REPUBLIC OF KENYA

LAKE BASIN DEVELOPMENT AUTHORITY

SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

DATA BOOK 1

GROUND SURVEY

DECEMBER, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

NAIROBI OFFICE
P. O. BOX 30572
NAIROBI KENYA

TOKYO HEAD OFFICE
P. O. BOX 216 SHINJUKU
TOKYO JAPAN

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DEVELOPMENT PROJECT

DATA BOOK - 1

GROUND SURVEY

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LIST OF REPORTS

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Volume II. FEASIBILITY REPORT ON SONDU HYDROPOWER DEVELOPMENT PROJECT

Volume III. PRE-FEASIBILITY REPORT ON KANO PLAIN IRRIGATION PROJECT

Volume IV. SUPPORTING STUDY REPORT FOR HYDROPOWER PLAN

Volume V. SUPPORTING STUDY REPORT FOR IRRIGATION PLAN

Volume VI. SUPPORTING STUDY REPORT FOR SOCIO-ECONOMY

DATA BOOK-1 GROUND SURVEY
DATA BOOK-2 GEOTECHNICAL SURVEY
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TABLE OF CONTENTS

BENCH MARK

PRECISION

Line No.	Distance	Point	Error of Closure	Error of Height	Fractional Closing Error
T - 1	$2909^{m}.19$	19	$0^{m}.17$	- 1^{cm}	$^{1}/16,000$
P - 1	2210.00	11	0.12	+ 0	$^{1}/18,000$
P - 2	1108.60	10	0.03	- 1^{cm}	$^{1}/37,000$
C	825.85	8	0.16	- 1^{cm}	$^{1}/5,000$
K	427.92	5	0.02	0	$^{1}/21,000$
T - 2	572.49	7	0.02	- 1^{cm}	$^{1}/26,000$
R	1332.69	12	0.11	- 8^{cm}	$^{1}/12,000$
N	3845.80	37	0.08	- 3^{cm}	$^{1}/48,000$
G	442.76	6	0.09	- 2^{cm}	$^{1}/5,100$
F	824.10	7	0.06	- 1^{cm}	$^{1}/13,700$
A	1149.27	11	0.05	+ 12^{cm}	$^{1}/22,000$
B	1621.14	17	0.10	+ 7^{cm}	$^{1}/16,000$

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JAPAN

BM NO. BP

PAGE /

BENCH MARK

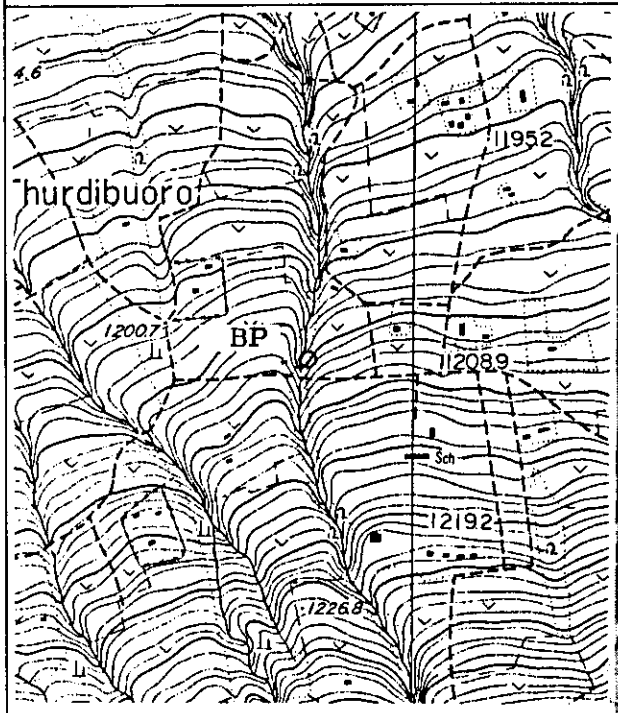
TRAVERSE POINT

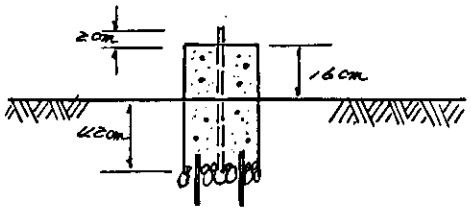
MAP NYAKACH
SCALE 1:50000
SHEET NO. 116/4

THE POINT IS MEASURED AND PERMANENTLY MARKED IN

ELEVATION NETWORK
X = 62,450.58
Y = 5,853.81

ELEVATION IN METER
MAIN STATION = 1206 m 212
REFERENCE 1 = m
REFERENCE 2 = m
REFERENCE 3 = m





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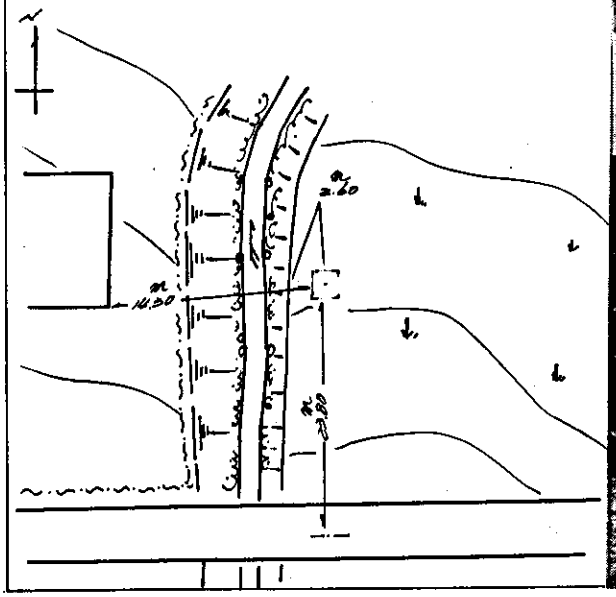

AREA INDICATION ON THE MAP ON THE REVERSE SIDE

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JAPAN

BM NO. NO.18

PAGE 2

BENCH MARK

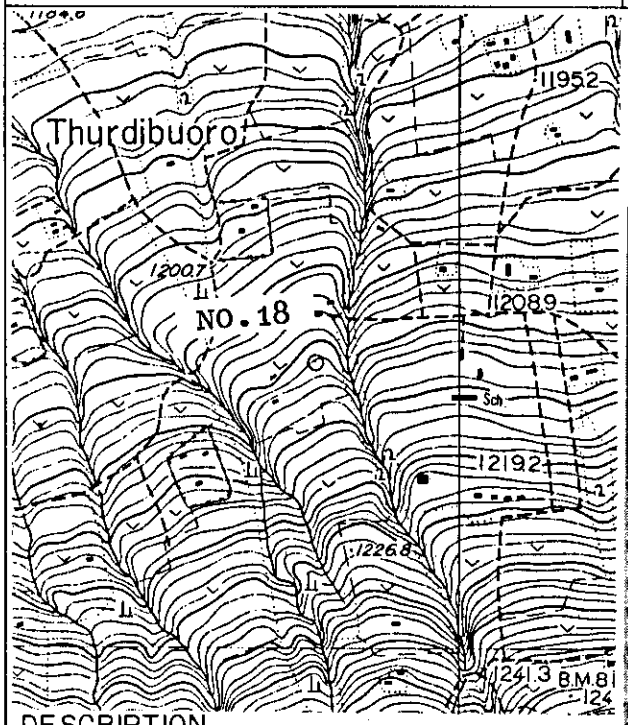
TRAVERSE POINT

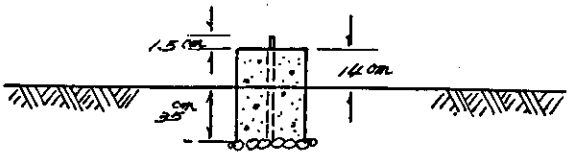
MAP NYAKACH
SCALE 1:50000
SHEET NO. 116/4

THE POINT IS MEASURED AND PERMANENTLY MARKED IN

ELEVATION NETWORK
X = 62,370.90
Y = 5,809.16

ELEVATION IN METER
MAIN STATION = 1211 m 421
REFERENCE 1 = m
REFERENCE 2 = m
REFERENCE 3 = m





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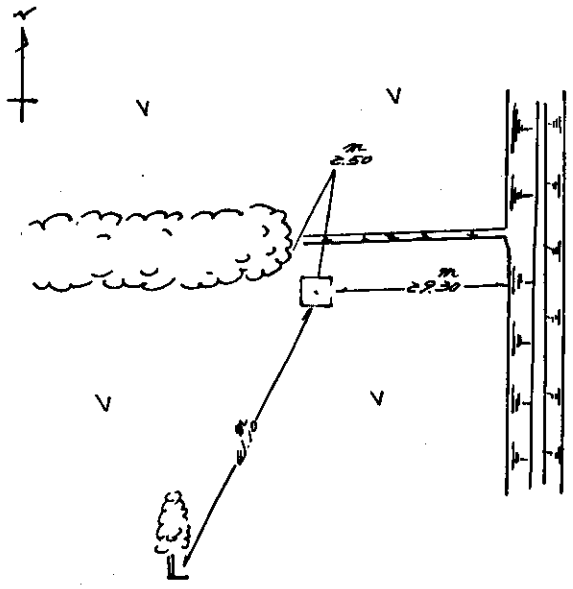
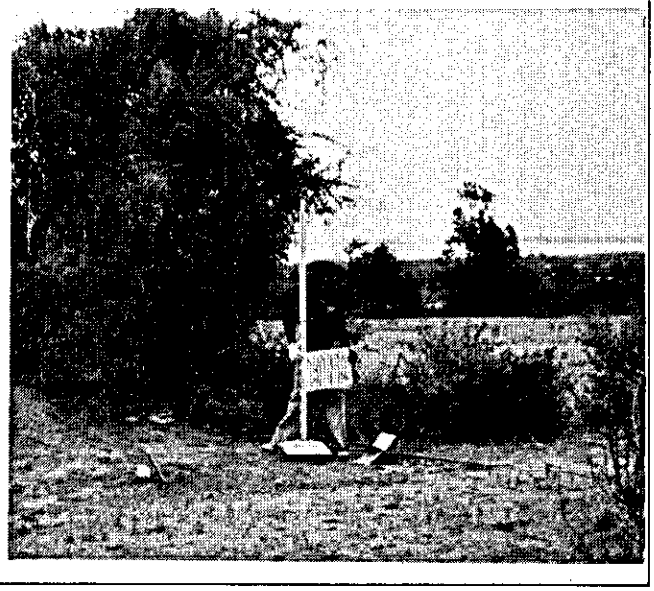




AREA INDICATION ON THE MAP ON THE REVERSE SIDE

Pasco International Inc.
JAPAN

BM NO. NO.13

PAGE 3

BENCH MARK

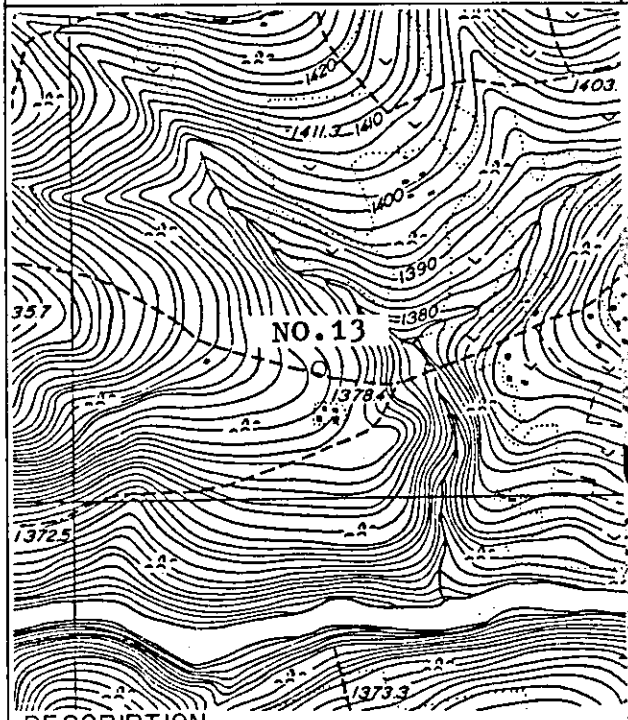
TRAVERSE POINT

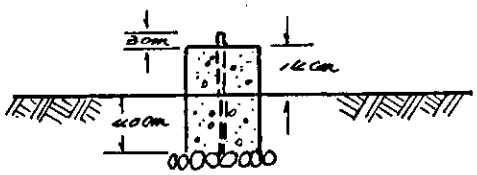
MAP NYAKACH
SCALE 1:50000
SHEET NO. 116/4

THE POINT IS MEASURED AND PERMANENTLY MARKED IN

ELEVATION NETWORK X = 57,184.67
Y = 6,267.58

ELEVATION IN METER
MAIN STATION = 1398 m 686
REFERENCE 1 = m
REFERENCE 2 = m
REFERENCE 3 = m





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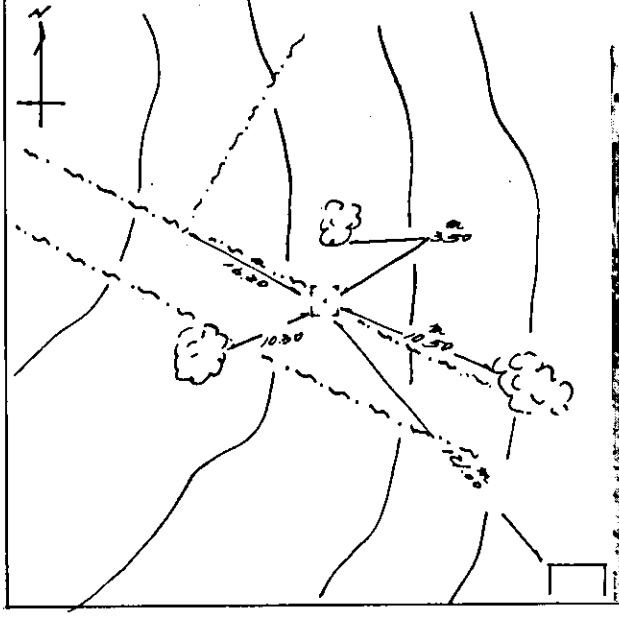


AREA INDICATION ON THE MAP ON THE REVERSE SIDE

Pasco International Inc.
JAPAN

BM NO. BM85 (NO.10)

PAGE 4

BENCH MARK

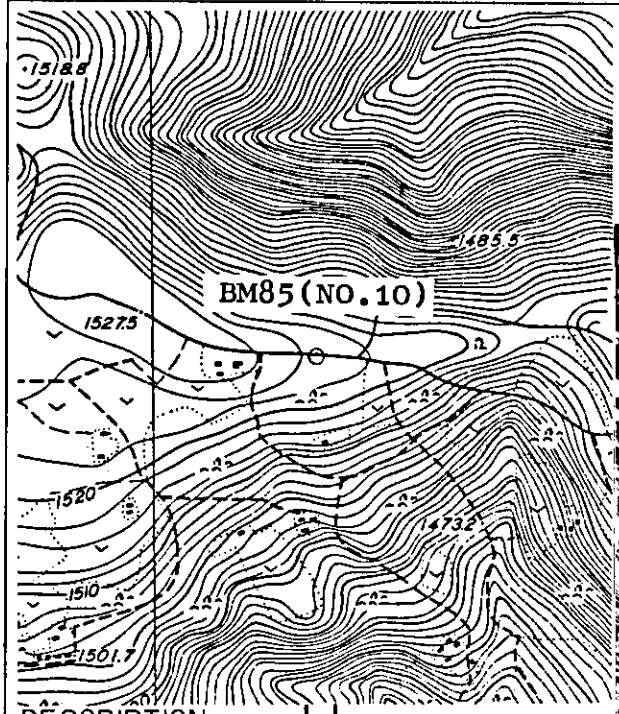
TRAVERSE POINT

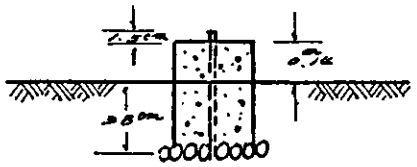
MAP NYAKACH
SCALE 1:50000
SHEET NO. 116/4

THE POINT IS MEASURED AND PERMANENTLY MARKED IN

ELEVATION NETWORK
X = 58,506.43
Y = 6,186.06

ELEVATION IN METER
MAIN STATION = 1525 m 180
REFERENCE 1 = m
REFERENCE 2 = m
REFERENCE 3 = m





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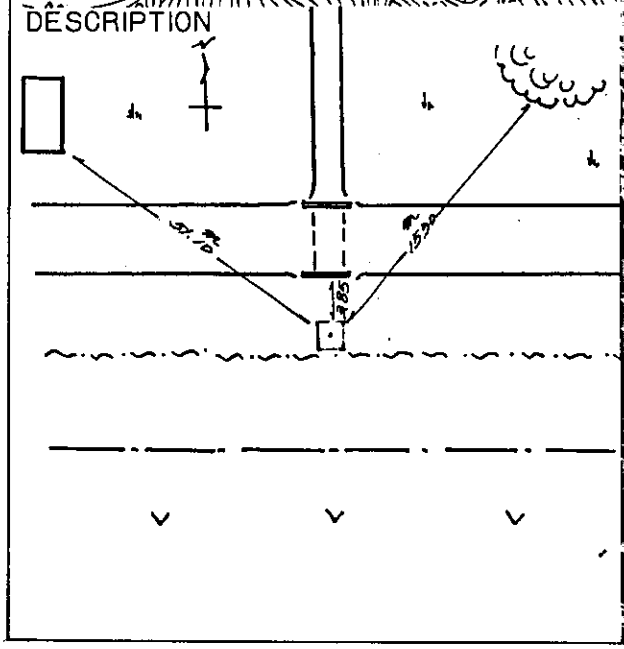


AREA INDICATION ON THE MAP ON THE REVERSE SIDE

Pasco International Inc.
JAPAN

BM NO. NO.12

PAGE 5

BENCH MARK

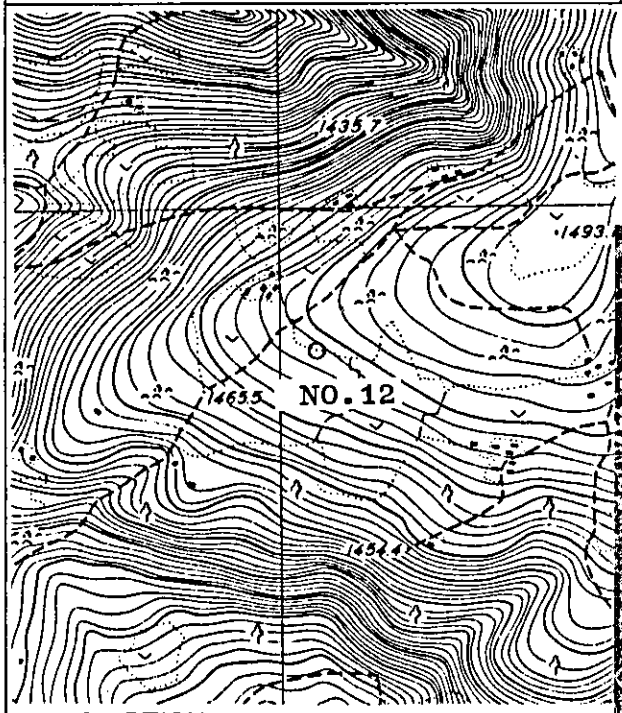
TRAVERSE POINT

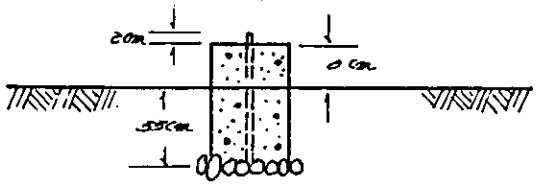
MAP NYAKACH
SCALE 1:50000
SHEET NO. 116/4

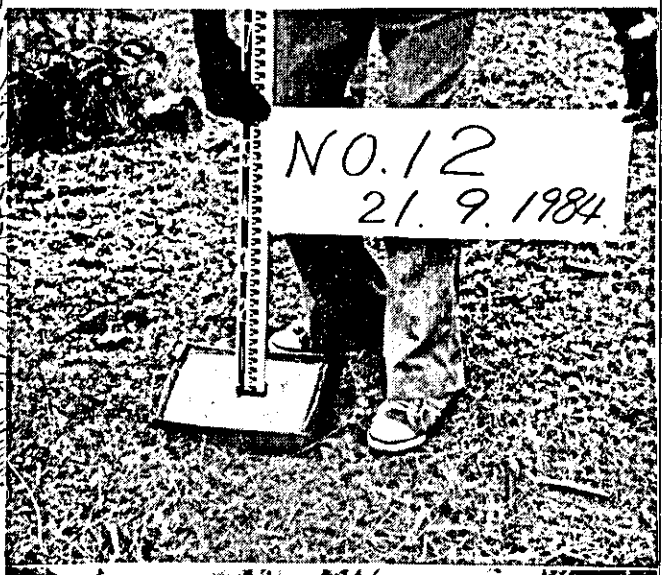
THE POINT IS MEASURED AND PERMANENTLY MARKED IN

ELEVATION NETWORK
X = 57,811.25
Y = 5,044.27

ELEVATION IN METER
MAIN STATION = 1477 m. 830
REFERENCE 1 = m.
REFERENCE 2 = m.
REFERENCE 3 = m.







