

Project: Kafue Muzuma Victoria Falls 220vK Bypass Line

Date: 2014

Client: Zenith Installations / OptiPower

Description: This entailed the design of various Method 4 structures using PLS Pole, and provision of bypass options for Kafue Muzuma Victoria Falls 220kV bypass line project, Zambia.

Key Features:

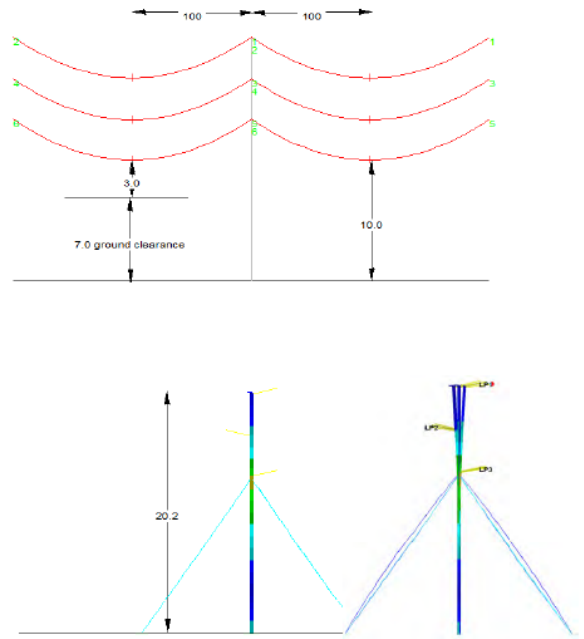
ZESCO LIMITED				
DOCUMENT	KAFUE – MUZUMA – VICTORIA FALLS BYPASS LINE			Page 1 of 4
Revision No	Date	Drawn	Approved	Detail
Rev 0	11 June 2014	R.C	K.C	Comparison of monopole options

SUMMARY

CRITERIA	OPTION 1	OPTION 2	OPTION 3
Windspan	100m	120m	145m
Weightspan	100m	150m	188m
Weight / wind ratio	1	1.3	1.3
Limiting criteria	post insulator	ground clearance	pole capacity
weight of steel per structure	798 kg	1328 kg	1038 kg
Qty structures required for 40km	200	167	138
Weight of steel for 40 km	160 ton	221 ton	143 ton
3m foundations		167	
M20 stays	800		552

ZESCO LIMITED				
DOCUMENT	KAFUE – MUZUMA – VICTORIA FALLS BYPASS LINE			Page 1 of 4
Revision No	Date	Drawn	Approved	Detail
Rev 0	11 June 2014	R.C	K.C	Comparison of monopole options

Option 1:- 20.2m x 273 dia x 6mm wall pinned guyed structure



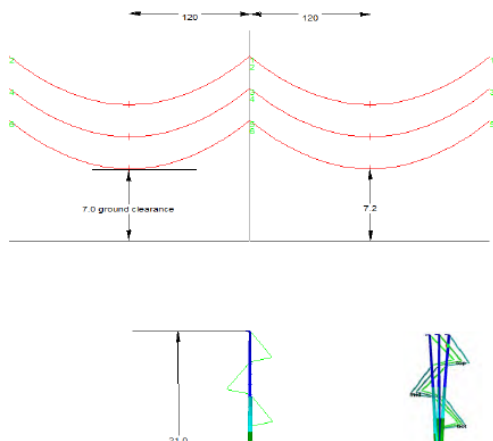
Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case Weight (N)	*** Weight of structure (N):
LPC	Post	97.12	+NA TEC wind @15°C, I NA= 544.9	Weight of Guys: 509.3
LPB	Post	96.92	-NA TEC wind @15°C, I NA= 544.9	Weight of Davit Arms: 17.8
				Weight of Steel Poles: 7825.3
				Weight of Posts: 1634.7
				Total: 9987.2

Windspan	100m	Limiting criteria = post insulators
Weightspan	100m	This is the max span allowable in order not to overload LP insulator. <b>based on level ground. (ie wind = weight)</b>
Ruling Span	180m	There will be 10m – 3m spare ground clearance at max sag point.
Spare clearance	3m	No foundation required. 4 x stays required. <b>Can only be used on level ground</b>

