

BISON 2 WINDPOWER - SIEMENS FEEDERS

PRIMARY CONDUCTOR & COMMUNICATIONS B.O.M.

Cable Labels	FROM	TO	TRENCH	QTY.	UNIT	DESCRIPTION	MANUFACTURER
808A 77 - Sub	SW 808 ALPHA-77	FDR BKR 808	14,184	42552	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
808C 77 - 808B 88	SW 808 CHARLIE-77	SW 808 BRAVO-88	1620	4860	FT	750 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
808B 77 - 808A 88	SW 808 BRAVO-77	SW 808 ALPHA-88	4730	14190	FT	750 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
808D 77 - 808C 88	SW 808 DELTA-77	SW 808 CHARLIE-88	4598	13794	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
808A 33 - 808E 77	SW 808 ALPHA-33	SW 808 ECHO-77	2954	8862	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
T201 - 808D 88	TURBINE 201	SW 808 DELTA-88	1,092	3276	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T202 - 808C 33	TURBINE 202	SW 808 DELTA-33	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T204 - 808C 44	TURBINE 204	SW 808 CHARLIE-44	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T205 - 808C 33	TURBINE 205	SW 808 CHARLIE-33	1790	5370	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T203 - 808B 33	TURBINE 203	SW 808 BRAVO-33	16	48	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
808A T7 - 808TR	SW 808 ALPHA-T7	808TR	26	78	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T206 - 808E 33	TURBINE 206	SW 808 ECHO-33	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T207 - 808E 88	TURBINE 207	SW 808 ECHO-88	2,746	8238	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
	MET TOWER	SW 808 ECHO-88	5,308	5,308	24 FO	9/125 SINGLE MODE, 24 STRAND FIBER, LOOSE TUBE, UV RESISTANT PE JKT, FOR	COMMSCOPE
Feeder Fiber Total			39,118	39,118	24 FO	9/125 SINGLE MODE, 24 STRAND FIBER, LOOSE TUBE, UV RESISTANT PE JKT, FOR	COMMSCOPE
Feeder Conductor Total				101430	FT		
FEEDER #809							
809A 77 - Sub	SW 809 ALPHA-77	FDR BKR 809	13,014	39042	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
809C 77 - 809A 44	SW 809 CHARLIE-77	SW 809 ALPHA-44	3,716	11148	FT	750 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
809D 77 - 809C 33	SW 809 DELTA-77	SW 809 CHARLIE-33	1,548	4644	FT	350 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
809A 88 - 809B 77	SW 809 ALPHA-88	SW 809 BRAVO-77	3,136	9408	FT	350 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
809E 77 - 809D 88	SW 809 ECHO-77	SW 809 DELTA-88	1,598	4794	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
T214 - 809E 33	TURBINE 214	SW 809 ECHO-33	1,256	3768	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T213 - 809E 88	TURBINE 213	SW 809 ECHO-88	16	48	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T212 - 809D 33	TURBINE 212	SW 809 DELTA-33	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T211 - 809C 44	TURBINE 211	SW 809 CHARLIE-88	20	60	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T208 - 809B 44	TURBINE 208	SW 809 BRAVO-44	1,430	4290	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T209 - 809B 88	TURBINE 209	SW 809 BRAVO-88	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T210 - 809B 33	TURBINE 210	SW 809 BRAVO-33	1,942	5826	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
809A T7 - 809TR	SW 809 ALPHA-T7	809TR	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
Feeder Fiber Total			27,730	27,730	24 FO	9/125 SINGLE MODE, 24 STRAND FIBER, LOOSE TUBE, UV RESISTANT PE JKT, FOR	COMMSCOPE
Feeder Conductor Total				83190	FT		
FEEDER #810							
810B 77 - 810A 88	SW 810 BRAVO-77	SW 810 ALPHA-88	5,648	16944	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
810A 77 - Sub	SW 810 ALPHA-77	FDR BKR 810	10,550	31650	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
810C 77 - 810B 88	SW 810 CHARLIE-77	SW 810 BRAVO-88	2,010	6030	FT	750 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
810D 77 - 810C 88	SW 810 DELTA-77	SW 810 CHARLIE-88	7,554	22662	FT	750 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
810E 77 - 810D 88	SW 810 ECHO-77	SW 810 DELTA-88	2,240	6720	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
T221 - 810E 33	TURBINE 221	SW 810 ECHO-33	2,208	6624	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T220 - 810E 88	TURBINE 220	SW 810 ECHO-88	118	354	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T219 - 810D 33	TURBINE 219	SW 810 DELTA-33	976	2928	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T218 - 810D 44	TURBINE 218	SW 810 DELTA-44	2,356	7068	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T217 - 810C 33	TURBINE 217	SW 810 CHARLIE-33	636	1908	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T216 - 810B 33	TURBINE 216	SW 810 BRAVO-33	716	2148	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T215 - 810A 33	TURBINE 215	SW 810 ALPHA-33	1,478	4434	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
810A T7 - 810TR	SW 810 ALPHA-T7	TR810	20	60	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
Feeder Fiber Total			36,510	36,510	24 FO	9/125 SINGLE MODE, 24 STRAND FIBER, LOOSE TUBE, UV RESISTANT PE JKT, FOR	COMMSCOPE
Feeder Conductor Total				109530	FT		

