

Hassan Haidar

A 3 phase, 11 KV overhead Rural Line is to be erected between points A and B wooden poles are used Soil Resistance is Good

Pin Insulator are used if Average height of Buildings - Trees is 10 m above Ground level,

- a) Assume Line is above 2.7m above The structures.
b) $SaB = 1m$. pole planning depth & Total length of pole.

$$+ 0.6 + (0.1 \times \text{pole length above Ground})$$

- c) no of poles = ?? for power line = 20 Km.

- a) Ground clearance = $2.7 + 10 = 12.7m$.

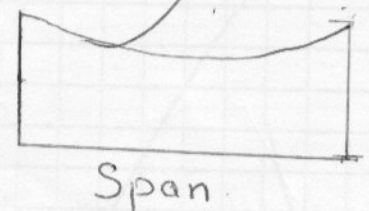
$$\begin{aligned}\text{Pole planning Depth} &= 0.6 + 0.1 \times \text{pole length above Ground} \\ &= 0.6 + 0.1 \times (1 + 2.7 + 10) = 0.6 + 0.1 \times 13.7 \\ &= 0.6 + 1.37 = 1.97m.\end{aligned}$$

$$\begin{aligned}\text{Total Length of pole} &= \text{pole length above Ground} + \text{pole planning Depth} \\ &= 13.7 + 1.97 = 15.67m.\end{aligned}$$

c)

$$SaB = \frac{wl^2}{8T}, l^2 = \frac{8T \times SaB}{w}$$

$$l = \sqrt{\frac{8T \times SaB}{w}}$$



$$T = 6kN = 6000N$$

$$SaB = 1m$$

$$w = ??$$

$$\frac{\text{mass}}{100\text{m}} = 43 \text{ gram.}$$

$$\frac{\text{mass}}{m} = \frac{43}{100} = 0.43 \text{ g}$$

$$f = m \cdot g$$

$$\text{weight} = 0.43 \times 9.81 = 4.22 \text{ N/m}$$

$$\text{wind force} = \text{wind pressure} \times \text{Diameter} \times \text{Length}$$

$$= 750 \text{ N/m}^2 \times \frac{16 \text{ m}}{1000} \times 1 \text{ m}$$

$$= 12 \text{ N/m}$$

$$w = \sqrt{\text{wind force}^2 + \text{Conductor weight}^2}$$

$$= \sqrt{12^2 + 4.22^2} = 12.72 \text{ N/m}$$

$$L = \sqrt{\frac{8T \text{ Sag}}{w}} = \sqrt{\frac{8 \times 6000 \times 1}{12.72}} = 61 \text{ m}$$

$$\text{No of poles} = \frac{20 \times 10^3}{61} \div 1 = 328 + 1 = 329 \text{ poles}$$

Hassan

Size of Conductor

$$\text{Current} = \frac{\text{MVA} \times 10^3}{\sqrt{3} \times \text{Line Volt}} = \frac{2 \times 1000}{1.7321 \times 33} = 34.99 \text{ AMP.}$$

- According To Table 20, I use a Conductor with a Current carrying capacity of 38 AMP and its Size is mm^2 is 6.

(7)

$$\text{weight of Conductor N/m} = \frac{\text{CSA of Conductor (mm}^2) \times \text{density} \times 9.81}{1000}$$

$$= \frac{6 \times 8.89 \times 9.81}{1000} = 0.523 \text{ N/m.}$$

- ultimate Tensile strength = according to regulation.
28.1 any voltage exceeding 650 V, its Tensile strength is 6840 N

wind Load 500 N/m^2 .

$$\text{win force} = \text{wind Load} \times \text{Diameter} \times \text{6mt.}$$

$$\text{wind force} = 500 \text{ N/m}^2 \times \frac{6\text{mt}}{1000} \times 1\text{mt} = 3 \text{ N/m.}$$

$$\text{Resultant force} = \sqrt{3^2 + 0.523^2} = 3.04 \text{ N/m.}$$

- Safety factor = 2.

- Span = Is 30m according to rule 3.13.9.