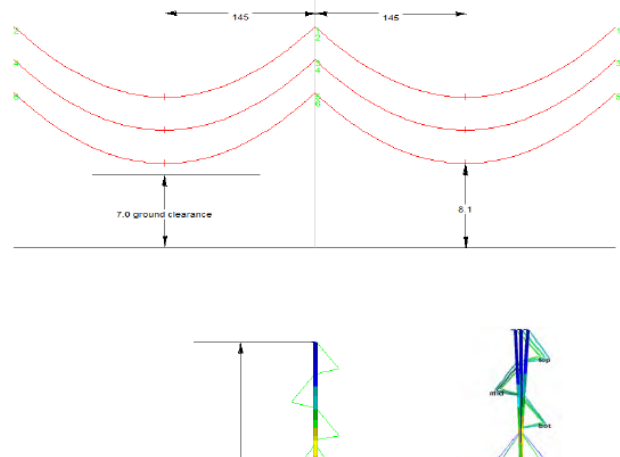
ZESCO LIMITED				
DOCUMENT	KAFUE – MUZUMA – VICTORIA FALLS BYPASS LINE			Page 1 of 4
Revision No	Date	Drawn	Approved	Detail
Rev 0	11 June 2014	R.C	K.C	Comparison of monopole options

Option 2:- 24m 8 sided tapered x 5mm self supporting structure



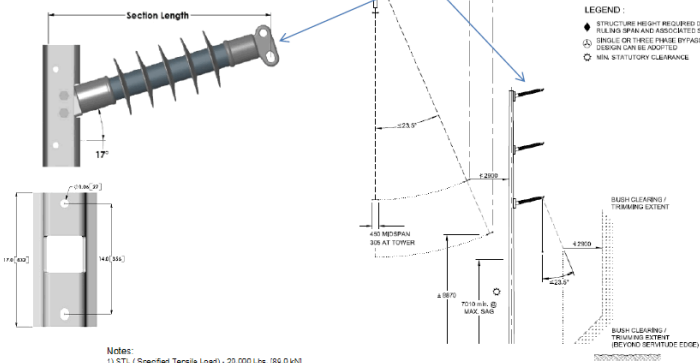
ZESCO LIMITED				
DOCUMENT	KAFUE – MUZUMA – VICTORIA FALLS BYPASS LINE			Page 1 of 4
Revision No	Date	Drawn	Approved	Detail
Rev 0	11 June 2014	R.C	K.C	Comparison of monopole options

Option 3:- 24m X 356 dia x 5mm wall pinned guyed structure



**LINE POST INSULATOR SELECTION**

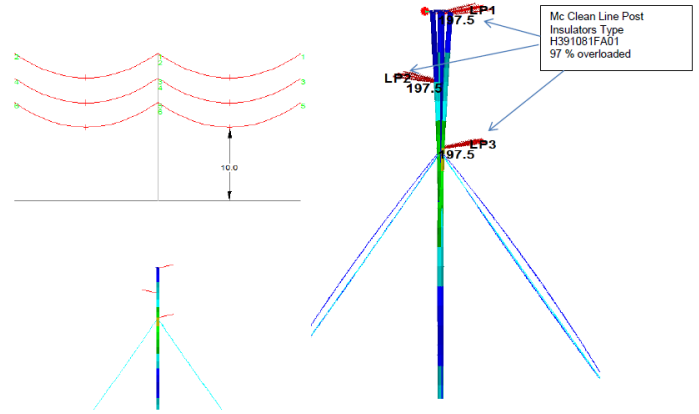
LP insulators were used as specified.



- Notes:
- 1) STL (Standard Tension Load) - 20,000 Lbs (90.0 kN)
  - 2) H391 Series supplied with standard Q3-D Bendable Gan Base
  - 3) For Flat Base F30, change the "H" in H391, to "H" + H211 (See base section for details)
  - 4) For Turnon end fitting, change the "H" in H391, to "H" + H322 (Turnon limit MDCL to 2500 lbs)
  - 5) FX - Electrical Data is without Corona Ring
  - 6) FA - Electrical Data is with a 4" Corona Ring on the line end fitting
  - 7) FB - Electrical Data is with a 12" Corona Ring on the line end fitting
  - 8) FE - Electrical Data is with two 12" Corona Rings on the line and tower end fittings
  - 9) For other ratings or custom insulator designs, contact your local MPS Sales Representative