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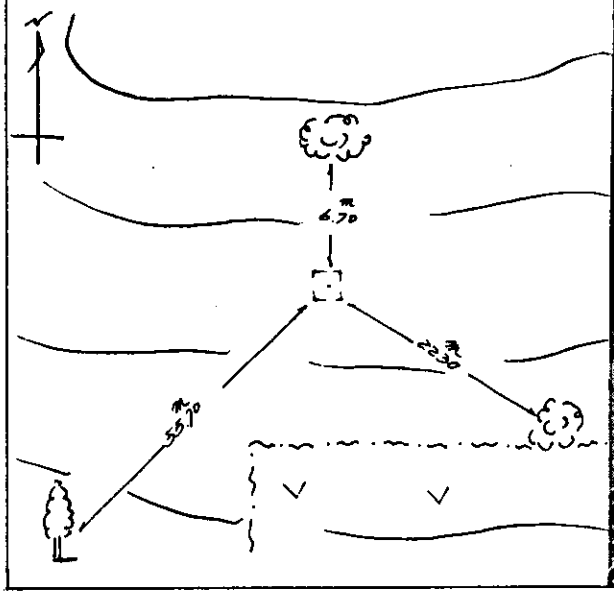


AREA INDICATION ON THE MAP ON THE REVERSE SIDE

Pasco International Inc.
JAPAN

BM NO. 1350

PAGE 6

BENCH MARK

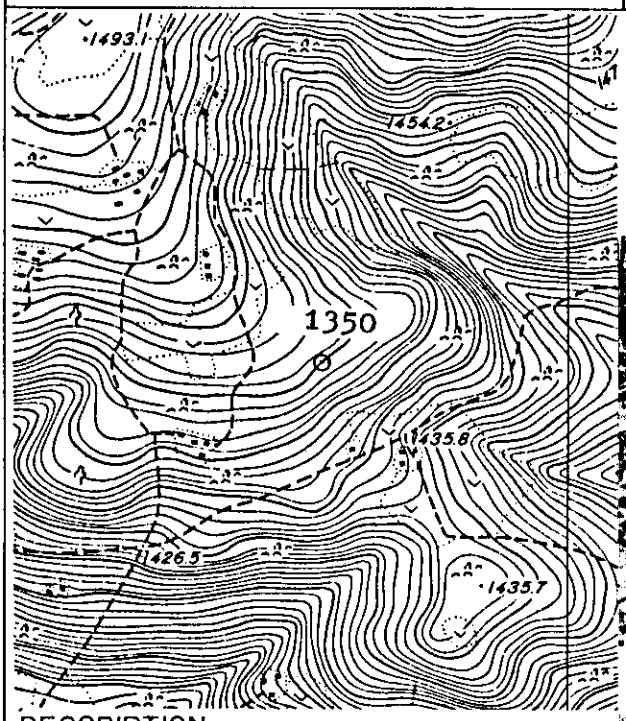
TRAVERSE POINT

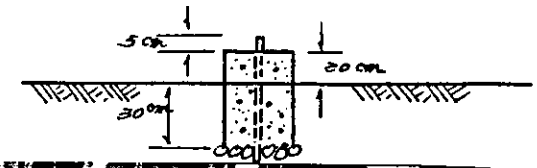
MAP NYAKACH
SCALE 1:50000
SHEET NO. 116/4

THE POINT IS MEASURED AND PERMANENTLY MARKED IN

ELEVATION NETWORK
X = 57,550.19
Y = 5,674.72

ELEVATION IN METER
MAIN STATION = 1459 m. 490
REFERENCE 1 = m.
REFERENCE 2 = m.
REFERENCE 3 = m.





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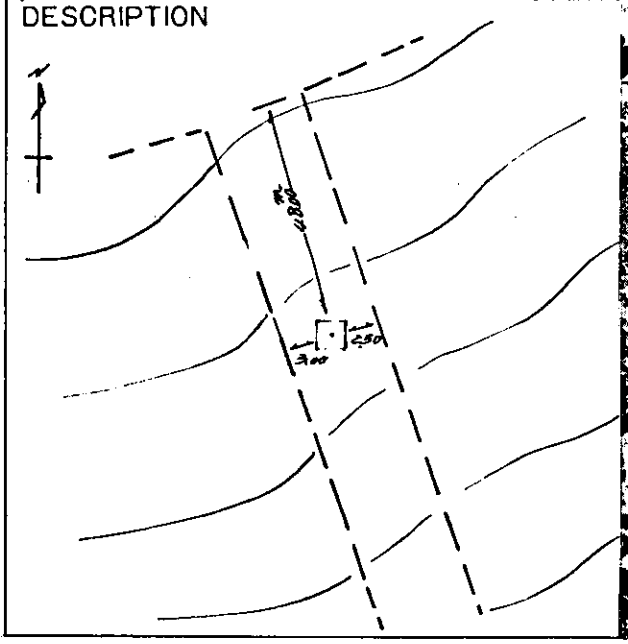


AREA INDICATION ON THE MAP ON THE REVERSE SIDE

Pasco International Inc.
JAPAN

BM NO. NO.9

PAGE 1

BENCH MARK

TRAVERSE POINT

MAP NYAKACH

SCALE 1:50000

SHEET NO. 116/4

THE POINT IS MEASURED AND PERMANENTLY MARKED IN

ELEVATION NETWORK X = 56,430.53

Y = 6,295.29

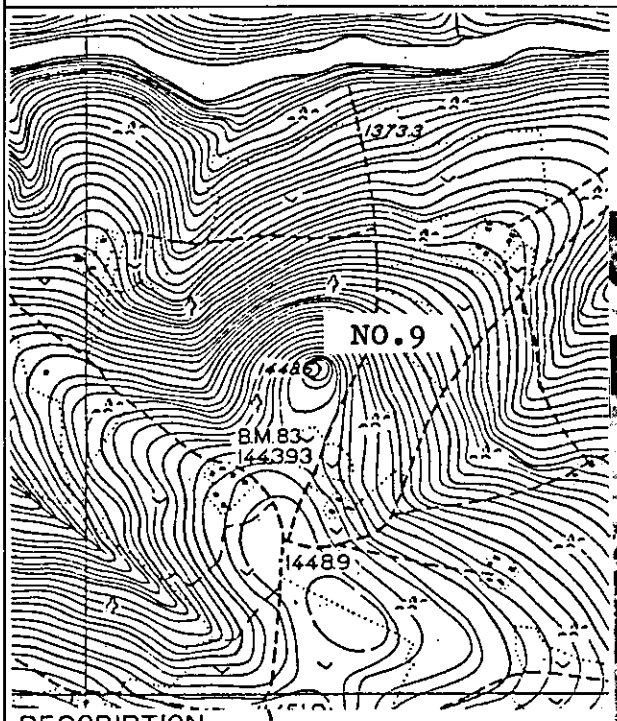
ELEVATION IN METER

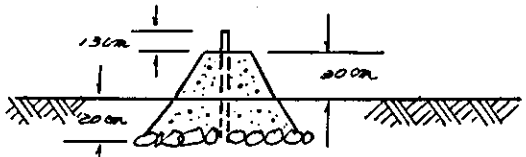
MAIN STATION = 1450 m 712

REFERENCE 1 = m

REFERENCE 2 = m

REFERENCE 3 = m





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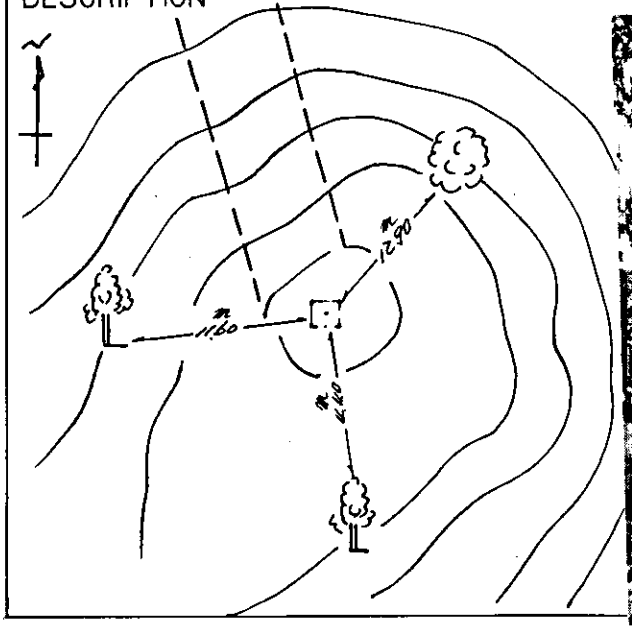
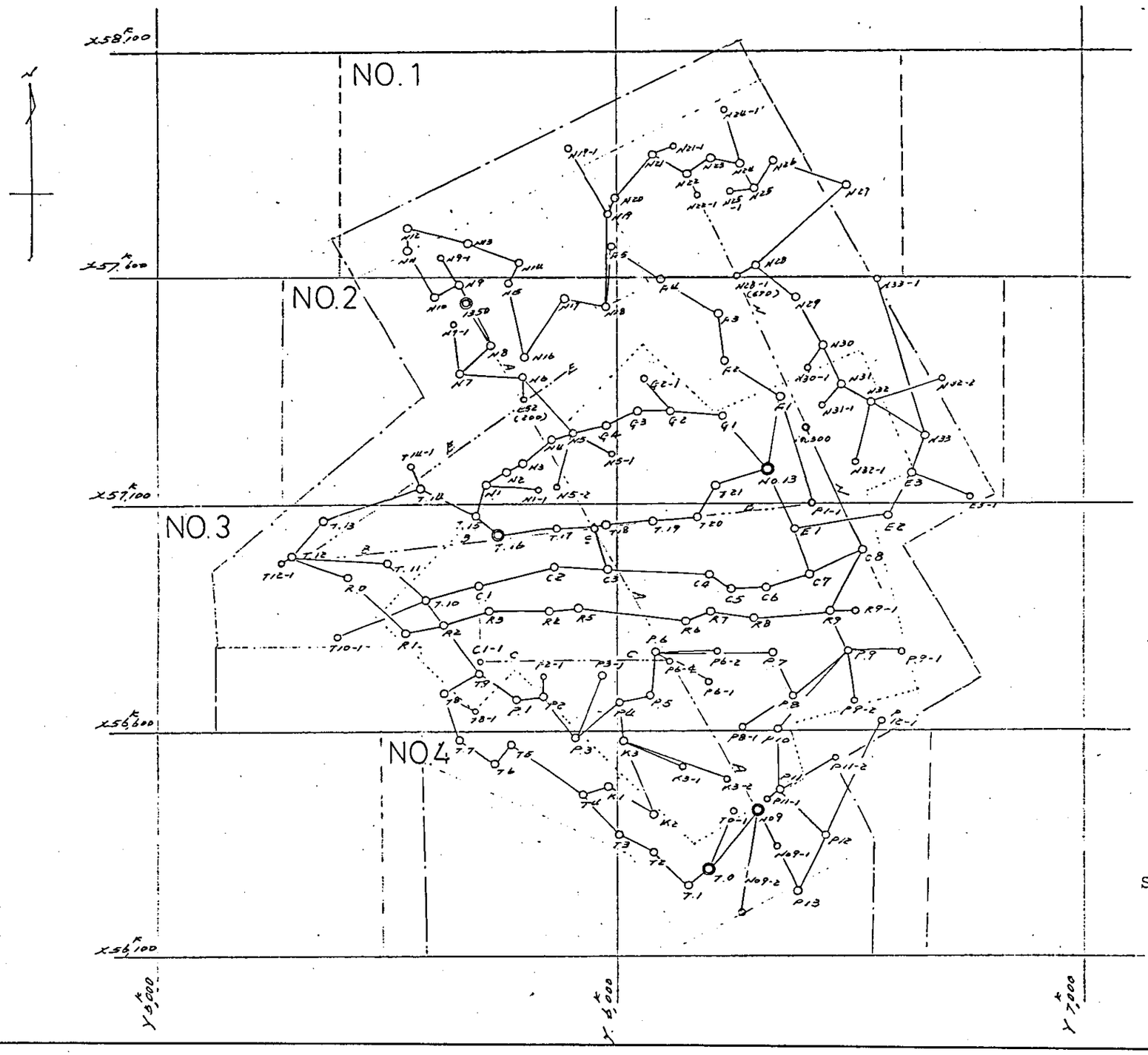
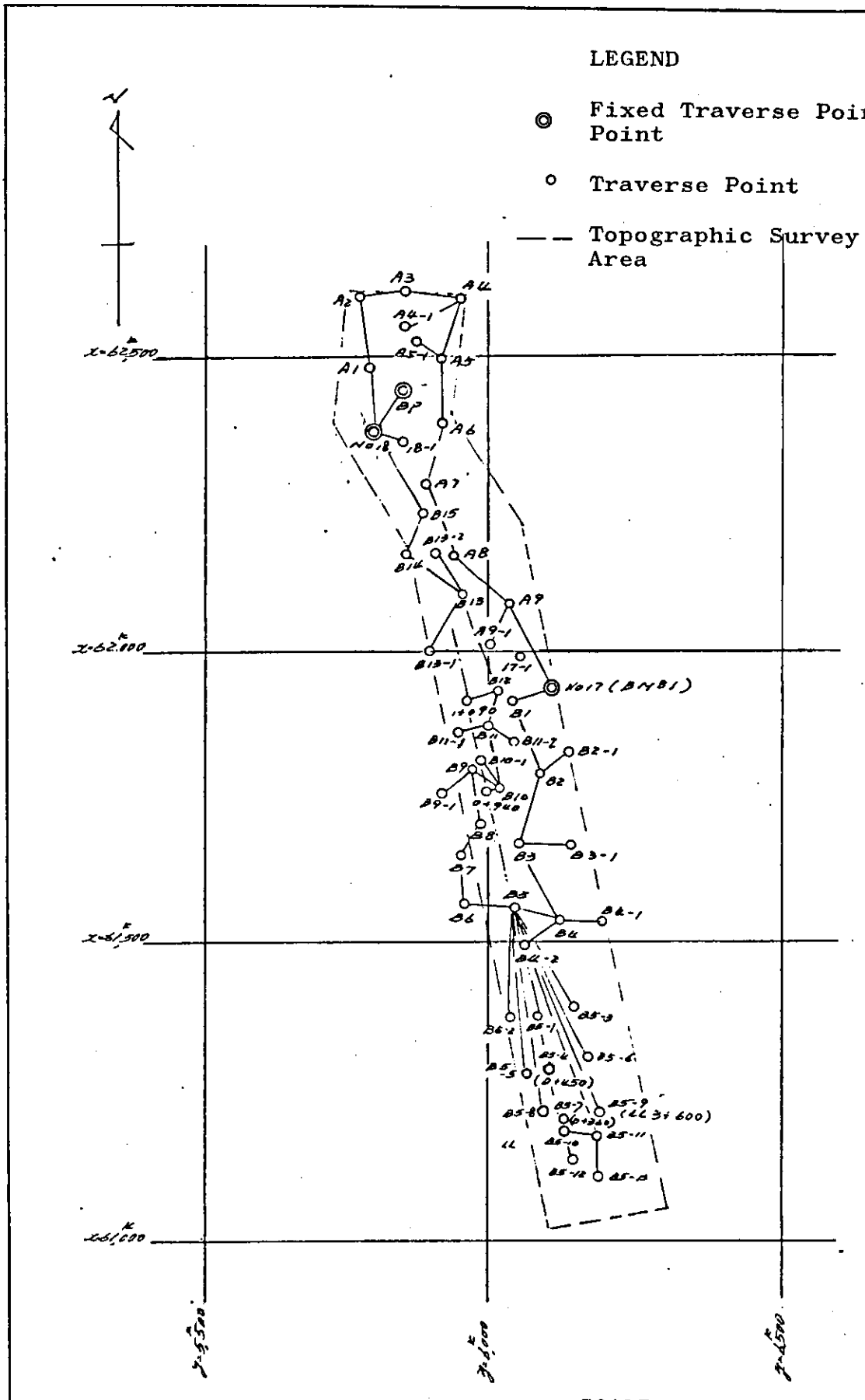


AREA INDICATION ON THE MAP ON THE REVERSE SIDE

TRAVERSE NETWORK


X58,100
X57,600
X57,100
X56,600
X56,100
Y 3,000
Y 4,000
Y 7,000
NO. 1
NO.2
NO.3
NO.4
N
LEGEND
Fixed Traverse Point
Point
Traverse Point
Topographic Survey Area
SCALE 1:10,000


LEGEND
Fixed Traverse Point Point
Traverse Point
Topographic Survey Area
N
X-62,500
X-62,000
X-61,500
X-61,000
A3
A4
A2
A4-1
A5-1
A5
A1
B7
A6
No.8
B-1
A7
B15
B13-2
A8
B14
B13
A9
A9-1
B13-1
17-1
B12
No17 (BM81)
B1
B11-1
B11
B11-2
B2-1
B9
B10-1
B2
B10
B9-1
B8
B3
B3-1
B7
B5
B4-1
B6
B4
B4-2
B5-9
B6-2
B5-1
B5-4
B5-5
(0+450)
B5-8
B5-7
B5-9
(0+340)
(0+300)
B5-11
B5-10
B5-12
B5-13
SCALE 1:10,000

TABULATION OF BENCH MARK

TABULATION

OF BENCH-MARK

FROM 1350

TO 17100

COMPUTED BY Y. Kawakita

CHECKED BY

POINT	DIST.	DIFFERENCE I	DIFFERENCE II	DIFFERENCE CORR. FOR STAFF	OBSERVED ELEVATION	CORR. FOR ORTHO-METRIC	CORR. FOR CLOSURE	ADJUSTED ELEVATION	REMARKS
	km	m			m			m	
1350								1447.480	
		-29.446	460	-462					
17100								1420.028	1420.030

TABULATION

OF BENCH-MARK

FROM BM83 COMPUTED BY Y. Kawahata

TO NO4 CHECKED BY

POINT	DIST.	DIFFERENCE I	DIFFERENCE II	CORR. FOR STAFF	OBSERVED ELEVATION	CORR. FOR ORTHO-METRIC	CORR. FOR CLOSURE	ADJUSTED ELEVATION	REMARKS
	km	m			m			m	
BM84								1443.930	
		+ 6.778	785	782					
NO4								1450.712	

TABULATION OF BENCH-MARK

FROM BMB2 COMPUTED BY Y. Kuwakata

TO BM83 CHECKED BY

POINT	DIST.	DIFFERENCE I	DIFFERENCE II	DIFFERENCE CORR. FOR STAFF	OBSERVED ELEVATION	CORR. FOR ORTHO-METRIC	CORR. FOR CLOSURE	ADJUSTED ELEVATION	REMARKS
	km	m			m			m	
BM82								1464.526	
		−21.583							
BM83								1443.943	1443.950

TABULATION
OF BENCH-MARK

FROM BM80 COMPUTED BY Y. Kaunhata
TO BP CHECKED BY

POINT	DIST.	DIFFERENCE I	DIFFERENCE II	CORR. FOR STAFF	OBSERVED ELEVATION	CORR. FOR ORTHO-METRIC	CORR. FOR CLOSURE	ADJUSTED ELEVATION	REMARKS
	km	m			m			m	
BM80								1247.618	
		– 36.206	188	–147					
Ne18								1211.421	
		– 5.209	208	–208					
BP								1206.212	

TABULATION

OF BENCH-MARK

FROM BM80 COMPUTED BY Y. Kuwahata

TO N012 CHECKED BY

POINT	DIST. (km)	DIFFERENCE I (m)	DIFFERENCE II	CORR. FOR STAFF	OBSERVED ELEVATION (m)	CORR. FOR ORTHO-METRIC	CORR. FOR CLOSURE	ADJUSTED ELEVATION (m)	REMARKS
BM80								1482.628	
		− 4.796	~~798~~ 800	798					
N012								1477.830	

TABULATION

OF BENCH-MARK

FROM 17100 COMPUTED BY Y. Kuwahara

TO No 13 CHECKED BY

POINT	DIST.	DIFFERENCE I	DIFFERENCE II	CORR. FOR STAFF	OBSERVED ELEVATION	CORR. FOR ORTHO-METRIC	CORR. FOR CLOSURE	ADJUSTED ELEVATION	REMARKS
	km	m			m			m	
17100		-31.300	300	-300				1420.050	
No 14								1388.686	

TABULATION

OF BENCH-MARK

FROM 1350 COMPUTED BY Y. Kuwahata

TO BM85 CHECKED BY

POINT	DIST.	DIFFERENCE			OBSERVED ELEVATION	CORR. FOR ORTHO-METRIC	CORR. FOR CLOSURE	ADJUSTED ELEVATION	REMARKS
		I	II	CORR. FOR STAFF					
	km	m			m			m	
1350								1459.480	
BM90		+ 24.136	140	-138				1483.628	
BM85		+ 41.552	551	-542				1525.180	1910.

