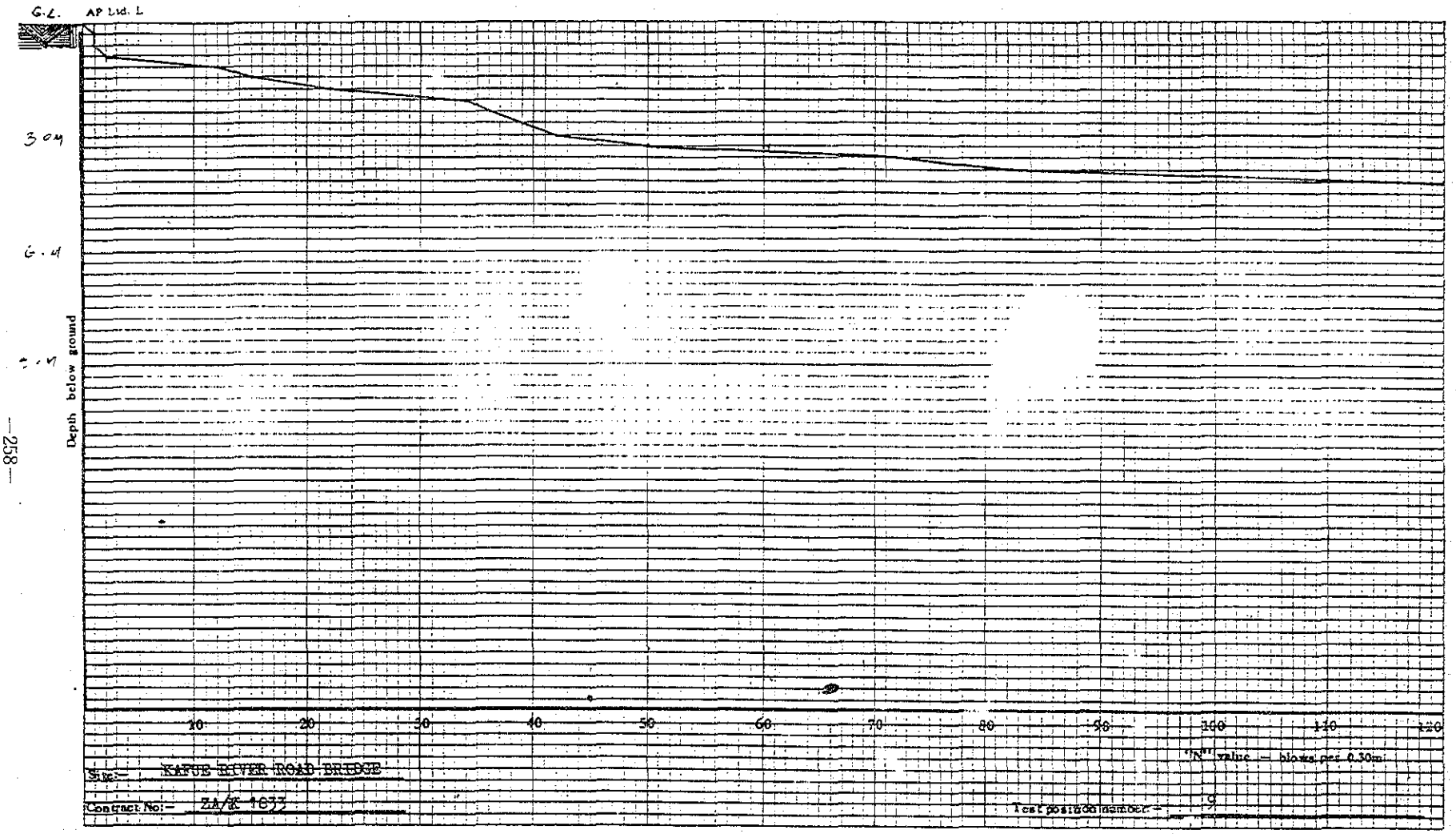
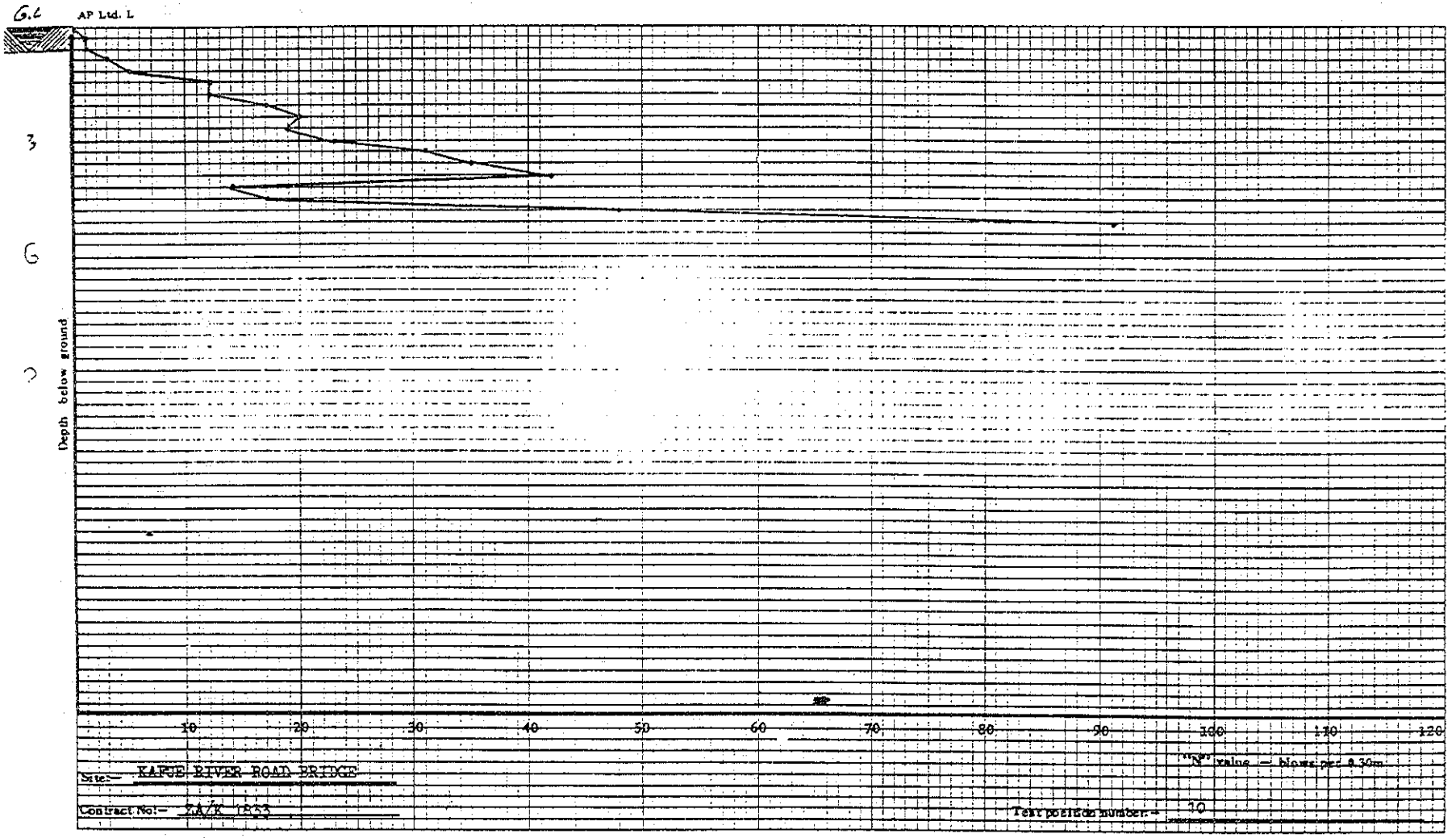


WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 3RD MARCH 1990



WADE ADAMS PILING AND FOUNDATIONS LTD. **PENETROMETER TEST REPORT** Date 3RD MARCH 1990

G.L AP Ltd. L

Site:— KAFUE RIVER ROAD BRIDGE

Contract No:— ZA/E 1077

Test position number:— 13

WADE ADAMS PILING AND FOUNDATIONS LTD.

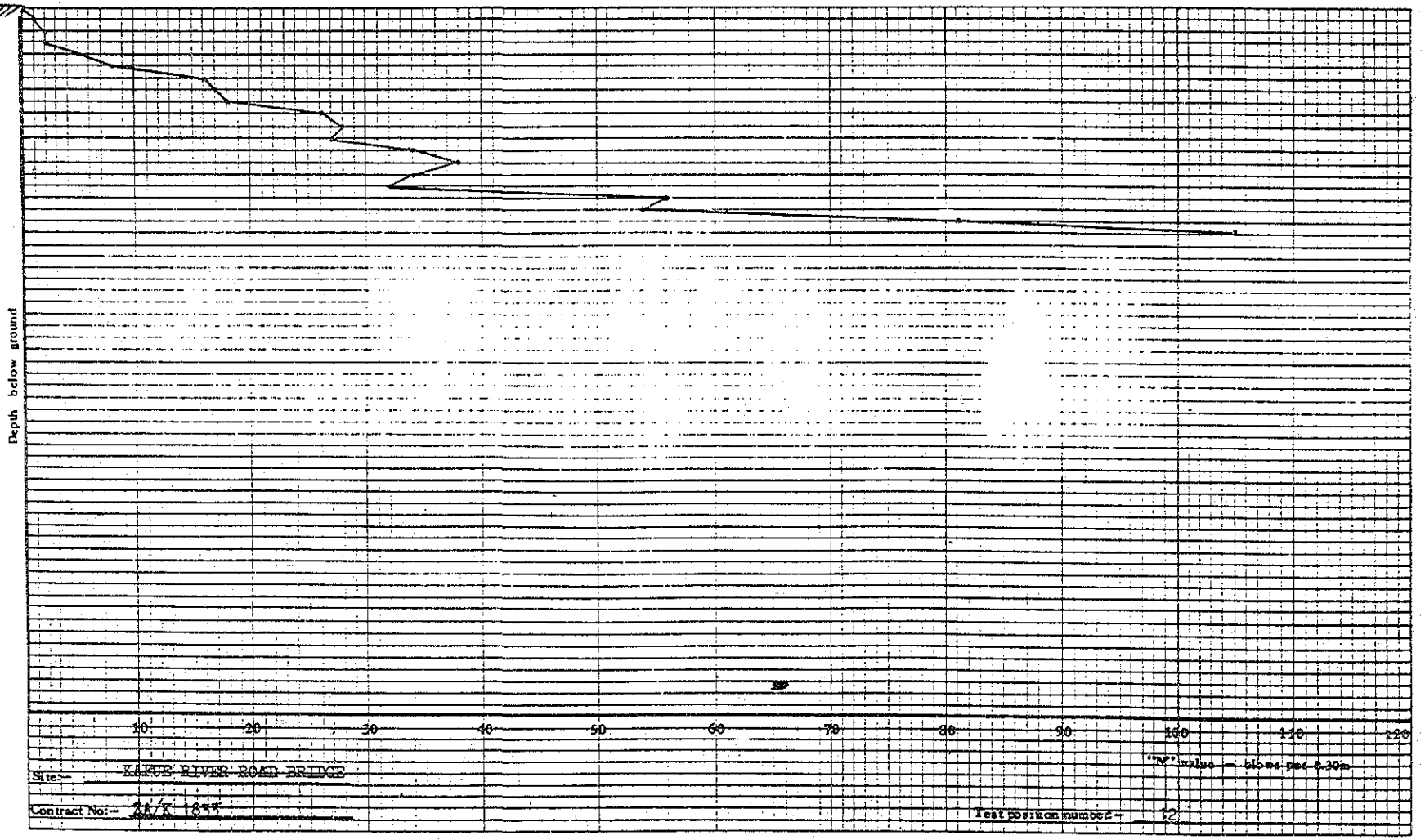
PENETROMETER TEST REPORT

Date 3RD MARCH 1990

G.C

AP Ltd. L

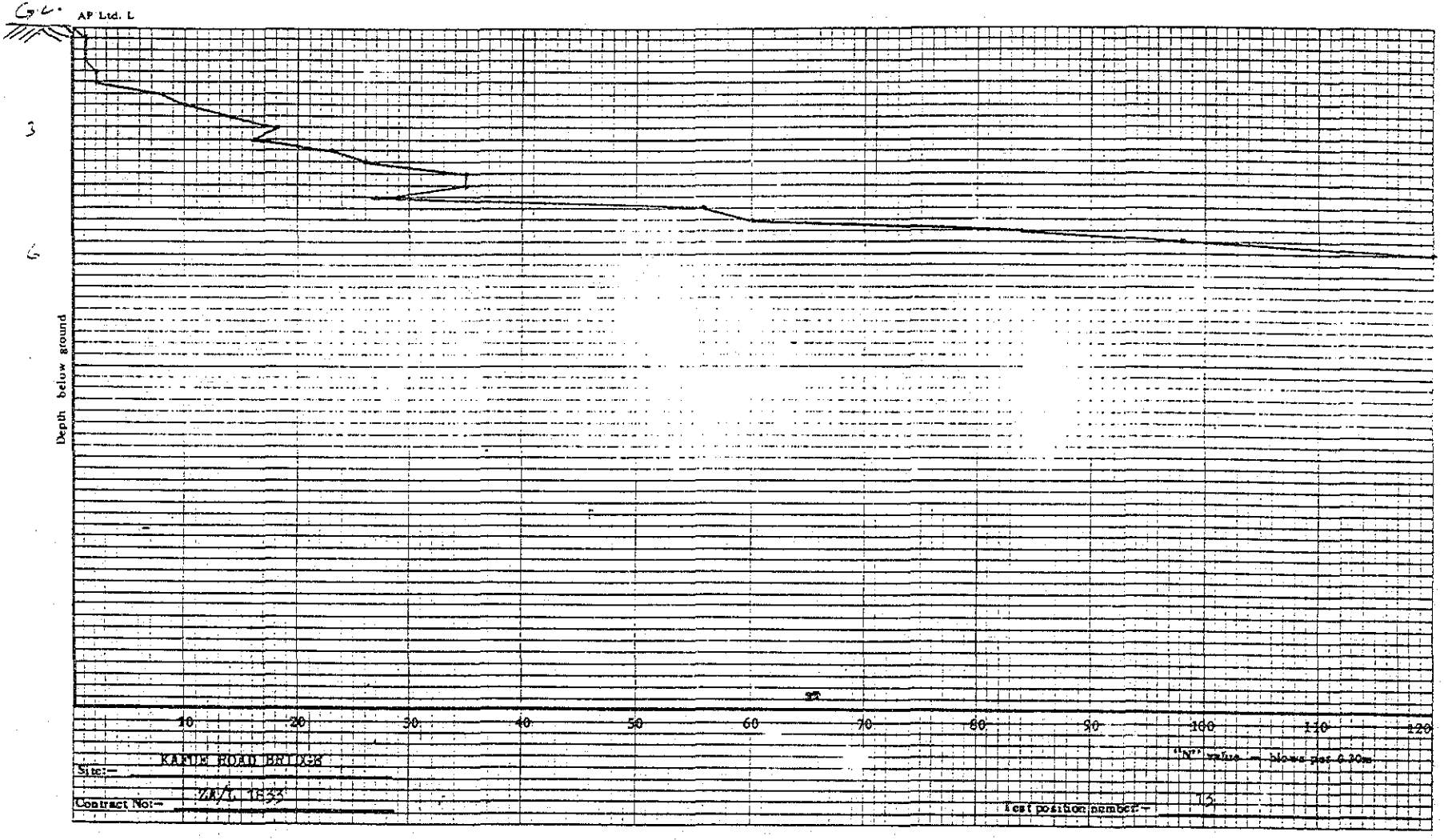
3



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 3RD MARCH 1990



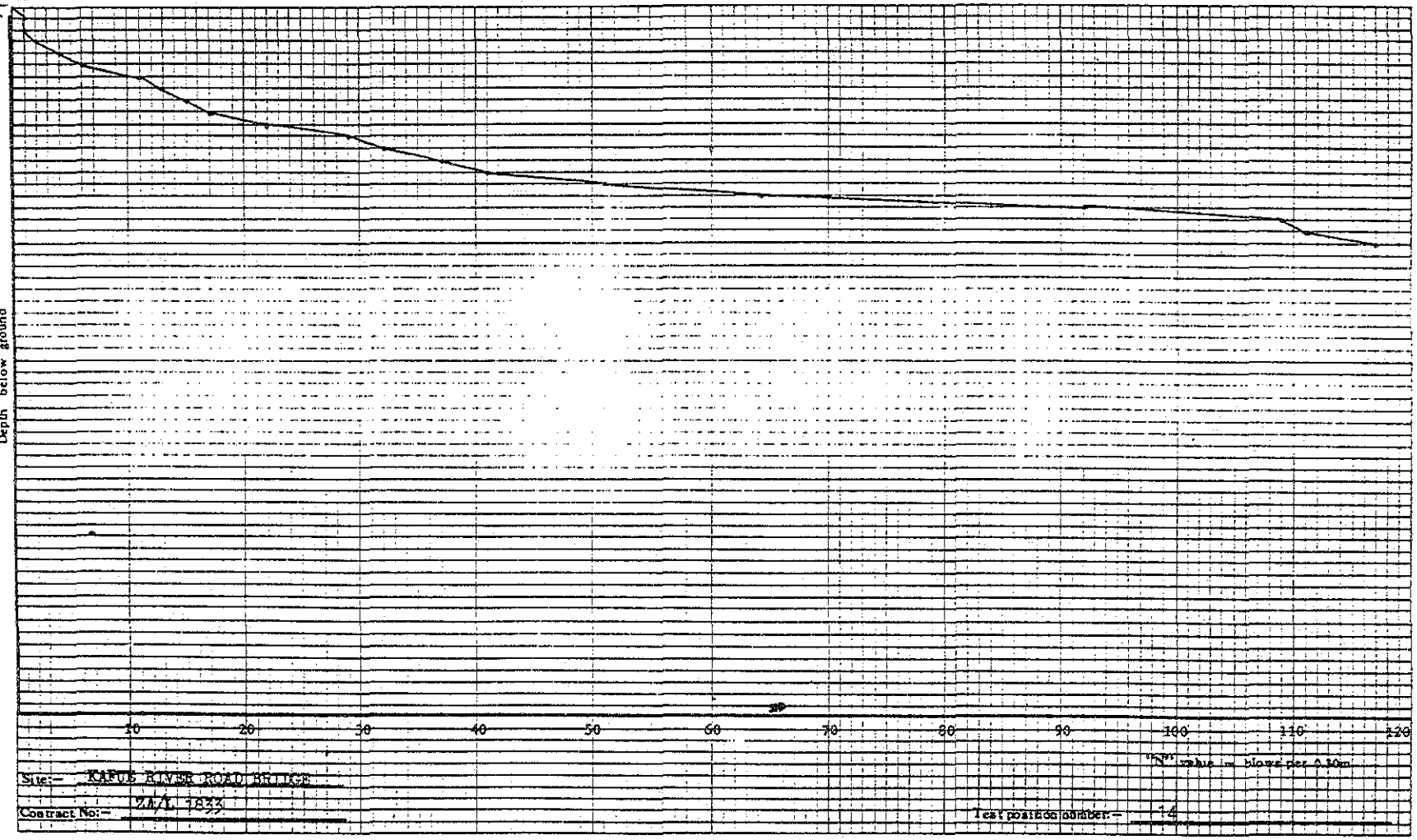
WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 4TH MARCH 1990