Catalog Number	Line Voltage (kV)	MDCL (kN)	Section Length (mm)	Dry Arc (mm)	Leakage (mm)	Dry Electrical Flashover (kV/60 Hz)	Wet Electrical Flashover (kV/60 Hz)	CFO+ (kV)	CFO- (kV)
H391001FA01	230	8.4	2057	1765	4651	642	588	1125	1159
H391001FA02	230	8.4	2057	1765	5306	642	588	1125	1159
H391006FA01	230	7.8	2184	1897	4823	687	627	1206	1235
H391006FA02	230	7.8	2184	1897	5563	687	627	1206	1235
H391002FA01	230	7.3	2337	2311	5966	740	672	1301	1326
H391002FA02	230	7.3	2337	2311	5966	740	672	1301	1326
H391009FA01	230	6.9	2464	2189	4954	785	709	1379	1401
H391009FA02	230	6.9	2464	2189	6345	785	709	1379	1401
H39102FA01	230	6.5	2591	2324	5250	826	745	1457	1475

**LINE POST INSULATORS OVERLOADED (when using Bison conductor @ 200m span)**

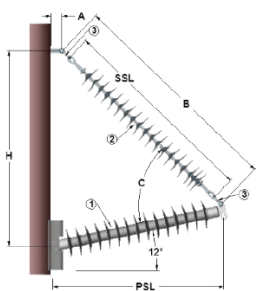


Summary of Post Capacities And Usages for Load Case "001 IEC wind 815°C, 1 Bl"\*

Post Label	Vertical Force (kN)	Trans. Force (kN)	Long. Force (kN)	Cent. Force (kN)	Axial Force (kN)	Vert. Capacity (kN)	Down Capacity (kN)	Up Capacity (kN)	Trans. Capacity (kN)	Long. Capacity (kN)	Cent. Capacity (kN)	Comp. Capacity (kN)	Tens. Capacity (kN)	Insul. S.F.	Usage
19P1	5.27	5.85	0.00	6.37	6.63	7.65	-0.00	-0.00	44.10	2.22	0.00	0.00	0.00	0.50	137.84 MG
19P2	5.27	-5.85	-0.00	3.99	-6.63	7.72	-0.00	24.03	0.00	2.22	0.00	0.00	0.00	0.50	136.82 MG
19P3	5.27	5.43	0.00	6.29	4.22	7.69	-0.00	-0.00	44.10	2.22	0.00	0.00	0.00	0.50	137.07 MG

**PROPOSED BRACED INSULATORS**

Braced Post insulators are proposed, however the pole becomes 1m taller.



**Features:**

- A = 1.5" [38mm] (not included) pole connection offset
- B = Brace Length
- C = Brace Angle
- H = Assembly Height (Tolerance = +/- 3")
- SSL = Suspension Section Length
- PSL = Post Section Length

**Material:**

**Standard Strength Braced Posts**

- 2.5" Line Post Insulator (1 each)
- 25kib (S199) Suspension Insulator (1 each)
- ASH-55 Anchor Shackle (2 each)

**High Strength Braced Posts (marked "HS")**

- 2.5" Line Post Insulator (1 each)
- 36kib (S999) Suspension Insulator (1 each)
- ASH-56 Anchor Shackle (2 each)

Catalog Number	Line Voltage	MDCL (kN)	Dry Arc (mm)	Leakage (mm)	Dry Electrical Flashover (kV) 60 Hz	Wet Electrical Flashover (kV) 60 Hz	CFO+ (kV)	Net (kV) CFO	Weight Est. (kg)
B291084A199A	230	44.3	1770	3913	644	590	1129	1163	46.7
B291084A199B	230	44.3	1770	5149	644	590	1129	1163	50.4
B291084A199C	230	44.3	1770	5791	644	590	1129	1163	53.2
B291085A199A	230	50.3	1836	3955	666	609	1168	1200	41.5
B291085A199B	230	50.3	1836	4905	666	609	1168	1200	45.2
B291085A199C	230	50.3	1836	6030	666	609	1168	1200	49.6
B291090A199A	230	44.0	1925	3952	696	635	1222	1251	50.5
B291090A199B	230	44.0	1925	5131	696	635	1222	1251	52.1
B291090A199C	230	44.0	1925	6071	696	635	1222	1251	53.5
B291090A199D	230	50.5	1963	4115	709	646	1245	1273	42.5
B291090A199E	230	50.5	1963	5265	709	646	1245	1273	46.0
B291090A199F	230	50.5	1963	6284	709	646	1245	1273	50.9
B291096A199A	230	43.7	2070	3932	745	676	1308	1333	52.2
B291096A199B	230	43.7	2070	5075	745	676	1308	1333	53.8
B291096A199C	230	43.7	2070	6571	745	676	1308	1333	55.8