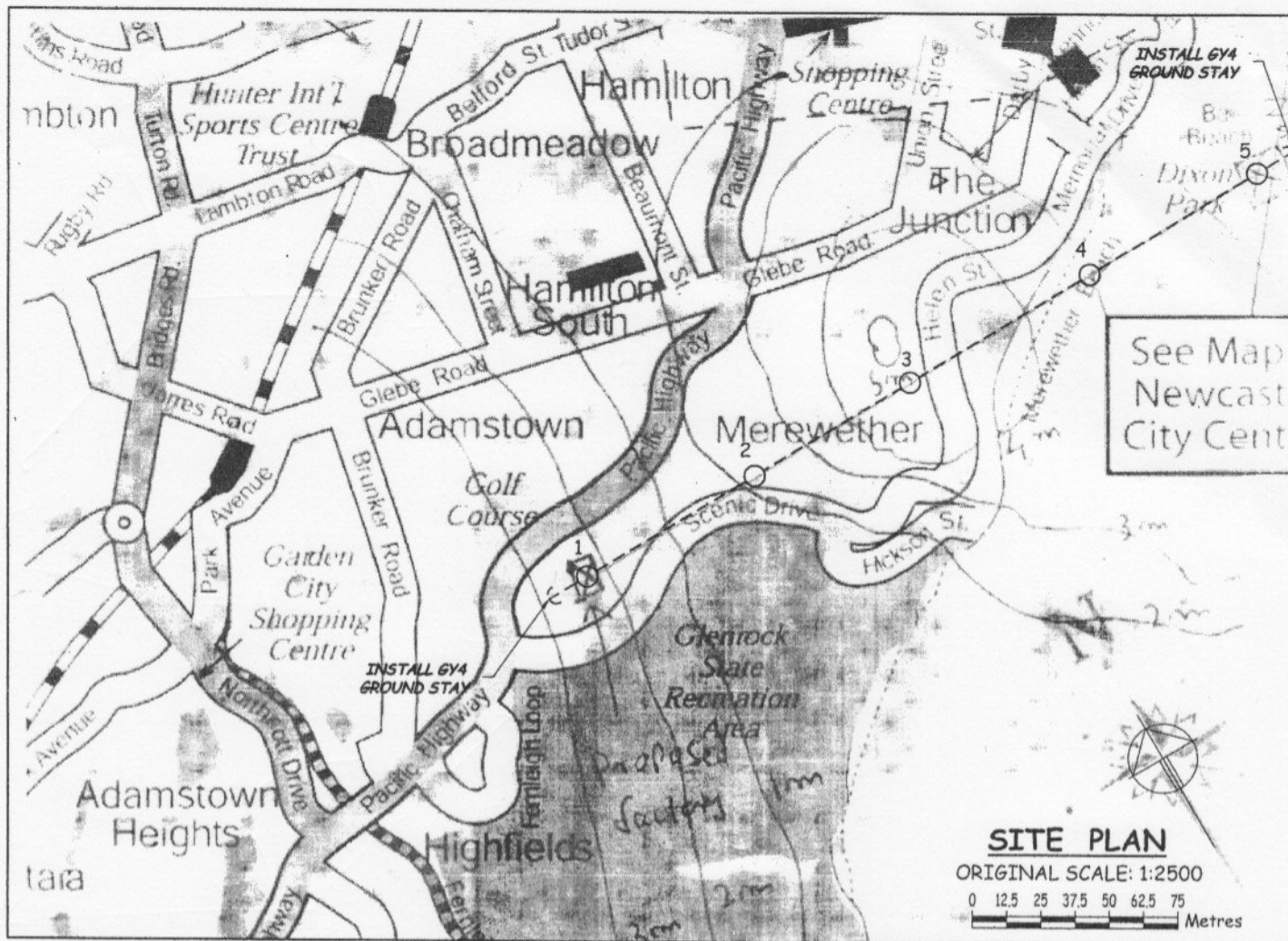
$$- \text{Sag} = \frac{wL^2}{8T}$$

$$T = \frac{6890N}{2} = 3445N$$

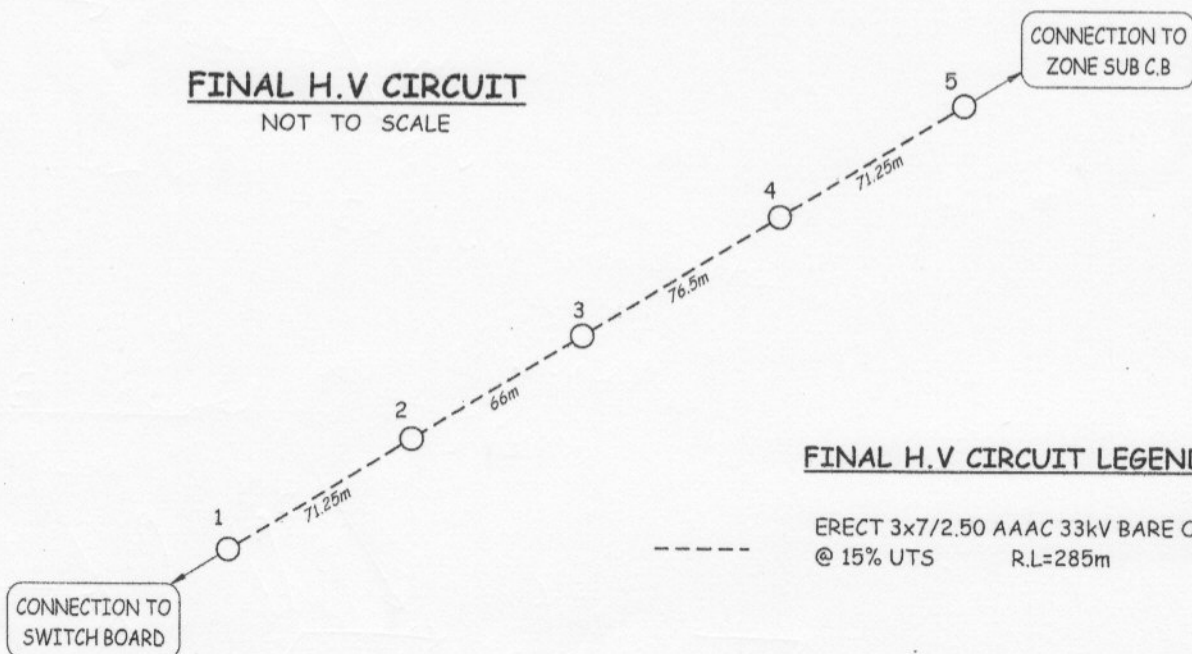
$$\text{Sag} = 99.27 \text{ mT}$$

$$\text{No of poles} = \frac{\text{Total Length of Line route} + 1}{\text{Span.}}$$

$$= \frac{289.5}{30} + 1 = 11 \text{ poles.}$$



FINAL H.V CIRCUIT NOT TO SCALE



FINAL H.V CIRCUIT LEGEND

ERECT 3x7/2.50 AAAC 33kV BARE O/H MAINS
@ 15% UTS R.L.=285m C.L.=880m

AMENDMENTS

ORIGINAL
ISSUE

A

**THIS DRAWING SUPPLIES ONE
NEW INDUSTRIAL FACTORY (2MVA@33kV)**

LOT No
DP No.

101
999999

DEVELOPER

U Kyaw Naing
(JOE)

DEVELOPER'S
REP

JOHN
DOHERTY

PHONE
NUMBER

(02)4683 0235

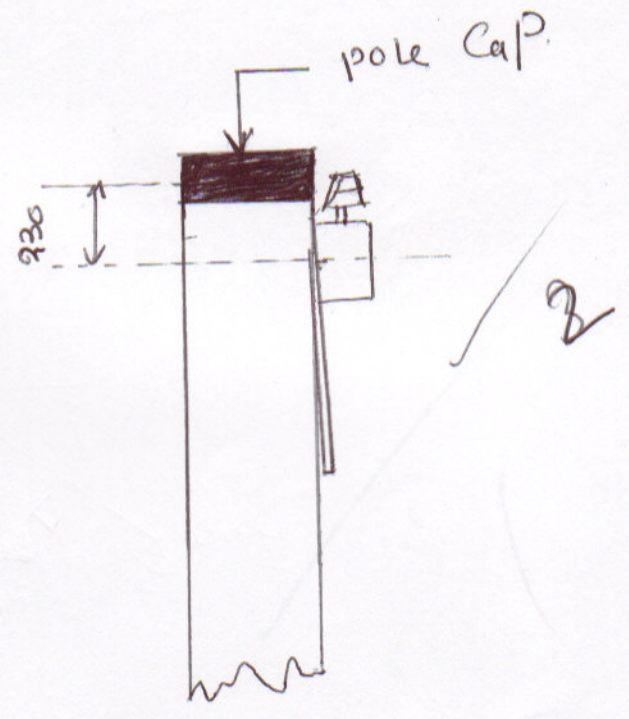
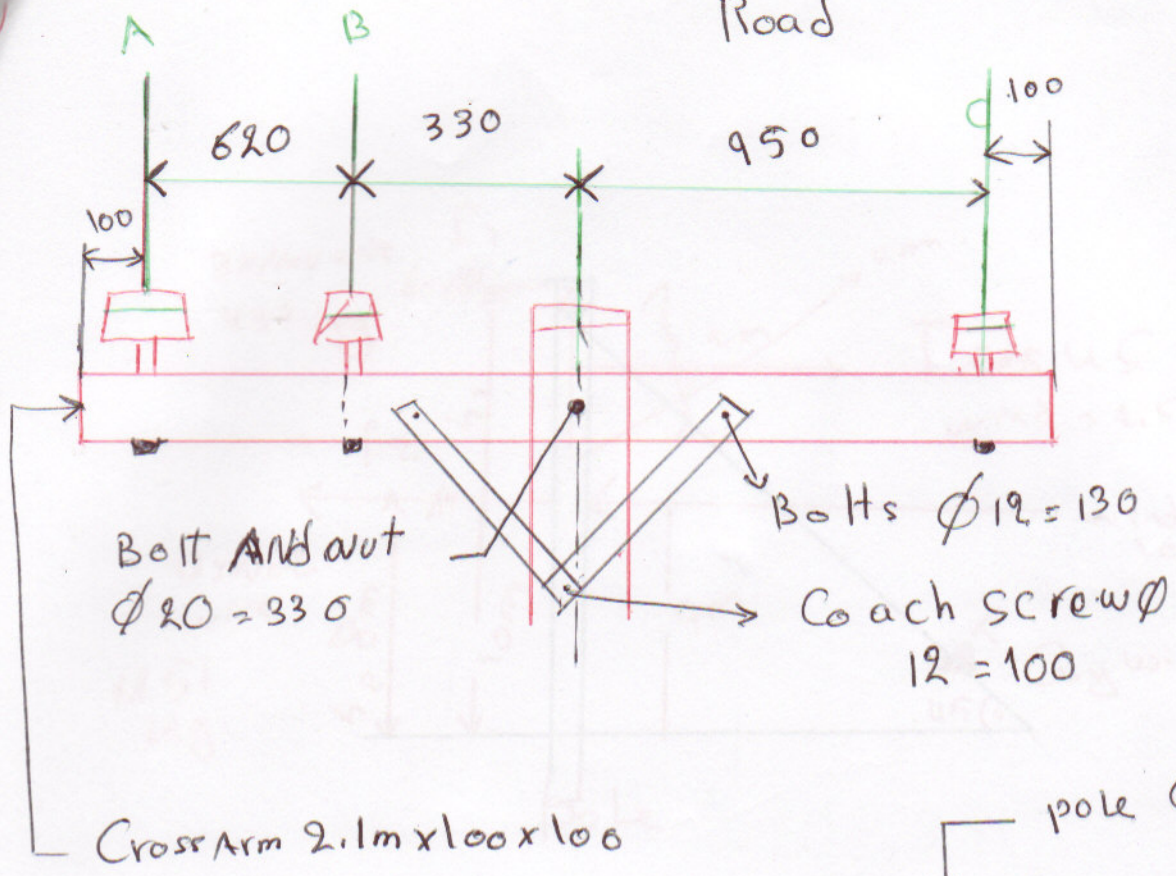
11