G.e

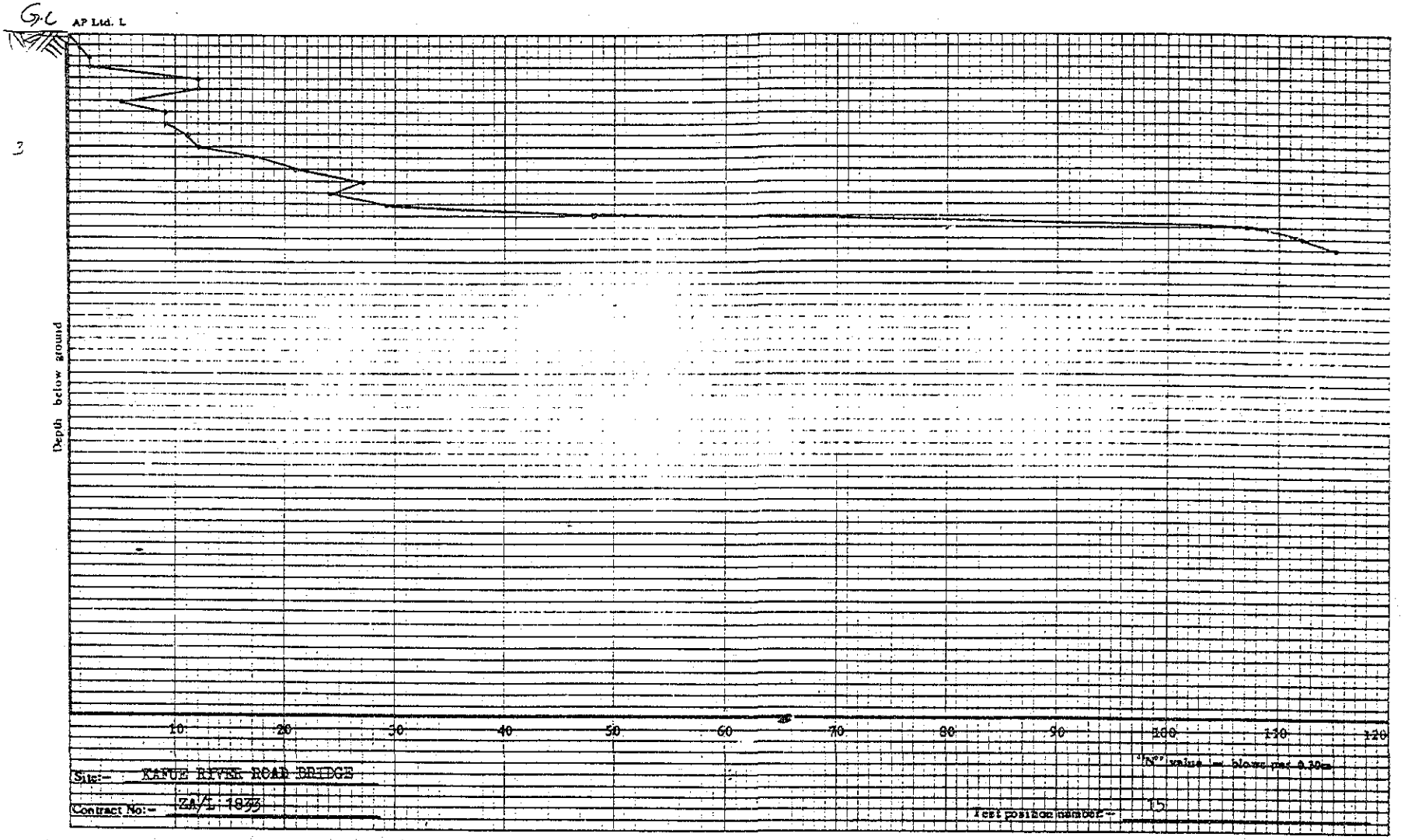
AP Ltd. L



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

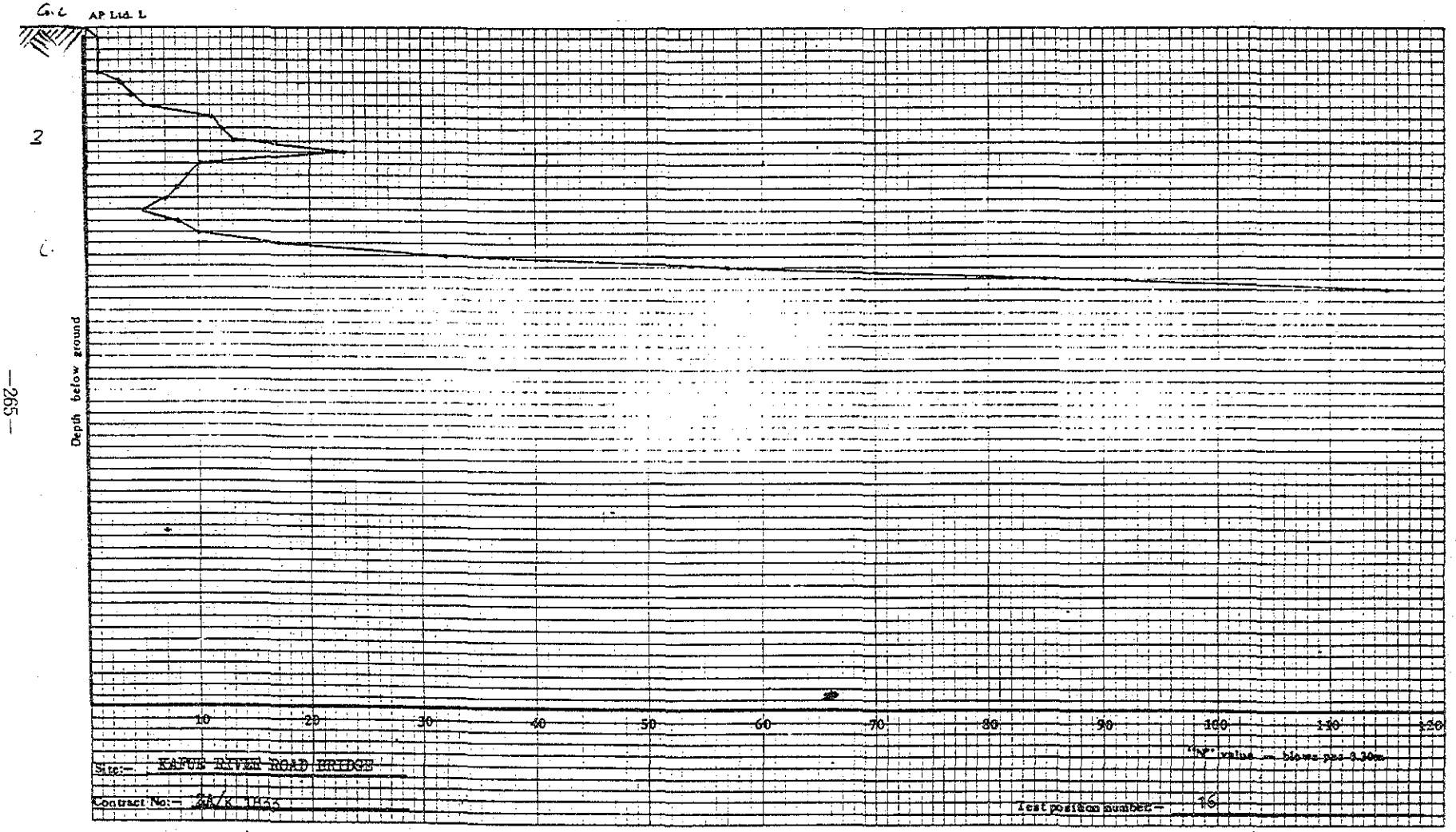
Date 4TH MARCH 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

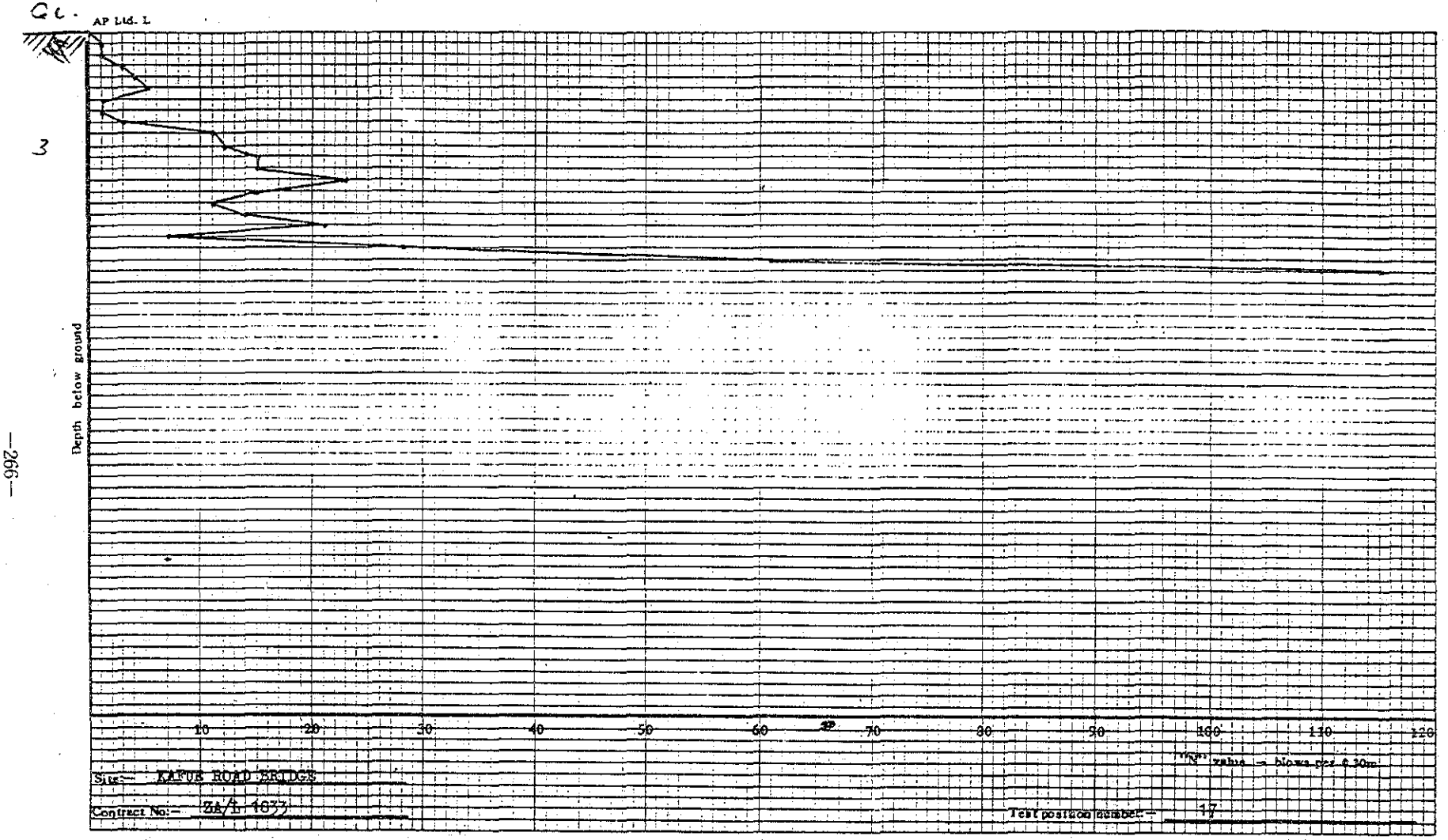
Date 4TH MARCH 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 4TH MARCH 1990