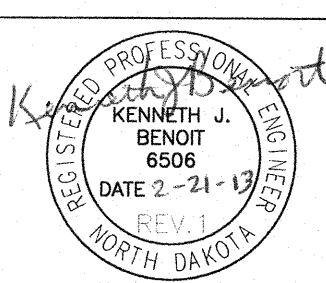
BISON 2 WINDPOWER - SIEMENS FEEDERS

PRIMARY CONDUCTOR & COMMUNICATIONS B.O.M. (CON'T)

Cable Labels	FROM	TO	TRENCH	QTY.	UNIT	DESCRIPTION	MANUFACTURER
FEEDER #811							
811B 77 - 811A 88	SW 811 BRAVO-77	SW 811 ALPHA-88	5,162	15486	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
811A 77 - Sub	SW 811 ALPHA-77	FDR BKR 811	21,216	63648	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
811B 33 - 811E 44	SW 811 BRAVO-33	SW 811 ECHO-44	6,400	19200	FT	350 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
811C 77 - 811B 88	SW 811 CHARLIE-77	SW 811 BRAVO-88	2,842	8526	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
811D 77 - 811C 88	SW 811 DELTA-77	SW 811 CHARLIE-88	2,204	6612	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
T225 - 811D 33	TURBINE 225	SW 811 DELTA-33	346	1038	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T224 - 811D 88	TURBINE 224	SW 811 DELTA-88	1,060	3180	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T226 - 811C 33	TURBINE 226	SW 811 CHARLIE-33	1,822	5466	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T227 - 811B 44	TURBINE 227	SW 811 BRAVO-44	728	2184	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T222 - 811E 77	TURBINE 222	SW 811 ECHO-77	2,196	6588	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T223 - 811E 88	TURBINE 223	SW 811 ECHO-88	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T228 - 811E 33	TURBINE 228	SW 811 ECHO-33	2,670	8010	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
811A T7 - 811TR	SW 811 ALPHA-T7	811TR	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
Feeder Fiber Total			46,682	46,682	24 FO	9/125 SINGLE MODE, 24 STRAND FIBER, LOOSE TUBE, UV RESISTANT PE JKT, FOR	COMMSCOPE
Feeder Conductor Total				140046	FT		
FEEDER #812							
812A 77 - Sub	SW 812 ALPHA-77	FDR BKR 812	20,820	62460	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
812B 77 - 812A 88	SW 812 BRAVO-77	SW 812 ALPHA-88	3,368	10104	FT	750 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
812C 77 - 812B 88	SW 812 CHARLIE-77	SW 812 BRAVO-88	1,320	3960	FT	350 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	OKONITE
812D 44 - 812E 77	SW 812 DELTA-44	SW 812 ECHO-77	1,950	5850	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
812A 33 - 812D 77	SW 812 ALPHA-33	SW 812 DELTA-77	1,030	3090	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	OKONITE
T230 - 812E 33	TURBINE 230	SW 812 ECHO-33	16	48	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T229 - 812E 88	TURBINE 229	SW 812 ECHO-88	1,140	3420	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
