.200	80.0
T4	Transformer				0.160	0.131	81.7	0.128	80.0
T6	Transformer				0.050	0.041	81.7	0.040	80.0
T7	Transformer				30.000				
T8	Transformer				0.100	0.082	81.5	0.080	80.0
T10	Transformer				0.250	0.204	81.5	0.200	80.0
T11	Transformer				0.200	0.163	81.5	0.160	80.0
T12	Transformer				0.160	0.130	81.5	0.128	80.0
T13	Transformer				0.100	0.082	81.5	0.080	80.0
T15	Transformer				0.200	0.163	81.5	0.160	80.0
T16	Transformer				0.100	0.082	81.6	0.080	80.0
T18	Transformer				0.100	0.082	81.7	0.080	80.0
T20	Transformer				0.315	0.257	81.7	0.252	80.0
T21	Transformer				0.315	0.257	81.7	0.252	80.0
T22	Transformer				0.100	0.082	81.7	0.080	80.0
T23	Transformer				0.250	0.204	81.7	0.200	80.0
T24	Transformer				0.250	0.204	81.6	0.200	80.0
T25	Transformer				0.400	0.326	81.6	0.320	80.0
T26	Transformer				0.400	0.080	20.1	0.080	20.0
T29	Transformer				0.315	0.257	81.5	0.252	80.0
T31	Transformer				0.400	0.326	81.5	0.320	80.0
T33	Transformer				0.250	0.204	81.5	0.200	80.0
T40	Transformer				0.250	0.204	81.5	0.200	80.0
T41	Transformer				0.100	0.082	81.5	0.080	80.0
T42	Transformer				0.100	0.082	81.5	0.080	80.0
T43	Transformer				0.025	0.020	81.5	0.020	80.0
T44	Transformer				0.160	0.130	81.5	0.128	80.0
T45	Transformer				0.315	0.257	81.5	0.252	80.0
T46	Transformer				0.100	0.082	81.5	0.080	80.0
T47	Transformer				0.200	0.163	81.5	0.160	80.0
T48	Transformer				0.250	0.204	81.5	0.200	80.0
T49	Transformer				0.100	0.081	81.5	0.080	80.0

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 37
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT / Branch		Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%
T50	Transformer				0.100	0.081	81.5	0.080	80.0
T51	Transformer				0.025	0.020	81.5	0.020	80.0
T54	Transformer				0.315	0.257	81.5	0.252	80.0
T55	Transformer				0.250	0.204	81.5	0.200	80.0
T58	Transformer				0.100	0.081	81.5	0.080	80.0
T59	Transformer				0.100	0.081	81.5	0.080	80.0
T61	Transformer				0.160	0.130	81.5	0.128	80.0
T62	Transformer				0.200	0.163	81.5	0.160	80.0
T63	Transformer				0.315	0.257	81.5	0.252	80.0
T73	Transformer				0.200	0.163	81.5	0.160	80.0
T74	Transformer				0.025	0.020	81.5	0.020	80.0
T75	Transformer				0.315	0.257	81.5	0.252	80.0
T76	Transformer				0.050	0.041	81.5	0.040	80.0
T77	Transformer				0.250	0.204	81.5	0.200	80.0
T78	Transformer				0.250	0.204	81.5	0.200	80.0
T79	Transformer				0.200	0.163	81.5	0.160	80.0
T82	Transformer				0.100	0.082	81.5	0.080	80.0
T83	Transformer				0.400	0.326	81.5	0.320	80.0
T89	Transformer				0.100	0.082	81.5	0.080	80.0
T90	Transformer				0.315	0.257	81.5	0.252	80.0
T91	Transformer				0.160	0.130	81.5	0.128	80.0
T92	Transformer				0.200	0.163	81.5	0.160	80.0
T93	Transformer				0.050	0.041	81.5	0.040	80.0
T95	Transformer				0.100	0.082	81.5	0.080	80.0
T98	Transformer				0.100	0.082	81.5	0.080	80.0
T99	Transformer				0.100	0.082	81.5	0.080	80.0
T108	Transformer				0.315	0.257	81.5	0.252	80.0
T109	Transformer				0.100	0.082	81.5	0.080	80.0
T113	Transformer				0.100	0.082	81.5	0.080	80.0
T114	Transformer				0.100	0.082	81.5	0.080	80.0
T116	Transformer				0.100	0.082	81.5	0.080	80.0
T117	Transformer				0.100	0.082	81.5	0.080	80.0
T118	Transformer				0.100	0.082	81.5	0.080	80.0
T119	Transformer				0.100	0.082	81.5	0.080	80.0
T123	Transformer				0.160	0.130	81.5	0.128	80.0