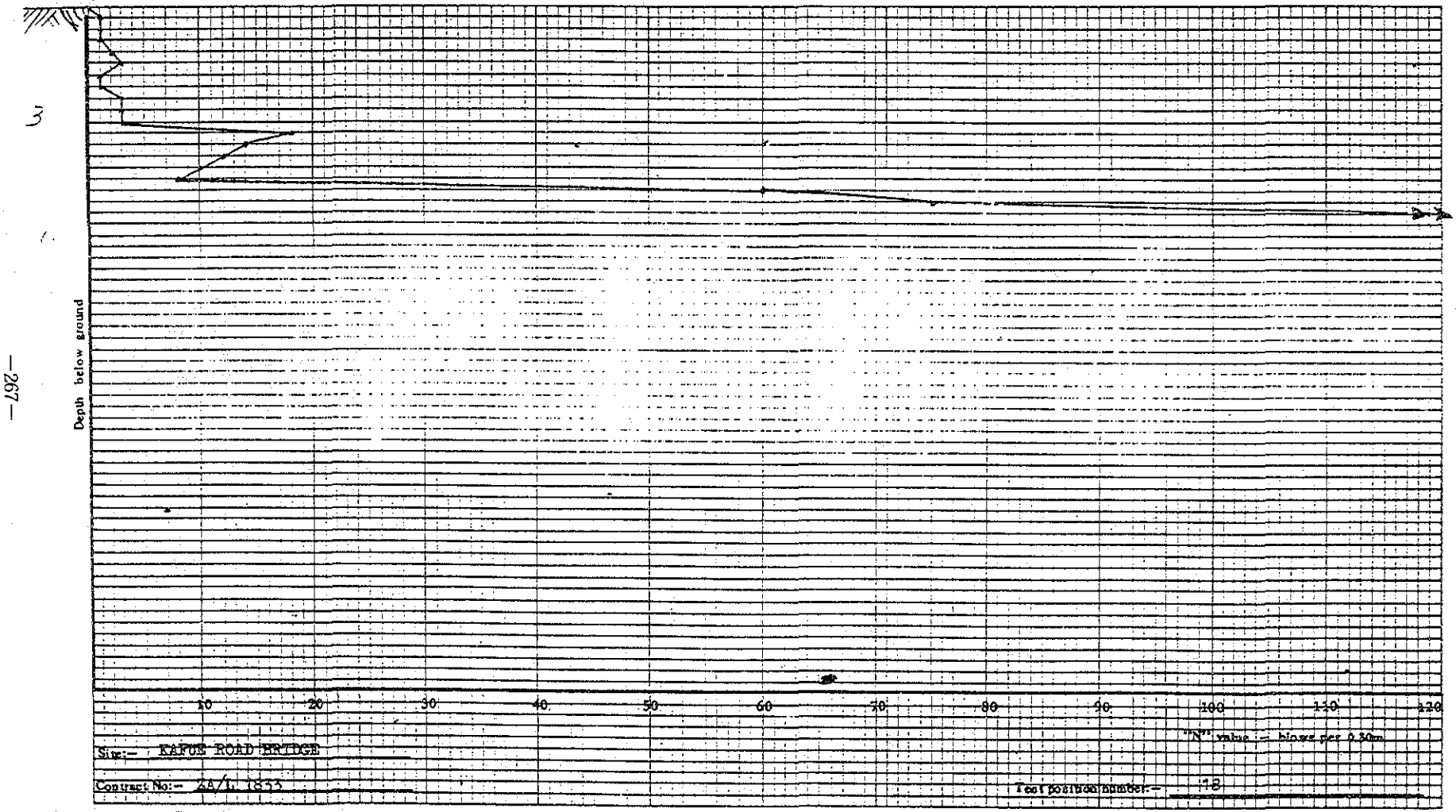


WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 5TH MARCH 1990

AP Ltd. L



Site:— KAFUE ROAD BRIDGE

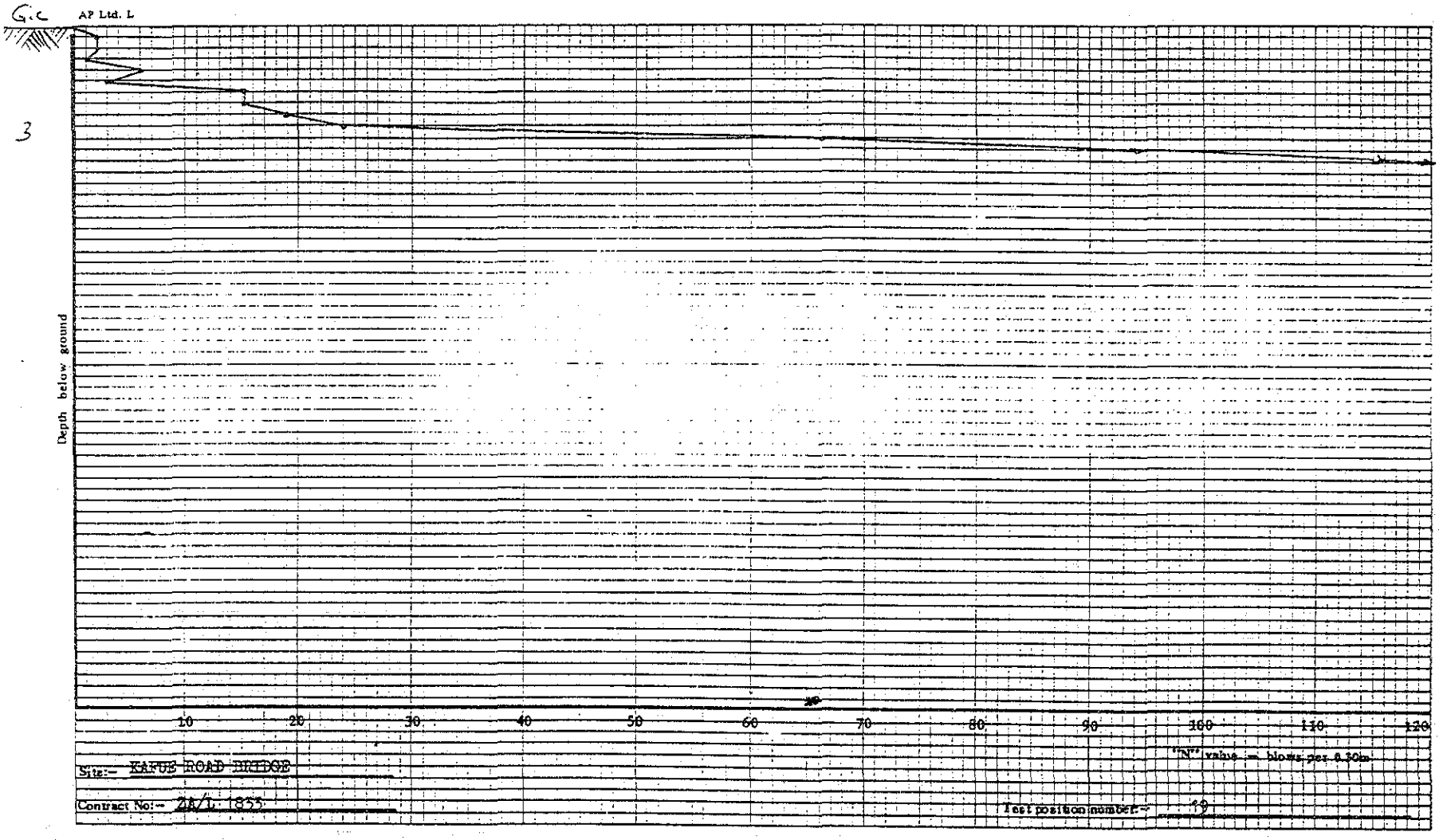
Contract No:— ZA/1L 1855

Test position number:— TB

WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 5TH MARCH 1990

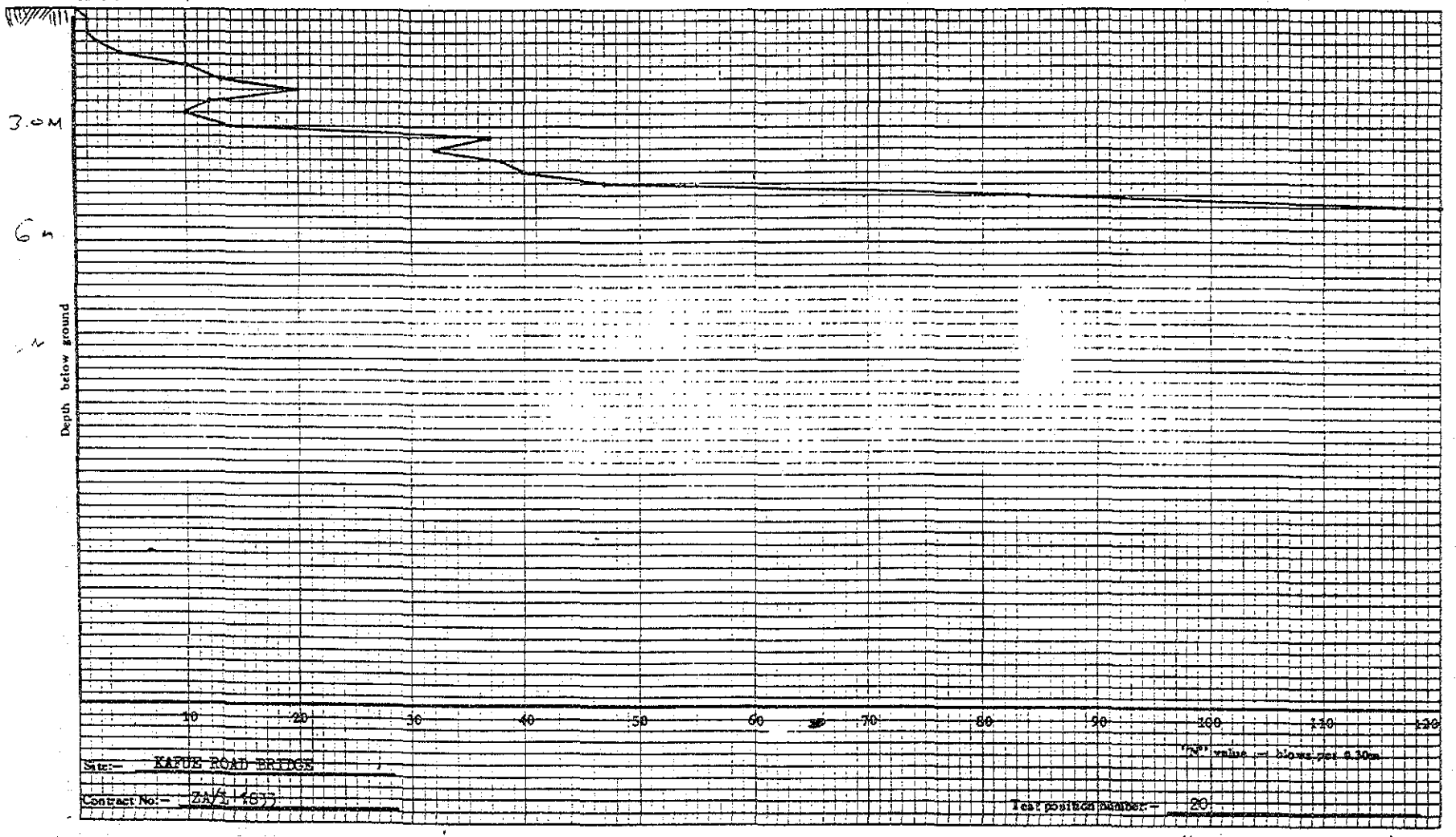


WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 5TH MARCH 1990

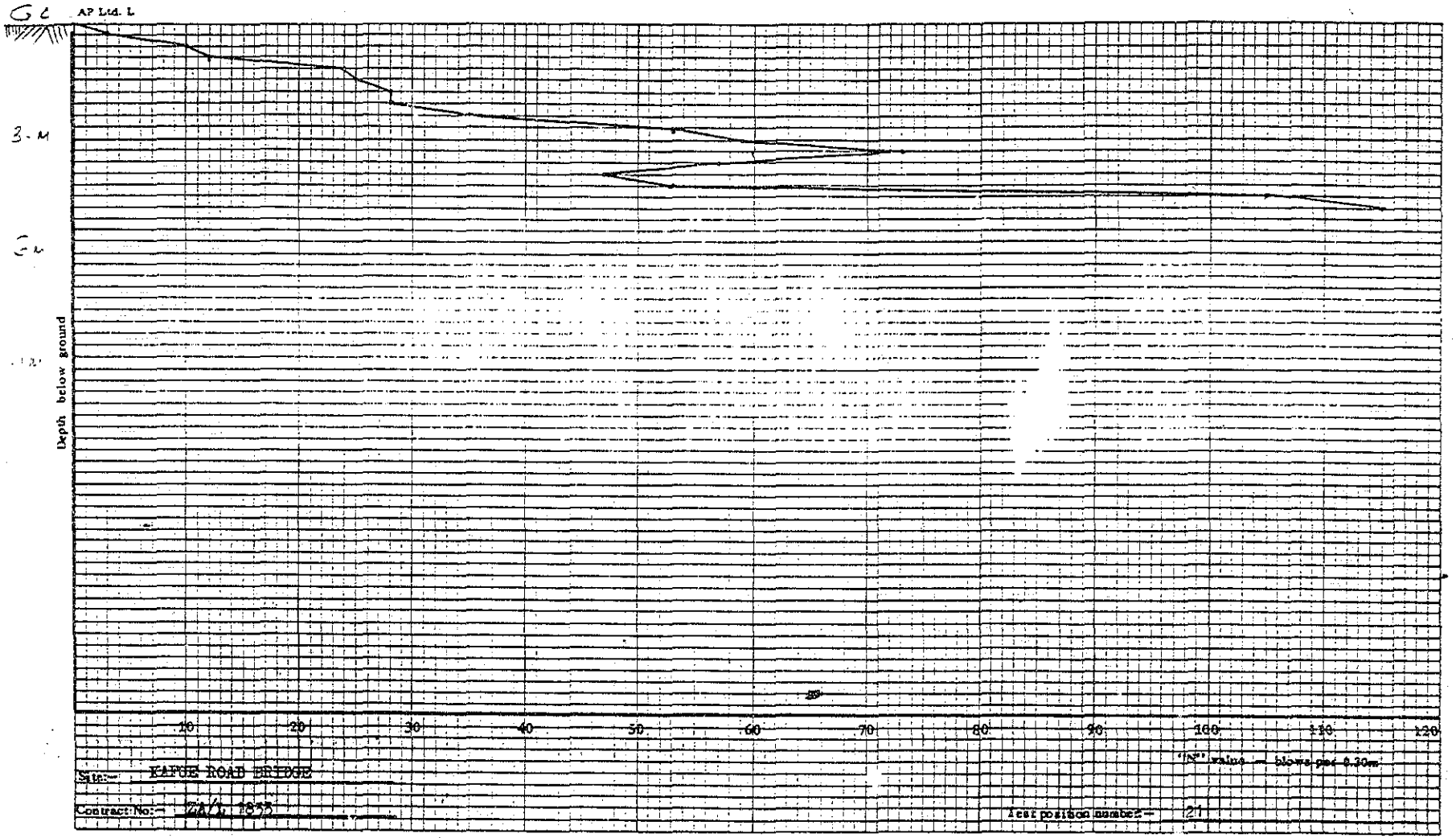
GC AP Ltd. L



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

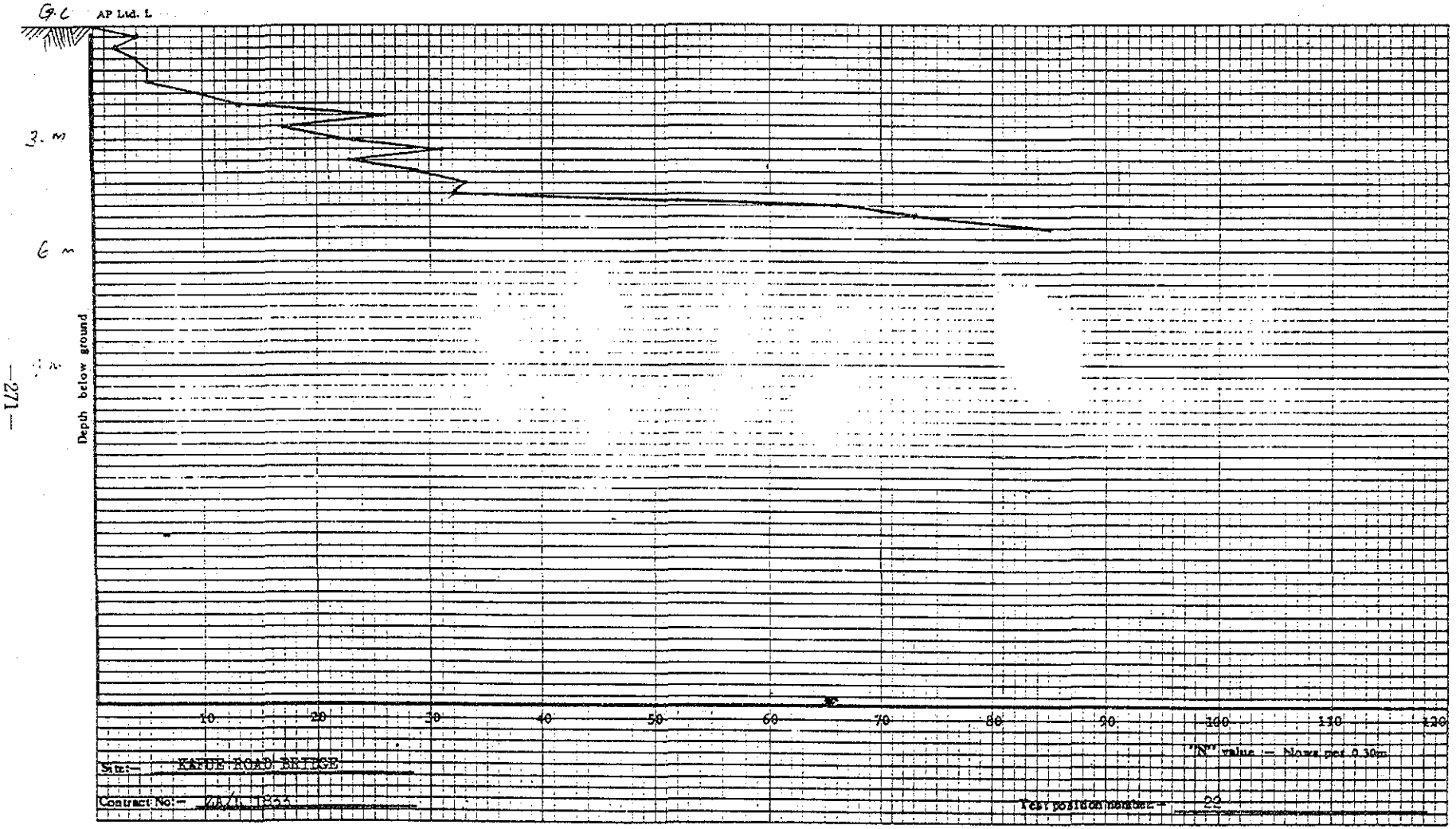
Date 1ST MARCH 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

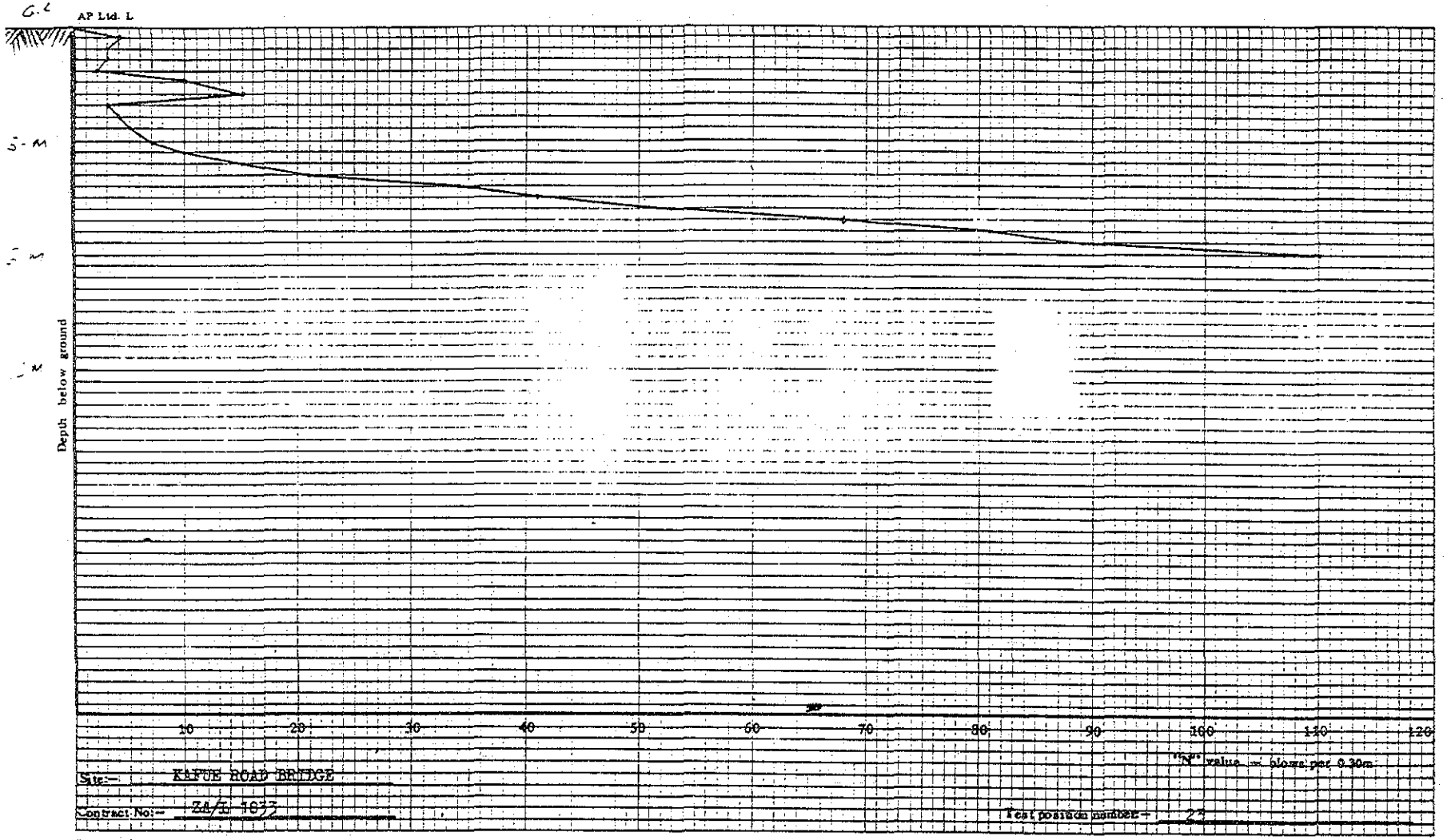
Date 1ST MARCH 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