812A T7 - 812TR	SW 812 ALPHA-T7	TR812	17	51	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T234 - 812C 33	TURBINE 234	SW 812 CHARLIE-33	1,326	3978	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T233 - 812C 88	TURBINE 233	SW 812 CHARLIE-88	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T235 - 812C 44	TURBINE 235	SW 812 CHARLIE-44	3,108	9324	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T232 - 812B 44	TURBINE 232	SW 812 BRAVO-44	138	414	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
T231 - 812D 88	TURBINE 231	SW 812 DELTA-88	18	54	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	OKONITE
Feeder Fiber Total			34,269	34,269	24 FO	9/125 SINGLE MODE, 24 STRAND FIBER, LOOSE TUBE, UV RESISTANT PE JKT, FOR	COMMSCOPE
Feeder Conductor Total				102807	FT		
TOTALS							
			90,594	271,782	FT	1000 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	AS-BUILT
			22,998	68,994	FT	750 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	
			12,404	37,212	FT	350 kcmil str AL, 35kV, 16#12 CU CONC NEUTRAL, JKT	
			19,416	58,248	FT	4/0 AWG str AL, 35kV, 12#14 CU CONC NEUTRAL, JKT	
			33,489	100,467	FT	1/0 AWG str AL, 35kV, 10#14 CU CONC NEUTRAL, JKT	
			184,209	184,209	FT	9/125 SINGLE MODE, 24 STRAND FIBER, LOOSE TUBE, UV RESISTANT PE JKT, FOR	AS-BUILT
						DIRECT BURIAL, IN 2" HDPE INNERDUCT. *CAT# D-024-LN-8W-F-12-N5	
DOES NOT INCLUDE CONDUCTORS/CABLES FOR LV POWER/GROUND FROM GSU TO TURBINE OR WTG FOUNDATION GROUNDING							

Images in Drawing -

A	RJG	RJG	CSF	7/8/11	90% DELIVERABLE
B	RJG	RJG	CSF	7/14/11	REVISIONS PER CLIENT COMMENTS
C	RJG	RJG	CSF	7/21/11	CONDUCTOR REVISIONS
O	BNK	RJG	CSF	8/4/11	ISSUED FOR CONSTRUCTION
1	NJG	RJG	CSF	2/21/13	CONSTRUCTION REVISIONS
NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION



CLIENT	7/8/11/14/11/21/11/8/4/11
BID	
CONSTRUCTION PERMITTING	
RELEASED TO/FOR	A B C O 1 2 3
DATE RELEASED	

BARR ENGINEERING CO.
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
55435-4803
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

Scale	N.T.S
Date	07/08/11
Drawn	RJG
Checked	CEG
Designed	RJG
Approved	JLM

MINNESOTA POWER
AN ALLETE COMPANY

BISON
A WIND ENERGY INITIATIVE OF MINNESOTA POWER IN NORTH DAKOTA

PIKE ENERGY SOLUTIONS, LLC.
10101 Claude Freeman Drive, Suite 100W
Charlotte, NC 28262
ND License No. 954PE

BISON 2 WIND PROJECT
MORTON & OLIVER COUNTIES, NORTH DAKOTA

COLLECTOR SYSTEM
BILL OF MATERIAL - PRIMARY CONDUCTOR AND COMMUNICATIONS

BARR PROJECT No. 34/33-1007
CLIENT PROJECT No.
DWG. No. E-BM-01
REV. No. 1