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 38
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT / Branch		Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%
T124	Transformer				0.100	0.082	81.5	0.080	80.0
T125	Transformer				0.315	0.257	81.5	0.252	80.0
T133	Transformer				0.100	0.082	81.6	0.080	80.0
T134	Transformer				0.250	0.204	81.6	0.200	80.0
T135	Transformer				0.100	0.082	81.6	0.080	80.0
T136	Transformer				0.100	0.082	81.6	0.080	80.0
T137	Transformer				0.250	0.204	81.6	0.200	80.0
T138	Transformer				0.100	0.082	81.6	0.080	80.0
T139	Transformer				0.100	0.082	81.6	0.080	80.0
T142	Transformer				0.100	0.082	81.6	0.080	80.0
T143	Transformer				0.250	0.204	81.6	0.200	80.0
T147	Transformer				0.050	0.041	81.6	0.040	80.0
T148	Transformer				0.050	0.041	81.6	0.040	80.0
T149	Transformer				0.050	0.041	81.6	0.040	80.0
T151	Transformer				0.160	0.131	81.6	0.128	80.0
T160	Transformer				0.050	0.041	81.6	0.040	80.0
T161	Transformer				0.100	0.082	81.6	0.080	80.0
T162	Transformer				0.100	0.082	81.6	0.080	80.0
T163	Transformer				0.050	0.041	81.6	0.040	80.0
T164	Transformer				0.050	0.041	81.6	0.040	80.0
T165	Transformer				0.050	0.041	81.6	0.040	80.0
T166	Transformer				0.050	0.041	81.6	0.040	80.0
T167	Transformer				0.100	0.082	81.6	0.080	80.0
T174	Transformer				60.000	12.179	20.3	12.123	20.2
TAS	Transformer				0.250	0.204	81.5	0.200	80.0

* Indicates a branch with operating load exceeding the branch capability.

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 39
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Branch Losses Summary Report