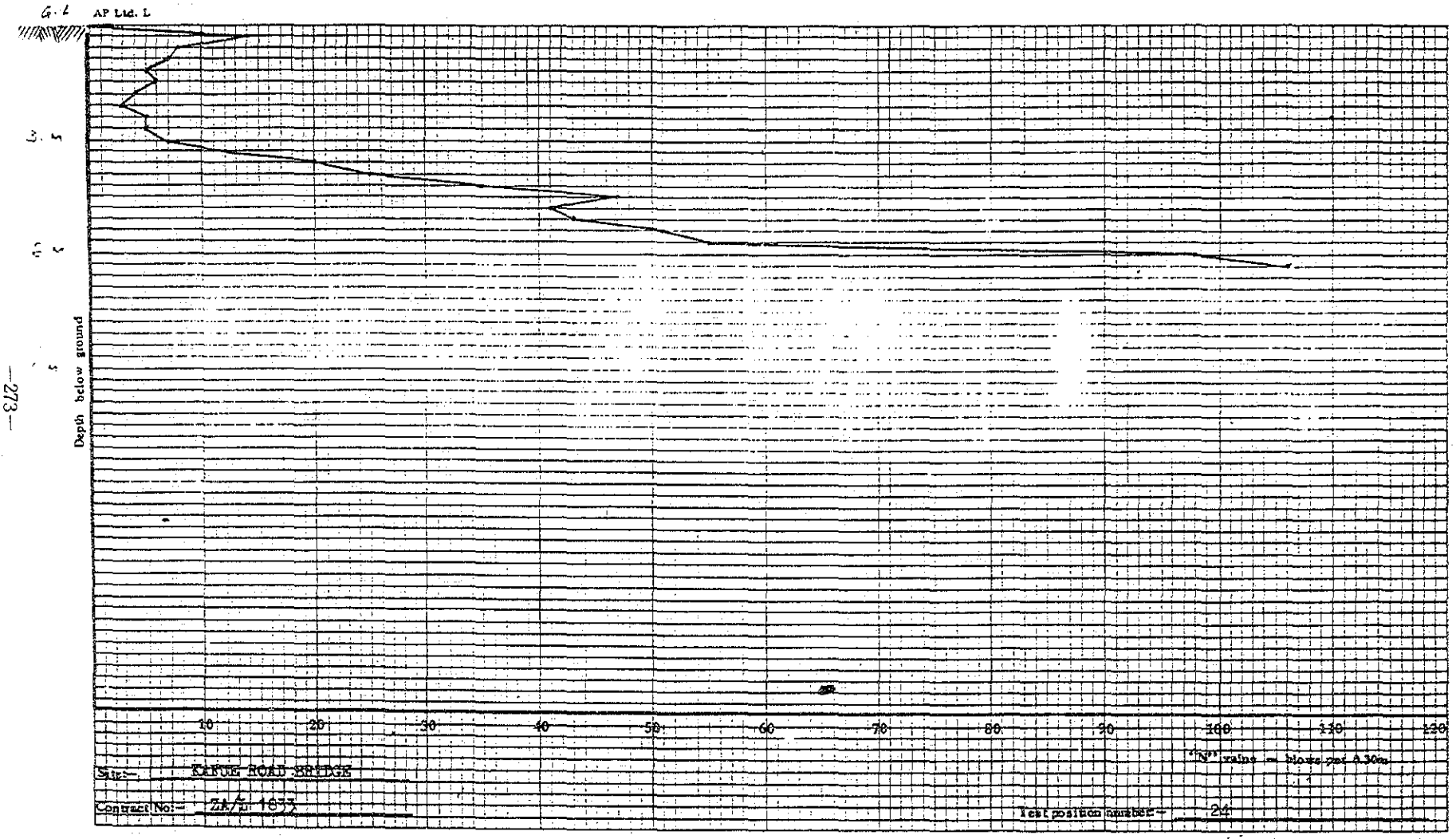
Date 28TH FEBRUARY 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

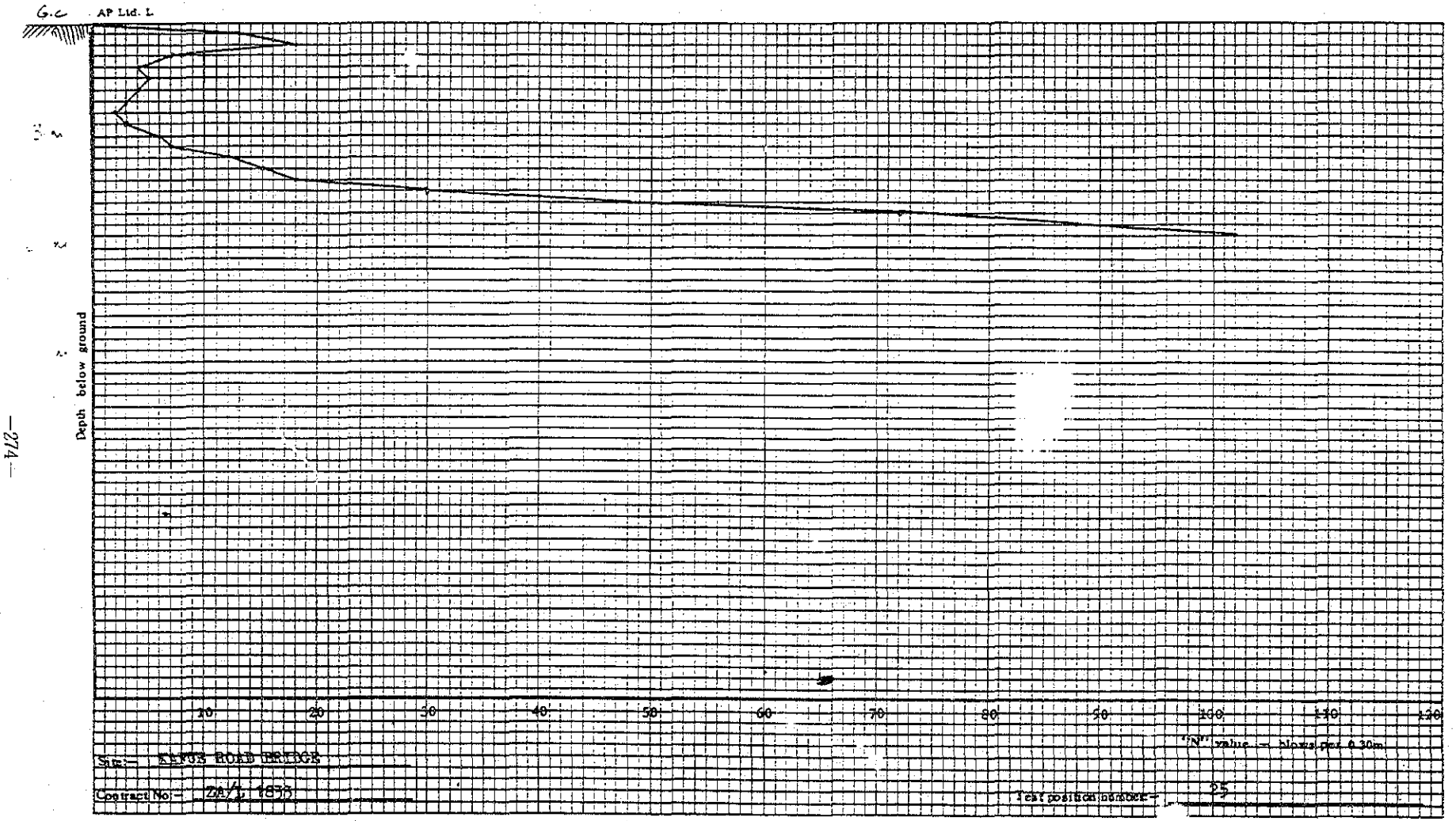
Date 27TH FEBRUARY 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 27TH FEBRUARY 1990

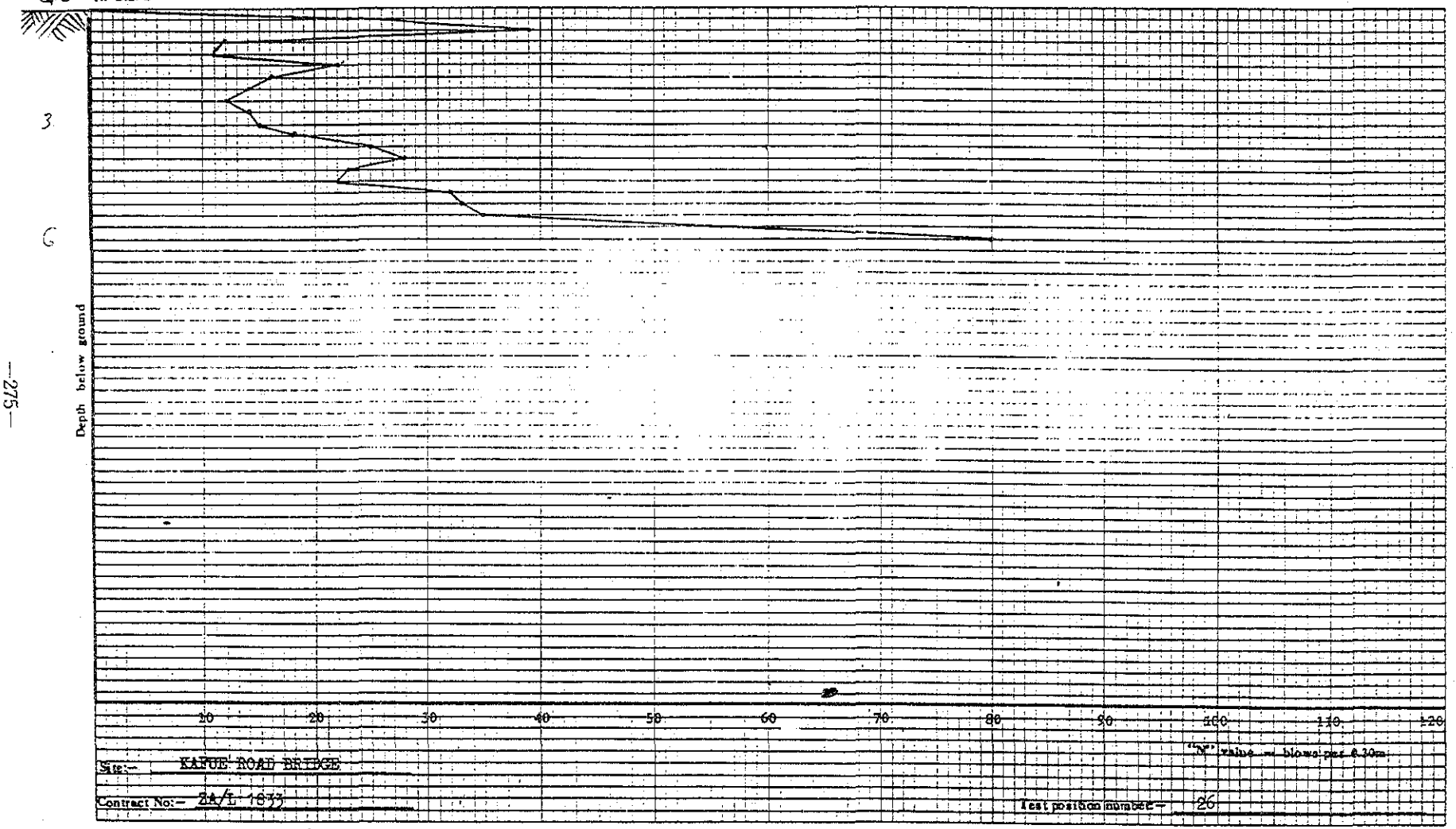


WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 27TH FEBRUARY 1990

G.C AP Ltd. L



Site:— KAFUE ROAD BRIDGE

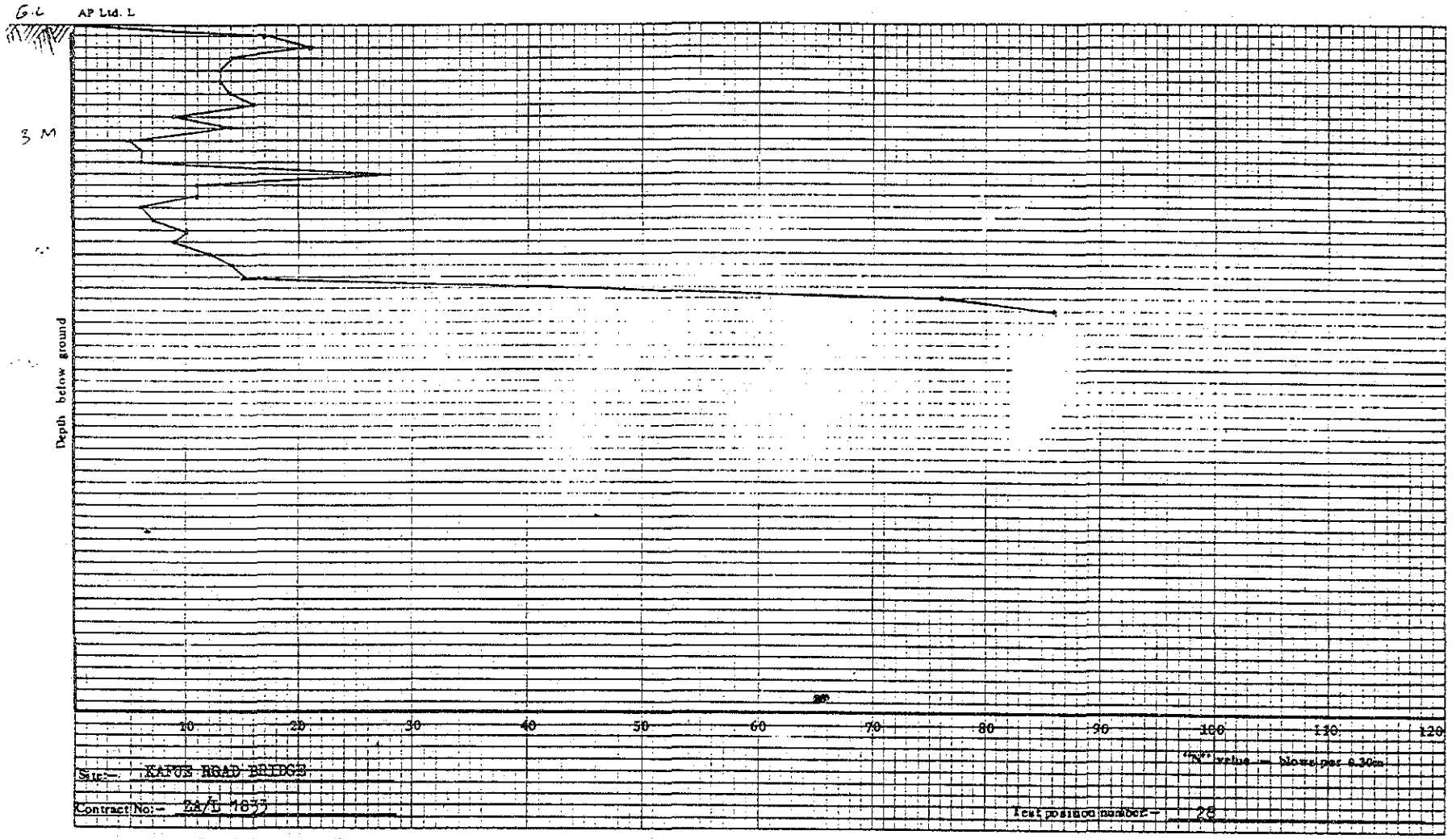
Contract No:— ZA/L 1033

Test position number— 26

WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

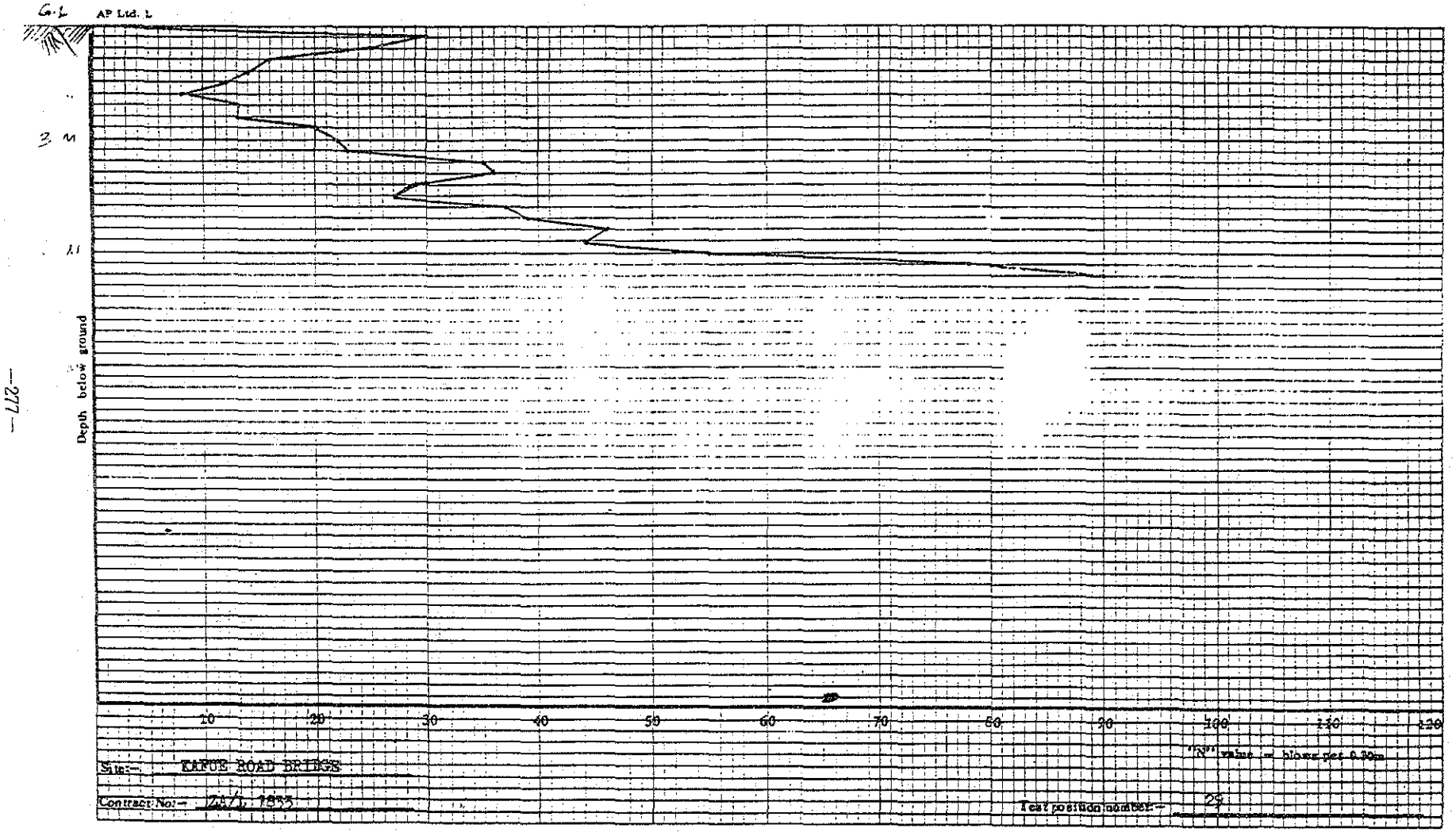
Date 6TH MARCH 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 6TH MARCH 1990



WADE ADAMS PILING AND FOUNDATIONS LTD.