- ① All pole, framing materials must Be Delivered To work site.
- ② All structures must Be Assembled (or) framed
- ③ All Holes are Dug
- ④ The setting Ria must Come By Set The pole And Hold it until Back fill Crew Can. Screw it

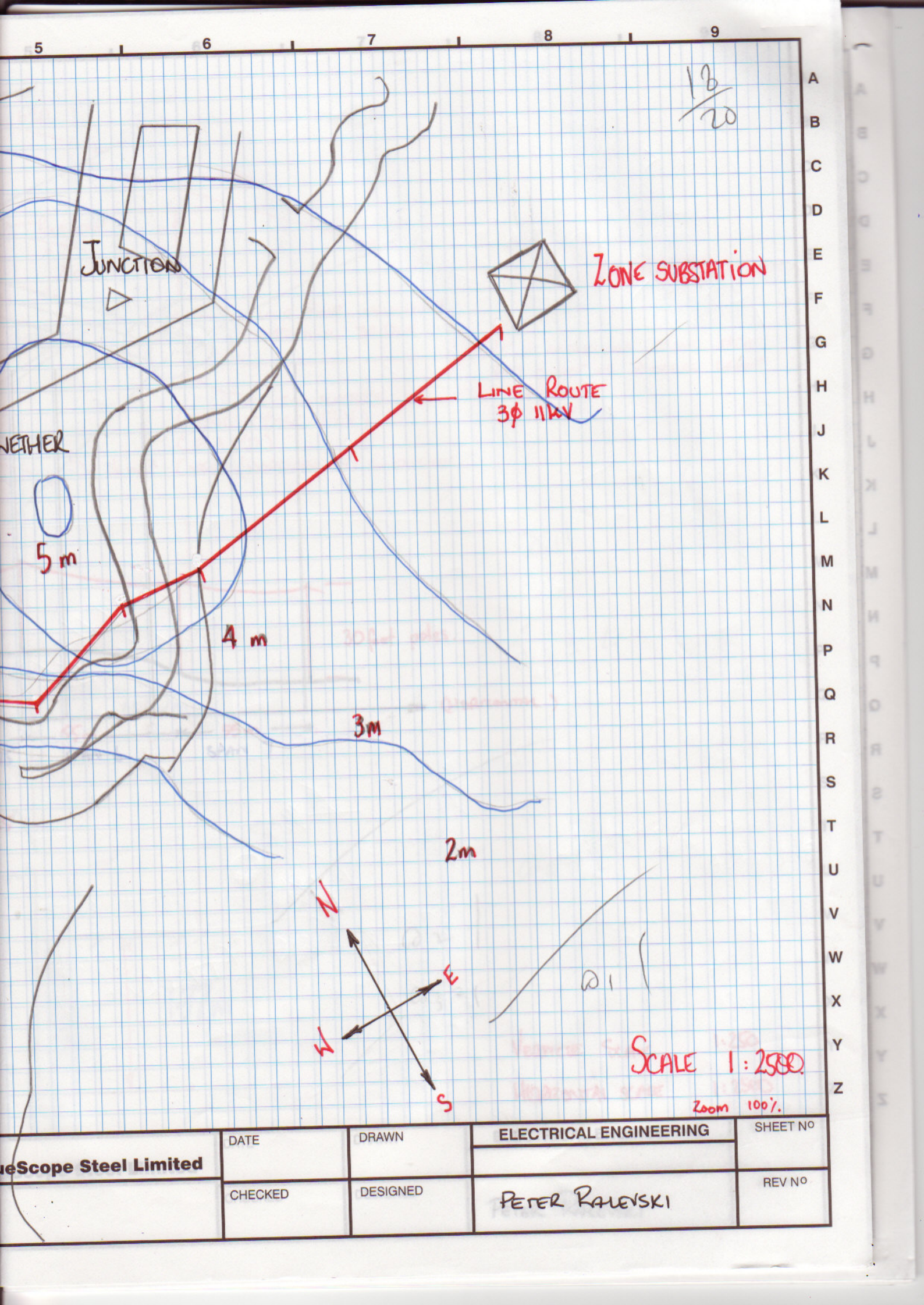


assan foot path

Road



2

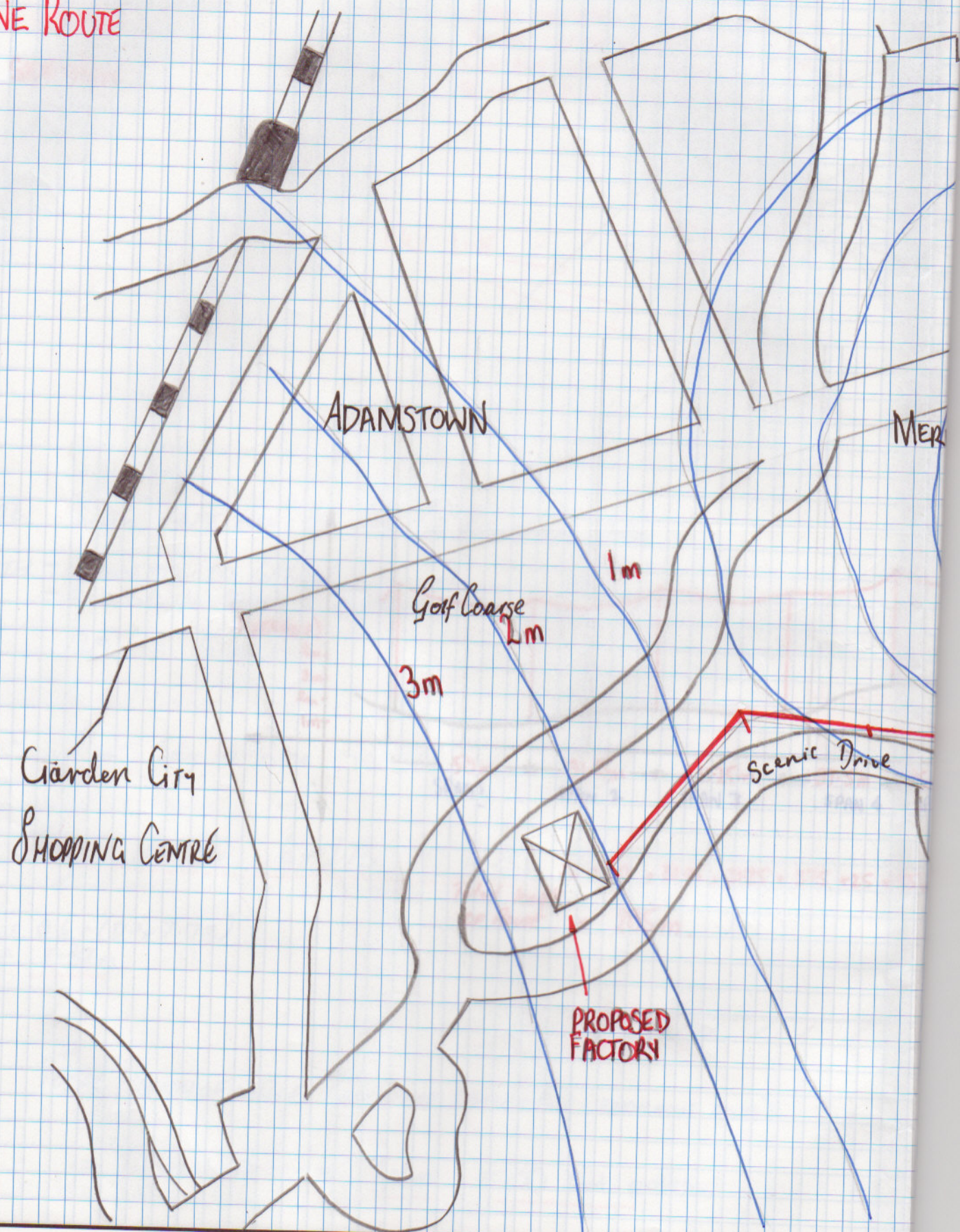


SteelScope Steel Limited	DATE	DRAWN	ELECTRICAL ENGINEERING	SHEET NO