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd
ID		MW	Mvar	MW	Mvar	kW	kvar	From	To	% Drop in Vmag
T1		-0.109	-0.067	0.109	0.072	0.1	4.9	91.2	93.1	1.96
Line1		-0.109	-0.072	0.109	0.072	0.0	-0.1	93.1	93.1	0.00
T3		-0.170	-0.105	0.170	0.113	0.2	7.7	91.2	93.1	1.96
Line2		-0.279	-0.185	0.279	0.185	0.0	-0.3	93.1	93.1	0.01
T4		-0.109	-0.067	0.109	0.072	0.1	4.9	91.2	93.1	1.96
Line3		-0.388	-0.257	0.388	0.257	0.1	-0.6	93.1	93.2	0.02
T6		-0.034	-0.021	0.034	0.023	0.0	1.5	91.2	93.2	1.96
Line19		-0.422	-0.279	0.422	0.279	0.0	-0.1	93.2	93.2	0.00
TAS		-0.170	-0.105	0.170	0.112	0.2	6.9	96.6	98.4	1.85
Line5		-0.170	-0.112	0.170	0.112	0.0	-0.1	98.4	98.4	0.00
Line147		0.000	0.000	0.000	0.000	0.0	-0.2	98.4	98.4	0.00
T8		-0.068	-0.042	0.068	0.045	0.1	2.7	96.6	98.4	1.85
Line149		-0.238	-0.157	0.238	0.157	0.0	-0.2	98.4	98.4	0.00
T10		-0.170	-0.105	0.170	0.112	0.2	6.9	96.6	98.5	1.85
Line7		2.348	1.515	-2.347	-1.515	0.6	0.4	98.5	98.4	0.03
Line8		-2.518	-1.628	2.519	1.628	0.8	0.6	98.5	98.5	0.04
T11		-0.136	-0.084	0.136	0.090	0.1	5.5	96.6	98.5	1.85
Line27		-2.655	-1.718	2.660	1.722	4.7	4.0	98.5	98.7	0.21
T12		-0.109	-0.067	0.109	0.072	0.1	4.4	96.5	98.4	1.85
Line6		-2.108	-1.358	2.109	1.358	0.7	0.5	98.4	98.4	0.04
Line10		1.999	1.286	-1.999	-1.286	0.8	0.5	98.4	98.3	0.05
T13		-0.068	-0.042	0.068	0.045	0.1	2.7	96.5	98.3	1.85
Line12		1.931	1.241	-1.930	-1.240	0.8	0.5	98.3	98.3	0.05
T15		-0.136	-0.084	0.136	0.090	0.1	5.5	96.4	98.3	1.85
Line148		1.794	1.150	-1.776	-1.141	17.8	9.5	98.3	97.1	1.19
T16		-0.068	-0.042	0.068	0.045	0.1	2.8	95.2	97.1	1.87
Line13		-1.265	-0.807	1.265	0.807	0.1	0.0	97.1	97.1	0.01
Line16		1.197	0.762	-1.158	-0.766	39.6	-3.7	97.1	93.2	3.90
T18		-0.068	-0.042	0.068	0.045	0.1	3.1	91.2	93.2	1.96
Line18		1.090	0.720	-1.089	-0.721	0.3	0.0	93.2	93.2	0.03
T20		-0.214	-0.133	0.214	0.142	0.2	9.7	91.2	93.2	1.96
Line20		0.453	0.299	-0.453	-0.299	0.0	-0.3	93.2	93.1	0.01
T21		-0.214	-0.133	0.214	0.142	0.2	9.7	91.2	93.1	1.96
Line21		0.068	0.045	-0.068	-0.045	0.0	-0.7	93.1	93.1	0.00
Line22		0.170	0.112	-0.170	-0.113	0.0	-0.8	93.1	93.1	0.01