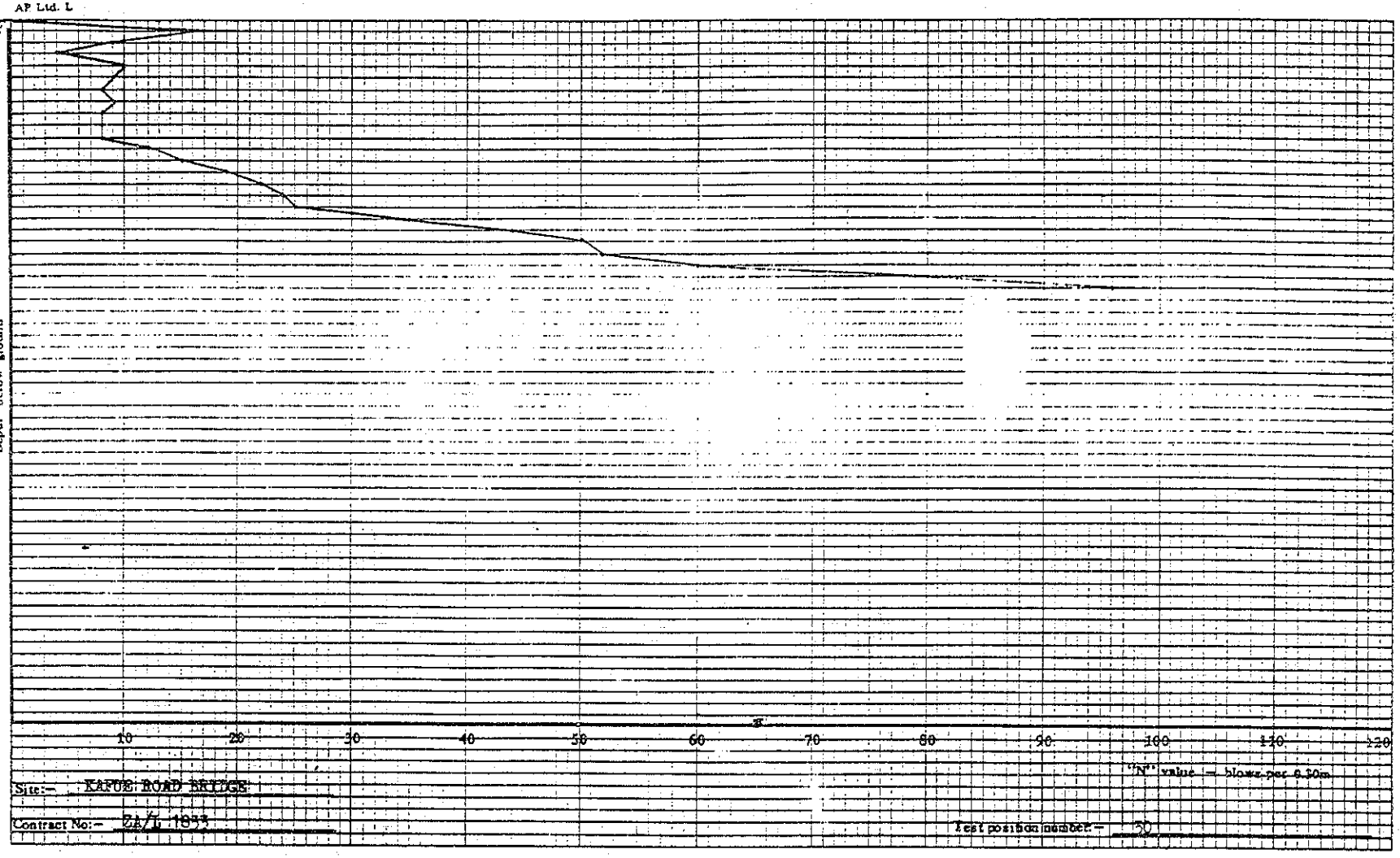
PENETROMETER TEST REPORT

Date 6TH MARCH 1990

GL

AP Ltd. L

3



WADE ADAMS PILING AND FOUNDATIONS LTD.

PENETROMETER TEST REPORT

Date 6TH MARCH 1990

付属資料　4-6　　水平積荷試験結果

Project: Kafue Road Bridge

Boring Hole
Location　:3　　Depth: GL　-0.50m　　Water Level upon Surveyed: GL± 0.00m

P0= 0.73(kg/cm2)　　Pf= 2.29(kg/cm2)　　P1=　　(kg/cm2)

Pw= 0.05(kg/cm2)

Ep=2(1+ν)(Vc+Vm)dp/dv
=2(1+0.3)(535+ 71)×0.011
= 17.33(kg/cm2)

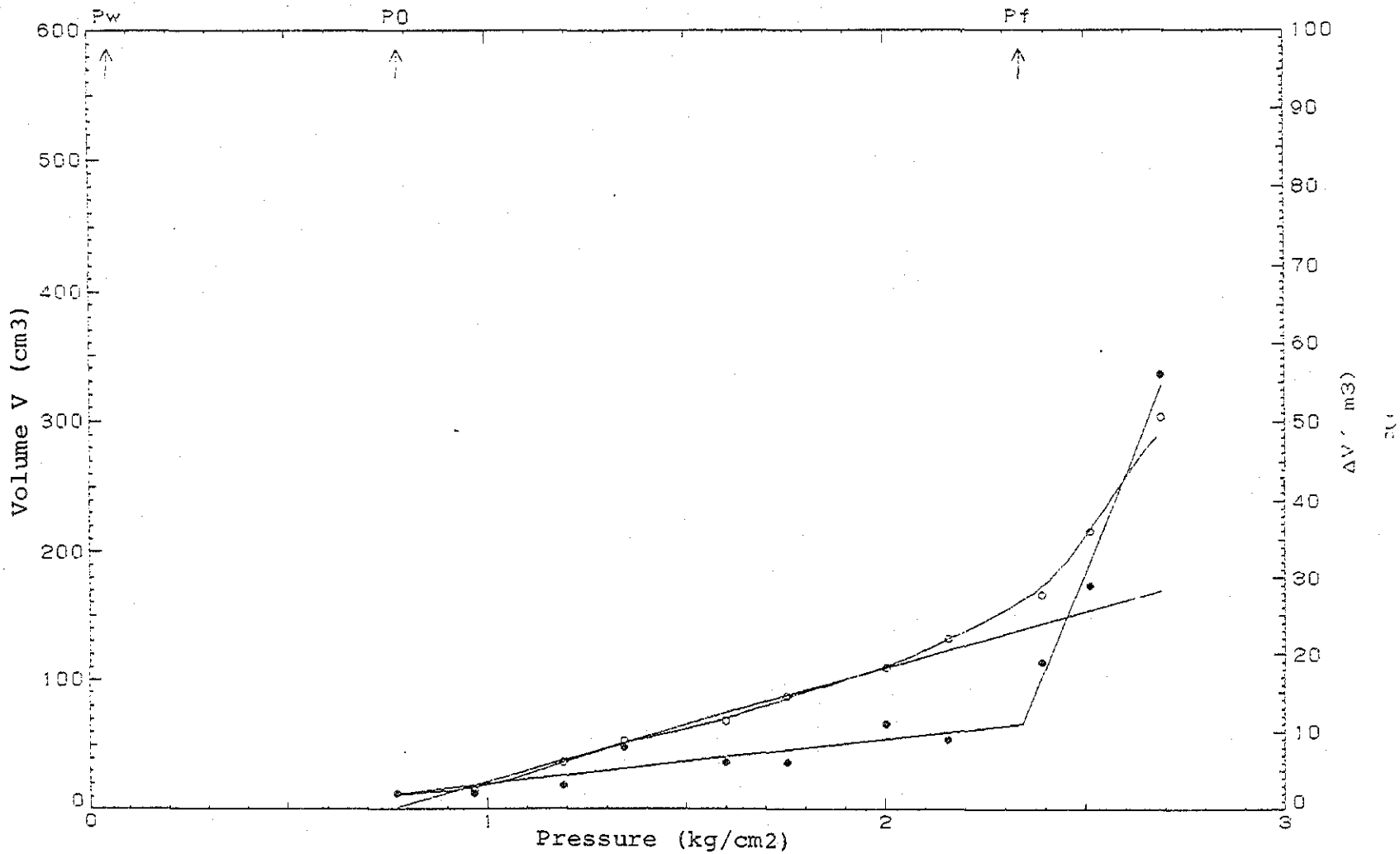


Fig. 1　Records of Horizontal Loading Test

Project: Kafue Road Bridge

Boring Hole
Location : 8 Depth : GL -2.50m Water Level upon Surveyed : GL -2.50m

Pw= 0.00 (kg/cm2)

Ep=2(1+ν)(Vc+Vm)dp/dv
=2(1+0.3)(535+309)×0.022
= 48.28 (kg/cm2)

P0= 2.44 (kg/cm2) Pf= 4.25 (kg/cm2) P1= (kg/cm2)

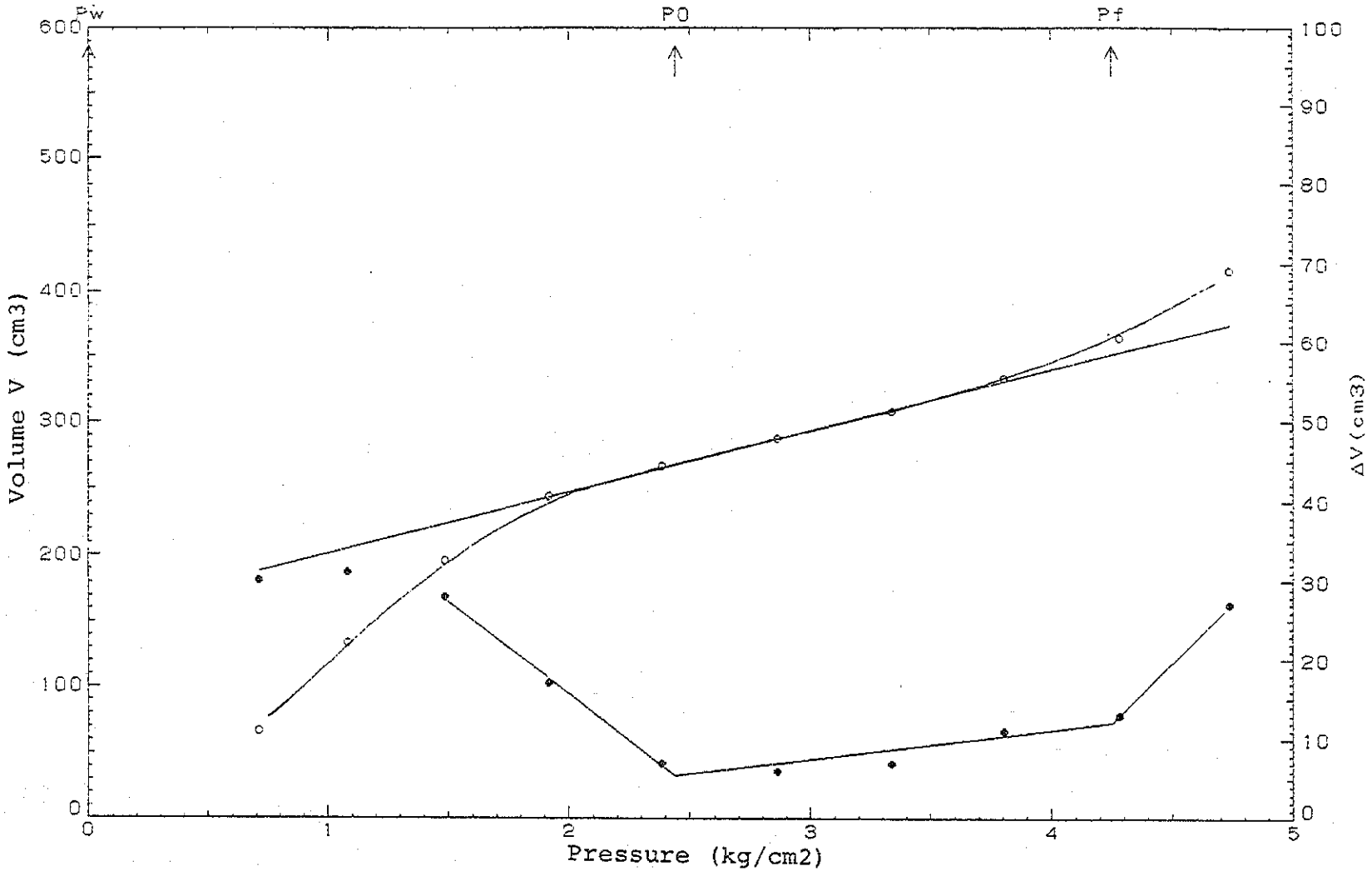


Fig. 2 Records of Horizontal Loading Test

Project: Kafue Road Bridge

Boring Hole Location :8 Depth: GL -3.50m Water Level upon Surveyed: GL -2.00m

P0= 1.99(kg/cm2) Pf= 6.50(kg/cm2) Pl= (kg/cm2)

Pw= 0.15(kg/cm2)

Ep=2(1+ν)(Vc+Vm)dp/dv
=2(1+0.3)(535+130)×0.055
= 95.09(kg/cm2)

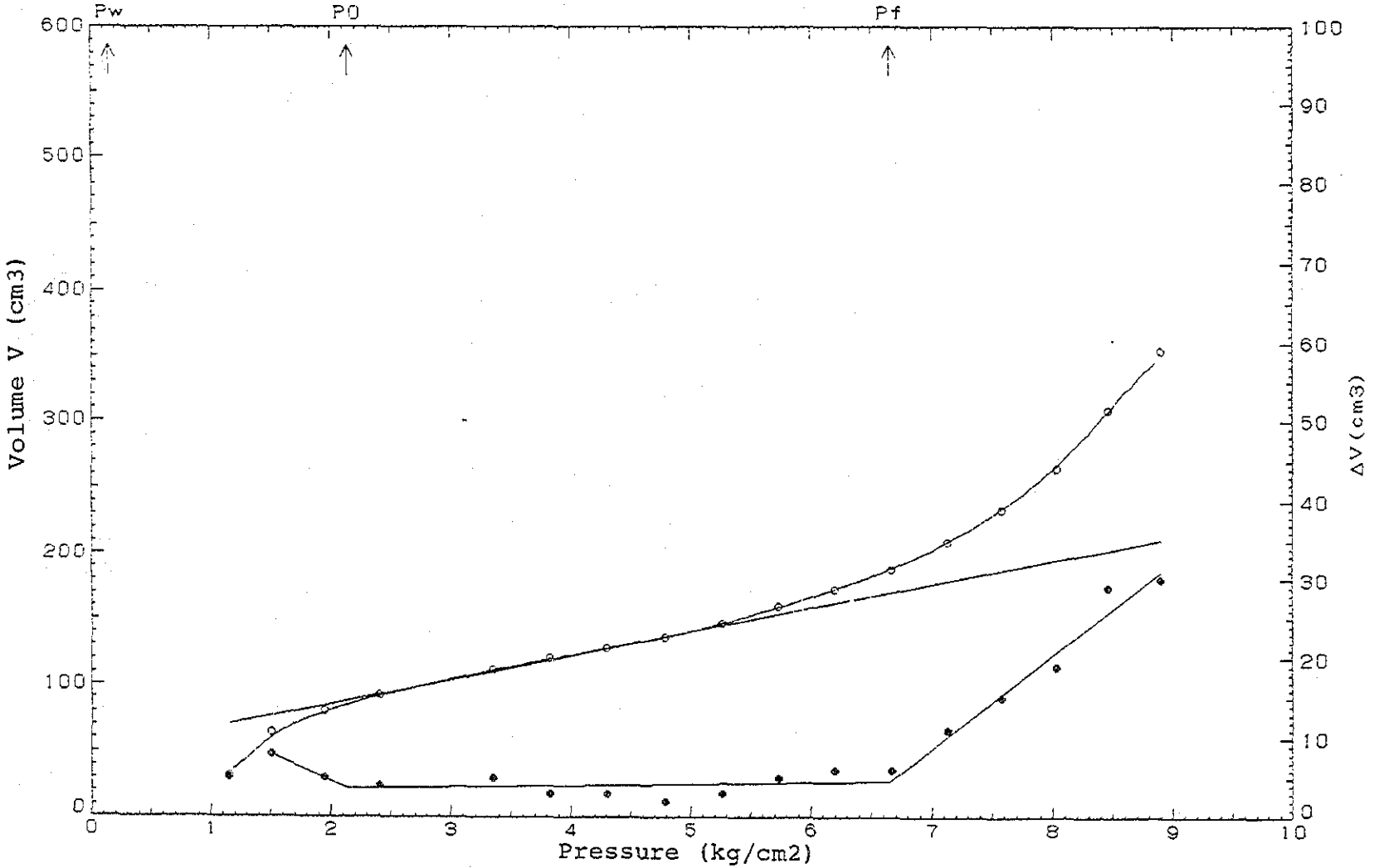


Fig. 3 Records of Horizontal Loading Test

Project: Kafue Road Bridge

Boring Hole Location :8 Depth: GL -1.50m Water Level upon Surveyed: GL -2.00m

P0= 2.01(kg/cm2) Pf= 4.00(kg/cm2) Pl= (kg/cm2)