Dr. Kuwahata,

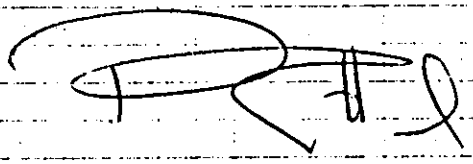
Elevation Dam axis (Line A)

Stage 1+100 GL. 1429.910

Top of pag. 1430.030

Stage 1+350 GL. 1459.300

Top of pag 1459.49.



TRAVERSE COMPUTATION

Line No.

TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
(SKP17)	11° 26' 58"	(129° 7' 54")	9,844,624.04	711,818.23	116T19
116T19	+ 2	1014.325			
	11 27 0	320.3454			
	182 54 24		55407.6369	11174.1562	
No6	+ 2	1985.927	− 0.05	− 0.08	No6
	182 54 26	322.4020	55,407.58	11,174.08	
	82 40 19		56986.8055	9969.9417	
No7	+ 2	2168.339	− 0.10	− 0.17	No7
	82 40 21	225.2041	56,986.70	9969.77	
	269 41 27		55462.8108	8427.4974	
No8	+ 2	2341.310	− 0.15	− 0.25	No8
	269 41 29	294.2510	55,462.66	8,427.24	
	242 34 14		56430.7399	6295.6330	
No9	+ 1	2078.808	− 0.20	− 0.34	No9
	242 34 15	356.5925	56,430.53	6,295.29	
	186 36 11		58506.6805	6186.4844	
No10	+ 2	1888.197	− 0.25	− 0.42	No10
	186 36 13	3.3538	58,506.43	6,186.06	
	57 0 6		60391.1642	6304.8443	
No11	+ 2	1067.392	− 0.30	− 0.50	No11
	57 0 8	240.3546	60,390.86	6,304.34	
	68 32 6		59867.1143	5374.9532	
SKP17	+ 2	8307.186	− 0.36	− 0.58	SKP17
	68 32 8		9,949,866.75	705,374.37	
116T19					
Σ β	1079° 59' 44"	ΣS	49 866.75	705 374.37	EXY
180(n-1)	1080 0 0		867.11	374.95	BXY
B.TA	129 7 44		− .36	− .59	dE
dE.TA	129 7 39				dE/n
E.TA	129 7 54				
ΔE	− 15				

Line No.
T-1 TRAVERSE COMPUTATION P ۱۹

NO	β	α & S	X	Y	NO
NO8	۱۰۷° ۱' ۱۸"	(۲۹۴° ۲۵' ۱۰")	۵۶ ۴۳۰ ، ۵۳	۶،۲۸۵ ، ۹۲	
NO9	+ ، ، ۷	۱۷۰،۷۰	،	،	NO9
	۱۰۷ ، ۱ ، ۲۵	221.2635	،	،	
	۱۷۲ ، ۴۸ ، ۴۳		56302.5709	6182.3078	
T.0	+ ، ، ۷	۵۵۵ ، ۱۵	،	+ ، ۱	
	۱۷۲ ، ۴۸ ، ۵۰	214.1525	۵۶ ۳۰۲ ، ۵۷	۶ ۱۸۲ ، ۳۲	T0
	۲۸۲ ، ۳۶ ، ۴۲		56256.9832	6151.2636	
T.1	+ ، ، ۷	۱۰۳ ، ۲۶	+ ، ۱	+ ، ۲	
	۲۸۲ ، ۳۶ ، ۴۹	316.5214	۵۶ ۲۵۷ ، ۰۰	۶،۱۵۱ ، ۲۸	T1
	۱۶۱ ، ۴۰ ، ۵۱		56332.3485	6080.6700	
T2	+ ، ، ۷	۸۸ ، ۸۵	+ ، ۱	+ ، ۳	
	۱۶۱ ، ۴۰ ، ۵۸	293.3312	۵۶ ۳۳۲ ، ۳۶	۶،۰۸۰ ، ۷۰	T2
	۲۰۳ ، ۵۳ ، ۵۴		56374.8167	6002.6266	
T3	+ ، ، ۷	۱۰۷ ، ۳۳	+ ، ۲	+ ، ۴	
	۲۰۳ ، ۵۴ ، ۱	322.2713	۵۶ ۳۷۴ ، ۸۴	۶،۰۰۲ ، ۶۷	T3
	۱۶۱ ، ۳۵ ، ۵۳		56459.9144	5937.2193	
T4	+ ، ، ۷	۱۹۱ ، ۶۶	+ ، ۲	+ ، ۴	
	۱۶۱ ، ۳۶ ، ۱	304.0314	۵۶ ۴۵۹ ، ۹۳	۵۹۳۷ ، ۲۶	T4
	۱۰۲ ، ۴۰ ، ۱۰		56567.2387	5778.4269	
T5	+ ، ، ۷	۴۸ ، ۹۲	+ ، ۲	+ ، ۵	
	۱۰۲ ، ۴۰ ، ۱۷	226.4331	۵۶ ۵۶۷ ، ۲۶	۵۷۷۸ ، ۴۸	T5
	۲۵۱ ، ۴۹ ، ۱۲		56533.7042	5742.8094	
T6	+ ، ، ۷	۹۵ ، ۰۲	+ ، ۳	+ ، ۶	
	۲۵۱ ، ۴۹ ، ۱۹	293.3250	۵۶ ۵۳۳ ، ۷۳	۵۷۴۲ ، ۸۷	T6
	۲۲۷ ، ۲۸ ، ۵۴		56579.1126	- 5659.3416	
T7	+ ، ، ۷	۱۱۳ ، ۶۵	+ ، ۳	+ ، ۷	
	۲۲۷ ، ۲۹ ، ۱	346.0151	۵۶ ۵۷۹ ، ۱۴	۵۶۵۹ ، ۴۱	T7
	۲۵۶ ، ۶ ، ۳۵		56689.4015	5631.9065	
T8	+ ، ، ۸	۸۵ ، ۴۸	+ ، ۳	+ ، ۸	
	۲۵۶ ، ۶ ، ۴۳	62.0834	۵۶ ۶۸۹ ، ۴۳	۵۶۳۱ ، ۹۹	T8
	۸۵ ، ۰ ، ۵۷		56729.3437	5707.4807	
T.9	+ ، ، ۷	۱۸۹ ، ۸۷	+ ، ۴	+ ، ۹	
	۸۵ ، ۱ ، ۴	327.0938	۵۶ ۷۲۹ ، ۳۸	۵۷۰۷ ، ۵۷	T9
Σ β	۱۰۱۲° ۴۳' ۹"	ΣS ۱۲۴۹ ، ۵۹	،	،	EXY
180(n-1)	، ،		،	،	BXY
B.TA	، ،		،	،	
dE.TA	، ،		- ،	،	dE
E.TA	، ،		،	،	$\frac{de}{n}$
ΔE	، ،				

Line No.
T

TRAVERSE COMPUTATION

NO	β 2012 43 P ° ' "	α & S	X	Y	NO
	161.48.4		56883.8713	5604.5167	
T10	+ , 07	123.78 ✓	+ .4	+ .10	
	161.48.11	303.5739	56883.91	5604.62	T10
	148.47.6		56966.7028	5503.2683	
T11	+ , 07	202.85 ✓	+ .5	+ .11	
	148.47.13	277.5452	56966.75	5503.38	T11
	305.38.48		56994.6341	5307.3505	
T12	+ , 07	110.30 ✓	+ .5	+ .12	
	305.38.55	43.3347	56994.68	5307.47	T12
	209.52.34		57074.5592	5383.3640	
T13	+ , 07	219.32 ✓	+ .5	+ .12	
	209.52.41	73.2628	57074.61	5383.48	T13
	223.1.27		57137.0656	5593.5882	
T14	+ , 07	120.40 ✓	+ .6	+ .13	
	223.1.34	116.2802	57137.13	5593.72	T14
	128.1.54		57083.4050	5701.3691	
T15	+ , 07	63.36 ✓	+ .6	+ .14	
	128.2.1	134.3003	57083.46	5701.51	T15
	183.27.50		57033.9948	5746.5600	
T16	+ , 07	819.29 ✓	+ .7	+ .15	
	183.27.57	137.5800	57034.06	5746.71	T16
	263.28.12		56430.4627	6295.1261	
No.9	+ , 07		+ .7	+ .16	
	263.28.19		56430.53	6295.29	No.9
	3706.09.04				
Σ β	3706°.09.04	ΣS 2909.12	56430.46	6295.13	EXY
180(n-1)	1260.09.04	ACCURACY	56430.53	6295.29	BXY
B.TA	114.25.10		− .7	− .16	dE
d E.TA	221.24.14	0.1746 / 2909.12 = 1 / 16000			dE / n
E.TA	221.26.25				
ΔE	− .2.14				

Line No.

P-1 TRAVERSE COMPUTATION P 21

NO	β	α & S	X	Y	NO
T.O	136°27'14"	(41 26 35)	56 430.53	6 295.29	NO9
NO9	— ' ' 2	764.65	.	.	
	136 '27' 12	357, 53, 47	.	.	
	322 44 42		57 184.6714	6,267.5292	
NO13	— ' ' 2	184.86	, 0	— , 1	
	322 44 40	140, 38, 27	57 184.67	6267.52	NO13
	202 22 58		57 041.7403	6,384.8237	
E1	— ' ' 2	[illegible]	— , 1	— , 2	
	202 22 56	163 01, 23	57 041.73	6384.80	E1
	82 49 00		56 952.4487	6,412.0836	
C7	— ' ' 2	127.02	— , 2	— , 4	
	82 48 58	65 50, 21	56 952.43	6412.04	C7
	300 28 24		57 004.4379	6527.9767	
C8	— ' ' 2	224.93	— , 2	— , 5	
	300 28 22	186 18, 43	57 004.42	6527.93	C8
	211 16 54		56 780.8714	6503.2475	
P9	— ' ' 2	217.72	— , 2	— , 6	
	211 16 52	217 35, 35	56 780.85	6503.19	P9
	152 22 6		56 608.3580	6370.4276	
P10	— ' ' 2	194.71	— , 3	— , 7	
	152 22 4	189 57, 39	56 608.33	6370.36	P10
	128 52 49		56 476.0726	6347.1953	
P11	— ' ' 2	153.71	— , 4	— , 8	
	128 52 47	238 50, 26	56 476.03	6347.12	P11
	263 54 54		56 367.8760	6441.7790	
P12	— ' ' 2	125.44	— , 4	— , 10	
	263 54 52	202, 26, 17	56 367.84	6441.68	P12
	308 41 34		56 251.9328	6393.9006	
133	— ' ' 2	204.00	— , 4	— , 11	
	308 41 32	331, 07, 49	56 251.89	6393.79	133
	70 18 48		56 430.5796	6295.405	
NO9	— ' ' 2		— , 5	— , 12	
T.O	70 18 46	221, 26, 35	56 430.53	6 295.29	NO9
Σβ	2160° 0' 34	ΣS 2,210.00	56 430.53	6 295.29	EXY
180(n-1)	1800 0 00		56 430.58	6 295.41	BXY
B.TA	41 26 35				
dE.TA	221 26 58	$\frac{0.120}{2210.00} = \frac{1}{18,000}$	— , 5	— , 12	dE
E.TA	221 26 35		0.005	0.012	$\frac{dE}{n}$
ΔE	+ ' ' 23				

Line No.

P-2 TRAVERSE COMPUTATION P 22

NO	β	α & S	X	Y	NO
T8	260° 7' 1"	(62 08 34)	56 729.38	5 707.67	T9
T9	+ 1 1 3	98.23	.	.	
	260 7 14	122 15 38	.	.	
P1	141 36 52		56 676.9477	5'790.6361	
	+ 1 1 2	61.05	.	. 0	
	141 36 54	83 52 32	56 676.85	5 790.66	P1
P2	247 24 18		56 683.4610	5851.3377	
	+ 1 1 3	104.81	.	− . 1	
	247 24 21	151 16 53	56 683.46	5851.33	P2
P3	78 57 22		56 591.5437	5901.6998	
	+ 1 1 2	128.16	.	− . 1	
	78 57 24	50 08 17	56 591.54	5901.69	P3
P4	218 35 7		56 673.6865	6000.0742	
	+ 1 1 3	67.83	.	− . 1	
	218 35 10	88 43 27	56 673.68	6000.06	P4
P5	96 12 50		56 675.2004	6068.0474	
	+ 1 1 3	100.46	.	− . 2	
	96 12 53	41 56 20	56 675.20	6068.03	P5
P6	266 0 28		56 775.2874	6076.6963	
	+ 1 1 2	261.07	.	− . 2	
	266 0 30	88 56 50	56 775.28	6076.68	P6
P7	265 46 3		56 780.0841	6337.7222	
	+ 1 1 3	107.33	.	− . 2	
	265 46 6	168 52 56	56 780.08	6337.70	P7
P8	64 53 26		56 674.7684	6358.4183	
	+ 1 1 2	179.50	.	− . 3	
	64 53 28	53 46 24	56 674.77	6358.39	P8
P9	102 32 16		56 780.8495	6503.2183	
	+ 1 1 3	.	.	− . 3	
	102 32 19	6 18 43	56 780.85	6503.19	P9
C8					
Σ β	1746° 9' 43"	Σ S 1108.60	56 780.85	6503.22	EXY
180(n-1)	-1620		56 780.85	6503.19	BXY
B.TA	262 8 34		± . 0	+ . 3	dE
d.E.TA	6 18 17	0.03 / 1108.60 = 1/37000			dE/n
E.TA	6 18 43				
Δ E	− . 26				

Line No.

C TRAVERSE COMPUTATION P 28

NO	β	∝ & S	X	Y	NO
T11	122°47'11"	(128 57 38)	56 888.91	5 604.62	
T10	— 1 11	116.27			
	122 46 50	71 44 29			T10
	186 11 20		56 924.7115	5 713.1367	
C1	— 1 11	158.21	+ .2	+ .1	
	186 11 9	77 55 38	56 924.73	5713.15	C1
	187 18 40		56 958.0109	5868.8254	
C2	— 1 11	126.14	+ .4	+ .2	
	187 18 29	85 14 07	56 958.05	5868.84	C2
	188 27 46		56 968.3225	5 992.5364	
C3	— 1 11	205.68	+ .6	+ .4	
	188 27 35	93 41 42	56 968.38	5 992.58	C3
	203 25 52		56 955.0674	6 197.7882	
C4	— 1 12	49.25	+ .8	+ .5	
	203 25 40	117 07 22	56 955.15	6 197.84	C4
	156 18 16		56 932.3864	6 242.0679	
C5	— 1 11	86.89	+ .10	+ .6	
	156 18 5	91 25 25	56 932.49	6242.13	C5
	163 41 58		56 930.2277	6 328.9311	
C6	— 1 11	85.91	+ .12	+ .7	
	163 41 47	75 07 12	56 930.35	6329.00	C6
	87 56 22		56 952.2890	6411.9602	
C7	— 1 11		+ .14	+ .8	
	87 56 11	363 1 1 23	56 952.43	6412.04	C7
E1					
Σβ	1296 5 11	ΣS 825.85	56 952.43	6412.04	EXY
180(n-1)	1260		56 952.29	6411.96	BXY
B.TA	308 57 38				
d.E.TA	363 2 52	0.161 / 825.85 = 1 / 5,000	+ .14	+ .8	dE
E.TA	363 1 23				dE/n
ΔE	+ 1 1 29				

Line No.

K — TRAVERSE COMPUTATION — P 4

NO	β	α & S	X	Y	NO
T3	[illegible]	(322 27 13)	[illegible]	[illegible] .26	T4
T4	+ 1	[illegible]		0	
	[illegible]	65, 43, 2			
	[illegible]		56 481 ,0636	5984 ,1033	
K1	+ 1	111 ,60	+ 0	0	
	[illegible]	121, 25, 31	56 481 ,06	5984 .10	K1
	[illegible]		56 422 ,8769	6079 ,3339	
K2	+ 0	189 ,61	+ 1	0	
	[illegible]	338, 8, 25	56 422 ,89	6079 ,33	K2
	[illegible]		56 598 ,8536	6008 ,7354	
K3	+ 1	[illegible]	+ 1	0	
	[illegible]	353, 22, 58	56 598 ,86	6008 ,74	K3
	[illegible] 18		56 673 ,6718	6000 ,0558	
P4	+ 1		+ 2	0	
	[illegible]	230, 8, 17	56 673 ,68	6000 ,06	P4
P3					

Σ β	807° [illegible] 00"	ΣS 427,92	56 673 ,69	6000 ,06	EXY
180(n-1)	− 720		56 673 ,67	6000 ,06	BXY
B.TA	142 27 13		+ 0,02	0	dE
dE.TA	230 8 13	$\frac{0.02}{427.92} = \frac{1}{21,000}$			$\frac{de}{n}$
E.TA	230 8 17				
ΔE	− 4				

Line No.
T-2 TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
T15	133°28'52"	(134 30 3)	57 039.06	5746.71	T16
T16	+ , , 9	135.70	.	.	
	133, 29, 1	27, 59, 04	.	.	
	175, 46, 6		57 043.8326	5882.3260	
T17	+ , , 9	84.26	.0	.0	
	175, 46, 15	83, 45, 19	57 043.83	5882.33	T17
	179, 35, 58		57 052.9980	5966.0860	
T18	+ , , 9	111.78	+ .1	.0	
	179, 36, 7	83, 21, 26	57 053.01	5966.09	T18
	181, 34, 12		57 065.9286	6077.1156	
T19	+ , , 10	93.12	+ .1	+ .1	
	181, 34, 22	84, 56, 48	57 065.94	6077.13	T19
	134, 36, 0		57 074.1309	6169.8737	
T20	+ , , 9	86.41	+ .2	+ .1	
	134, 36, 9	39, 32, 57	57 074.15	6169.88	T20
	184, 38, 26		57 140.7598	6224.8944	
T21	+ , , 9	61.22	+ .2	+ .1	
	184, 38, 35	44, 11, 32	57 140.78	6224.90	T21
	313, 42, 6		57 184.6549	6267.5689	
N013	+ , , 9	.	+ .2	+ .1	
	313, 42, 15	177, 53, 47	57 184.67	6267.58	N013
	, ,		.	.	
N09	, ,	.	.	.	
	, ,	, ,	.	.	
	, ,		.	.	
___	, ,	.	.	.	
	, ,	, ,	.	.	
	, ,		.	.	
___	, ,	.	.	.	
	, ,	, ,	.	.	
	, ,		.	.	
___	, ,	.	.	.	
	, ,	, ,	.	.	
Σ β	1303°, 22', 40"	ΣS 572.49	57 184.67	6267.58	EXY
180(n-1)	-1260, ,		57 184.65	6267.57	BXY
B.TA	134, 30, 3		+ 0.02	+ 0.01	dE
dE.TA	177, 52, 43	$\frac{0.022}{572.49} = \frac{1}{26.000}$			
E.TA	177, 53, 47		.	.	$\frac{de}{n}$
ΔE	- , 1, 4				

Line No.

TRAVERSE COMPUTATION

P 36

NO	β	α & S	X	Y	NO
P5	° ′ ″	4 56 20	56 775.29	6 076.68	P6
P6					
P6-1		132.01	118.4154 56711.8990 6192.4739		P6-1
	293 14 54				
P6-2		142.40	89.3340 56776.3807 6219.0758		P6-2
	264 37 20				
P7		268 56 50			
P6-3		29.66	96.4807 56771.7771 6106.1312		P6-3
	7 45 17				
—					
P7		168 52 56	56 674.77	6 358.39	P8
P8					
P8-1		111.32	253.1352 56608.1351 6269.2163		P8-1
	244 20 56				
—					
P8		[illegible]	56 [illegible]	6 [illegible]	P9
P9					
P9-1		[illegible]	97.4452 56766.8362 6606.1910		P9-1
	223 48 28				
P9-2		97.62	174.0404 56683.7527 6513.2792		P9-2
	300 17 40				
Σ β	° ′ ″	ΣS			EXY
180(n-1)					BXY
β.TA					dε
dε.TA					dε/n
ε.TA					
Δε					

Line No.

TRAVERSE COMPUTATION

P 27

NO	β	α & S	X	Y	NO
P10	° ' "	18P 57 3P	56 676.03	6 347.12	P11
P11					
			230.0919		
P11-1		38.682	56451.2460		
	220 11 40		6317.4205		P11-1
			62.4445		
P11-2		13P.75-	56540.0269		
	42 47 6		6471.3554		P11-2
P11		138 50 26	56 367.86	6 441.68	P12
P12					
			28.5006		
P12-1		271.77	56605.9138		
	69 49 40		6572.7516		P12-1
TD		41 26 3E	56 430.42	6 2PE.2P	NOP
NOP					
NOP-1					
	28P 2P 42				NOP-1
NOP-2					
	323 21 48				NOP-2
Σ β	° ' "	ΣS			EXY
180(n-1)					BXY
B.TA					
d.E.TA					dE
E.TA					de/n
ΔE					

Line No.

TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
T7	° ' "	(346.01 51)	56 689.45	5 801.99	T8
T8	307:17:46	82.57	113.1937		
			56656.7341		
T8-1			5707.8107		T8-1
T9		(327.09 38)	56 888.91	5 604.62	T10
T10	102:13:25	210.66	249.2303		
			56814.7365		
T10-1			5407.4501		T10-1
T11		(277.5452)	56 994.68	5 407.47	T12
T12	151:25:49	127.78	113.2051		
			56944.0399		
T12-1			5424.7871		T12-1
T13		(223.34 47)			T12
T12	199:59:09	25.82	242.3906		
			56982.8183		
T12-2			5284.5559		T12-2
T13		(73 26 28)	57 187.13	5 593.72	T14
T14	77:01:0	61.57	330.2728		
			57190.6954		
T14-1			5563.3620		T14-1
T10		(71 44 29)	56 924.73	5 710.31	C1
C1	250:35:55	166.99	182.2419		
			56757.8871		
C1-1			5706.1418		C1-1
C2		(85 14 07)	56 958.38	5 993.58	C3
C3	68:10:15	92.91	333.2422		
			57051.4603		
C3-1			5950.9875		C3-1
C7		(65 50 21)	57004.42	6 527.93	C8
C8	89:38:53	291.63	335.2914		
			57269.7650		
۳۰۰			6406.9338		۳۰۰
Σ β	° ' "	Σ S			EXY
180(n-1)					BXY
B.TA		ACCURACY			
dE.TA		=			dE
E.TA					dE/n
ΔE					

Line No.

TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
T0	° ' "	([illegible])	[illegible]	[illegible]	N09
N09	[illegible]	[illegible]			
N09-1		[illegible]	[illegible]	[illegible]	N09-1
T.0					
	[illegible]	[illegible]			
N09-2		[illegible]	[illegible]	[illegible]	N09-2
N09		([illegible])	[illegible]	[illegible]	T.0
T0	[illegible]	[illegible]			
T0-1		[illegible]	[illegible]	[illegible]	T0-1
K2		([illegible])	[illegible]	[illegible]	K3
K3	[illegible]	[illegible]	119.5314		
			56524.9798		
K3-1			6137.2877		K3-1
K2					K3
	[illegible]	[illegible]	115.3511		
			56495.6254		
K3-2			6224.3385		K3-2
P1		([illegible])	[illegible]	[illegible]	P2
P2	[illegible]	[illegible]	337.1102		
			56727.4654		
P2-1			5832.8172		P2-1
P2		([illegible])	[illegible]	[illegible]	P3
P3	[illegible]	[illegible]	25.1743		
			56721.5024		
P3-1			5963.1098		P3-1
Σβ		ΣS			EXY
180(n-1)					BXY
B.TA		ACCURACY			
dE.TA					dE
E.TA					dE/n
ΔE					

Line No.
R

TRAVERSE COMPUTATION

P 00

NO	β	α & S	X	Y	NO
T11	140.26.59	(277 44 52)	56 984.68	5 705.47	T12
T12	+ . . 6	127.78	.	.	
	15.26.5	113.2055	.	.	
	211.9.19		56944.0376	5424.7861	
R0	+ . . 6	140.99	+ . 1	− . 1	
	211.9.25	144.3020	56 944.05	5424.78	R0
	119.07.19		56821.1058	5512.4545	
R1	+ . . 6	118.82	+ . 2	− . 1	
	119.07.25	84.0745	56 821.13	5512.44	R1
	168.17.44		56832.7460	5625.6576	
R2	+ . . 6	93.78	+ . 2	− . 2	
	168.17.50	72.2525	56832.77	5625.64	R2
	200.18.2		56861.0654	5715.0595	
R3	+ . . 6	344.73	+ . 3	− . 2	
	200.18.8	92.4333	56861.10	5715.04	R3
	167.18.40		56854.6530	5849.6371	
R4	+ . . 6	64.99	+ . 4	− . 3	
	167.18.46	80.0219	56 854.70	5849.61	R4
	196.16.22		56865.9003	5913.6473	
R5	+ . . 6	231.81	+ . 5	− . 3	
	196.16.28	96.1847	56865.95	5913.62	R5
	140.30.27		56840.4103	6144.0516	
R6	+ . . 6	52.95	+ . 6	− . 4	
	140.30.33	66.4920	56840.47	6144.01	R6
	210.24.00		56861.2506	6192.7279	
R7	+ . . 6	97.95	+ . 6	− . 4	
	210.24.6	97.1326	56861.31	6192.69	R7
	167.1.42		56848.9337	6289.9004	
R8	+ . . 6	166.64	+ . 7	− . 5	
	167.1.48	84.1514	56849.00	6289.85	R8
	246.29.2		56865.6178	6455.7031	
R9	+ . . 6	97.27	+ . 8	− . 5	
	246.29.8	150.4422	56865.70	6455.65	R9
Σ β	[illegible].48.26	ΣS 1332.68	.	.	EXY
180(n-1)	. .	ACCURACY	.	.	BXY
B.TA	. .		.	.	dE
d E.TA	. .	——— = ———	.	.	dE/n
E.TA	. .		.	.	
ΔE	. .		.	.	

Line No.
۲

TRAVERSE COMPUTATION

پ ۹/

NO	β	α & S	X	Y	NO
	263° 1' 44"		56780.7589	6503.2470	
P9	6		+ 9	− 6	
	263 21 00	233 46 24	56 780 . 85	6 503 . 18	P9
P8.					

Σ β	2115° 40' 20"	ΣS 1332 . 69	56 780 . 76	6 503 . 25	EXY
180(n-1)	1260		56 780 . 85	6 503 . 18	BXY
B.TA	97 44 52	ACCURACY			
dE.TA	233 45 12	$\frac{0.108}{1332.69} = \frac{1}{12000}$	− 9	+ 6	dE
E.TA	233 46 24		1	0.005	$\frac{dE}{n}$
ΔE	− 1 12				

Line No.
R

TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
R8	182°51'44"	(84 15 14)	56 865.70	6 455.65	R9
R9		55.27			
		86.46.56	56.868.80	6 510.83	R9-1
R9-1					

Σ β		ΣS			EXY
180(n-1)		ACCURACY			BXY
B.TA					dE
dE.TA		——— = ———			dE/n
E.TA					
ΔE					

Line No.

N

TRAVERSE COMPUTATION

[illegible]

NO	β	α & S	X	Y	NO
T14	81°40'40"	(116 28 02)	57084.46	5701.51	T15
T15	0	65.45			
	81 40 40	18.0842			
	220 58 26		57145.6552	5721.8926	
N1	+ 1	56.84			
	220 58 27	59.0709	57145.66	5721.89	N1
	185 46 56		57174.8286	5770.6747	
N2	0	50.05			
	185 46 56	64.5405	57174.83	5770.67	N2
	158 42 45		57196.0587	5815.9990	
N3	0	62.13		+ 1	
	158 42 45	43.3650	57196.06	5816.01	N3
	210 23 6		57241.0411	5858.8559	
N4	+ 1	50.71		+ 1	
	210 23 7	73.5957	57241.04	5858.87	N4
	64 20 20		57255.0194	5907.6013	
N5	0	176.24		+ 1	
	64 20 20	318.2017	57255.02	5907.61	N5
	333 53 2		57386.6847	5790.4486	
N6	0	333.51		+ 1	
	333 53 2	271.3319	57386.68	5790.46	N6
	314 39 20		57390.3084	5656.9877	
N7	+ 1	91.29		+ 1	
	314 39 21	46.1240	57390.31	5657.00	N7
	107 46 8		57453.4813	5722.8895	
N8	0	146.71		+ 2	
	107 46 8	333.5848	57453.48	5722.91	N8
	92 54 56		57585.3210	5658.5300	
N9	0	65.08		+ 2	
	92 54 56	246.5344	57585.32	5658.55	N9
	272 46 0		57559.6653	5598.3940	
N10	+ 1	126.26		+ 2	
	272 46 1	339.3945	57559.67	5598.41	N10
Σ β	1823°11'39"	ES 1024.57			EXY
180(n-1)					BXY
β.TA		ACCURACY			
dE.TA					dE
E.TA					dE/n
ΔE					

Line No.

TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
	[illegible]		57678.0544	5554.5124	
N11	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	340.1740	[illegible]	[illegible]	N11
	[illegible]		57713.6314	5541.7701	
N12	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	102.5930	[illegible]	[illegible]	N12
	[illegible]		57682.1131	5678.3814	
N13	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	114.5609	[illegible]	[illegible]	N13
	[illegible]		57633.4517	5783.0420	
N14	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	201.4027	[illegible]	[illegible]	N14
	[illegible]		57590.9641	5766.1563	
N15	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	169.4622	[illegible]	[illegible]	N15
	[illegible]		57422.0315	5796.6349	
N16	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	32.1800	[illegible]	[illegible]	N16
	[illegible]		57555.0334	5880.7152	
N17	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	99.1514	[illegible]	[illegible]	N17
	[illegible]		57540.1200	5972.2483	
N18	[illegible]	[illegible]	.	+ . [illegible]	
	[illegible]	1.4305	[illegible]	[illegible]	N18
	[illegible]		57739.1405	5978.2178	
N19	[illegible]	[illegible]	− . [illegible]	+ . [illegible]	
	[illegible]	28.5329	[illegible]	[illegible]	N19
	[illegible]		57772.6210	5996.6935	
N20	[illegible]	[illegible]	− . [illegible]	+ . [illegible]	
	[illegible]	39.2905	[illegible]	[illegible]	N20
	[illegible]		57872.5838	6079.0517	
N21	[illegible]	[illegible]	− . [illegible]	+ . [illegible]	
	[illegible]	120.2036	[illegible]	[illegible]	N21
Σ β	[illegible]	[illegible]	.	.	EXY
180(n-1)			.	.	BXY
β.TA		ACCURACY	.	.	
d E.TA			.	.	d E
E.TA		——— = ———	.	.	dE / n
Δ E					

س

Line No.
N

TRAVERSE COMPUTATION

P 34

NO	β	α & S	X	Y	NO
N22	117 59 22		57833.8768	6145.1758	
	0 0 0	63.28	− .1	+ .5	
	117 59 22	57.5958	57833.87	6145.23	N22
N23	226 23 48		57867.4107	6198.8400	
	0 0 1	68.10	− .1	+ .5	
	226 23 49	104.2357	57867.40	6198.89	N23
N24	227 47 24		57850.4758	6264.8007	
	0 0 0	63.07	− .1	+ .5	
	227 47 24	152.1121	57850.47	6264.85	N24
N25	61 21 50		57794.6909	6294.2263	
	0 0 0	72.87	− .1	+ .6	
	61 21 50	33.3311	57794.68	6294.29	N25
N26	255 7 42		57855.4189	6334.5022	
	0 0 0	169.07	− .1	+ .6	
	255 7 42	108.4053	57855.41	6334.56	N26
N27	300 1 12		57801.1688	6494.9488	
	0 0 1	262.79	− .1	+ .6	
	300 1 13	228.4156	57801.16	6495.01	N27
N28	81 34 20		57627.7231	6297.5275	
	0 0 0	109.94	− .1	+ .6	
	81 34 20	130.1616	57627.71	6297.59	N28
N29	201 25 44		57556.6573	6381.4111	
	0 0 0	121.06	− .1	+ .7	
	201 25 44	151.4200	57556.65	6381.48	N29
N30	181 24 56		57450.0667	6438.8042	
	0 0 1	92.38	− .1	+ .7	
	181 24 57	153.0657	57450.06	6438.87	N30
N31	146 25 46		57367.6709	6480.5774	
	0 0 0	75.50	− .1	+ .7	
	146 25 46	119.3243	57367.66	6480.65	N31
N32	185 32 16		57330.4410	6546.2598	
	0 0 0	129.21	− .1	+ .7	
	185 32 16	125.0459	57330.43	6546.33	N32
Σ β	1948 06 47	ΣS 1456.51	.	.	EXY
180(n-1)	. .		.	.	BXY
B.TA	. .	ACCURACY	.	.	dE
dE.TA	. .		.	.	
E.TA	. .	——— = ———	.	.	dE/n
ΔE	. .		.	.	

Line No. N

TRAVERSE COMPUTATION

P 36

NO	β [illegible]	α & S	X	Y	NO
NW	252.23.44		57256.1759	6651.9949	
	. . 1	91.94	− . 1	+ . 8	
	252.23.45	197.2844	57256.17	6652.07	NW
E3	189.44.38		57168.4809	6624.3803	
	. . 0	99.42	− . 1	+ . 8	
	189.44.38	207.1322	57168.47	6624.46	E3
E2	231.36.34		57080.0732	6578.9005	
	. . 0	197.93	− . 1	+ . 8	
	231.36.44	258.4956	57080.06	6578.98	E2
E1	241.48.31		57041.7376	6384.7185	
	. . 0	.	− . 1	+ . 8	
	241.48.31	320.3827	57041.73	6384.80	E1
No/3	. .		.	.	
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Σ β	6864.10.14	ΣS 3845.80	57041.73	6384.80	EXY
180(n-1)	−6840. .		57041.74	6384.72	BXY
B.TA	293.28.2	ACCURACY			
d E.TA	320.38.16	$\frac{0.08}{3845.80} = \frac{1}{48000}$	− . 1	+ . 8	d E
E.TA	320.38.27		.	.	$\frac{dE}{n}$
Δ E	− . . 11				

Line No.

N — TRAVERSE COMPUTATION — P 47

NO	β	α & S	X	Y	NO
T15	° ' "	(18 8 42)	57 145.66	5 721 .89	N1
N1	258 48 10	108 .28	96.5652		
			57132.5619		
N1-1			5829.3748		N1-1
N4		(73 59 57)	57 245.02	5 807 .61	N5
N5	222 30 14	92 .60	116.3011		
			57213.7422		
N5-1			5990.3892		N5-1
N6		(38 20 17)	57 245.02	5 807 .61	N5
N5	226 19 0	126 .07	202.3917		
			57138.6772		
N5-2			5859.0907		N5-2
N5		(318 20 17)	57 386 .68	5 790 .46	N6
N6	36 1 41	55 .49	174.2958		
			57331.4455		
B52 (200)			5795.7790		B52 (200)
N6		(271 33 19)	57 390 .31	5 657 .00	N7
N7	260 57 26	138 .76	352.3045		
			57503.1000		
N7-1			5642.1759		N7-1
N7		(46 12 40)	57 445 .48	5 722 .81	N8
N8	107 13 50	108 .16	333.2630		
			57550.2269		
13&0			5674.5507		13&0
N8		(333 58 48)	57 585 .32	5 658 .55	N9
N9	168 50 58	71 .19	322.4946		
			57642.0470		
N9-1			5615.5377		N9-1
N10		(1 43 5)	57 738 .13	5 928 .26	N 19
N19	148 18 12	161 .89	331.0217		
			57880.7742		
N19-1			5899.8682		N19-1
N20		(39 29 5)	57 872 .47	6 078 .10	N21
N21	205 11 16	46 .85	64.4021		
			57892.6548		
N21-1			6121.5370		N21-1
N21		(120 20 36)	57 893 .87	6 145 .23	N22
N22	212 8 1	58 .08	152.2837		
			57782.3632		
N22-1			6172.0690		N22-1
N23		(104 23 57)	57 850 .47	6 284 .85	N24
N24	60 54 30	121 .36	344.2927		
			57967.4110		
N24-1			6232.3992		N24-1
Σ β	° ' "	ES			EXY
180(N-1)					
B.TA		ACCURACY			BXY
d.E.TA					dE
E.TA					dE/n
ΔE					

Line No.

G TRAVERSE COMPUTATION P 38

NO	β	α & S	X	Y	NO
N6	116° 4' 26"	(138 20 17)	57 285.02	6207.61	N5
N5	+ 1 1 4	70.08	,	,	
	116 4 30	74.2447	,	,	
	171 4 6		57273.8505	5975.1127	
G4	+ 1 1 4	70.63	+ , 1	+ , 1	
	171 4 10	65.2857	57 273.86	6035.12	G4
	204 29 45		57303.1599	6039.3743	
G3	+ 1 1 5	74.05	+ , 2	+ , 3	
	204 29 50	89.5847	57 303.18	6039.40	G3
	184 23 45		57303.1961	6113.4243	
G2	+ 1 1 4	108.50	+ , 3	+ , 4	
	184 23 48	94.2245	57 303.22	6113.46	G2
	243 1 20		57294.9014	6221.6075	
G1	+ 1 1 4	118.45	+ , 4	+ , 6	
	243 1 24	157.2409	57 294.94	6221.67	G1
	200 29 36		57184.6220	6267.5068	
N03	+ 1 1 4	,	+ , 5	+ , 7	
	200 29 38	177 58 47	57 184.67	6 267.58	N03
N0P	, ,	,	,	,	
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Σ β	1119° 33' 5"	Σ S 442.76	57 184.67	6 267.58	EXY
180(n-1)	900 ,		57 184.62	6 267.51	BXY
B.TA	318 20 17	ACCURACY			
d E.TA	177 53 22		+ , 5	+ , 7	d E
E.TA	177 53 47	0.086 = 1/5100			d E / n
Δ E	— , , 25	442.76	,	,	

Line No.

F TRAVERSE COMPUTATION P 3P

NO	β	d & S	X	Y	NO
N09	210°17'12"	(345) 42 47	57 184.67	6 267.58	N09
N013	— 1 1 5	177.03	.	.	
	210 17 19	28.1056	.	.	
	93 26 19		57340.7131	6351.1872	
F1	— 1 1 6	146.19	.	— 1	
	93 26 13	301.3709	57 340.71	6 351.18	F1
	228 17 49		57417.3562	6226.6889	
F2	— 1 1 5	103.24	.	— 2	
	228 17 44	349.5453	57 417.36	6 226.68	F2
	136 16 45		57519.0010	6208.6201	
F3	— 1 1 5	134.42	+ 1	— 3	
	136 16 40	306.0133	57 519.01	6 208.62	F3
	176 46 48		57598.7070	6099.0181	
F4	— 1 1 6	132.36	+ 1	— 4	
	176 46 42	302.0615	57 598.72	6 098.98	F4
	64 20 1		57669.0511	5986.8981	
F5	— 1 1 5	129.26	+ 1	— 5	
	64 19 56	186.2611	57 669.06	5986.84	F5
	272 49 8		57540.1090	5972.3520	
N18	— 1 1 4		+ 1	— 6	
	272 49 3	279 45 14	57 540.12	5 972.29	N18
N17					
Σβ	1181°22'04"	Σs 824.10	57 540.12	5 972.29	EXY
180(n-1)	1080 1		57 540.11	5 972.35	BXY
B.TA	177 53 47	ACCURACY	+ 1 1	— 6	dE
d.E.TA	279 15 51	0.06 / 824.10 = 1 / 13700			dE/n
E TA	279 15 14				
dE	+ 1 37				

Line No.

N. F. G. TRAVERSE COMPUTATION P 40

NO	β	α & S.	X	Y	NO
N24	° ' "	(152 11 21)	57 784.68	6 284.29	N25
N25	289 47 58	50.90	261.5919		
			57787.5860		
N25-1			6243.8867		N25-1
N29		(310 16 16)	57 627.71	6 287.59	N28
N28	111 56 41	48.74	242.1057		
			57604.4984		
(Line 670) N28-1			6253.5980		N28-1
N29		(151 42 00)	57 440.06	6 438.87	N30
N30	246 30 22	45.32	218.1222		
			57406.5900		
N30-1			6404.6550		N30-1
N30		(153 6 57)	57 367.66	6 480.65	N31
N31	260 59 16	76.06	214.0611		
			57306.0876		
N31-1			6428.9576		N31-1
N31		(119 02 43)	57 330.43	6 546.33	N32
N32	267 12 19	143.81	196.5002		
			57193.2610		
N32-1			6504.8277		N32-2
N31		(119 02 43)			
N32	132 0 26	162.43	71.3309		
			57381.8602		
N32-2			6700.5082		N32-2
N32		(125 4 59)	57 256.17	6 652.07	N33
N33	38 58 54	345.07	344.0353		
			57597.5955		
N33-1			6554.5850		N33-1
N33		(197 28 44)	57 168.47	6 624.46	E3
E3	96 54 20	140.96	112.2304		
			57114.7897		
E3-1			6754.7985		E3-1
N013		(28 10 56	57 340.71	6 345.18	A1
A1	311 14 10	265.99	162.2456		
			57106.2144		
A1-1			6425.4963		A1-1
G3		(89 58 47	57 303.22	6 113.46	G2
G2	52 28 25	92.75	322.2712		
			57376.7575		
G2-1			6056.9374		G2-1
Σ β	° ' "	ES			EXY
180(n-1)					
B.TA		ACCURACY			BXY
d E.TA					d E
E.TA		=			dE / n
Δ E					

Line No.

TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
(NO2)	۱۹ ۱۶ ۲	(۴۸ ۲۵ ۱۰)	۶۵ ۵۳۱.۶۹	۵ ۶۵۹.۸۴	NO3
NO3	۰	۲۷۲.۲۷			
	۱۹ ۱۶ ۲	247.4112			
	۲۳۱ ۵۱ ۳۸		65259.3630	4996.2831	
NO20	− ۱	۱۰۳۳.۶۸	− .۴	− .۴	
	۲۳۱ ۵۱ ۳۷	141.3249	۶۵ ۲۵۹.۳۲	۴ ۹۹۶.۲۴	NO20
	۲۱۳ ۴۶ ۲۴		64449.8618	5639.1122	
NO19	۰	۲۰۸۵.۷۹	− .۹	− .۸	
	۲۱۳ ۴۶ ۲۴	175.1913	۶۴ ۴۴۹.۷۷	۵ ۶۳۹.۰۳	NO19
	۱۴۹ ۱۷ ۱۵		62371.0252	5809.2831	
NO18	۱	۵۲۷.۸۳	− .۱۳	− .۱۲	
	۱۴۹ ۱۷ ۱۴	144.3627	۶۲ ۳۷۰.۹۰	۵ ۸۰۹.۱۶	NO18
	۲۹۹ ۱۳ ۳۶	(۱۴۴.۳۶.۵۰")	61940.9808	6114.8150	
NO17	۰	۲۱۵۷.۲۱	− .۱۸	− .۱۶	
	۲۹۹ ۱۳ ۳۶	263.5003	۶۱ ۹۴۰.۸۰	۶ ۱۱۴.۶۶	NO17
	۲۲۵ ۵۰ ۴		61711.4306	3989.9683	
NO15	۰	۱۹۳۶.۴۷	− .۲۲	− .۲۰	
	۲۲۵ ۵۰ ۴	309.4007	۶۱ ۷۱۱.۲۱	۳ ۹۸۹.۷۷	NO15
	۹۴ ۲۸ ۳۶		62947.5689	2499.3717	
NO16	− ۱	۲۲۰۶.۸۴	− .۲۷	− .۲۴	
	۹۴ ۲۸ ۳۵	224.0842	۶۲ ۹۴۷.۳۰	۲ ۴۹۹.۱۳	NO16
	۴ ۱۶ ۲۸		61363.9068	962.2827	
NO2	۰		− .۳۱	− .۲۸	NO2
	۴ ۱۶ ۲۸	۲۲۸ ۲۵ ۱۰	۶۱ ۳۶۳.۶۰	۹۶۲.۰۰	
NO3					
Σβ	۱۰۸۰ ۰ ۳	ΣS ۱۰۶۴۴.۹۱	۶۱ ۳۶۳.۶۰	۹۶۲.۰۰	EXY
180(n-1)	۹۰۰	ACCURACY	۶۱ ۳۶۳.۹۱	۹۶۲.۲۸	BXY
β.TA	۴۸ ۲۵ ۱۰		− .۳۱	− .۲۸	dE
dE.TA	۲۲۸ ۲۵ ۱۳	0.418 / 10,644.91 = 1 / 25000	.۴	.۴	dE/n
E.TA	۲۲۸ ۲۵ ۱۰				
ΔE	+ ۳				

Line No.

A TRAVERSE COMPUTATION P 42

NO	β	∝ & S	X	Y	NO
No17	211° 41' 36"	(325 36 50)	62 370.90	5809.16	No18
No18	+ 1 1 6	116.64			
	211 41 40	325 41 30			
	176 36 12		62 487.21	5800.60	
A1	+ 1 1 6	118.88	0	0	
	176 36 28	325 17 55	62 487.21	5800 60	A1
	267 13 34		62 605.13	5784.45	
A2	+ 1 1 6	78.28	+ 1	0	
	267 13 40	78 31 35	62 605.14	5784.45	A2
	200 21 34		62 618.45	5862.41	
A3	+ 1 1 6	91.67	+ 2	0	
	200 21 40	99 36.15	62 618.46	5862.41	A3
	277 6 0		62 604.31	5842.71	
A4	+ 1 1 6	103.02	+ 2	0	
	277 6 6	196 40 21	62 604.33	5842.71	A4
	162 26 12		62 505.34	5823.06	
A5	+ 1 1 6	112.78	+ 3	0	
	162 26 18	179 06 39	62 505.37	5823.06	A5
	185 28 37		62 392.46	5824.81	
A6	+ 1 1 6	108.25	+ 4	+ 1	
	185 28 43	194 35 16	62 392.50	5824.82	A6
	165 6 13		62 287.80	5817.45	
A7	+ 1 1 6	132.24	+ 4	+ 1	
	165 6 19	149 41 35	62 287.84	5817.46	A7
	250 20 50		62 163.30	5843.62	
A8	+ 1 1 6	122.40	+ 5	+ 1	
	250 20 56	130 02 31	62 163.35	5843.63	A8
	201 41 23		62 084.561	6 037.33	
A9	+ 1 1 6	163.28	+ 5	+ 1	
	201 41 29	141 44.00	62 084.61	6 037.34	A9
	342 42 44		61 960.75	6 111.65	
No17	+ 1 1 6		+ 5	+ 1	
No18	342 42 50	325 36 50	61 960.80	6 111.66	No17
Σβ	3599° 58' 54"	Σ∝ 1148.27	61 960.80	6 111.66	EXY
180(n-1)	1 1		61 960.25	6 111.65	BXY
B.TA	325 36 40	ACCURACY	+ 5	+ 1	dE
dE.TA	325 35 44	0.041 / 1148.27 = 1 / 22000	− 0.005	0.001	dE/n
E.TA	325 36 50				
ΔE	− 1 1 6				

Line No.
B

TRAVERSE COMPUTATION

P 43

NO	β	α & S	X	Y	NO
No18	288°26'42"	(144 36 50)	61 940.80	6 114.66	No17
No17	− 1	67.12			
	288.26.41	253.0331			
	88.35.57		61921.2416	6050.4527	
B1	− 1	131.15	0	+ 1	
	88.35.56	161.3927	61 921.24	6 050.46	B1
	211.43.56		61796.7551	6091.7252	
B2	0	125.26	− 1	+ 1	
	211.43.56	193.2323	61 796.75	6 091.74	B2
	140.9.6		61674.9000	6062.7183	
B3	− 1	142.91	− 1	+ 2	
	140.9.5	153.3228	61 674.89	6 062.74	B3
	309.10.46		61546.9592	6126.3927	
B4	− 1	76.92	− 1	+ 2	
	309.10.45	282.4313	61 546.95	6 126.41	B4
	171.19.18		61563.8963	6051.3605	
B5	− 1	88.45	− 2	+ 3	
	171.19.17	274.0230	61 563.88	6 051.39	B5
	260.18.50		61570.1304	5963.1305	
B6	0	84.14	− 2	+ 3	
	260.18.50	354.2120	61 570.11	5 963.16	B6
	216.59.18		61653.8625	5954.8549	
B7	− 1	62.15	− 2	+ 4	
	216.59.17	31.2037	61 653.84	5 954.89	B7
	141.7.2		61706.9425	5987.1834	
B8	− 1	96.77	− 2	+ 4	
	141.7.1	352.2738	61 706.92	5 987.22	B8
	303.57.40		61802.8759	5974.4864	
B9	− 1	49.61	− 3	+ 5	
	303.57.39	116.2517	61 802.85	5 974.54	B9
	52.35.16		61780.8009	6018.9144	
B10	0	97.85	− 3	+ 6	
	52.35.16	349.0033	61 780.77	6 018.97	B10
Σ β	2184°23'54"	ΣS 1022.93			EXY
180(n-1)					BXY
B.TA		ACCURACY			dE
dE.TA					
E.TA					dE/n
ΔE					

Line No.

B TRAVERSE COMPUTATION P 44

NO	β	α & S	X	Y	NO
	216°58'38"		61876.8561	6000.2591	
B11	− 1	67.66	− .3	+ .6	
	216°58'37"	25.5910	61876.83	6000.32	B11
	131°27'29"		61937.6757	6029.9046	
B12	− 1	173.69	− .4	+ .7	
	131°27'28"	337.2638	61937.64	6029.97	B12
	145°58'0"		62098.0792	5963.2792	
B13	− 1	119.23	− .4	+ .7	
	145°57'59"	303.2437	62098.04	5963.35	B13
	260°56'37"		62163.7309	5863.7520	
B14	0	75.16	− .4	+ .8	
	260°56'37"	24.2114	62163.69	5863.83	B14
	123°57'6"		62232.2028	5894.7459	
B15	− 1	163.07	− .5	+ .8	
	123°57'5"	323.1819	62232.15	5894.83	B15
	356°18'32"		62370.9525	5809.0700	
N018	− 1		− .5	+ .9	
	356°18'31"	144°36'50"	62370.90	5809.16	N018
N017					

			X	Y	
Σ β	3420°0'13"	ΣS 1621.14	62370.90	5809.16	EXY
180(n-1)			62370.95	5809.07	BXY
B.TA	144°36'50"	ACCURACY			
dE.TA	144°37'3"	$\frac{0.103}{1621.14} = \frac{1}{16000}$	− .5	+ .9	dE
ETA	144°36'50"		+ 0.003	− 0.005	$\frac{dE}{n}$
ΔE	+ 13				

Line No.

OPEN TRAVERSE COMPUTATION P 45

NO	β	α & S	X	Y	NO
BK	° ′ ″	(282 43 13)	61 563.88	6 051.39	B5
B5	64 17 50	181.54	167.0103 61386.9803 6092.1735		
B5-1					B5-1
		177.62	180.2851 61386.2662 6049.8994		
B5-2	77 45 38				B5-2
	42 56 14	182.54	145.3927 61413.1603 6154.3678		
B5-3					B5-3
	64 18 24	276.07	167.0137 61294.8564 6113.3657		
B5-4					B5-4
	71 55 09	281.44	174.3852 61283.6670 6077.6421		
B5-5					B5-5
	50 59 08	282.03	153.4251 61311.0130 6176.2868		
B5-6					B5-6
	64 17 07	366.20	167.0050 61207.0457 6133.6805		
B5-7					B5-7
	69 11 18	352.79	171.5431 61214.6020 6101.0460		
B5-8					B5-8
	55 44 54	378.85	153.3807 61211.0644 6189.4063		
B5-9					B5-9
B5		(167 00 20)	61 187.55	6 138.23	B5-10
B5-10	179 47 2	44.08	166.4722 61134.9011 6150.5889		
B5-12					B5-12
B5-1		(160 11 25)	61 180.64	6 189.44	B5-11
B5-11	200 51 40	74.28	181.0305 61106.3725 6183.0770		
B5-13					B5-13
Σ β	° ′ ″	ΣS			EXY
180(n-1)					BXY
β.TA		ACCURACY			dE
dE.TA		— = —			dE/n
E.TA					
ΔE					

Line No.

OPEN TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
BK	64°17′8″	(282 43 13)	61 563.88	6 051.39	BK
BK	− 1	386.22			
	64 17 7	167.0020			
	110 40 48		61187.5503	6138.2341	
BK-10	− 2	51.67			
	110 40 46	97.4106	61 187.55	6 138.23	BK-10
	62 30 20		61180.6407	6189.4400	
BK-11	− 1	407.35			
	62 30 19	340.1125	61 180.64	6 189.44	BK-11
	302 31 49		61563.8850	6051.3900	
BK	− 1				
	302 31 48	102 43 13	61 563.88	6 051.39	BK
BK					

Σβ	540° 0 5	ΣS 845.24	61 563.88	6 051.39	EXY
180(n-1)					
B.TA	282 43 13	ACCURACY	61 563.88	6 051.39	BXY
d E.TA	102 43 18	$\frac{0}{845.24} = \frac{1}{\infty}$	0	0	dE
E.TA	102 43 13		0	0	$\frac{dE}{n}$
ΔE	+ 5				

Line No.

OPEN TRAVERSE COMPUTATION P 47

NO	β	α & S	X	Y	NO
B8	° ' "	(342 27 38)	61 802.85	6 226.46	B9
B9	54 47 12	62.37	227.1450		
			61760.5109		
B9-1			5923.7423		B9-1
B9		(116 25 17)	61 780.77	6 018.87	B10
B10	34 21 48	62.96	330.4705		
			61835.7209		
B10-1			5983.2397		B10-1
B9					
B10	306 32 18	18.06	242.5735		
			61772.5596		
MM 0+960			6002.8841		MM 0+960
B10		(349 00 33)	61 876.83	6 000.32	B11
B11	82 43 46	49.72	251.5419		
			61861.3875		
B11-1			5953.0589		B11-1
B10					
B11	303 32 40	54.48	112.3323		
			61855.9318		
B11-2			6050.6324		B11-2
B11		(25 58 10)	61 893.64	6 029.87	B12
B12	46 50 8	64.13	252.4919		
			61918.6997		
MM 1+080			5968.7007		MM 1+080
B12		(33 7 26 38)	62 098.04	4 963.34	B13
B13	4 43 34	111.13	209.1012		
			62001.0038		
B13-1			5909.1849		B13-1
B12					
B13	169 23 02	80.64	326.4940		
			62165.5380		
B13-2			5919.2272		B13-2
Σβ	° ' "	Σs			EXY
180(n-1)					BXY
B.TA		ACCURACY			dE
dE.TA					de/n
E.TA					
ΔE					

Line No.

OPEN TRAVERSE COMPUTATION P 48

NO	β	α & S	X	Y	NO
NO17	° ' "	(324 36 50)	62 370.90	5 809.16	NO18
NO18	244 39 5	91.34	29.1555		
			62450.5818		
BP			5853.8119		BP
A1		(175 41 30)	62 370.90	5 809.16	NO18
NO18	110 58 40	48.22	106.4000		
			62357.0703		
NO18-1			5855.3542		NO18-1
A3		(99 36 15)	62 604.33	5 752.71	A4
A4	322 21 12	106.71	241.5527		
			62554.1080		
A4-1			5858.5570		A4-1
A4		(196 40 21)	62 505.37	5 923.06	A5
A5	282 31 26	63.42	299.1147		
			62531.4285		
A5-1			5876.4268		A5-1
A8		(130 02 31)	62 084.61	6 037.34	A9
A9	253 45 58	78.63	203.0729		
			62012.2977		
A9-1			6006.4593		A9-1
A9		(151 44 00)	61 960.80	6 114.66	NO17
NO17	341 44 24	75.67	313.2824		
			61992.8622		
NO17-1			6059.7466		NO17-1
B1		(161 39 27)	61 796.75	6 091.74	B2
B2	72 50 8	61.43	54.2935		
			61832.4286		
B2-1			6141.7467		B2-1
B2		(193 23 23)	61 674.89	6 062.74	B3
B3	78 1 32	82.82	91.2455		
			61672.8195		
B3-1			6146.5444		B3-1
B3		(153 32 28)	61 546.75	6 126.41	B4
B4	117 9 48	71.00	90.4226		
			61546.0736		
B4-1			6197.4045		B4-1
B3					B4
B4	267 42 22	72.14	241.1450		
			61512.2484		
B4-2			6063.1646		B4-2
Σ β	° ' "	ΣS			EXY
180(n-1)					BXY
B.TA		ACCURACY			dE
dE.TA					dE
E.TA		=			dE/n
ΔE					

Line No.

No12.EP12. TRAVERSE COMPUTATION

NO	β	α & S	X	Y	NO
T.O	96°22'42"	(41 26 35)	58 430.53	6 295.29	No9
No9		1863.18			
		317.49.17			
			57811.25	5044.27	
No12					No12
—					
—					
No3	10.30.32	(228 25 10)	61 363.60	962.00	No2
No2		612.53			
		58.55.42			
			61 679.73	1486.65	
EP12					EP12.
—					
T.O	109.33.34	(41 26 35)	58 430.53	6 295.29	No9
No9		1280.138			
		331.00.09			
			47 450.19	5 674.72	[illegible]
—					
—					
—					
Σ β	° ' "	ΣS			EXY
180(n-1)					BXY
B.TA		ACCURACY			dE
d E.TA		=			$\frac{dE}{n}$
E.TA					
ΔE					

DISTANCE AND HEIGHT COMPUTATION

Line No. No6 ~ No11

Distance & Height Computation

	(BM783) No.0 → No9	No9 → No10	No10 → No11	No11 → Skp 17	→	No9 → No8	No8 → No7	No7 → No6	No6 → 116 T.P	→
V1		+ 2 2 48	− 0 1 50	+ 1 17 42		− 0 5 50	+ 0 33 10	− 0 23 44	+ 2 34 8	
V2	− 2 10 40	− 2 3 59	+ 0 0 41	− 1 18 12		+ 0 4 38	− 0 34 44	+ 0 22 1	− 2 34 42	
V0	+ 2 10 40	+ 2 3 24	− 0 1 20	+ 1 17 57		− 0 5 12	+ 0 33 37	− 0 22 32	+ 2 34 54	
S	170 825	2080 675	1888 916	1068 022		2362 178	2169 228	1886 700	1021 834	
Sin V0	+ 5 84	+ 67 21	− 0 66	+ 21 38		− 8 21	+ 19 09	− 11 72	+ 121 29	
h1	1443 93	1449 77	1516 88	1516 32		1449 77	1446 56	1465 65	1453 93	
h2	1449 77	1516 88	1516 82	1538 11		1446 56	1465 65	1453 93	1534 22	
h0	1446 85	1483 38	1516 85	1527 22		1448 16	1456 10	1459 79	1514 58	
K										
i	−									
f										
H										
e										
Ho										
S x Cos V0	170 725	2079 589	1888 916	1067 800		2362 176	2169 144	1886 665	1014 711	
dD1	− 39	− 484	− 450	− 256		− 332	− 496	− 445	− 241	
dD2	24	287	269	152		334	309	283	145	
So	170 662	2078 808	1888 197	1067 332		2364 310	2168 339	1884 283	1014 325	

Line No. T.-1

Distance & Height Computation

	T0 (DH83) → T1	T1 → T2	T2 → T3	T3 → T4	T4 → T5	T5 → T6	T6 → T7	T7 → T8	T8 → T9	T9 → T10
V1	+ ۱ ۱۶ ۴۸	- ۴ ۴ ۵۴	- ۴ ۱۴ ۲۰	- ۳ ۴۷ ۴۶	- ۲ ۲۸ ۴۶	- ۰ ۳۶ ۱۴	- ۳ ۴۳ ۱۲	- ۸ ۲۰ ۱۲	- ۱ ۳ ۱۲	- ۳ ۳۶ ۳۶
V2	- ۱ ۱۳ ۳۴	+ ۴ ۳ ۲۳	+ ۴ ۱۲ ۴	+ ۳ ۴۸ ۵۴	+ ۲ ۲۶ ۴	+ ۰ ۳۶ ۴۸	+ ۳ ۴۳ ۱۲	+ ۸ ۲۰ ۳۴	+ ۱ ۳ ۳۴	+ ۳ ۴۸ ۰
Vo	+ ۱ ۱۶ ۱۲	- ۴ ۳ ۱	- ۴ ۱۳ ۲۲	- ۳ ۴۸ ۱۸	- ۲ ۲۸ ۳۴	- ۰ ۳۶ ۳۱	- ۳ ۴۳ ۱۸	- ۸ ۲۰ ۲۶	- ۱ ۳ ۳۶	- ۳ ۳۶ ۳۶
S	۳۴ ۱۶۴	۱۰۳ ۳۲۴	۹۹ ۰۲۴	۱۰۲ ۴۴۲	۱۹۱ ۴۶۲	۷۴ ۳۷۰	۳۴ ۶۲۲	۱۱۴ ۴۶۴	۴۴ ۴۶۱	۱۲۵ ۲۰۴
Sin Sx Vo	+ ۰ ۲۳	- ۰ ۳۲	- ۰ ۶۲	- ۱۰ ۹۱	- ۰ ۲۹	- ۰ ۰۳۴	- ۰ ۹ ۳۲	- ۱ ۶۶	- ۱ ۶۳	- ۱ ۹۴
h1	۱۴۴۳ ۹۳									
h2										
hoi	۱۴۴۶ ۶۴	۱۴۳۶ ۲۶	۱۴۳۲ ۶۳	۱۴۲۱ ۶۴	۱۴۱۳ ۴۳	۱۴۱۲ ۶۰	۱۴۰۳ ۵۸	۱۳۸۶ ۴۲	۱۳۸۴ ۲۲	۱۳۶۴ ۶۴
K										
i	+ ۱ ۱۸	+ ۱ ۲۶	+ ۱ ۱۷	+ ۱ ۳۳	+ ۱ ۲۲	+ ۱ ۳۰	+ ۱ ۲۸	+ ۱ ۱۶	+ ۱ ۱۸	+ ۱ ۲۹
f	- ۱ ۲۶	- ۱ ۳۷	- ۱ ۳۳	- ۱ ۲۲	- ۱ ۳۰	- ۱ ۲۸	- ۱ ۱۶	- ۱ ۱۸	- ۱ ۲۹	- ۱ ۲۴
H	۱۴۴۴ ۳۸	۱۴۳۶ ۲۰	۱۴۳۱ ۳۲	۱۴۲۰ ۴۲	۱۴۱۲ ۱۴	۱۴۱۱ ۳۲	۱۴۰۱ ۹۲	۱۳۸۴ ۲۴	۱۳۸۳ ۴۰	۱۳۶۳ ۶۱
e										
Ho	۱۴۴۴ ۳۰	۱۴۳۶ ۲۰	۱۴۳۱ ۳۲	۱۴۲۰ ۴۲	۱۴۱۲ ۱۴	۱۴۱۱ ۳۲	۱۴۰۱ ۹۲	۱۳۸۴ ۲۴	۱۳۸۳ ۴۰	۱۳۶۳ ۶۱
Sx Cos Vo	۳۴ ۱۴۰	۱۰۳ ۲۶۱	۹۹ ۸۴۸	۱۰۲ ۳۲۹	۱۹۱ ۶۶۳	۷۴ ۲۲۳	۳۴ ۰۴۶	۱۱۴ ۶۴۰	۴۴ ۴۲۴	۱۲۵ ۸۶۰
dD1										
dD2										
So										