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 40
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T22	-0.068	-0.042	0.068	0.045	0.1	3.1	91.2	93.1	1.96
T23	-0.170	-0.105	0.170	0.113	0.2	7.7	91.2	93.1	1.96
T24	-0.170	-0.105	0.170	0.112	0.2	7.1	95.2	97.1	1.87
Line14	-0.510	-0.334	0.510	0.334	0.0	-0.1	97.1	97.1	0.00
Line23	0.340	0.222	-0.340	-0.222	0.0	-0.6	97.1	97.1	0.01
T25	-0.272	-0.169	0.272	0.180	0.3	11.3	95.2	97.1	1.87
Line24	0.068	0.042	-0.068	-0.043	0.0	-0.4	97.1	97.1	0.00
T26	-0.068	-0.042	0.068	0.043	0.0	0.7	96.6	97.1	0.45
T29	-0.214	-0.133	0.214	0.141	0.2	8.6	96.9	98.7	1.84
Line26	-3.318	-2.155	3.320	2.157	2.1	2.0	98.8	98.8	0.08
Line28	0.442	0.290	-0.442	-0.291	0.1	-0.7	98.8	98.8	0.02
Line150	2.876	1.865	-2.874	-1.863	1.6	1.4	98.8	98.7	0.07
Line29	0.170	0.111	-0.170	-0.112	0.0	-0.7	98.8	98.7	0.01
T31	0.272	0.179	-0.272	-0.169	0.2	10.9	98.8	96.9	1.84
T33	0.170	0.112	-0.170	-0.105	0.2	6.8	98.7	96.9	1.84
T40	-0.170	-0.105	0.170	0.112	0.2	6.8	97.0	98.8	1.84
T41	-0.068	-0.042	0.068	0.045	0.1	2.7	97.1	98.9	1.84
Line35	3.565	2.320	-3.560	-2.315	5.0	4.9	99.1	98.9	0.17
Line37	-3.633	-2.365	3.634	2.366	1.5	1.5	99.1	99.1	0.05
T42	0.068	0.045	-0.068	-0.042	0.1	2.7	99.1	97.2	1.83
Line36	3.492	2.270	-3.490	-2.269	1.2	1.1	98.9	98.8	0.04
T43	-0.017	-0.011	0.017	0.011	0.0	0.7	97.3	99.1	1.83
T44	-0.109	-0.067	0.109	0.072	0.1	4.3	97.3	99.2	1.83
Line38	3.763	2.452	-3.761	-2.451	1.4	1.4	99.2	99.2	0.05
Line42	-3.977	-2.593	3.978	2.594	0.5	0.5	99.2	99.2	0.02
T45	0.214	0.141	-0.214	-0.133	0.2	8.5	99.2	97.4	1.83
Line39	3.653	2.379	-3.651	-2.378	1.3	1.3	99.2	99.1	0.04
T46	-0.068	-0.042	0.068	0.045	0.1	2.7	97.4	99.2	1.83
T47	-0.136	-0.084	0.136	0.090	0.1	5.4	97.5	99.4	1.83
Line40	4.189	2.735	-4.187	-2.734	1.2	1.3	99.4	99.4	0.04
Line43	-4.359	-2.847	4.361	2.849	1.8	1.8	99.4	99.5	0.05
T48	0.170	0.112	-0.170	-0.105	0.1	6.7	99.4	97.6	1.83
Line41	4.051	2.644	-4.046	-2.639	5.4	5.5	99.4	99.2	0.16
T49	-0.068	-0.042	0.068	0.045	0.1	2.7	97.6	99.5	1.83
T50	-0.068	-0.042	0.068	0.045	0.1	2.7	97.6	99.5	1.83
Line44	4.884	3.194	-4.881	-3.192	2.2	2.3	99.5	99.5	0.05
Line49	0.596	0.390	-0.596	-0.391	0.1	-0.4	99.5	99.5	0.02

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 41
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Line50	-5.496	-3.596	5.497	3.596	0.1	0.2	99.5	99.5	0.00
T51	0.017	0.011	-0.017	-0.011	0.0	0.7	99.5	97.7	1.82
Line45	4.813	3.147	-4.813	-3.147	0.1	0.1	99.5	99.5	0.00
Line151	-4.429	-2.894	4.429	2.894	0.1	0.1	99.5	99.5	0.00
T54	-0.214	-0.133	0.214	0.141	0.2	8.5	97.6	99.5	1.83
Line46	-0.385	-0.253	0.385	0.253	0.0	0.0	99.5	99.5	0.00
Line48	0.170	0.112	-0.170	-0.112	0.0	-0.1	99.5	99.5	0.00
T55	0.170	0.112	-0.170	-0.105	0.1	6.7	99.5	97.6	1.83
T58	-0.068	-0.042	0.068	0.045	0.1	2.7	97.7	99.5	1.83
Line52	0.068	0.044	-0.068	-0.045	0.0	-0.4	99.5	99.5	0.00
Line53	-0.487	-0.319	0.487	0.319	0.0	-0.3	99.5	99.5	0.01
Line54	0.351	0.230	-0.351	-0.230	0.0	-0.3	99.5	99.5	0.01
T59	0.068	0.045	-0.068	-0.042	0.1	2.7	99.5	97.7	1.83
T61	0.109	0.072	-0.109	-0.067	0.1	4.3	99.5	97.7	1.83
Line55	0.214	0.141	-0.214	-0.141	0.0	-0.4	99.5	99.5	0.01
T62	0.136	0.090	-0.136	-0.084	0.1	5.4	99.5	97.7	1.83
T63	0.214	0.141	-0.214	-0.133	0.2	8.5	99.5	97.7	1.83
T73	-0.136	-0.084	0.136	0.090	0.1	5.4	97.4	99.2	1.83
T74	-0.017	-0.011	0.017	0.011	0.0	0.7	97.4	99.3	1.83
Line62	4.616	3.023	-4.616	-3.023	0.1	0.1	99.3	99.2	0.00
Line159	-4.633	-3.034	4.644	3.045	10.5	10.8	99.3	99.5	0.27
Line63	4.480	2.933	-4.472	-2.926	7.5	7.7	99.2	99.0	0.20
T75	-0.214	-0.133	0.214	0.141	0.2	8.5	97.1	98.9	1.84
T76	-0.034	-0.021	0.034	0.022	0.0	1.4	97.0	98.9	1.84
T77	-0.170	-0.105	0.170	0.112	0.2	6.8	96.9	98.7	1.84
T78	-0.170	-0.105	0.170	0.112	0.2	6.8	96.8	98.7	1.84
Line64	-3.905	-2.547	3.907	2.549	2.3	2.3	98.7	98.7	0.07
Line70	0.340	0.224	-0.340	-0.224	0.0	-0.2	98.7	98.7	0.00
Line71	3.394	2.211	-3.393	-2.210	1.0	0.9	98.7	98.6	0.03
Line65	-4.077	-2.661	4.082	2.666	4.9	4.9	98.7	98.9	0.14
Line66	-4.116	-2.689	4.118	2.691	2.1	2.1	98.9	98.9	0.06
Line67	-4.332	-2.832	4.336	2.836	3.8	3.9	98.9	99.0	0.11
T79	0.136	0.090	-0.136	-0.084	0.1	5.4	99.0	97.2	1.83
T82	-0.068	-0.042	0.068	0.045	0.1	2.7	96.8	98.7	1.84
Line69	-0.068	-0.045	0.068	0.044	0.0	-0.6	98.7	98.7	0.00
T83	0.272	0.179	-0.272	-0.169	0.2	10.9	98.7	96.8	1.84
T89	-0.068	-0.042	0.068	0.045	0.1	2.7	96.7	98.5	1.85