Pw= -0. (kg/cm2)

Ep=2(1+ν)(Vc+Vm)dp/dv
=2(1+0.3)(535+261)×0.018
= 37.25(kg/cm2)

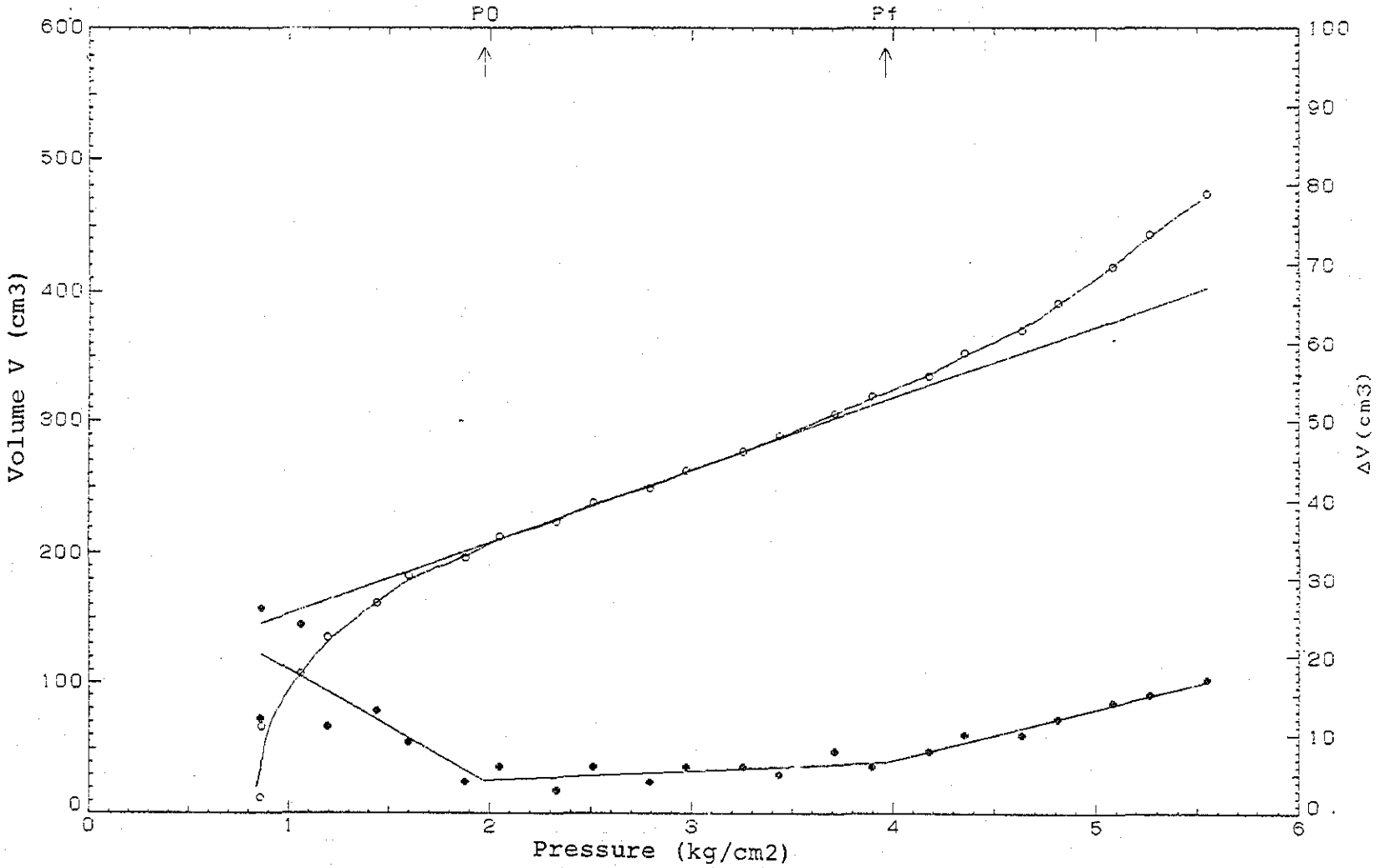


Fig. 4 Records of Horizontal Loading Test

Project: Kafue Road Bridge

Boring Hole Location : 11 Depth : GL -3.30m Water Level upon Surveyed : GL+ 4.20m

P0= 0.31(kg/cm2) Pf= 7.93(kg/cm2) P1= (kg/cm2)

Pw= 0.75(kg/cm2)

Ep=2(1+ν)(Vc+Vm)dp/dv
=2(1+0.3)(535+126)×0.033
= 56.71(kg/cm2)

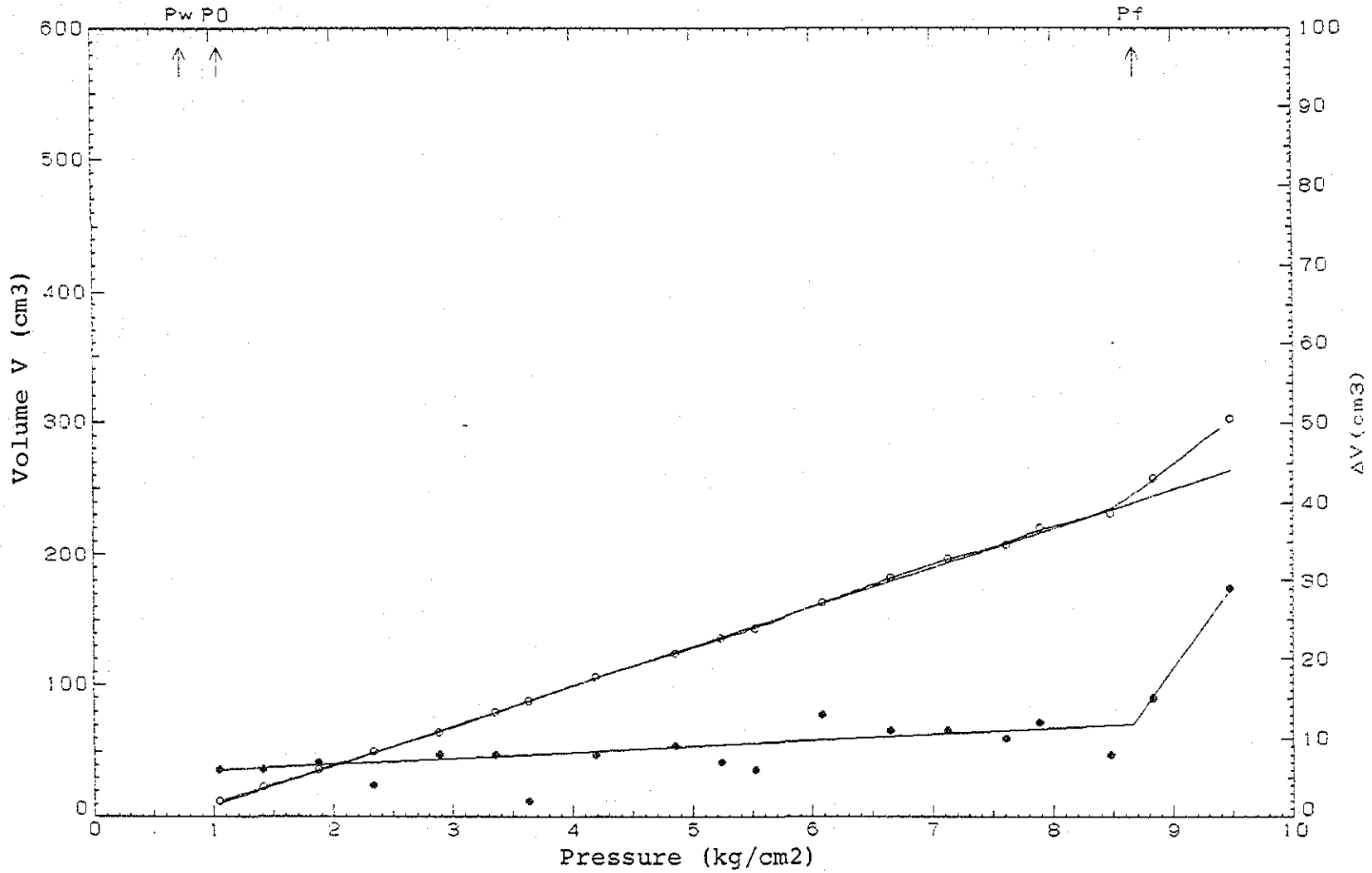


Fig. 5 Records of Horizontal Loading Test

付属資料　5-1　　カフエの水位

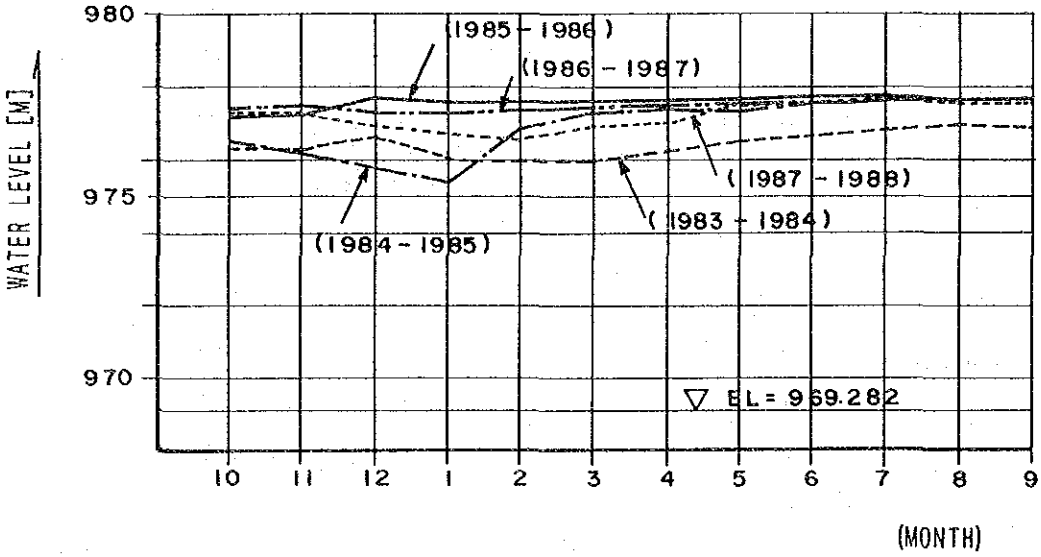


FIG. 1. MAXIMUM MONTHLY WATER LEVEL

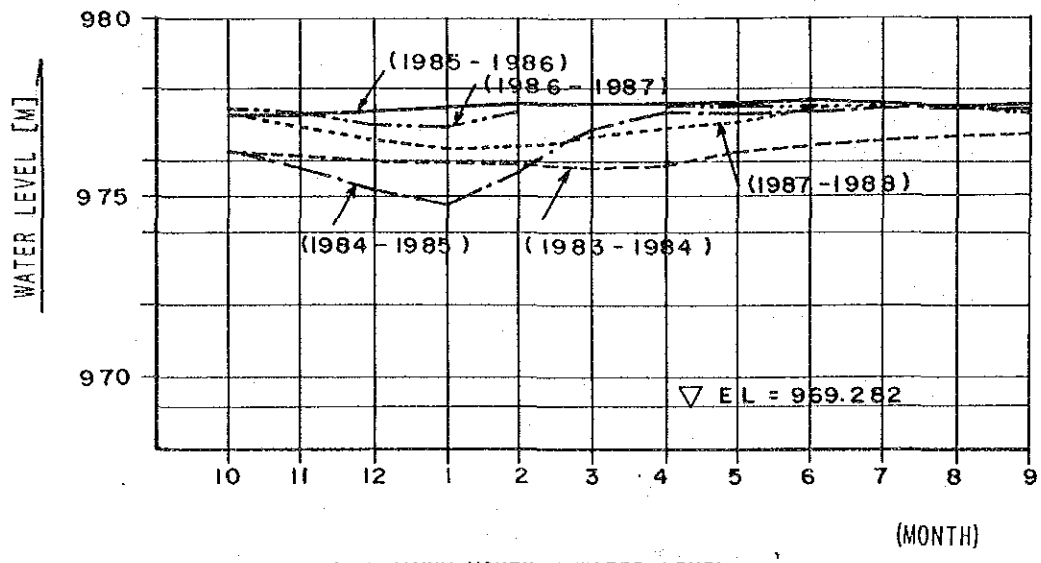
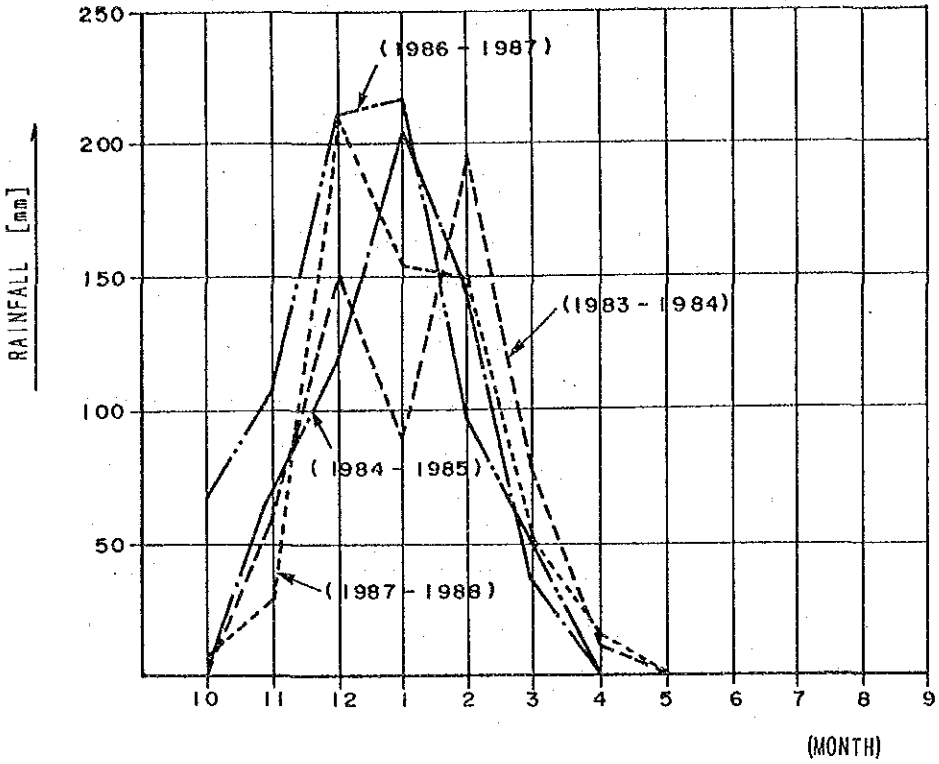
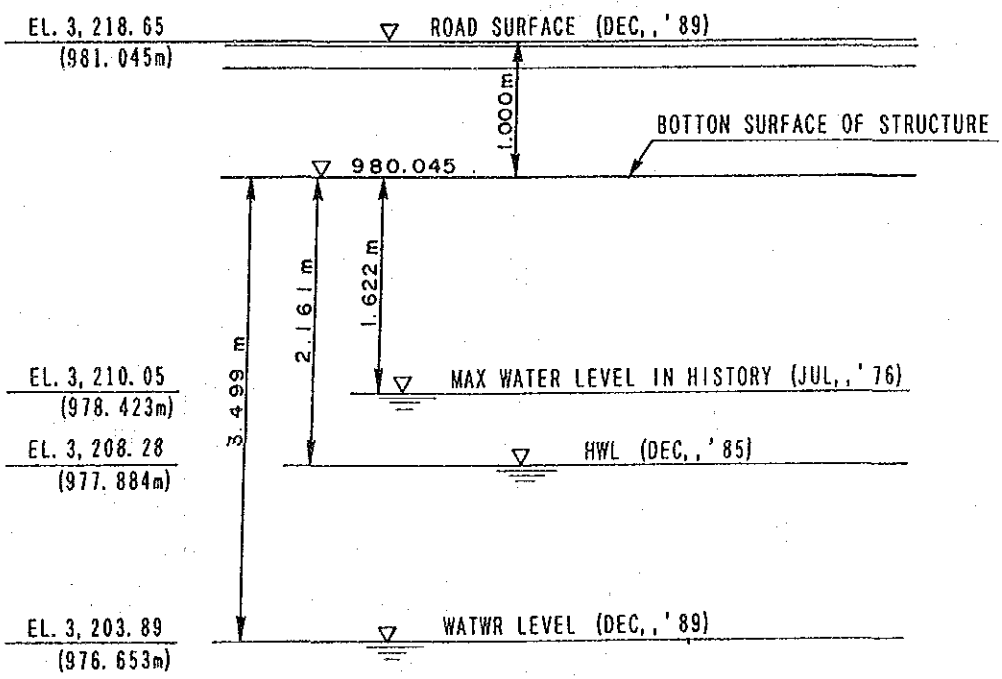