	CHECKED	DESIGNED	PETER RAJEVSKI	REV NO

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1) LINE ROUTE



AMENDMENT

5 6 7 8 9

A
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Scope Steel Limited

DATE

DRAWN

ELECTRICAL ENGINEERING

SHEET NO

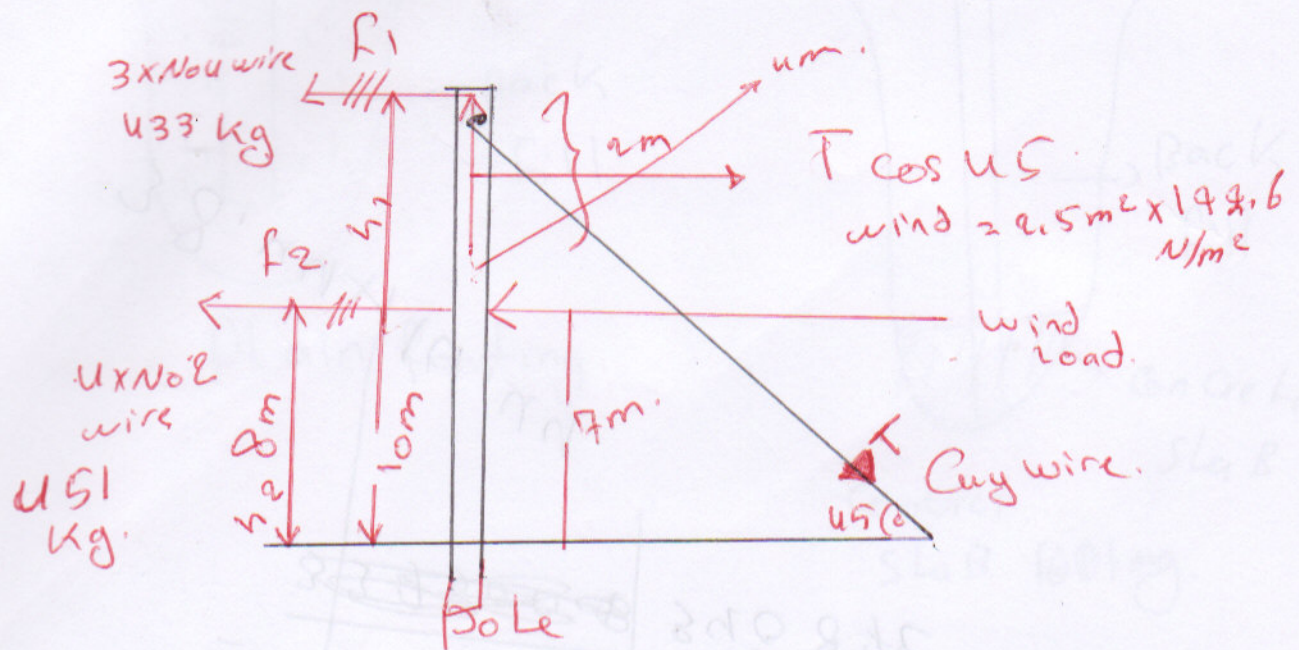
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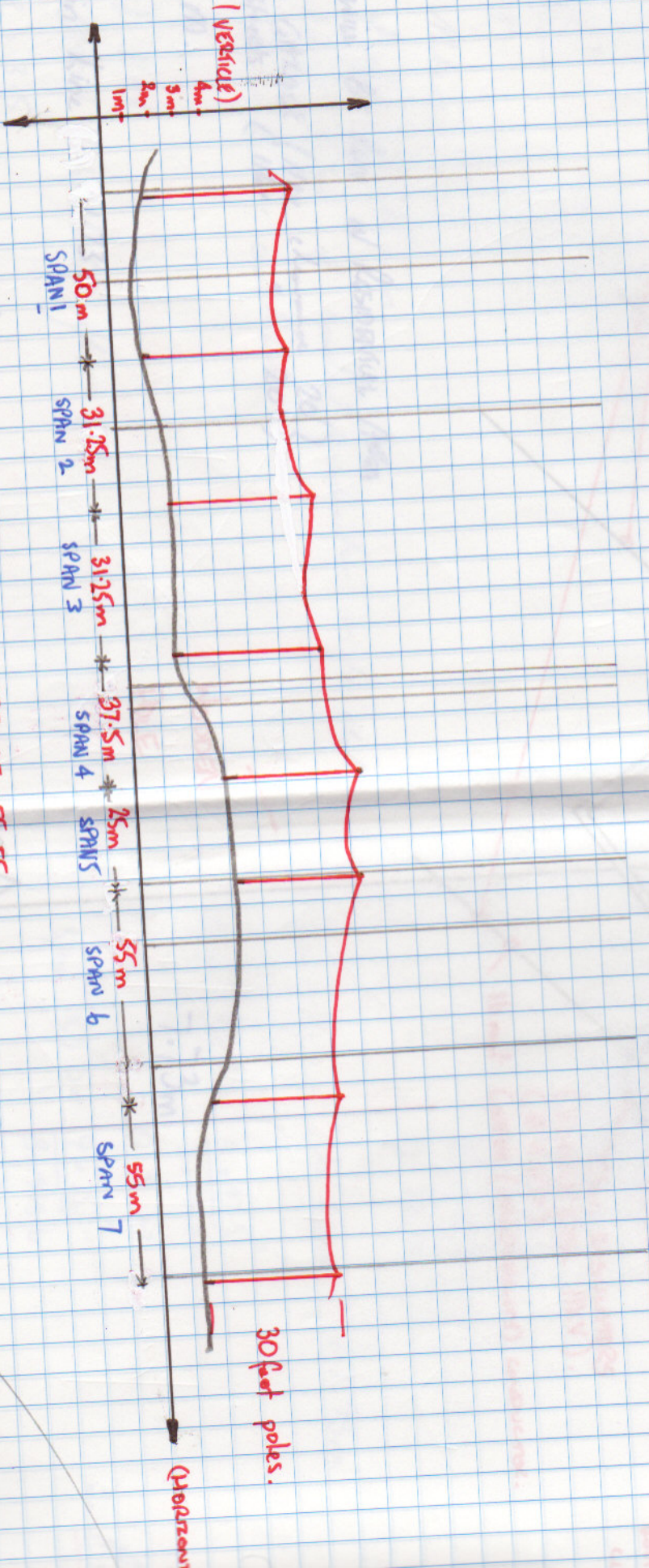
PETER RAUFESKI