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 42
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T90	-0.214	-0.133	0.214	0.141	0.2	8.6	96.6	98.5	1.85
T91	-0.109	-0.067	0.109	0.072	0.1	4.4	96.5	98.3	1.85
T92	-0.136	-0.084	0.136	0.090	0.1	5.5	96.4	98.3	1.85
Line76	-2.890	-1.878	2.892	1.880	1.7	1.5	98.3	98.3	0.07
Line83	2.754	1.788	-2.753	-1.787	1.2	1.0	98.3	98.2	0.05
Line77	-3.001	-1.952	3.004	1.954	3.1	2.8	98.3	98.5	0.12
Line78	-3.286	-2.138	3.288	2.139	1.4	1.3	98.5	98.5	0.05
Line80	0.068	0.042	-0.068	-0.045	0.0	-2.7	98.5	98.4	0.01
Line79	-3.356	-2.184	3.359	2.188	3.5	3.3	98.5	98.6	0.12
T93	0.034	0.022	-0.034	-0.021	0.0	1.4	98.6	96.8	1.84
T95	-0.068	-0.042	0.068	0.045	0.1	2.7	96.6	98.4	1.85
T98	-0.068	-0.042	0.068	0.045	0.1	2.8	96.4	98.2	1.85
Line85	1.151	0.757	-1.151	-0.757	0.3	-0.1	98.2	98.2	0.04
Line108	1.533	0.986	-1.510	-0.978	23.4	7.6	98.2	96.4	1.82
Line95	1.083	0.712	-1.083	-0.712	0.2	-0.1	98.2	98.2	0.02
T99	0.068	0.045	-0.068	-0.042	0.1	2.8	98.2	96.3	1.85
T108	-0.214	-0.133	0.214	0.141	0.2	8.7	96.3	98.1	1.85
T109	-0.068	-0.042	0.068	0.045	0.1	2.8	96.3	98.2	1.85
Line93	1.015	0.667	-1.014	-0.667	0.2	-0.1	98.2	98.1	0.02
Line94	0.800	0.526	-0.800	-0.526	0.1	-0.2	98.1	98.1	0.02
T113	-0.068	-0.042	0.068	0.045	0.1	2.8	96.3	98.1	1.85
Line97	0.068	0.044	-0.068	-0.045	0.0	-0.5	98.1	98.1	0.00
Line99	0.664	0.437	-0.664	-0.437	0.1	-0.2	98.1	98.1	0.01
T114	0.068	0.045	-0.068	-0.042	0.1	2.8	98.1	96.3	1.85
Line100	0.136	0.089	-0.136	-0.090	0.0	-0.4	98.1	98.1	0.00
Line102	0.459	0.303	-0.459	-0.303	0.0	-0.1	98.1	98.1	0.00
T116	0.068	0.045	-0.068	-0.042	0.1	2.8	98.1	96.2	1.85
Line101	0.068	0.045	-0.068	-0.045	0.0	-0.2	98.1	98.1	0.00
T117	0.068	0.045	-0.068	-0.042	0.1	2.8	98.1	96.2	1.85
T118	0.068	0.045	-0.068	-0.042	0.1	2.8	98.1	96.2	1.85
Line107	0.391	0.258	-0.391	-0.258	0.0	-0.1	98.1	98.1	0.00
T119	0.068	0.045	-0.068	-0.042	0.1	2.8	98.1	96.2	1.85
T123	-0.109	-0.067	0.109	0.072	0.1	4.4	96.2	98.1	1.85
T124	-0.068	-0.042	0.068	0.045	0.1	2.8	96.2	98.1	1.85
Line105	-0.068	-0.045	0.068	0.045	0.0	-0.1	98.1	98.1	0.00
Line106	-0.177	-0.117	0.177	0.117	0.0	-0.1	98.1	98.1	0.00
T125	0.214	0.141	-0.214	-0.133	0.2	8.7	98.1	96.2	1.85