FIG. 2. MINIMUM MONTHLY WATER LEVEL

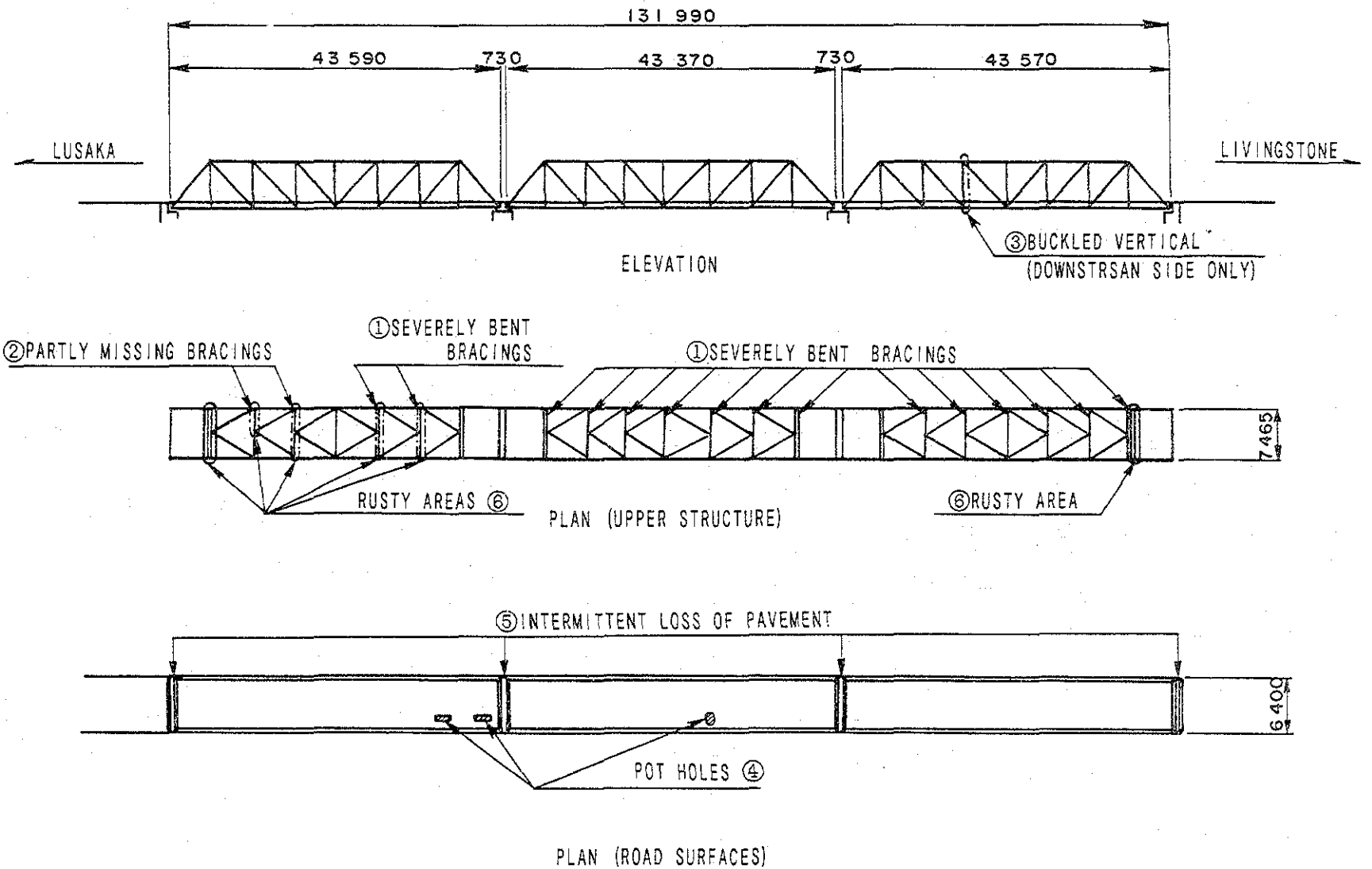
付属資料　5-2　　カフエの降雨記録

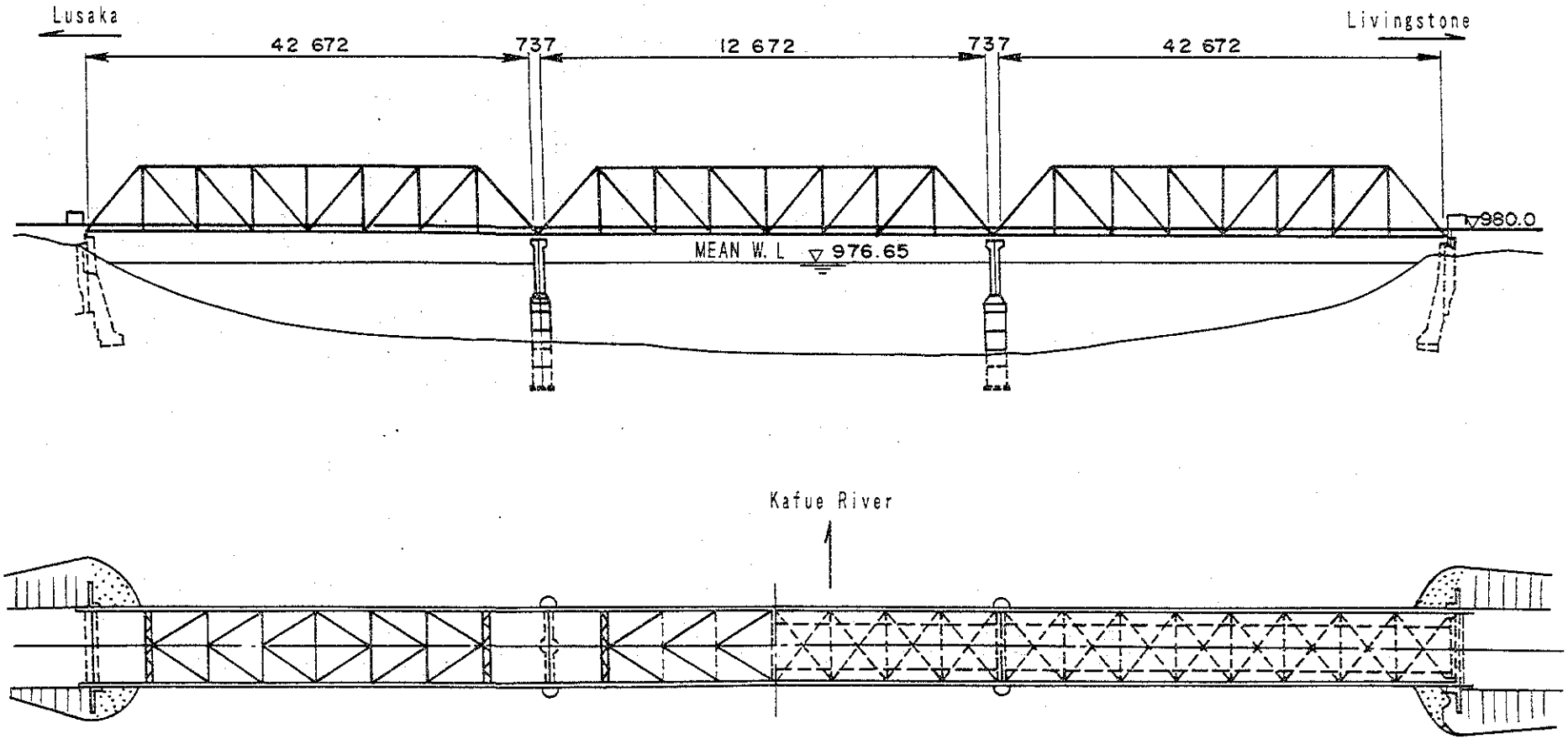


付属資料　5-3　　カフエ橋桁下余裕高



付属資料　5-4　　損傷部位置図





付属資料　5-5　　既存橋梁一般図

付属資料　6-1　　道路区分

1. Summary of Road System

T	International Main Roads
M	Main Roads
D, RD	District Roads
B	Branch Roads
R	Rural Roads
E	Estate Roads

2. Road Classification

Class	Formation Width at Finished Surface Level (Meters)	Carriageway Width (Meters)	Type of Surface
Class 1A	13.30	7.30	Bituminous
Class 1B	10.10 to 12.70 According to Traffic Needs	6.70	Bituminous
Class 1C	10.10	6.10	Bituminous
Class II	10.10	Minimum 6.10	Gravel
Class III	7.50	Minimum 5.50	Gravel where Necessary for All Weather Standard
Unclassified	Cleared and Stumped Track of 5.50 minimum Width and Skeleton Drainage		Earth with 3.50 Gravel Surface Where Essential

付属資料 6-2 幾何学的設計条件

Road Classification		Class I A	Bituminous B	Bituminous C	Class II Gravel	Class III Gravel
Average daily traffic estimated for nth year after construction (ADT)		1,500 to 5,000	500 to 1,500	Up to 500	Up to 500	20 to 50
Width of surfaced carriageway (metres)		7.30	6.70	6.10	Min. 6.10	Min. 5.50
Shoulder widths (metres)		3	2-3	2	2	1
Flat	Design Speed (km/h)	100	100	100	80-100	60-80
Topo-graphy	Limiting Grade (%)	4	5	6	6	8
Rolling to Hilly Topo-graphy	Design Speed (km/h)	100	80-100	80	60-80	50-60
	Limiting Grade (%)	6	6	7	8	10
	Maximum length of limiting grade(metres)	220	220	180	150	N.A.
Mountain-us Topo-graphy	Design Speed (km/h)	80	60-80	60	50-60	30-50
	Limiting Grade (%)	7	8	8	10	12
	Maximum length of limiting grade (metres)	180	150	150	150	N.A.

Notes: 1. Where difficulty is encountered in obtaining lengths of limiting grade less than the maximum length stated in Table 3.2., reference should be made to the Director of Works (Roads).

2. Shoulder widths for Class I B roads should be chosen according to traffic needs and economics.

付属資料　6-3　　設計車両寸法

Design Vehicle		Dimensions in Metres					
Symbol		Wheel-base	Front Overhang	Rear Overhang	Overall Length	Overall Width	Height
Passenger	P	3.3	1.0	1.5	5.8	2.1	-
Single Unit Trucks	SU	6.1	1.2	1.8	9.1	2.5	4.1
Trailer	WB-40	4.0+6.2 =12.2	1.2	1.8	15.2	2.5	4.1
Trailer	WB-50	6.2+9.0 =15.2	1.0	0.6	16.8	2.5	4.1

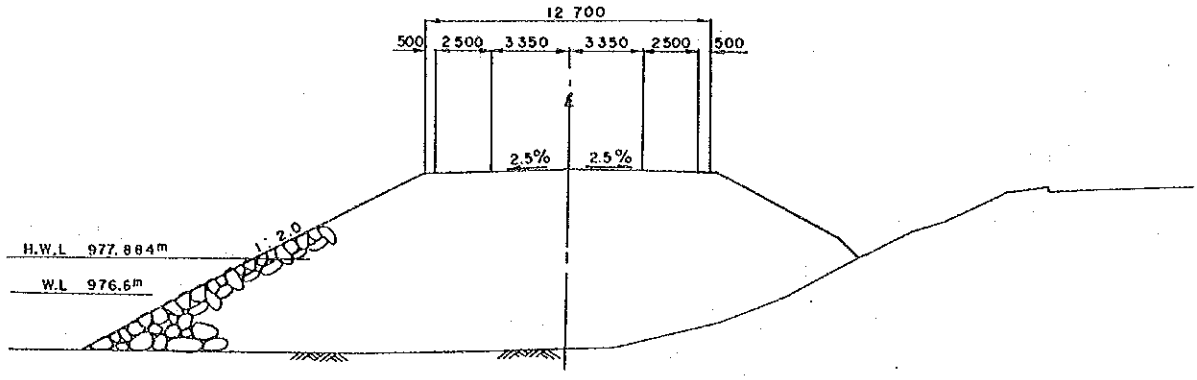
付属資料　6-4　　幾何学的設計基準

Item	Unit	Design Standard
Design Classification	-	Class-1B
Design Speed	km/hr	100
Cross Section Elements		
Lane Width	m	3.35
Left Shoulder Width	m	2.00
Marginal Strip Width	m	0.30
Crossfall of Tavelled Way	%	2.5
Crossfall of Outer Shoulder	%	2.5
Vertical Clearance	m	5.0
Min. Stopping Sight Distance	m	160
Horizontal Alignment		
Min. Radius		
Absolute Min.	m	340
Desirable	m	700
Min. Radius Without Superelevation	m	5,000
(*) Min. Curve Length	m	1,200/a or 170
Max. Superelevation	%	10
Min. Transition curve Length	m	50
Min. Radius Without Transition Cuevem		1,500
Vertical Alignment		
Max. Grade		
Standard	%	3
Absolute Max.	%	6
Min. Vertical Curve Radius		
Crest, Standard	m	6,500
Crest, Desirable	m	10,000
Sag, Standard	m	3,000
Sag, Desirable	m	4,500
Min. Vertical Curve Length	m	50

Note:

1) The above values are bsed on the "Standard Specifications for Geometric Design of Kafue Road Bridge."

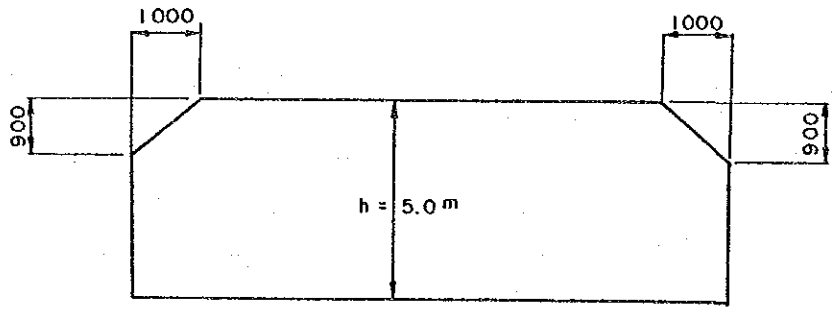
(*) 2) The value of "a" in minimum horizontal curve length shows an interesting angle in degrees (min. 2 degrees), when the angle is less than 7 degrees.