Line No. 7

Distance & Height Computation

	T10 → T11			T11 → T12			T12 → T13			T13 → T14			T14 → T15			T15 → T16			T16 → T17			T17 → T18			T18 → T19			T19 → T20		
V_1	+4	2	48	-1	23	28	+4	44	44	+5	5	10	+3	43	44	-3	37	28	-2	28	36	+3	5	54	-6	28	50	+3	21	22
V_2	-4	2	47	+1	23	34	-4	43	52	-5	5	4	-3	43	9	+3	37	19	+2	28	48	-3	5	58	+6	28	54	-3	21	38
V_0	+4	2	48	-1	23	31	+4	44	18	+5	5	7	+3	43	26	-3	37	24	-2	28	42	+3	5	56	-6	28	52	+3	21	30

	T10 → T11		T11 → T12		T12 → T13		T13 → T14		T14 → T15		T15 → T16		T16 → T17		T17 → T18		T18 → T19		T19 → T20	
S	124	091	202	913	110	682	220	192	120	556	63	482	135	823	84	379	112	502	93	278
$S \times \sin V_0$	+8	76	-4	93	+9	14	+19	52	+7	84	-4	01	-5	87	+4	56	-12	70	+5	46
h_1																				
h_2																				
h_{ai}	1373	71	1368	78	1377	92	1397	44	1405	28	1401	27	1395	40	1393	86	1387	26	1393	72
K																				
i	+1	24	+1	24	+1	23	+1	27	+1	25	+1	28	+1	15	+1	18	+1	30	+1	20
f	-1	24	-1	23	-1	27	-1	25	-1	28	-1	15	-1	18	-1	30	-1	20	-1	28
H	1372	47	1367	55	1376	65	1396	19	1404	00	1400	12	1394	22	1398	66	1386	06	1391	44
e													-	1	-	1	-	1	-	1
Ho	1372	47	1367	55	1376	65	1396	18	1404	00	1400	12	1394	21	1393	65	1386	05	1391	43
$S \times \cos V_0$	123	782	202	853	110	304	219	325	120	401	63	555	135	696	84	256	111	793	93	118
dD_1																				
dD_2																				
So																				

Line No. P

Distance & Height Computation

	T20 → T21	T21 → N013	N013 → E1	E1 → C7	C7 → C8	C8 → P9	P9 → P10	P10 → P11	P11 → P12	P12 → P13
V_1	+ ٤ ٣٢ ٢٤	+ ٠ ٢٤ ٣٦	-	- ٦ ٦ ٣٥	- ٠ ١١ ٤٦	- ٠ ٩ ١٥	+ ٦ ٢٩ ٢٤	+ ١٢ ٤١ ١٣	- ٣ ٩ ٦	+ ٤ ٤ ٣٤
V_2	- ٤ ٣٢ ٤٤	- ٠ ٢٤ ٤٩	+ ٢ ٤٩ ٢٩	+ ٦ ٨ ٤	+ ٠ ١٢ ١٥	+ ٠ ٨ ٤٩	- ٦ ٢٩ ٣٥	- ١٢ ٤١ ٤٦	+ ٣ ٨ ٢٢	- ٤ ٤ ١٢
V_0	+ ٤ ٣٢ ٣٤	+ ٠ ٢٤ ٤٣	(-٢ ٤٩ ٢٩	- ٦ ٦ ٤٨	- ٠ ١٢ ٣	- ٠ ٩ ٨	+ ٦ ٢٩ ٢٦	+ ١٢ ٤١ ٣٥	- ٣ ٨ ٤٤	+ ٤ ٤ ٢٣
S	٨٦ ٦٧٨	٦١ ٢١٨	١٨٤ ٠٨٨	٢٤ ٠٩٢	١٢٦ ٠٢٤	٢٢٤ ٣٥٠	٢١٩ ١٢٦	١٣٦ ٦٧٦	١٤٣ ٩٢٨	١٢٤ ٦٤٢
Sin Vo	+ ٦٨٦	+ ٠٤٤	- ٩١٢	- ١١٦٨	- ٠٤٤	- ٠٦٠	+ ٢٤ ٦٦	+ ٣٥ ٢٤	- ٦ ٩٥	+ ٨ ٩٦
h_1										
h_2										
h_0	١٣٩٩ ٩٩	١٤٥٥ ٥٤	١٣٩٥ ٣٣	١٣٦٩ ٢٤	١٣٦٨ ٤٥	١٣٦٨ ٢٥	١٤٥٦ ٩٩	١٤٣٦ ٢٢	١٤٢٤ ٠٢	١٤٣٤ ٢٩
K										
i	+ ١٢٨	+ ١٢٣	+ ١٣٣	+ ١١٦	+ ١٣٢	+ ١٢٤	+ ١٢٣	+ ١٣١	+ ١٣٥	+ ١٣١
f	- ١٢٣	- ١٣٣	- ١١٦	- ١٣٢	- ١٢٤	- ١٢٣	- ١٣١	- ١٣٥	- ١٣١	- ١٢٦
H	١٣٩٨ ٣٦	١٣٩٨ ٦٢	١٣٩٣ ٦٦	١٣٦٦ ٩٦	١٣٦٦ ٩٦	١٣٦٩ ٩٦	١٤٥١ ٩٩	١٤٣١ ٩٢	١٤٢٤ ٥١	١٤٣٣ ٢٥
e	- ١	- ١	- ١	- ١	- ١	- ١	- ١	- ١	- ١	- ١
Ho	١٣٩٨ ٣٦	١٣٩٨ ٦١	١٣٩٣ ٦٦	١٣٦٦ ٩٢	١٣٦٦ ٩٤	١٣٦٩ ٩٦	١٤٥١ ٦٤	١٤٣١ ٩١	١٤٢٤ ٥٠	١٤٣٣ ٥١
Cos Vo	٨٦ ٤٠٦	٦١ ٢١٦	١٨٤ ٨٦٣	٢٤ ٣٦٤	١٢٦ ٠٢٣	٢٢٤ ٩٢٩	٢١٩ ٦٢٢	١٣٦ ٣١٢	١٤٣ ٦١١	١٢٤ ٤٤٢
dD_1										
dD_2										
So										

Line No. C

Distance & Height Computation

	PB → No9	No9 → T.O	→	TO → C1	C1 → C2	C2 → C3	C3 → C4	C4 → C5	C5 → C6	C6 → C7
V_1	+ 4 56 6	− 2 10 40		+ 3 4 12	+ 2 55 56	− 0 56 56	+ 0 24 15	− 2 21 54	+ 0 48 22	+ 2 30 30
V_2	− 4 56 17	+ 2 10 37		− 3 3 51	− 2 6 16	+ 0 56 48	− 0 24 26	+ 2 20 56	− 0 48 8	− 2 30 12
V_o	+ 4 56 12	− 2 10 38		+ 3 4 2	+ 2 6 6	− 0 56 52	+ 0 24 20	− 2 21 25	+ 0 48 15	+ 2 30 21
S	204 758	170 825		114 430	159 316	124 162	205 690	49 725	86 900	85 985
Sin Vo	+ 17 62	− 6 49		+ 6 12	+ 5 84	− 2 05	+ 1 46	− 2 05	+ 1 22	+ 3 76
h_1				1363 71						
h_2										
h_o	1451 91	1445 42		1371 07	1376 91	1374 86	1376 32	1374 27	1375 49	1379 25
K										
i	+ 1 27	+ 1 19		+ 1 24	+ 1 23	+ 1 26	+ 1 21	+ 1 27	+ 1 21	+ 1 48
f	− 1 19	− 1 48		− 1 23	− 1 26	− 1 21	− 1 27	− 1 21	− 1 48	− 1 32
H	1450 72	1443 94		1369 74	1375 54	1373 57	1374 92	1372 99	1373 88	1377 93
e	− 1	+ 1					− 1	− 1	− 1	− 1
Ho	1450 71	1443 93		1369 74	1375 54	1373 57	1374 91	1372 98	1373 87	1377 92
Cos Vo	203 998	120 702		114 266	159 209	124 145	205 68	49 753	86 891	85 913
dD_1										
dD_2										
So										

Line No. P

Distance & Height Computation

6

	T9 → P1			P1 → P2			P2 → P3			P3 → P4			P4 → P5			P5 → P6			P6 → P7			P7 → P8			P8 → P9			→		
V1	+5	16	42	+1	8	11	+1	36	46	−1	37	36	−4	27	8	−8	0	28	−0	56	46	+10	17	44	−3	23	28			
V2	−5	16	11	−1	7	56	−1	36	46	+1	37	46	+5	27	22	+8	0	20	+0	56	44	−10	17	36	+3	23	20			
V0	+5	16	26	+1	8	4	+1	36	46	−1	37	41	−5	27	15	−8	0	24	−0	56	46	+10	17	39	−3	23	24			
S	98	643		61	062		104	840		128	210		68	284		101	444		261	110		109	088		179	818				
Sin V0	+	201		+	121		+	890		−	64		−	649		−	14	13	−	4	31	+	19	49	−	10	63			
h1	983	50																												
h2																														
h0i	1393	80		1395	01		1397	90		1394	26		1387	77		1373	64		1369	33		1388	82		1378	19				
K																														
i	+	29		+	26		+	20		+	21		+	23		+	24		+	15		+	42		+	34				
f	−	26		−	20		−	21		−	23		−	24		−	15		−	42		−	34		−	23				
H	1392	54		1393	81		1396	69		1393	03		1386	53		1372	49		1367	81		1387	47		1376	96				
e																											0			
Ho	1392	54		1393	81		1396	69		1393	03		1386	53		1372	49		1367	81		1387	47		1376	96				
Cos V0	98	231		61	050		104	810		128	158		67	986		100	448		261	074		107	327		179	504				
dD1																														
dD2																														
So																														

Line No. K.

Distance & Height Computation

	TK → K1	K1 → K2	K2 → K3	K3 → PK	→	NO9 → T16	NO9 → 1350	NO9 → NO13	NO9 → TO	→
V1	- ۶ 24 22	+ ۳ 22 46	- 7 11 21	- ۳ ۶۹ ۳۶		- ۳ ۳2 30	+ 0 23 18	- ۳ ۶6 1۷	- 2 10 40	
V2	+ ۶ 27 ۶۷	- ۳ 22 46	+ 7 11 2۷	+ ۳ ۶۹ 20		+ ۳ ۳2 20		+ ۳ ۶۶ ۷8	+ 2 10 ۳7	
V0	- ۶ 26 8	+ ۳ 22 46	- 7 11 22	- ۳ ۶۹ 28		۳ ۳2 2۶		۳ ۶6 1	- 2 10 ۳8	
S	۶۶ 626	111 788	181 108	2۶ ۶07		820 856	1280 278	2۶6 ۳32	170 82۶	
Sin V0	- 489	+ 6 ۶9	- 2۳ 92	- ۶ 26		-۶0 69	+ 8 68	- ۶1 89	- 6 ۷9	
h1	1۷20 ۶2					1۷۶0 ۷2				
h2						1۳۶۶ ۶۳				
h01	1۷16 8۶	1۷2۳ ۷۷	1۳۶۶ ۶2	1۳۶۷ 26						
K										
i	+ 122	+ 124	+ 122	+ 127						
f	- 124	- 122	- 127	- 123						
H	1۷۶۶ 61	1۷22 22	1۳۶8 2۶	1۳۶۳ 03						
e				0						
Ho	1۷۶۶ 61	1۷22 22	1۳۶8 2۶	1۳۶۳ 03						
Cos V0	۶1 ۳۶۷	111 60۷	18۶ 606	2۶ ۳2۷		819 29Ŏ	1280 268	2۷ ۶۶	170 702	
dD1										
dD2										
So										

Line No. R

Distance & Height Computation

	T12 → R0	R0 → R1	R1 → R2	R2 → R3	R3 → R4	R4 → R5	R5 → R6	R6 → R7	R7 → R8	R8 → R9
V_1	− 1 16 14	− 5 53 24	− 0 3 43	+ 6 36 43	− 2 47 36	− 0 7 32	− 0 9 46	+ 9 30 50	− 5 5 24	+ 1 19 2
V_2	+ 1 15 9	+ 5 53 14	+ 0 3 36	− 6 36 38	+ 2 47 38	+ 0 7 25	+ 0 9 40	− 9 31 12	+ 5 5 30	− 1 19 2
V_0	− 1 15 42	− 5 53 19	− 0 3 40	+ 6 36 40	− 2 47 37	− 0 7 28	− 0 9 43	+ 9 31 1	− 5 5 27	+ 1 19 2
S	127 809	151 794	113 799	94 403	134 886	64 993	231 814	53 685	98 341	166 683
S × Sin Vo	− 2 81	− 15 57	− 0 07	+ 10 87	− 6 57	− 0 14	− 0 66	+ 8 88	− 8 73	+ 3 83
h_1	1367 55									
h_2										
h_i	1365 97	1350 40	1350 33	1361 20	1354 63	1354 49	1353 83	1362 71	1353 98	1357 81
K										
i	+ 1 23	+ 1 24	+ 1 48	+ 1 40	+ 1 27	+ 1 30	+ 1 32	+ 1 49	+ 1 24	+ 1 50
f	− 1 24	− 1 48	− 1 40	− 1 27	− 1 30	− 1 32	− 1 49	− 1 24	− 1 50	− 1 47
H	1364 73	1348 92	1348 93	1359 93	1353 33	1353 17	1352 34	1361 47	1352 48	1356 34
e	− 1	− 2	− 2	− 3	− 4	− 5	− 6	− 6	− 7	− 8
Ho	1364 72	1348 90	1348 91	1359 90	1353 29	1353 12	1352 28	1361 41	1352 41	1356 26
S × Cos Vo	127 78	150 99	113 80	93 78	134 73	64 99	231 81	52 95	97 95	166 64
dD_1										
dD_2										
So										

Line No. R

Distance & Height Computation

9

	R9 → P9	→	R9 → R9-1	→	→	→	→	→	→	→
V_1	+ 11 43 1									
V_2	- 11 43 10									
V_o	+ 11 44 6		+ 2 11 8							
S	99 402		44 308							
Sin Vo	+ 20 47		+ 2 11							
h_1			1346 26							
h_2										
h_o'										
K										
i	+ 1 47		+ 1 47							
f	- 1 23		- 1 36							
H	1377 05									
e	- . 0									
Ho	1376 96		1358 48							
Cos Vo	99 27		44 27							
dD_1										
dD_2										
So										

Line No. G

Distance & Height Computation

	NS → G4	G4 → G3	G3 → G2	G2 → G1	G1 → N013	→	→	→	→	→
V_1	−6 44 18	−8 15 23	−5 12 23	−6 31 22	−0 59 44					
V_2	+6 44 18	+8 15 22	+5 12 10	+6 28 31	+0 59 47					
V_0	−6 44 18	−8 15 22	−5 12 16	−6 29 56	−0 59 50					
S	70 57 4	71 36 5	76 34 2	109 202	119 46 7					
Σ x Sin Vo	−8 28	−10 25	−6 76	−12 36	−2 08					
h_1	1438 51									
h_2										
h_0	1431 45	1421 20	1416 46	1402 10	1400 02					
K										
i	+1 22	+1 49	+1 24	+1 25	+1 32					
f	−1 49	−1 26	−1 25	−1 32	−1 33					
H	1429 86	1419 86	1413 21	1400 78	1398 69					
e		−1	−1	−2	−2					
Ho	1429 86	1419 85	1413 20	1400 76	1398 71					
Σ x Cos Vo	70 08	70 63	76 05	108 50	119 44					
dD_1										
dD_2										
So										

Line No. A

Distance & Height Computation

11

	NOB → A1	A1 → A2	A2 → A3	A3 → A4	A4 → A5	A5 → N18	→	→	→	→
V_1	−1 37 34	+2 2 44	+8 22 11	+3 2 40	+4 47 36	−1 18 43				
V_2	+1 37 14	−2 2 55	−8 22 16	−3 2 4	−4 47 40	+1 18 50				
V_0	−1 37 24	+2 2 50	+8 22 14	+3 2 22	+4 47 38	−1 18 46				
S	177 106	146 284	104 381	135 710	102 824	129 796				
Sin V0	−5 02	+5 23	+5 19	+2 20	+11 10	−2 27				
h_1	1398 71									
h_2										
h_d	1395 02	1400 25	1405 44	1422 64	1433 74	1430 77				
K										
i	+1 33	+1 20	+1 23	+1 27	+1 25	+1 33				
f	−1 20	−1 23	−1 27	−1 25	−1 33	−1 27				
H	1393 82	1399 02	1406 17	1421 39	1432 41	1429 50				
e				− 1	− 1	− 1				
Ho	1393 82	1399 02	1406 17	1421 38	1432 40	1429 49				
Cos V0	177 03	146 19	104 26	135 62	102 36	129 26				
dD_1										
dD_2										
So										

Line No. N

Distance & Height Computation

	TP → N1	N1 → N2	N2 → N3	N3 → N4	N4 → N5	N5 → N6	N6 → N7	N7 → N8	N8 → N9	N9 → N10
V_1	+10 18 8	+13 7 4	+7 2 23	+2 47 50	+0 1 56	−0 44 24	+4 16 56	−1 14 0	+7 47 55	+2 51 56
V_2	−10 18 17	−13 8 53	−7 4 43	−2 47 42	−0 1 34	+0 43 40	−4 17 46	+1 14 12	−7 47 56	−2 51 58
V_0	+10 18 17	+13 7 58	+7 2 23	+2 47 42	+0 1 42	−0 44 2	+4 17 20	−1 14 6	+7 47 56	+2 51 57
S	66 426	68 370	50 442	62 204	50 724	176 250	133 888	91 307	148 084	65 462
Sin $\frac{S}{2R}$ Vo	+ 11 90	+ 12 27	+ 6 22	+ 3 03	+ 0 03	− 2 26	+ 10 02	− 1 97	+ 20 09	+ 3 27
h_1	1404 00									
h_2										
h_0	1417 18	1430 45	1436 67	1439 20	1439 73	1437 47	1446 49	1445 42	1465 61	1468 88
K										
i	+ 1 28	+ 1 20	+ 1 22	+ 1 25	+ 1 22	+ 1 22	+ 1 25	+ 1 18	+ 1 25	+ 1 29
f	− 1 20	− 1 22	− 1 15	− 1 22	− 1 22	− 1 25	− 1 18	− 1 25	− 1 29	− 1 28
H	1415 98	1429 23	1435 52	1438 48	1438 51	1436 22	1446 31	1444 27	1464 32	1467 62
e							− 1	− 1	− 1	− 1
Ho	1415 98	1429 23	1435 52	1438 48	1438 51	1436 22	1446 30	1444 26	1464 31	1467 61
$\frac{S}{R}$ Cos Vo	65 45	68 84	50 06	62 13	50 71	176 24	133 51	91 29	148 71	65 38
dD_1										
dD_2										
So										

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Line No. ۸۱

Distance & Height Computation

۱۳

	N10 → N11	N11 → N12	N12 → N13	N13 → N14	N14 → N15	N15 → N16	N16 → N17	N17 → N18	N18 → N19	N19 → N20
V_1	+ 2 42 13	+ 0 43 1	− 5 51 24	− 0 3 21	− 0 6 29	− 7 43 21	+ 2 18 2	− 7 44 2	+ 5 46 18	+ 12 7 20
V_2	− 2 42 19	− 0 43 2	+ 5 51 3	+ 0 3 12	+ 0 6 18	+ 7 43 8	− 2 18 11	+ 7 43 52	− 5 46 28	− 12 7 50
V_0	+ 2 42 16	+ 0 43 2	− 5 51 14	− 0 3 16	− 0 6 24	− 7 43 14	+ 2 18 6	− 7 43 47	+ 5 46 23	+ 12 7 35
S	126 397	37 786	160 837	115 422	45 720	173 232	157 474	93 590	200 126	39 118
Sin V_0	+ 5 96	+ 0 05	− 14 37	− 0 11	− 0 09	− 23 27	+ 6 32	− 12 59	+ 20 13	+ 8 22
h_1										
h_2										
h_0	1474 84	1474 89	1460 52	1460 41	1460 32	1437 05	1443 37	1430 38	1460 81	1459 13
K										
i	+ 1 26	+ 1 29	+ 1 30	+ 1 31	+ 1 41	+ 1 24	+ 1 56	+ 1 30	+ 1 27	+ 1 32
f	− 1 29	− 1 30	− 1 31	− 1 41	− 1 24	− 1 56	− 1 30	− 1 27	− 1 32	− 1 24
H	1473 55	1473 59	1459 21	1459 00	1459 08	1435 49	1442 07	1429 51	1459 49	1457 89
e	− 1	− 1	− 1	− 1	− 1	− 1	− 1	− 2	− 2	− 2
Ho	1473 54	1473 58	1459 20	1458 99	1459 07	1435 48	1442 06	1429 49	1459 47	1457 87
Cos V_0	126 26	37 79	160 20	115 42	45 72	173 66	157 34	93 24	199 11	38 24
dD_1										
dD_2										
So										