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 43
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT / Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T133	-0.068	-0.042	0.068	0.045	0.1	2.9	94.5	96.4	1.89
T134	-0.170	-0.105	0.170	0.113	0.2	7.2	94.5	96.4	1.89
Line115	1.340	0.866	-1.340	-0.866	0.1	0.0	96.4	96.4	0.01
Line116	1.272	0.821	-1.272	-0.821	0.1	0.0	96.4	96.4	0.01
T135	-0.068	-0.042	0.068	0.045	0.1	2.9	94.5	96.4	1.89
T136	-0.068	-0.042	0.068	0.045	0.1	2.9	94.1	96.0	1.90
T137	-0.170	-0.105	0.170	0.113	0.2	7.3	93.7	95.6	1.91
T138	-0.068	-0.042	0.068	0.045	0.1	2.9	93.7	95.6	1.91
Line117	-0.552	-0.358	0.552	0.358	0.1	-0.3	95.6	95.6	0.01
Line129	0.484	0.313	-0.483	-0.317	0.6	-4.0	95.6	95.5	0.15
Line118	-0.722	-0.470	0.724	0.466	2.1	-4.6	95.6	96.0	0.33
Line119	-0.792	-0.511	0.795	0.506	2.6	-4.4	96.0	96.4	0.38
Line120	-1.203	-0.776	1.204	0.776	0.1	0.0	96.4	96.4	0.01
Line121	0.340	0.224	-0.340	-0.225	0.0	-0.1	96.4	96.4	0.00
T139	0.068	0.045	-0.068	-0.042	0.1	2.9	96.4	94.5	1.89
T142	-0.068	-0.042	0.068	0.045	0.1	2.9	94.5	96.4	1.89
Line123	-0.068	-0.045	0.068	0.045	0.0	-0.1	96.4	96.4	0.00
Line124	0.102	0.067	-0.102	-0.067	0.0	-0.1	96.4	96.4	0.00
T143	0.170	0.113	-0.170	-0.105	0.2	7.2	96.4	94.5	1.89
T148	-0.034	-0.021	0.034	0.023	0.0	1.4	94.5	96.4	1.89
T149	-0.034	-0.021	0.034	0.023	0.0	1.4	94.5	96.4	1.89
Line127	0.068	0.045	-0.068	-0.045	0.0	-0.1	96.4	96.4	0.00
Line128	0.034	0.022	-0.034	-0.023	0.0	-0.1	96.4	96.4	0.00
T147	0.034	0.023	-0.034	-0.021	0.0	1.4	96.4	94.5	1.89
T151	-0.109	-0.067	0.109	0.072	0.1	4.7	93.6	95.5	1.91
Line144	0.375	0.245	-0.374	-0.246	0.1	-1.6	95.5	95.4	0.04
T160	-0.034	-0.021	0.034	0.023	0.0	1.5	93.5	95.4	1.91
T161	-0.068	-0.042	0.068	0.045	0.1	2.9	93.5	95.4	1.91
Line137	0.306	0.201	-0.306	-0.201	0.0	-0.1	95.4	95.4	0.00
Line138	0.272	0.179	-0.272	-0.179	0.0	-0.2	95.4	95.4	0.00
T162	-0.068	-0.042	0.068	0.045	0.1	2.9	93.5	95.4	1.91
T163	-0.034	-0.021	0.034	0.023	0.0	1.5	93.5	95.4	1.91
T164	-0.034	-0.021	0.034	0.023	0.0	1.5	93.5	95.4	1.91
T165	-0.034	-0.021	0.034	0.023	0.0	1.5	93.5	95.4	1.91
Line139	0.068	0.044	-0.068	-0.045	0.0	-0.6	95.4	95.4	0.00
Line140	-0.102	-0.067	0.102	0.067	0.0	-0.2	95.4	95.4	0.00
Line141	-0.136	-0.089	0.136	0.089	0.0	-0.2	95.4	95.4	0.00