REV NO

Hassan

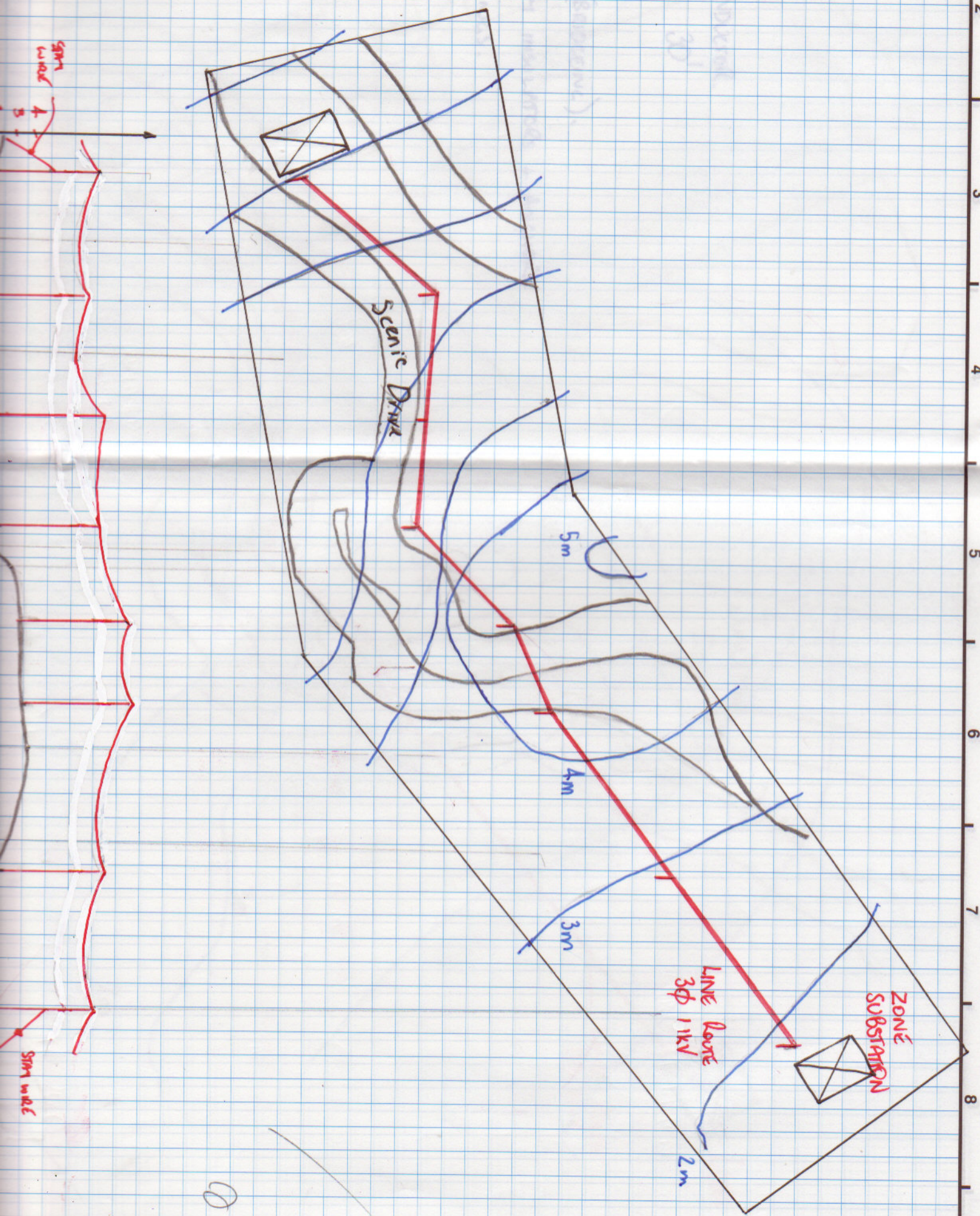


View



Total length
 of Route = 285 m.
 $\therefore = 50 + 31.25 + 31.25 + 37.5 + 25 + 55 + 55$

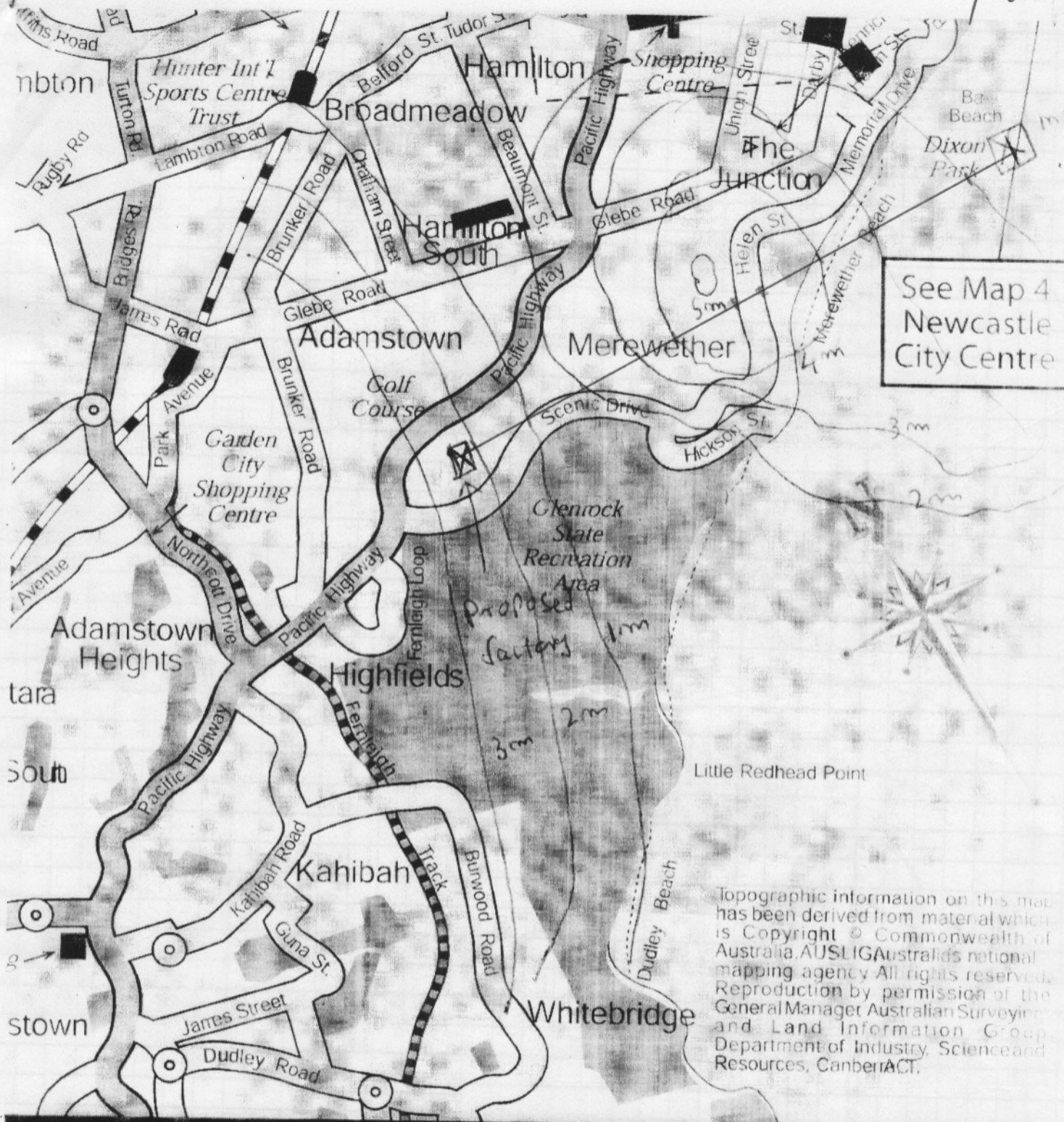
ACRAM



03

Hassan Haidar.