۲۹

Line No. 1

Distance & Height Computation

	N20 → N21	N21 → N22	N22 → N23	N23 → N24	N24 → N25	N25 → N26	N26 → N27	N27 → N28	N28 → N29	N29 → N30
V_1	+ 4 26 58	− 3 18 18	− 6 22 20	− 6 24 32	− 1 17 59	− 6 42 12	− 2 0 33	− 0 56 9	− 6 18 41	− 5 41 2
V_2	− 4 26 58	+ 3 18 6	+ 6 22 18	+ 6 24 11	+ 1 17 58	+ 6 41 50	+ 2 0 24	+ 0 56 11	+ 6 18 20	+ 5 40 47
V_0	+ 4 26 58	− 3 18 12	− 6 22 19	− 6 24 22	− 1 17 58	− 6 42 1	− 2 0 28	− 0 56 10	− 6 18 30	− 5 41 0
S	129 914	76 768	63 678	68 528	63 087	73 868	169 474	262 823	110 607	121 652
S_x Sin Vo	+ 10 08	− 4 42	− 7 07	− 7 65	− 1 43	− 8 56	− 5 94	− 4 29	− 12 15	− 12 05
h_1										
h_2										
h_0	1469 21	1466 78	1457 72	1450 07	1468 64	1460 08	1434 14	1429 85	1417 70	1405 65
K										
i	+ 1 24	+ 1 31	+ 1 22	+ 1 37	+ 1 41	+ 1 29	+ 1 31	+ 1 46	+ 1 23	+ 1 27
f	− 1 31	− 1 22	− 1 37	− 1 41	− 1 29	− 1 31	− 1 46	− 1 23	− 1 27	− 1 26
H	1467 90	1463 57	1456 35	1448 66	1467 35	1438 77	1432 68	1428 62	1416 43	1404 39
e	− 2	− 2	− 2	− 2	− 2	− 2	− 2	− 2	− 2	3
Ho	1467 88	1463 55	1456 33	1448 64	1467 33	1438 75	1432 66	1428 60	1416 41	1404 37
S_x Cos Vo	129 52	76 62	63 28	68 10	63 07	72 87	169 97	262 79	109 94	121 05
dD_1										
dD_2										
So										

Line No. N

Distance & Height Computation

	N30 → N31	N31 → N32	N32 → N33	N33 → E3	E3 → E2	E2 → E1	→	→	→	→
V_1	−6 20 30	−5 28 38	+5 33 10	−4 18 56	−3 25 53	+0 52 25				
V_2	+6 20 17	+5 28 44	−5 33 6	+4 14 00	+3 26 15	−0 52 16				
V_0	−6 20 24	−5 28 42	+5 33 8	−4 18 47	−3 26 4	+0 52 20				
S	92 946	25 847	129 816	92 188	99 495	187 952				
Sin V0	− 10 26	− 3 24	+ 12 56	− 6 80	− 5 27	+ 3 01				
h_1										
h_2										
h_0	1395 38	1388 15	1400 71	1392 91	1387 94	1390 95				
K										
i	+ 1.26	+ 1.28	+ 1.20	+ 1.25	+ 1.25	+ 1.27				
f	− 1.28	− 1.20	− 1.25	− 1.25	− 1.27	− 1.16				
H	1394 11	1386 95	1399 46	1392 66	1386 67	1389 79				
e	− 3	− 3	− 3	− 3	− 3	− 3				
Ho	1394 08	1386 92	1399 43	1392 63	1386 64	1389 76				
Cos V0	92 38	25 40	129 21	91 94	99 42	187 93				
dD_1										
dD_2										
So										

Line No. T.C (OPEN)

Distance & Height Computation

	T8 → T8-1	T10 → T10-1	→	T12 → T12-1	T12 → T12-2	T14 → T14-1	C1 → C1-1	C3 → C3-1	C8 → in sea	→
V_1										
V_2										
V_0	+ 6 6 42	- 0 56 48		- 1 16 14	+ 1 28 10	+ 3 18 44	+ 1 31 16	+ 14 10 37	+ 2 1 2	
S	83 044	210 688		127 808	26 038	6 1 673	167 046	84 825	291 812	
Sin Vo	+ 8 84	— 3 42		— 2 83	+ 3 32	+ 3 58	+ 4 43	+ 23 47	+ 10 27	
h_1	1385 24	1363 71		1367 45	1367 45	1396 18	1378 74	1373 47	1377 54	
h_2										
h_0										
K										
i	+ 1 18	+ 1 24		+ 1 23	+ 1 23	+ 1 25	+ 1 23	+ 1 21	+ 1 24	
f	— 1 18	— 1 21		— 1 24	— 1 28	— 1 18	— 1 47	— 0 24	— 1 32	
H										
e										
Ho	1384 08	1360 25		1366 71	1370 89	1389 83	1370 83	1388 01	1387 67	
Cos Vo	82 47	210 66		127 78	25 82	6 1 47	166 99	82 81	291 64	
dD_1										
dD_2										
So										

Line No. K (OPEN)

Distance & Height Computation

	NO9 → NO9-1	NO9 → NO9-2	T0 → T0-1	K3 → K3-1	K3 → K3-2	P2 → P2-1	P3 → P3-1	→	→	→
V_1										
V_2										
V_0	−7 37 26	−0 20 52	−0 27 44	−2 18 18	+5 43 46	−16 41 43	−5 5 2			
S	92 634	233 526	160 245	168 388	240 208	69 886	144 312			
Sin Vo	−12 28	−1 42	−1 18	−6 01	+28 99	−1 47	−12 79			
h_1	1450 71	1450 71	1443 93	1398 25	1398 25	1393 81	1396 69			
h_2										
h_0										
K										
i	+1 18	+1 18	+1 48	+1 27	+1 27	+1 20	+1 21			
f	+1 18	−1 22	−1 28	−1 15	−1 12	−1 13	−1 20			
H										
e										
Ho	1448 43	1449 26	1443 00	1392 36	1422 38	1379 41	1383 91			
Cos Vo	91716	233 522	160 260	168 266	238 04	47761	143 746			
dD_1										
dD_2										
So										

Line No. P (OPEN)

Distance & Height Computation

	P6 → P6-1	P6 → P6-2	P6 → P6-3	P8 → P8-1	P9 → P9-1	P9 → P9-2	P11 → P11-1	P11 → P11-2	P12 → P12-1	→
V_1										
V_2										
V_0	-2 1 50	-5 56 16	-10 44 2	+4 2 33	+ 2 4 48	+7 29 44	+18 50 40	-9 39 48	-5 42 44	
S	132 093	142 172	30 206	111 600	104 020	98 464	40 873	141 762	273 126	
Sin S^x V_0	- 4 68	-14 81	- 5 71	+ 7 87	+ 3 78	+12 84	+ 8 20	-23 80	-27 18	
h_1	1372 49	1372 49	1372 49	1387 47	1376 96	1376 96	1431 91	1431 91	1422 00	
h_2										
h_0										
K										
i	+ 1 15	+ 1 15	+ 1 15	+ 1 35	+ 1 23	+ 1 23	+ 1 30	+ 1 30	+ 1 31	
f	- 1 15	- 1 31	- 1 25	- 1 46	- 1 12	- 1 35	- 1 27	- 1 27	- 1 32	
H										
e										
Ho	1368 96	1367 42	1366 68	1384 23	1380 84	1389 68	1445 16	1408 16	1396 81	
Cos S^x V_0	132 010	142 404	29 66	111 322	103 841	97 623	38 852	138 251	271 770	
dD_1										
dD_2										
So										

Line No. x1 (OPEN)

Distance & Height Computation

	N1 → N1-1	N5 → N5-1	N5 → N5-2	N6 → BS2 (200)	N7 → N7-1	N8 → 1360	N9 → N9-1	N19 → N19 -1	N21 → N21 -1	N22 → N22 -1
V_1										
V_2										
V_0	+ 4 46 24	- 6 29 44	- 4 55 58	- 6 6 22	+ 7 17 6	+ 8 0 46	+ 3 27 6	+ 1 38 36	- 2 48 36	- 5 23 34
S	108 658	99 100	126 538	55 808	116 684	109 222	71 319	161 843	47 014	58 342
Sin S_x V_0	+ 8 04	- 10 53	- 10 88	- 5 94	+ 14 54	+ 15 22	+ 4 29	+ 4 64	- 2 44	- 5 48
h_1	1435 98	1438 51	1438 51	1436 22	1446 30	1444 26	1464 31	1469 47	1467 88	1463 55
h_2										
h_0										
K										
i	+ 1 20	+ 1 22	+ 1 22	+ 1 25	+ 1 18	+ 1 25	+ 1 29	+ 1 32	+ 1 31	+ 1 22
f	- 1 45	- 1 47	- 1 36	- 1 52	- 1 23	- 1 33	- 1 29	- 0 00	- 1 28	- 1 26
H										
e										
Ho	1426 77	1427 33	1427 49	1430 01	1460 39	1454 40	1468 60	1465 53	1467 47	1458 03
Cos S_x V_0	108 28	99 60	126 07	55 49	113 76	108 16	71 19	161 89	46 85	58 08
dD_1										
dD_2										
So										

Line No. N (OPEN)

Distance & Height Computation

(in 670)

	N24 → N24-1	N25 → N25-1	N28 → N28-1	N30 → N30-1	N31 → N31-1	N32 → N32-1	N32 → N32-2	N33 → N33-1	E3 → E3-1	→
V_1										
V_2										
V_0	−1 21 25	+4 53 31	−1 41 44	−2 10 24	−1 37 27	−2 20 42	+2 55 22	−0 47 36	+0 48 10	
S	121.394	51.083	49.766	55.361	74.390	143.429	162.738	355.104	140.976	
S × Sin V_0	−2.87	+4.36	−1.47	−2.10	−2.11	−5.87	+8.30	−4.92	+1.98	
h_1	1448.64	1447.33	1428.60	1404.37	1394.08	1386.92	1386.92	1399.43	1392.63	
h_2										
h_0										
K										
i	+1.41	+1.29	+1.23	+1.26	+1.28	+1.20	+1.20	+1.25	+1.25	
f	−0.00	−1.34	−1.38	−1.26	−1.28	0	0	0	−1.29	
H										
e										
Ho	1447.18	1451.64	1426.98	1402.27	1391.97	1382.25	1396.42	1395.76	1394.57	
S × Cos V_0	121.36	50.90	49.74	55.32	74.36	143.31	162.53	355.07	140.96	
dD_1										
dD_2										
So										

Line No. F. G (OPEN)

Distance & Height Computation

	F1 → F1-1	→	G2 → G2-1	→	→	→	→	→	→	→
V_1										
V_2										
V_0	− 1 29 30		− 2 21 42							
S	246 074		92 828							
$S^1 \times \sin V_0$	− 6 41		− 3 83							
h_1	1295 82		1413 20							
h_2										
h_0										
K										
i	+ 1 20		+ 1 24							
f	− 1 29		− 1 27							
H										
e										
Ho	1287 32		1409 34							
$S^2 \times \cos V_0$	246 99		92 74							
dD_1										
dD_2										
So										

$-dD_2 = 0.999857383$

$k = -0.000142$

Line No. NO16~NO20

Distance & Height Computation

	NO17 → NO15	NO15 → NO14	NO14 → NO11	NO17 → NO18	NO18 → NO19	NO19 → NO20	NO20 → NO3	→	NO4 → NO16	NO16 → NO2
V_1	+ 0 11 2	− 3 49 0	+ 7 15 25	− 3 46 12	− 1 27 54	− 1 20 26	+ 0 40 8		− 3 18 38	+ 2 13 51
V_2	− 0 12 4	+ 3 48 45	− 7 16 49	+ 3 45 24	+ 1 26 32	+ 1 19 39	− 0 41 11		+ 3 17 26	− 2 15 4
V_0	+ 0 11 59	− 3 48 38	+ 7 16 7	− 3 45 48	− 1 27 13	− 1 20 2	+ 0 40 40		− 3 18 2	+ 2 14 28
S	2137 346	419 116	2371 349	428 209	2086 456	1034 012	717 342		1938 774	2208 246
Sin V_0	+ 7 18	− 29 07	+ 300 03	− 34 70	− 52 83	− 24 07	+ 8 49		− 111 68	+ 86 37
h_1	1246 86	1253 45	1224 47	1246 86	1211 66	1158 78	1136 66		1253 45	1141 86
h_2	1253 45	1224 47	1524 50	1211 66	1148 78	1134 66	1143 45		1141 86	1228 23
h_0	1249 95	1239 00	1374 48	1229 01	1185 20	1146 70	1138 90		1197 70	1185 04
K										
i										
f										
H										
e										
Ho										
Cos V_0	2137 99	418 11	2372 29	427 96	2085 88	1033 78	717 30		1938 46	2207 [illegible]
dD_1	− 42	− 08	− 41	− 10	− 38	− 19	− 13		− 36	− 41
dD_2	+ 30	+ 06	+ 03	+ 07	+ 30	+ 45	+ 15		+ 23	+ 31
So	2137 21	418 09	2372 11	427 93	2085 72	1033 69	717 32		1938 47	2206 95

Line No. A

Distance & Height Computation

	N018 → A1		A1 → A2		A2 → A3		A3 → A4		A4 → A5		A5 → A6		A6 → A7		A7 → A8		A8 → A9		A9 → N017	
V1	-2	43 16	-3	3 44	-0	44 51	+0	43 3	+2	52 51	+3	45 18	+2	48 21	+3	32 1	+3	45 34	+4	8 59
V2	+2	43 8	+3	3 31	+0	44 48	-0	43 16	+2	52 44	-3	45 22	-2	48 32	-3	32 8	-3	45 48	-4	9 16
V0	-2	43 12	-3	3 38	-0	44 50	+0	43 10	+2	52 52	+3	45 20	+2	48 26	+3	32 11	+3	45 41	+4	9 8
S	116	776	119	164	79	284	91	580	103	452	112	973	108	381	132	999	122	602	163	946
Sin V0	-	4 54	-	6 06	-	1 03	+	1 15	+	4 20	+	6 42	+	5 31	+	8 20	+	6 87	+	14 72
h1	1211	14																		
h2																				
h	1207	08	1200	72	1198	69	1200	84	1206	04	1212	46	1217	77	1225	97	1232	94	1247	66
K																				
i	+	1 48	+	1 26	+	1 27	+	1 31	+	1 32	+	1 22	+	1 60	+	1 25	+	1 33	+	1 27
f	-	1 26	-	1 27	-	1 31	-	1 32	-	1 22	-	1 60	-	1 25	-	1 33	-	1 27	-	1 42
H	1205	82	1198	45	1198	38	1198	52	1204	82	1210	86	1216	52	1224	64	1231	67	1246	24
e	+	8	+	8	+	9	+	9	+	10	+	10	+	11	+	11	+	12	+	12
Ho	1205	89	1199	53	1198	47	1198	61	1204	92	1211	06	1216	63	1224	75	1231	79	1246	36
Cos V0	116	64	118	99	79	28	91	57	103	02	112	79	108	25	132	35	122	40	163	28
dD1																				
dD2																				
So																				

Line No. B

Distance & Height Computation

	N017 → B1		B1 → B2		B2 → B3		B3 → B4		B4 → B5		B5 → B6		B6 → B7		B7 → B8		B8 → B9		B9 → B10	
V_1	- 2	24 30	+ 4	25 28	+ 4	43 25	+ 5	1 8	- 2	24 26	- 0	1 44	- 5	30 35	- 5	5 8	- 4	43 20	+ 2	14 36
V_2	+ 2	25 20	- 4	25 32	- 4	42 32	- 5	1 20	+ 2	24 22	+ 0	1 47	+ 5	30 31	+ 5	5 20	+ 4	47 20	- 2	14 21
V_0	- 2	25 25	+ 4	25 30	+ 4	42 28	+ 5	1 14	- 2	24 25	- 0	1 46	- 5	30 33	- 5	5 14	- 4	47 20	+ 2	14 28
S	67	181	131	546	124	690	143	461	76	985	80	544	84	526	62	396	99	108	49	646
Sin Vo	- 2	84	+ 10	15	+ 10	33	+ 12	55	- 3	23	- 0	05	- 8	11	- 5	53	- 8	11	+ 1	84
h_1	1246	36																		
h_2																				
$h_0 \lambda$	1246	94	1258	09	1266	42	1277	87	1274	74	1274	69	1266	58	1261	05	1252	94	1244	88
K																				
i	+	1 42	+	1 46	+	1 27	+	1 15	+	1 23	+	1 30	+	1 24	+	1 32	+	1 16	+	1 27
f	-	1 46	-	1 27	-	1 15	-	1 23	-	1 30	-	1 24	-	1 32	-	1 16	-	1 27	-	1 23
H	1243	48	1258	82	1266	27	1276	74	1273	44	1273	45	1265	26	1254	89	1251	67	1243	65
e	±	0	+	1	+	1	+	2	+	2	+	3	+	3	+	4	+	4	+	5
Ho	1243	48	1258	83	1266	28	1276	76	1273	46	1273	48	1265	29	1254	93	1251	71	1243	70
Cos Vo	67	12	131	15	124	26	142	91	76	92	88	45	84	14	62	15	96	77	49	61
dD_1																				
dD_2																				
So																				

Line No. B.

Distance & Height Computation

2

	B10 → B11	B11 → B12	B12 → B13	B13 → B14	B14 → B15	B15 → N018	→	→	N017 → N018	N018 → N017
V_1	- 4 26 46	- 4 34 24	- 3 59 28	- 1 28 32	- 4 3 54	- 3 5 20			- 3 46 12	+ 3 45 24
V_2	+ 4 26 46	+ 4 34 26	+ 3 59 20	+ 1 27 35	+ 4 2 22	+ 3 3 44				
V_0	- 4 26 46	- 4 34 25	- 3 59 24	- 1 28 4	- 4 3 8					
S	98 148	67 873	174 111	119 268	75 [illegible]	163 310			528 703	528 703
S' × Sin Vo	- 7 61	- 5 41	- 12 12	- 3 06	- 5 32	- 8 80	- 8 72		- 34 76	34 64
h_1									1246 36	
h_2										
hc	1247 27	1241 86	1229 74	1226 68	1221 36	1212 56	1212 64			
K									+ 2	- 2
i	+ 1 23	+ 1 27	+ 1 25	+ 1 22	+ 1 30	+ 1 23	+ 1 48		+ 1 14	- 1 45
f	- 1 47	- 1 25	- 1 22	- 1 30	- 1 23	- 1 44	- 1 23		- 1 45	+ 1 14
H	1246 00	1240 61	1228 52	1225 38	1220 13	1211 12 (1211 14)	1211 16		1211 31	1211 39
e	+ 5	+ 6	+ 6	+ 6	+ 7	+ 7				
Ho	1246 05	1240 67	1228 58	1225 44	1220 20	1211 21			1211 35	
S' × Cos Vo	97 85	67 66	173 69	119 23	75 16	163 07	163 08		527 56	527 57
dD_1										
dD_2										
So										

Line No. A (OPEN)

Distance & Height Computation

	NO18 → B.P	→	NO18 → NO18-1	AL → AL-1	AF → AF-1	AQ → AQ1	NO17 → NO17-1	→	→	→
V_1	-٣ ١٢ ١٦									
V_2		+٣ ٢٣ ١٩								
V_0			+ ١ ١٢٤	+ ١ ٢٣ ٢٨	- ١ ١٦ ٣٩	+ ٢ ٤١ ٨	- ٦ ٣ ٣٦			
S	٩١ ٤٩٣		٤٨ ٢٢٤	١٠٦ ٧٤٢	٤٣ ٤٣٣	٣٨ ٧٢٤	٧٦ ١٠٠			
Sin Vo	- ٠ ٢٤ ٢٥	+ ٠ ٢٠ ٢٠	+ ٠ ٨٦	+ ٢ ٤٩	- ١ ١٦	+ ٣ ٩٢	- ٨ ٠٣			
h_1	١٢١١ ٢١		١٢١١ ٢١	١١٩٩ ٦١	١٢٠٤ ٩٢	١٢٣١ ٩٩	١٢٤٦ ٣٦			
h_2										
h_0										
K										
i	+ ١ ٤٨	- ١ ٢٩	+ ١ ٤٨	+ ١ ٣٢	+ ١ ٢٢	+ ١ ٢٧	+ ١ ٤٢			
f	- ١ ٢٩	+ ١ ٤٤	- ١ ٣٨	- ١ ٣١	- ١ ٣٩	- ١ ٢٦	٠			
H	١٢٠٦ ١٥	١٢٠٦ ١٦								
e										
Ho	١٢٠٦ ١٦		١٢١٢ ١٧	١٢٠٢ ٢١	١٢٠٣ ٤٩	١٢٣٤ ٢٢	١٢٣٩ ٢٥			
Cos Vo	٩١ ٣٤		٤٨ ٢٢	١٠٦ ٧١	٤٣ ٤٢	٣٨ ٨٣	٧٦ ٤٦			
dD_1										
dD_2										
So										