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 44
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd
	MW	Mvar	MW	Mvar	kW	kvar	From	To	% Drop in Vmag
Line142	-0.170	-0.112	0.170	0.112	0.0	-0.2	95.4	95.4	0.00
Line143	-0.238	-0.157	0.238	0.156	0.0	-0.1	95.4	95.4	0.00
T166	0.034	0.023	-0.034	-0.021	0.0	1.5	95.4	93.5	1.91
T167	-0.068	-0.042	0.068	0.045	0.1	2.9	93.5	95.4	1.91
T7	0.000	0.000	0.000	0.000			100.0	100.0	
T174	10.143	6.741	-10.141	-6.642	2.2	98.9	100.0	99.5	0.46
Line158	-10.140	-6.641	10.141	6.642	1.0	1.1	99.5	99.5	0.01
					177.9	565.1			

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 45
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

Alert Summary Report

% Alert Settings

	<u>Critical</u>	<u>Marginal</u>
<u>Loading</u>		
Bus	100.0	95.0
Cable	100.0	95.0
Reactor	100.0	95.0
Line	100.0	95.0
Transformer	100.0	95.0
Panel	100.0	95.0
Protective Device	100.0	95.0
Generator	100.0	95.0
Inverter/Charger	100.0	95.0
<u>Bus Voltage</u>		
OverVoltage	105.0	102.0
UnderVoltage	90.0	93.0
<u>Generator Excitation</u>		
OverExcited (Q Max.)	100.0	95.0
UnderExcited (Q Min.)	100.0	

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus1	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus11	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus37	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus41	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus43	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus45	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus47	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus5	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase
Bus7	Bus	Under Voltage	0,40	kV	0,36	91.2	3-Phase

Project:
Location:
Contract:
Engineer:
Filename: widia

ETAP
12.6.0H

Study Case: LF

Page: 46
Date: 08-22-2018
SN:
Revision: Base
Config.: Normal

SUMMARY OF TOTAL GENERATION, LOADING & DEMAND

	<u>MW</u>	<u>Mvar</u>	<u>MVA</u>	<u>% PF</u>
Source (Swing Buses):	10.143	6.741	12.179	83.28 Lagging
Source (Non-Swing Buses):	0.000	0.000	0.000	
Total Demand:	10.143	6.741	12.179	83.28 Lagging
Total Motor Load:	9.965	6.176	11.724	85.00 Lagging
Total Static Load:	0.000	0.000	0.000	
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.178	0.565		
System Mismatch:	0.000	0.000		

Number of Iterations: 3