18/20



TRANSMISSION LINE DESIGN

TRANSMISSION LINE DESIGN

Scale 1:2500 mm

SCALE 1:2500

The materials That must be used is :

- * WOOD poles
- * Cross arm with suitable measurements!
- + Pin Insulator.
- * Copper Conductor Cable. ~~Aluminum~~
- * Concrete.
- * Crib roof -
- * Guy wire
- * Anchor \rightarrow concrete one.
- * Digging Instruments.

See Map 4
Newcastle
City Centre

TRANSMISSION LINE DESIGN

TRANSMISSION LINE DESIGN

Scale 1:2500 mm

SCALE 1:2500

CONDUCTOR MAY BE BARE BUT IT MUST COMPLY WITH REGULATION 25C(1)

CONDUCTOR TENSION TO EXCEED 50% OF ULTIMATE STRENGTH UNDER 500 PA WIND LOAD
REG (16)

INSULATORS MAY BE PIN WEDGE OR SMALL TYPE (REG 13)
OC 2.6/2.6 Regulations 1
(CD)

POINT OF ATTACHMENT 25-2-C (iii)

MINIMUM STRENGTH REQUIRED IN REG (23)

AERIAL CONDUCTOR & JOINT TO COMPLY WITH REG 15
(CD) OC 2.6/2.6 Regulations 1
(OR) uploaded TOPIC AA 2.6

(CD) Rule 25-2 2AC(i)(ii)

CLEARANCE ABOVE PUBLIC ROADWAY

OC 2.2/ AA 2.2
OH Line Design Table 1

RULE 25-2 2AC(i) (Note 1st 0.3048 m)
(OR) uploaded AA 2.2

ROADWAY Topic

MINIMUM CLEARANCE ABOVE VEHICLE
25(2)(A) (ii)

MINIMUM CLEARANCE ABOVE PUBLIC HOME

PRIVATE LAND

MINIMUM CLEARANCE ABOVE NORMALLY ACCESSIBLE ROOF 2.7m
ABOVE METAL PART OF CLOTHING LINE

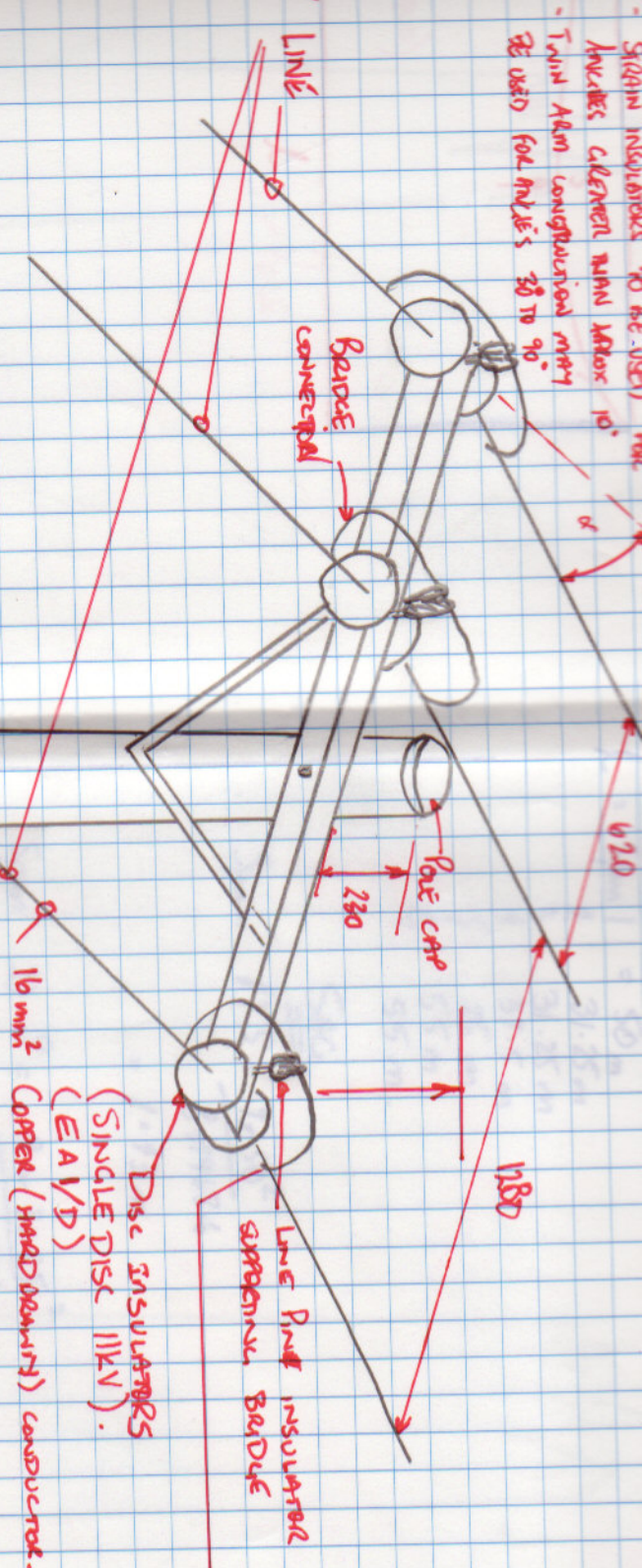
MINIMUM SPAN 4.5m
REG: 24

CONSUMER EARTHING
SAA RULE

NO LIMIT TO LENGTH OF SPAN PROVIDED THAT CONDUCTOR SAG & TENSION COMPLY WITH REGULATION

CLEARANCES

- STRAIN INSULATORS TO THE LINE
 - TWIN ARM CONSTRUCTION WITH
 BE USED FOR ANGLES 30 TO 90°



BLK. 3 CONNECTION USING SLITS
 FOR CLAMP OF SPANCL CLAMP

Q 11

Q 6 = 4

Q 4 = 2

IN RESIDENTIAL AREA
 clearance 20'