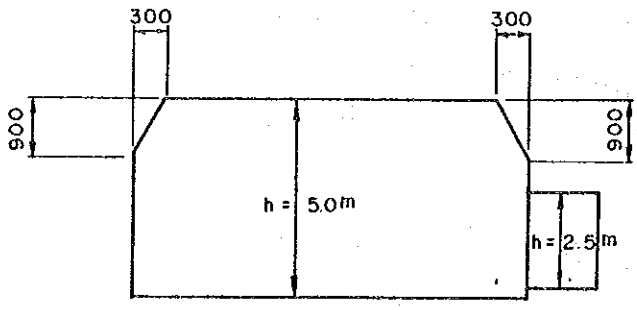
付属資料　6-5　　取付道路部標準断面

All demensions are in mm. otherwise indicated

For Roadway Clearance on Embankment



For Roadway and Footpath no Bridge



付属資料　6-6　　建築限界

BC No. 0+0.0 R=∞ R=15,000

EC No. 11+38.394 R=15,000 R=∞

SECURITY AREA

Bench Mark T_0

Bench Mark T_1

⟸ LUSAKA

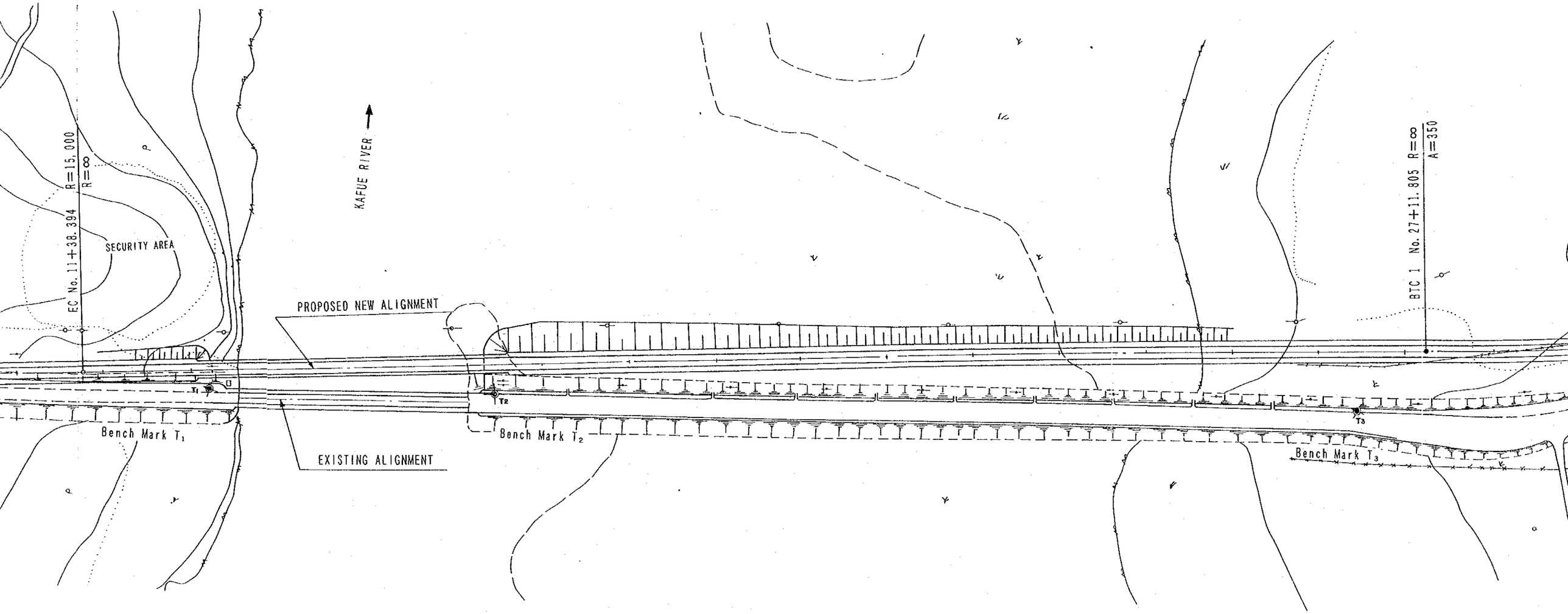
PROPOSED NEW ALIGNM

EXISTING ALIGNME

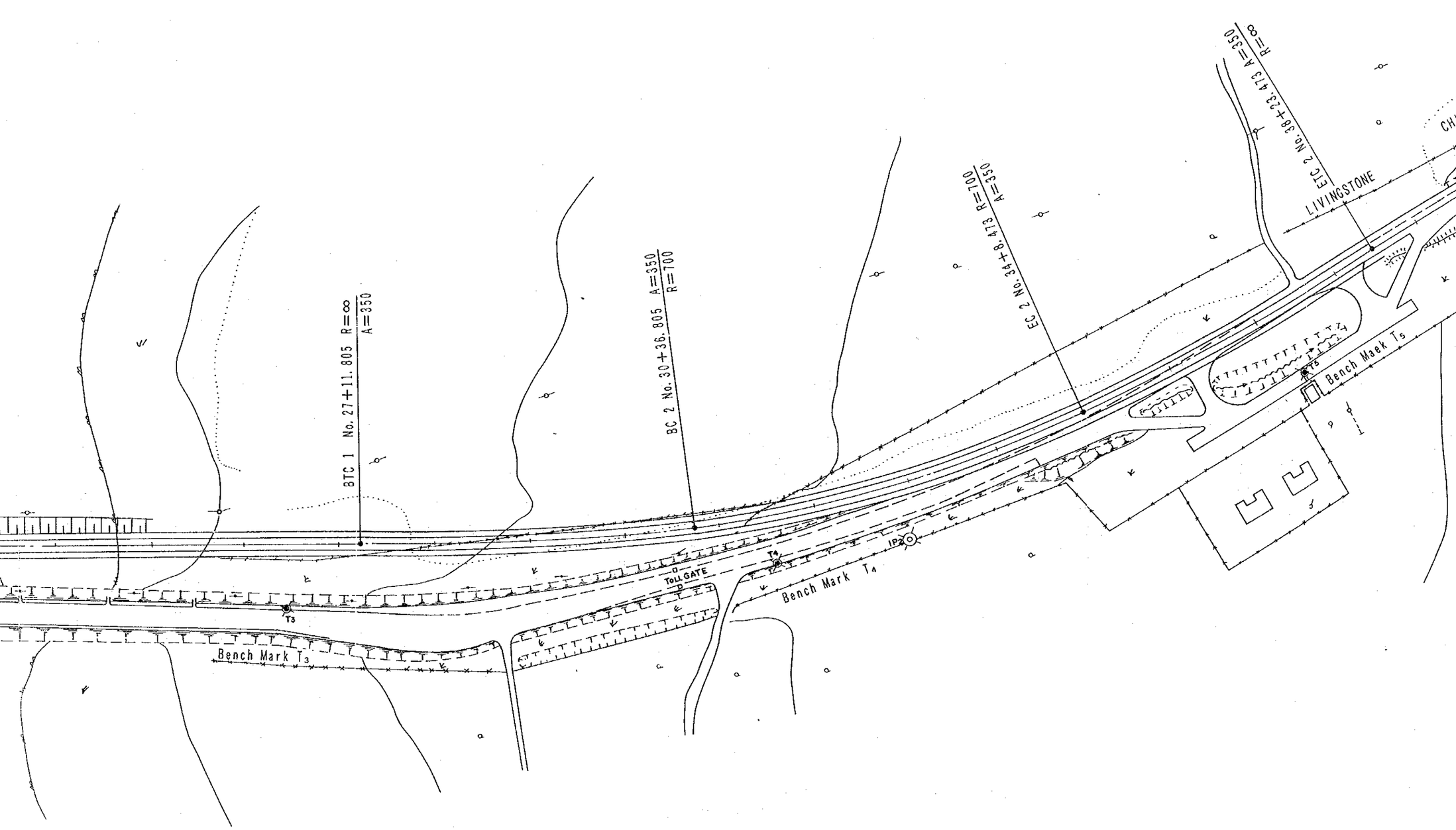
KAFUE RIVER ⟶

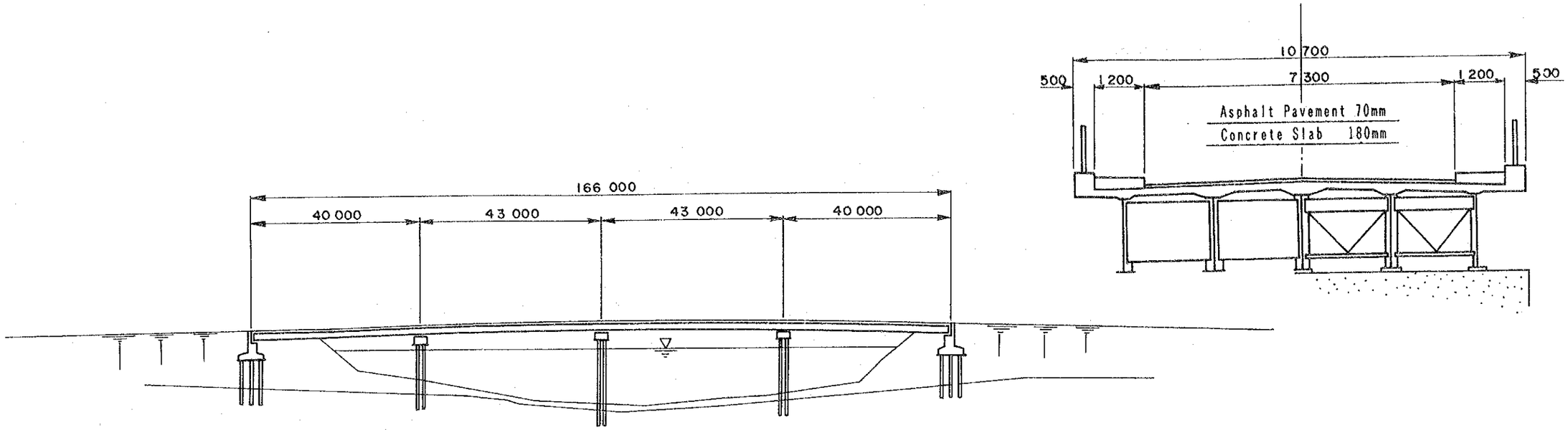
LEGEND

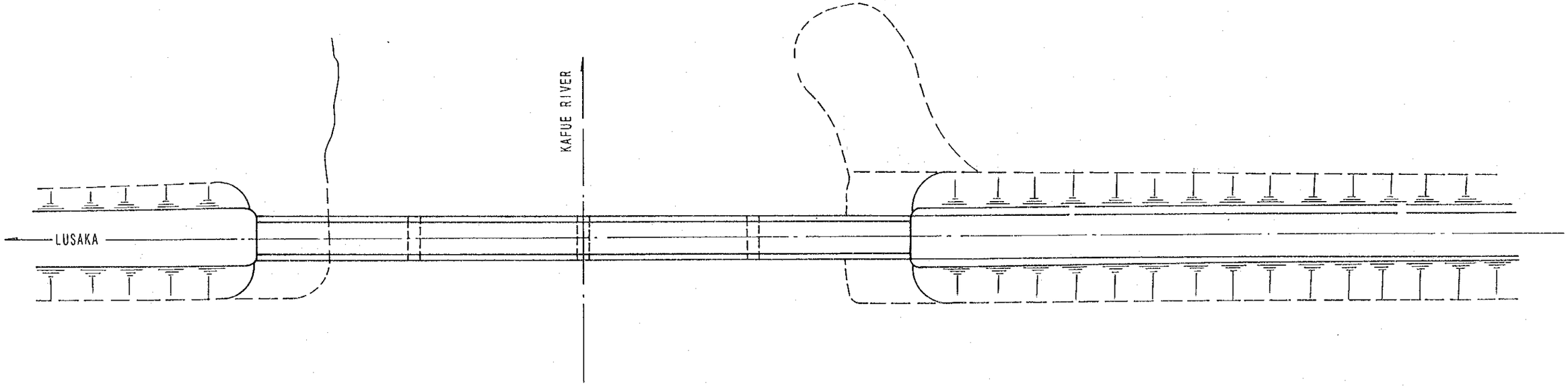
- 1ST TRAVERSE POINT
- WIDE LEAFED TREES
- GRASSLAND
- POWERLINE
- TELEPHONE LINE
- BOUNDARY OF SAVANNAH
- EMBARKMENT, SLOPE


KAFUE RIVER
EC No. 11+38.394 R=15,000
R=∞
SECURITY AREA
PROPOSED NEW ALIGNMENT
EXISTING ALIGNMENT
BTC 1 No. 27+11.805 R=∞
A=350
T1
T2
T3
Bench Mark T1
Bench Mark T2
Bench Mark T3

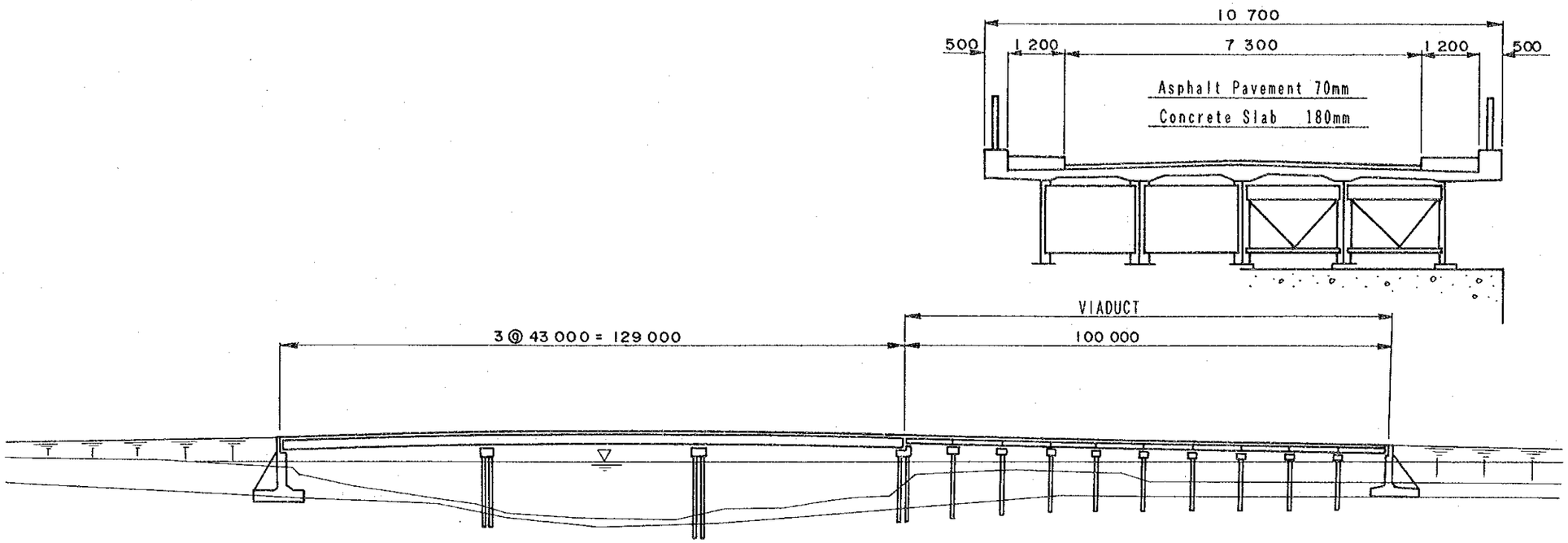
付属資料　7-1　　提案線形


BTC 1 No. 27+11.805 R=∞ A=350
BC 2 No. 30+36.805 A=350 R=700
EC 2 No. 34+8.473 R=700 A=350
EIC 2 No. 38+3.413 A=350 R=∞
LIVINGSTONE
CHIRUNDU
Bench Mark T5
Bench Mark T4
Bench Mark T3
Toll GATE
IP2
T3
T4
T5

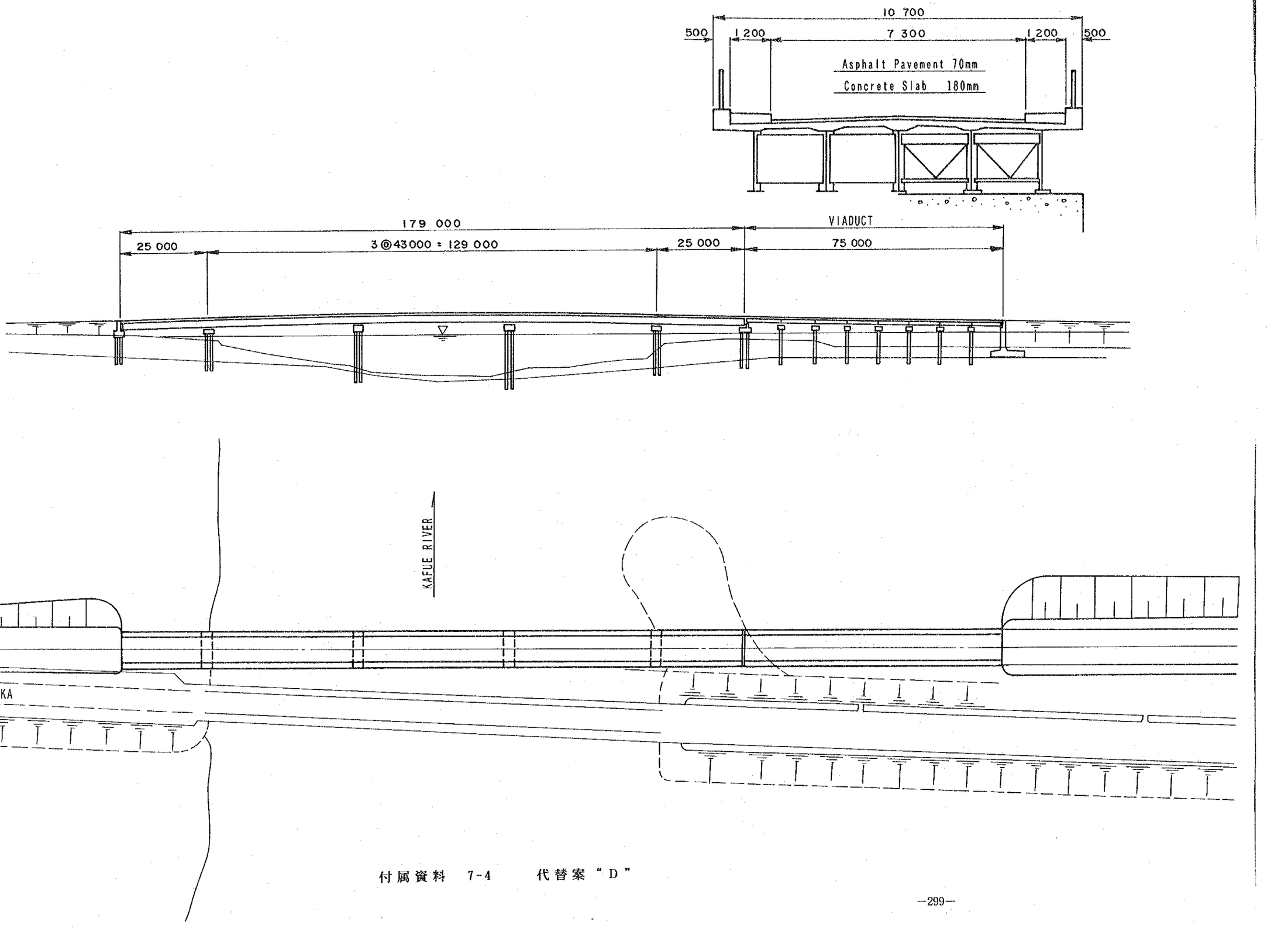

166 000
40 000
43 000
43 000
40 000
10 700
500
1 200
7 300
1 200
500
Asphalt Pavement 70mm
Concrete Slab 180mm


KAFUE RIVER
LUSAKA

付属資料 7-2 代替案 “A”


10 700
500
1 200
7 300
1 200
500
Asphalt Pavement 70mm
Concrete Slab 180mm
VIADUCT
3 @ 43 000 = 129 000
100 000
KAFUE RIVER
LUSAKA

付属資料　7-3　　代替案“B”


10 700
500
1 200
7 300
1 200
500
Asphalt Pavement 70mm
Concrete Slab 180mm
179 000
VIADUCT
25 000
3@43000 = 129 000
25 000
75 000
KAFUE RIVER
LUSAKA

付属資料　7-4　　代替案“D”

付属資料 12-1　車両運行費単価表

(Unit:Kwacha)

(Type of Vehicle)		Passenger Car	Large TRuck
(Representative Vehicle)		Toyota Cressida	Leyland 3-Axle Draw-Bar-Trailer
(1) Vehicle Price		598,800	1,356,000
Usage	Hour (/Year)	3000	3650
	Running (1000Km)	36	42
(2) Duration	Year	12	15
	Distance (1000Km)	432	630
	Salvage Value	20%	10%
(3) Depreciation			
	Time (Ratio/Year)	3%	3%
	Distance (Ratio/100000Km)	10%	7%
		44%	45%
(4) Tyre	Duration (1000Km)	60	60
	Unit Price	6,000	8,500
	Number of Tyre	4	18
	Total Price	24,000	153,000
(5) Fuel	Price (/l)	7.6	4.7
	Consumption (l/Km)	0.083	0.11
(6) Oil	Percentage for Fuel	6%	7%
(7) Maintenance	(/1000Km)	694	4638
(8) Insurance	(/Year)	80,000	22,300
(9) Personnel Cost		4,300	4,300
(10) Overhead		10%	20%
(11) Interest Rate		15%	15%
(A) Time	(/Year)		
Capital Cost		44,910	101,700
Personnel Cost		4,300	4,300
Insurance		80,000	22,300
Depreciation		17,964	40,680
(Subtotal)		147,174	168,980
(Subtotal Converted to /1000Km)		4,088	4,023
(B) Distance (/1000Km)			
Fuel		631	517
Oil		38	36
Tyre		400	2,550
Maintenance		694	4,638
Depreciation		610	969
(Subtotal)		2,373	8,710
(C) Total		6,461	12,733
(D) Overhead		646	2,547
(E) Grand Total	(/1000Km)	7,107	15,280

Note : 1) Basic data are interviewed from car-dealers and trucking company.
2) Data used are as of January, 1990.
3) Exchange rate: US$ 1 = Kwacha 40

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