1.73

= 7.73m

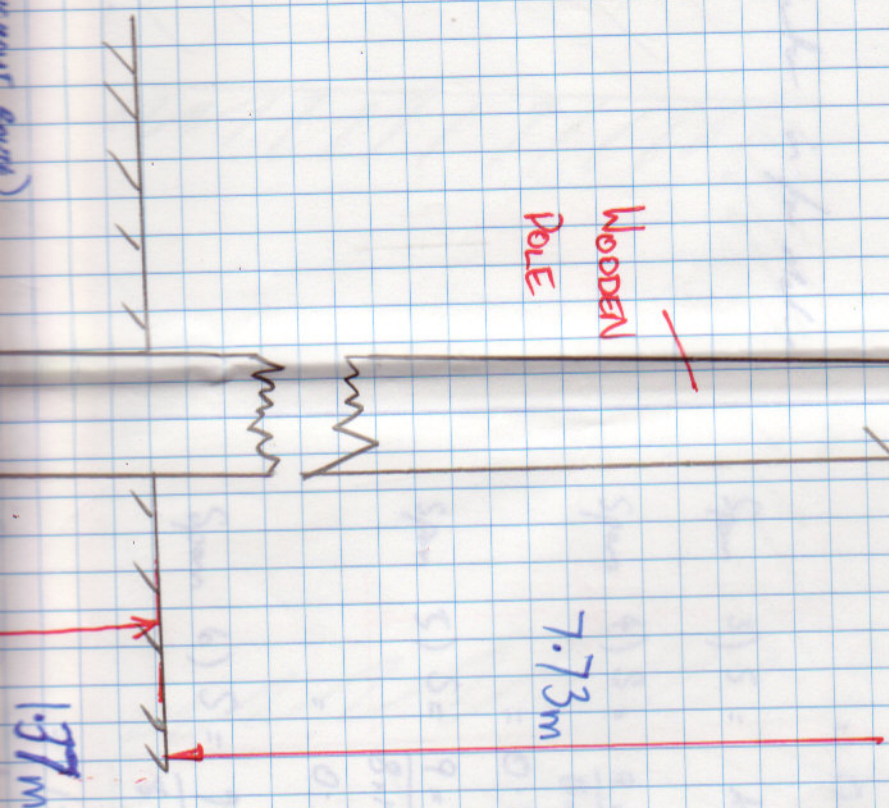


TABLE 20
CURRENT-CARRYING CAPACITIES OF AERIAL CABLES
WITH COPPER CONDUCTORS

1	2	3	4	5	6	7	8	9	10	11	12	13
Current-carrying capacity, A												
Conductor size mm ² or stranding (No./mm)	Bare conductors			PVC insulated single-core			PVC insulated two-core twisted, two-core neutral screened and two-core or three-core parallel webbed cable			PVC insulated three-core and four-core twisted and three-core or four-core neutral screened cable		
	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind
7/1.00	37	74	87	—	—	—	—	—	—	—	—	—
6	38	76	89	35	70	79	30	50	59	26	48	58
7/1.25	49	97	115	—	—	—	—	—	—	—	—	—
10	53	105	123	48	96	110	40	68	80	36	65	76
16	71	139	164	85	125	145	52	90	105	47	85	100
7/1.75	76	148	174	—	—	—	—	—	—	—	—	—
7/2.00	89	174	205	—	—	—	—	—	—	—	—	—
25	96	186	220	88	165	190	68	120	140	63	115	135
35	117	226	267	105	205	230	82	145	170	76	135	180
7/2.75	133	257	303	—	—	—	—	—	—	—	—	—
50	142	272	321	130	240	275	97	175	205	92	165	190
19/1.75	142	272	322	—	—	—	—	—	—	—	—	—
19/2.00	168	321	379	—	—	—	—	—	—	—	—	—
70	179	341	403	165	305	345	120	215	255	115	205	240
7/3.50	181	345	407	—	—	—	—	—	—	—	—	—
7/3.75	197	376	444	—	—	—	—	—	—	—	—	—
95	216	410	484	200	360	415	—	—	—	—	—	—
37/1.75	216	410	485	—	—	—	—	—	—	—	—	—

(continued)

TABLE 20 (continued)

1	2	3	4	5	6	7	8	9	10	11	12	13
Conductor size mm ² or stranding (No./mm)	Current-carrying capacity, A											
	Bare conductors			PVC insulated single-core			PVC insulated two-core twisted, two-core neutral screened and two-core or three-core parallel webbed cable			PVC insulated three-core and four-core twisted and three-core or four-core neutral screened cable		
	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind
19/2.75	251	474	560	—	—	—	—	—	—	—	—	—
120	255	481	568	235	425	485	—	—	—	—	—	—
19/3.00	280	528	625	—	—	—	—	—	—	—	—	—
150	290	547	646	265	475	550	—	—	—	—	—	—
185	336	628	742	310	540	620	—	—	—	—	—	—
37/2.50	339	634	750	—	—	—	—	—	—	—	—	—

NOTES:

- The current-carrying capacities are based on an ambient air temperature of 40°C, a maximum conductor temperature of 75°C and exposure to direct sunlight having an intensity of 1000 W/m². In addition the values for bare conductors are based on black (weathered) conductors and the values of insulated conductors are based on the use of black PVC.
- Under normal circumstances there will always be some air movement and a minimum rating for 1.0 m/s wind is recommended.
- To determine the three-phase voltage drop of these configurations, refer to the following Tables:
 - For twisted cables, see Table 40.
 - For parallel and webbed cables, see Table 41.
 - For bare and single insulated cables, see Table 49.
- These ratings are based on 40°C ambient air temperature. For other conditions, see Clause 3.5.3.

3 ϕ volt-drop = $\frac{1\phi \text{ volt-drop}}{1.7321}$

TABLE 40

**THREE-PHASE VOLTAGE DROP AT 50 Hz OF SINGLE-CORE
INSULATED AND SHEATHED COPPER CONDUCTORS,
LAID IN TREFOIL**

Conductor size mm ²	Three-phase voltage drop at 50 Hz, mV/A.m									
	Conductor temperature, °C									
	45		60		75		90		110	
	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.
1	40.3	—	42.5	—	44.7	—	46.8	—	49.7	—
1.5	25.9	—	27.3	—	28.6	—	30.0	—	31.9	—
2.5	14.1	—	14.9	—	15.6	—	16.4	—	17.4	—
4	8.77	—	9.24	—	9.71	—	10.2	—	10.8	—
6	5.86	—	6.18	—	6.49	—	6.81	—	7.23	—
10	3.49	—	3.67	—	3.86	—	4.05	—	4.30	—
16	2.20	—	2.31	—	2.43	—	2.55	—	2.70	—
25	1.40	—	1.47	—	1.54	—	1.62	—	1.72	—
35	1.01	—	1.07	—	1.12	—	1.17	—	1.24	—
50	0.757	—	0.795	—	0.834	—	0.872	—	0.924	—
70	0.537	—	0.563	—	0.589	—	0.615	—	0.650	—
95	0.402	—	0.420	—	0.439	—	0.457	—	0.481	—
120	0.332	—	0.345	—	0.359	—	0.373	—	0.392	—
150	0.284	—	0.295	—	0.305	—	0.316	—	0.331	—
185	0.245	0.245	0.253	0.253	0.261	—	0.269	—	0.280	—
240	0.211	0.208	0.216	0.214	0.221	0.220	0.227	0.226	0.235	0.234
300	0.191	0.185	0.195	0.190	0.198	0.195	0.202	0.199	0.208	0.206
400	0.175	0.166	0.178	0.169	0.181	0.173	0.183	0.176	0.187	0.181
500	0.165	0.150	0.166	0.153	0.168	0.156	0.170	0.158	0.172	0.162
630	0.155	0.138	0.156	0.140	0.157	0.142	0.159	0.144	0.160	0.146

TABLE 41

**THREE-PHASE VOLTAGE DROP AT 50 Hz OF SINGLE-CORE INSULATED
AND SHEATHED COPPER CONDUCTORS, LAID FLAT TOUCHING
OR IN A WIRING ENCLOSURE**

Conductor size mm ²	Three-phase voltage drop at 50 Hz, mV/A.m									
	Conductor temperature, °C									
	45		60		75		90		110	
	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.
1	40.3	—	42.5	—	44.7	—	46.8	—	49.7	—
1.5	25.9	—	27.3	—	28.6	—	30.0	—	31.9	—
2.5	14.1	—	14.9	—	15.6	—	16.4	—	17.4	—
4	8.77	—	9.24	—	9.71	—	10.2	—	10.8	—
6	5.86	—	6.18	—	6.49	—	6.81	—	7.23	—
10	3.49	—	3.68	—	3.86	—	4.05	—	4.30	—
16	2.20	—	2.32	—	2.43	—	2.55	—	2.71	—
25	1.40	—	1.47	—	1.55	—	1.62	—	1.72	—
35	1.02	—	1.07	—	1.12	—	1.18	—	1.25	—
50	0.763	—	0.801	—	0.840	—	0.878	—	0.929	—
70	0.545	—	0.571	—	0.597	—	0.623	—	0.657	—
95	0.413	—	0.431	—	0.449	—	0.467	—	0.491	—
120	0.345	—	0.358	—	0.371	—	0.385	—	0.403	—
150	0.299	0.299	0.309	—	0.319	—	0.330	—	0.344	—
185	0.262	0.261	0.270	0.269	0.277	0.277	0.285	0.285	0.296	0.296
240	0.230	0.224	0.235	0.230	0.240	0.236	0.245	0.242	0.252	0.250
300	0.212	0.201	0.215	0.206	0.219	0.211	0.222	0.215	0.227	0.222
400	0.198	0.181	0.200	0.185	0.202	0.189	0.205	0.192	0.208	0.197
500	0.188	0.166	0.190	0.169	0.191	0.172	0.193	0.174	0.195	0.178
630	0.179	0.153	0.180	0.155	0.181	0.157	0.182	0.159	0.184	0.162

LAID FLAT TOUCHING

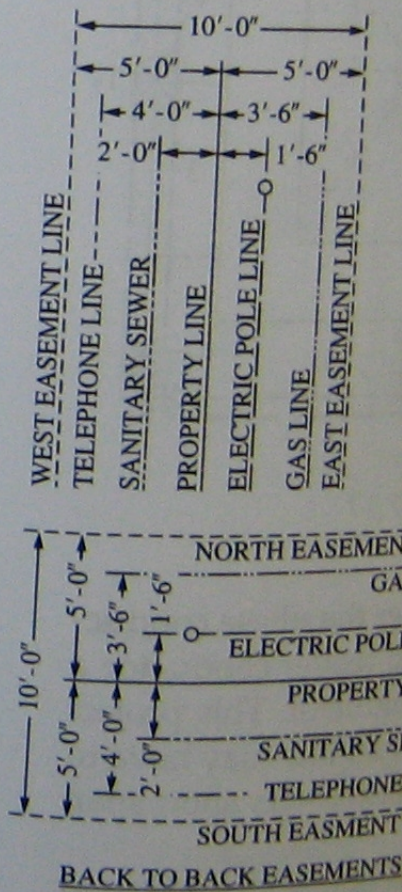
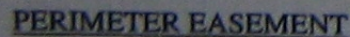
Conductor size mm ²	Three-phase voltage drop at 50 Hz, mV/A.m									
	Conductor temperature, °C									
	45		60		75		90		110	
	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.
1	40.3	—	42.5	—	44.7	—	46.8	—	49.7	—
1.5	25.9	—	27.3	—	28.6	—	30.0	—	31.9	—
2.5	14.1	—	14.9	—	15.6	—	16.4	—	17.4	—
4	8.77	—	9.24	—	9.71	—	10.2	—	10.8	—
6	5.86	—	6.18	—	6.49	—	6.81	—	7.23	—
10	3.49	—	3.68	—	3.86	—	4.05	—	4.30	—
16	2.20	—	2.32	—	2.43	—	2.55	—	2.71	—
25	1.40	—	1.47	—	1.55	—	1.62	—	1.72	—
35	1.02	—	1.07	—	1.12	—	1.18	—	1.25	—
50	0.763	—	0.801	—	0.840	—	0.878	—	0.929	—
70	0.545	—	0.571	—	0.597	—	0.623	—	0.657	—
95	0.413	—	0.431	—	0.449	—	0.467	—	0.491	—
120	0.345	—	0.358	—	0.371	—	0.385	—	0.403	—
150	0.299	0.299	0.309	—	0.319	—	0.330	—	0.344	—
185	0.262	0.261	0.270	0.269	0.277	0.277	0.285	0.285	0.296	0.296
240	0.230	0.224	0.235	0.230	0.240	0.236	0.245	0.242	0.252	0.250
300	0.212	0.201	0.215	0.206	0.219	0.211	0.222	0.215	0.227	0.222
400	0.198	0.181	0.200	0.185	0.202	0.189	0.205	0.192	0.208	0.197
500	0.188	0.166	0.190	0.169	0.191	0.172	0.193	0.174	0.195	0.178
630	0.179	0.153	0.180	0.155	0.181	0.157	0.182	0.159	0.184	0.162

TABLE 42
THREE-PHASE VOLTAGE DROP AT 50 Hz OF MULTICORE CABLES
WITH CIRCULAR COPPER CONDUCTORS

Conductor size mm ²	Three-phase voltage drop at 50 Hz, mV/A.m									
	Conductor temperature, °C									
	45		60		75		90		110	
	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.
1	40.3	—	42.5	—	44.7	—	46.8	—	49.7	—
1.5	25.9	—	27.3	—	28.6	—	30.0	—	31.9	—
2.5	14.1	—	14.9	—	15.6	—	16.4	—	17.4	—
4	8.77	—	9.24	—	9.71	—	10.2	—	10.8	—
6	5.86	—	6.18	—	6.49	—	6.80	—	7.22	—
10	3.49	—	3.67	—	3.86	—	4.05	—	4.29	—
16	2.19	—	2.31	—	2.43	—	2.55	—	2.70	—
25	1.39	—	1.47	—	1.54	—	1.61	—	1.71	—
35	1.01	—	1.06	—	1.11	—	1.17	—	1.24	—
50	0.751	—	0.790	—	0.829	—	0.868	—	0.920	—
70	0.530	—	0.556	—	0.583	—	0.609	—	0.645	—
95	0.394	—	0.413	—	0.431	—	0.450	—	0.475	—
120	0.323	—	0.337	—	0.351	—	0.366	—	0.385	—
150	0.274	—	0.285	—	0.296	—	0.307	—	0.322	—
185	0.234	—	0.242	—	0.251	—	0.259	—	0.271	—
240	0.198	0.198	0.204	0.204	0.210	0.210	0.216	0.216	0.224	—
300	0.178	0.175	0.182	0.180	0.186	0.185	0.190	0.189	0.196	0.196
400	0.162	0.157	0.165	0.160	0.168	0.164	0.171	0.167	0.175	0.172
500	0.152	0.143	0.154	0.146	0.156	0.148	0.158	0.151	0.160	0.155

TABLE 21
CURRENT-CARRYING CAPACITIES OF AERIAL AND ABC
CABLES WITH ALUMINIUM CONDUCTORS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Current-carrying capacity, A																		
Conductor size mm ² or stranding (No./mm)	Bare conductors			PVC insulated single-core			PVC insulated two-core twisted, two-core neutral screened and two-core or three-core parallel webbed cable			PVC insulated three-core and four-core twisted and three-core or four-core neutral screened cable			XLPE insulated two-core twisted cable and ABC			XLPE insulated three-core and four-core twisted cable and ABC		
	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind	Still air	1 m/s wind	2 m/s wind
	56	109	128	49	97	110	41	71	84	38	66	77	49	78	91	44	74	86
	76	148	173	87	130	145	53	91	110	48	87	100	64	105	120	59	97	115
	92	177	209	82	155	180	63	110	130	59	105	125	78	125	145	72	120	135
	93	180	213	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	105	202	239	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	111	214	252	99	185	215	75	135	160	71	125	150	94	150	180	88	140	165
	117	225	266	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/3.00	141	268	317	125	235	265	92	165	200	89	155	185	115	190	225	110	175	205
70	156	297	350	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/3.75	170	322	380	155	280	325	110	205	245	110	190	230	140	230	275	135	215	255
95	196	370	438	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/4.50	200	378	447	180	325	375	—	—	—	—	—	—	—	—	—	—	—	—
120	209	395	467	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/4.75	228	429	507	205	365	420	—	—	—	—	—	—	—	—	—	—	—	—
150	244	458	542	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19/3.25	264	493	583	240	420	480	—	—	—	—	—	—	—	—	—	—	—	—
185	269	503	595	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19/3.50																		



NOTE:

POLES TO BE LOCATED NORTH OF
EAST-WEST PROPERTY LINES AND