Line No. B (OPEN)

Distance & Height Computation

	B2 → B2-1	B3 → B3-1	B4 → B4-1	B4 → B4-2	B9 → B9-1	B10 → B10-1	B10 → MM 0+240	B11 → B11-1	B11 → B11-2	B12 → MM 1+070
V_1										
V_2										
V_o	+ 1 37 30	+ 0 19 24	+ 1 17 32	+ 1 3 31	+ 3 20 52	− 5 24 48	− 2 36 53	+ 3 3 54	− 0 20 30	+ 2 27 20
S	61 450	83 835	71 016	72 451	62 473	63 266	18 074	49 796	54 486	64 188
Sin S^x V_o	+ 1 74	+ 0 47	+ 1 60	+ 1 33	+ 3 65	− 5 97	− 0 81	+ 2 66	− 0 32	+ 2 75
h_1	1253 83	1266 28	1276 76	1276 76	1251 71	1253 70	1253 70	1266 05	1266 05	1260 67
h_2										
h_o										
K										
i	+ 1 27	+ 1 15	+ 1 23	+ 1 23	+ 1 27	+ 1 23	+ 1 23	+ 1 27	+ 1 27	+ 1 25
f	− 1 21	0	0	− 1 27	− 1 27	− 1 37	0	− 1 24	0	− 1 45
H										
e										
Ho	1254 83	1265 90	1270 92	1270 05	1254 96	1247 59	1254 12	1248 74	1247 00	1249 22
Cos S^x V_o	61 63	83 83	71 00	72 14	62 37	62 96	18 06	49 72	54 48	64 12
dD_1										
dD_2										
So										

Line No. B (OPEN)

Distance & Height Computation

	B13 → B13-1			B13 → B13-2			→			BS → BS-10			BS-10 → BS			BS-10 → BS-11			BS-11 → BS-10			BS-11 → BS			BS → BS-11			BS-10 → BS-12		
V_1										+21	20	54	-21	21	10	+5	10	28	-5	25	12	-20	56	27	+20	54	39			
V_2																														
V_0	+4	19	28	-3	15	44																						+10	7	33
S	111	450		80	768					414	677		414	682		51	896					436	152		436	082		54	931	
Sin Vo	+	8	40	−	4	60				+150	96		150	99		+	4	68		4	90	−154	88		154	64		+	9	66
h_1	1228	55		1228	55					1273	46					1424	48					1429	44		1429	44		1424	48	
h_2																														
h_0																														
K										+	1		−	1			0			0		+	1		−	1				
i	+	1	22	+	1	22				+	1	30	−	1	26	+	1	26	-	1	18	-1	1	18	−	1	30	+	1	26
f	−	1	33	−	1	14				−	1	26	+	1	30	−	1	00	+	1	26	−	1	30	+	1	00	−	1	15
H										1424	47		1424	48		1429	42		1429	46		1273	45		1273	49				
e																						+	1							
Ho	1236	84		1224	03					1424	48					1429	44					1273	46					1424	25	
Cos Vo	111	13		80	64					386	22		386	22		54	68		54	66		407	34		407	36		54	08	
dD_1																														
dD_2																														
So																														

Line No. B5 (OPEN)

Distance & Height Computation

	BS → BS-1			→ BS-2			→ BS-3			→ BS-4			→ BS-5			→ BS-6			→ BS-7			→ BS-8			→ BS-9			BS-11 → BS-13		
V_1																														
V_2																														
V_0	+15	14	3	+16	7	24	+12	47	28	+18	4	44	+18	6	40	+17	29	30	+20	56	58	+20	31	4	+20	12	36	+12	8	4
S	188	147		184	894		187	183		290	408		296	118		285	205		392	124		376	682		403	702		75	980	
$\sin^{S_x}V_0$	+ 49	44		+ 51	35		+ 41	44		+ 50	12		+ 82	07		+ 88	88		+140	20		+132	03		+139	46		+ 15	97	
h_1	1273	46		1273	46		1273	46		1273	46		1273	46		1273	46		1273	46		1273	46		1273	46		1429	44	
h_2																														
h_0																														
K																														
i	+	1	30	+	1	30	+	1	30	+	1	30	+	1	30	+	1	30	+	1	30	+	1	30	+	1	30	+	1	18
f		0		−	1	28		0			0			0			0			0			0		−	1	08	−	1	27
H																														
e																														
Ho	1324	20		1324	83		1316	20		1364	88		1366	83		1363	84		1414	96		1406	79		1403	14		1445	32	
$\cos^{S_x}V_0$	181	54		177	62		182	54		276	07		281	44		282	03		966	20		952	79		978	84		74	281	
dD_1																														
dD_2																														
So																														

Line No. NOP. IP12

Distance & Height Computation

	NOP → NO12	→	NO2 → IP12	→	NOP → NO10	→	→	→	→	→
V_1			− 7 27 18							
V_2			+ 7 26 30							
V_0	+ 0 48 60		− 7 26 54		+ 0 23 18					
S	1863 536		617 770		1280 278					
Sin Vo	+ 26 82		− 80 08		+ 8 68					
h_1	1460 71		1228 23		1460 71					
h_2	1477 42		1168 15		1465 09					
h_0	1464 06		1188 19		1455 05					
K										
i										
f										
H										
e										
Ho										
Cos Vo	1863 362		612 557		1280 268					
dD_1	− 628		− 114		− 282					
dD_2	+ 265		+ 87		+ 182					
So	1863 179		612 530		1280 108					

FIELD SHEETS OF LEVELING

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM BM 90 TO BM 85 (No10) (II)

Date: 19 9 84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Kuwahata	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
BM No10 85					
	1.682	0.938	0.744		
	2.707	0.281	2.426		
	1.146	2.392		1.246	
	0.041	2.685		2.644	
	1.273	3.524			
	0.888	2.527		1.254	
	0.213	4.946		4.733	
	0.498	4.555		4.057	
	0.046	4.601		4.555	
	0.114	4.614		4.500	
	0.205	4.501		4.296	
	0.089	3.788		3.699	
	0.244	4.672		4.428	
	0.234	4.185		3.951	
	0.370	1.941		1.571	
	0.167	4.695		4.528	
BM 90	1.836	1.125	0.711		
TOTAL	10.865	52.416	3.881	45.432	
CHECK		41.551	41.551		

FROM BM 90 TO BM 85 (No10) = − 41.551 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM 1360 TO BM90 (II)

Date: 19. 9. 84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Fukuhara	Checked:	

POINT	SCALE		DIFFERENCE		REMARKS
	BACK-SIGHT	FORE-SIGHT	+	−	
	m	m	m	m	
0.410					
	0.482	4.911		4.829	
	0.127	4.537		4.410	
	0.462	0.7			
		4.277		4.277	
	1.925	3.660		1.735	
	0.416	4.794		4.378	
	0.211	4.251		4.040	
1360	0.419	2.442		2.023	
TOTAL	4.132	28.272	0	24.140	
CHECK		24.140	24.140		

FROM 1360 TO BM90 ( ) = − 24.140 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM 1+50 TO 1+100 (# I)

Date: 19. 9. 84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Furukata	Checked:	

POINT	SCALE		DIFFERENCE		REMARKS
	BACK-SIGHT	FORE-SIGHT	+	−	
	m	m	m	m	
1+50					
	0.085	4.702		4.617	
	0.328	4.795		4.467	
	0.390	4.776		4.386	
	0.442	2.128		3.686	...BM.
	0.280	4.622		4.342	
	0.405	4.005		4.600	
	0.022	4.746		4.724	
01+100	0.441	1.965		1.524	
TOTAL	2.268	31.739	0	29.471	
CHECK		29.471	29.471		

FROM 1+50 TO 1+100 (I) = − 29.471 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM 1+60 TO 1+100 (Ⅱ)

Date: 19 9 84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Kuwahata	Checked:	

POINT	SCALE		DIFFERENCE		REMARKS
	BACK-SIGHT	FORE-SIGHT	+	−	
	m	m	m	m	
1+100					
	3.935	0.418	3.617		
	4.541	0.161	4.380		
	4.464	0.094	4.370		
	3.123	0.615	2.508		
	4.655	0.145	4.510		
	4.623	0.211	4.412		
	4.864	0.324			
		0.491	4.373		
	1.814	3.313			
1+60		0.732	1.082		
TOTAL	32.021	6.570	29.460	0	
CHECK		29.460	29.460		

FROM 1+60 TO 1+100 (Ⅱ) = + 29.460 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM 1350 / BM90 TO BM90 / N010 BM85 (L)

Date: 19 . 9 84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Kuwahata	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
1350					
	4.762	0.399	4.363		
	2.078	0.373	1.705		
	4.793	0.116	4.677		
	3.385	2.002	1.383		
	4.297	0.437	3.860		
	4.838	0.068	4.770		
BM90	3.883	0.605	3.278		+ 26.186
	4.272	0.275	3.997		
	2.645	0.075	2.570		
	4.849	0.107	4.742		
	4.434				
	4.687	0.462	4.225		
	4.077	0.095	3.982		
	4.625	0.169	4.456		
	3.919	0.097	3.822		
	4.237	0.094	4.143		
	3.675	0.353	3.322		
	4.122	0.203	3.919		
	2.747	0.937	1.810		
	2.883	0.192	2.691		
	2.446	1.761	0.685		
	0.525	2.498		1.973	
N010 BM85	1.007	1.855		0.848	+ 41.553
TOTAL	78.752	13.063	68.500	2.811	
CHECK		65.689	65.689		

FROM 1350 (I) TO BM90 ( ) = + 65.689 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE (   )   FROM BM90 TO No12   (I)

Date: 20 9 84	Weather: Fine	File page No.
Instrument: NIKON	Rods:	
Observer: Y.Kuwahata	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
BM90					
	4.637	0.532	4.105		
	4.696	0.072	4.624		
	3.192	2.951	0.241		
	0.447	3.3			
		3.595		3.148	
	0.026	4.492		4.466	
	0.182	3.782		3.600	
No12	0.827	4.379		3.552	
TOTAL	14.007	19.803	8.970	14.766	
CHECK		5.796	5.796		

FROM BM90 TO No12 (   ) = ∓ 5.796 (   ) :S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM BM90 TO No12 (II)

Date: 20 - 9 - 84	Weather: Fine	File page No.
Instrument: NIKON	Rods:	
Observer: Y. Kumahata	Checked:	

POINT	SCALE		DIFFERENCE		REMARKS
	BACK-SIGHT	FORE-SIGHT	+	−	
	m	m	m	m	
No12					
	4.696	0.266	4.430		
	4.498	0.272	4.226		
	4.865	0.458	4.407		
	4.468	0.467	4.001		
	2.920	4.249		0.429	
	2.141	4.687		4.546	
BM90	0.244	4.424		4.180	
TOTAL	19.490	14.620	14.025	9.225	
CHECK		4.870	4.800		

FROM BM 90 TO No12 ( ) = +4.800 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE (　　　) FROM 1+100 TO NO 13 (I)

Date: 20.9.84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Kuwahata	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
1+100					
	4.341	1.552	2.789		
	0.377	4.815		4.438	
	0.347	4.632		4.285	
	0.149	4.794		4.645	
	0.263	4.970		4.707	
	0.402	4.747		4.345	
	0.421	4.587		4.166	
	0.200	4.817		4.617	
NO 13	0.590	3.500		2.910	
TOTAL	7.090	38.434	2.789	34.133	
CHECK		31.344	31.344		

FROM 1+100 TO NO 13 (　　) = −31.344 (　　) :S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM 1+100 TO No 13 (2)

Date: 20 Y. 8X	Weather: Fine	File page No.
Instrument: NIKON	Rods:	
Observer: Y Fumakata	Checked:	

POINT	SCALE		DIFFERENCE		REMARKS
	BACK-SIGHT	FORE-SIGHT	+	−	
	m	m	m	m	
No 13	.	.	.	.	
	4.961	0.177	4.784	.	
	4.768	0.182	4.586	.	
	4.902	0.061	4.841	.	
	4.945	0.225	4.720	.	
	4.770	0.424	4.346	.	
	4.092	0.199	3.893	.	
	4.420	0.307	4.113	.	
	4.647	0.427	4.220	.	
	2.488	.	.	.	
1+100	1.324	4.284	.	2.960	
TOTAL	37.402	6.065	34.244	2.960	
CHECK			37.204	37.204	

FROM 1+100 TO NOW ( ) = +31.244 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM BP TO ~~No~~ BM80 ( )

Date: 24 9 84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Kuwakata	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
BP					
	4.684	1.252	3.432		
No.18	3.031	1.255	1.776		+5.208
	4.497	0.136	4.361		
	4.813	0.067	4.746		
	4.794	0.105	4.689		
	4.87				
	3.885	0.370	3.515		
	4.685	0.345	4.340		
	4.588	0.176	4.412		
	4.044	0.074	3.970		
	4.467	0.264	4.203		
No.17 (BM81)	1.530	1.042	0.488		
BM80	1.914	0.650	1.264		+36.188
TOTAL	46.932	5.736	41.196	0	
CHECK		41.196	41.196		

FROM BP TO BM80 ( ) = +41.196 ( ) :S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM BM80 TO BP ( )

Date: 24. 7 84	Weather: Fine	File page No.
Instrument: NIKON	Rods:	
Observer: Y. Kuwahata	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
BM80					
No.7(BM81)	1.565	2.828		1.263	
	0.657	4.705		4.048	
	0.341	4.630		4.289	
	0.053	4.733		4.680	
	0.237	4.355		4.118	
	0.047	4.888		4.841	
	0.040	4.575		4.535	
	0.083	4.757		4.674	
No.8	0.144	3.902		3.758	−36.206
	0.663	2.837		2.174	
BP	0.830	3.865		3.035	−5.209
TOTAL	4.660	46.075	0	41.415	
CHECK		41.415	41.415		

FROM BM80 TO BP ( ) = − 41.415 ( ) : S.P.

FIELD SHEETS OF LEVELING

ROUTE ( ) FROM BM82 TO BM83 ( )

Date: 25 9 84	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Kuwahata	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
BM82					
	0.980	1.542		0.562	
	1.101	2.407		1.306	
	0.058	3.580		3.522	
	0.132	4.618		4.486	
	0.012	4.530		4.518	
	0.083	4.925		4.842	
	0.331	0.081	0.250		
	3.742	0.808	2.934		
	0.627	3.367		2.740	
BM83	0.260	3.051		2.791	
TOTAL	7.326	28.909	3.184	24.767	
CHECK		21.583	21.583		

FROM BM82 TO BM83 ( ) = − 21.583 ( ) :S.P.

FIELD SHEETS OF LEVELING

ROUTE (   )   FROM BM83   TO NOP   (   )

Date: 25 9 86	Weather: Fine	File page No.
Instrument: Nikon	Rods:	
Observer: Y. Kuwakato	Checked:	

POINT	SCALE BACK-SIGHT (m)	SCALE FORE-SIGHT (m)	DIFFERENCE + (m)	DIFFERENCE − (m)	REMARKS
BM83					
	0.478	1.238		0.660	
	1.817	0.299	1.518		+ 6.779 ~~8.079~~
NOP	4.011	0.100	3.921		
	0.100	4.011		3.921	
	2.048	3.765		1.716	
BM83	1.655	0.483	8.052		− 6.785
TOTAL	10.206	10.206	8.491	8.497	
CHECK		0.006	0.006		

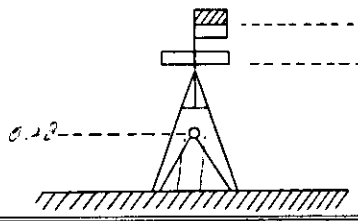
FROM BM83   TO NOP   (   ) = ± 6.779 / 6.786   (   ) : S.P.

HORIZONTAL AND VERTICAL ANGLE OBSERVATIONS

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

P.8

Instrument Ht meters Signal Ht.



Station: [illegible]	Observer: [illegible]
Date: [illegible]	Booker:
Ins. No. WILD T2 [illegible]	Checked:
Weather: [illegible]	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
SKP 17	[illegible]	C	1	[illegible]	[illegible]			[illegible]			
No 6			2		[illegible]			[illegible]			[illegible]
	[illegible]		2		[illegible]			[illegible]			
			1		[illegible]			[illegible]			
	[illegible]	[illegible]	1		[illegible]			[illegible]			
			2		[illegible]			[illegible]			[illegible]
	[illegible]		2		[illegible]			[illegible]			
			1	[illegible]	[illegible]			[illegible]			
SKP 17								[illegible]			
No 6								[illegible]			

Station	Face	Target	V. Reading			Reduced. Read'g			Remarks
SKP 17	[illegible]	[illegible]	[illegible]			r − ℓ = 2Z =	[illegible]		
	[illegible]		[illegible]			90 ± α = Z =	[illegible]		
			[illegible]			(SKP 17) α =	[illegible]		
No 6	[illegible]	[illegible]	[illegible]			r − ℓ = 2Z =	[illegible]		
	[illegible]		[illegible]			90 ± α = Z =	[illegible]		
			[illegible]			No 6 α =	[illegible]		
						r − ℓ = 2Z =			
						90 ± α = Z =			
						α =			

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HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.	Station: No 6	Observer: Y. Kuwahata.
1.50	Date: 10-7-84	Booker:
	Ins. No. WILD T2 No 264834	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	'	"	Reduced. Read'g °	'	"	Remarks
116 TIP	r	0	1	11.16	0	1	8	0	0	0	52+6
No7			2		182	6	37	182	5	29	58+8
	l		2		2	6	45	182	5	25	
			1		180	1	12	0	0	0	
	l	90	1		270	11	50	0	0	0	
			2		92	17	10	182	5	20	45+5
	r		2		272	17	7	182	5	25	
			1	22	90	11	42	0	0	0	
116 TIP											
No7								0	0	0	
								182	5	24	

Station	Face	Target	V. Reading °	'	"		Reduced. Read'g °	'	"	Remarks
116 TIP	r	甲	82	32	45	r − l = 2Z =	164	51	44	
	l		277	04	1	90 ± α = Z =	82	25	52	
			360	00	46	(116 TIP) α =	+7	34	8	
No7	l	甲	270	2	50	r − l = 2Z =	179	15	58	
	r		89	37	47	90 ± α = Z =	89	37	59	
			360	00	46	(No7) α =	+0	22	1	
						r − l = 2Z =				
						90 ± α = Z =				
						α =				

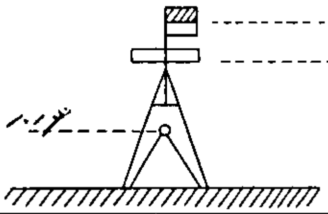
HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.	Station: No 8	Observer: Y Kuwahara
1.52	Date: 11 - 7 - 84	Booker:
	Ins. No. T2 No 266836	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
No 7	r	0	1	10 26	0	1	15	0	0	0	
No 8			2		248	5	41	248	4	26	153 - 1
	l		2		68	5	43	248	4	27	
			1		180	1	16	0	0	0	
	l	90	1		270	12	2	0	0	0	
			2		158	16	30	248	4	28	151 - 5
	r		2		338	16	24	248	4	23	
			1	36	90	12	1	0	0	0	
No 7								0	0	0	
No 8								248	4	27	

Station	Face	Target	V. Reading				Reduced. Read'g			Remarks
No 7	r	17	89	26	41	r − l = 2Z =	178	53	39	
	l		270	33	2	90 ± α = Z =	89	26	50	
			359	59	43	(No 7) α =	+ 0	33	10	
No 8	l	17	270	4	34	r − l = 2Z =	179	50	42	
	r		89	55	16	90 ± α = Z =	89	55	21	
			359	59	50	α =	+ 0	4	39	
						r − l = 2Z =				
						90 ± α = Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS



Station: No 9	Observer: Y. KUWAHARA	
Date: 11-7-84	Booker:	
Ins. No. WILD T2 254834	Checked:	
Weather: Fine		

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No. 8	r	0	1	11.30	0	1	33	0	0	0	
No. 10	l		2		242	35	48	242	34	15	29+1
			2		62	35	30	242	34	14	
			1		180	1	16	0	0	0	
		90	1		270	14	40	0	0	0	
			2		152	48	56	242	34	16	27-5
			2		332	48	49	242	34	11	
			1	11.38	90	14	38	0	0	0	
No 8								0	0	0	
No 10								242	34	14	

Station	Face	Target	V. Reading °	′	″	Reduced. Read'g	°	′	″	Remarks
~~No 8~~	~~r~~	~~中~~	~~90~~	~~6~~	~~6~~	r − ℓ = 2Z =				
	~~l~~		~~269~~	~~54~~	~~9~~	90 ± α = Z = [illegible]				
			~~360~~	~~0~~	~~15~~	( ) α =				
No 10	l	中	272	2	45	r − ℓ = 2Z =	175	54	24	
	r		87	57	9	90 ± α = Z =	87	57	12	
			359	59	54	No 10 α =	+2	2	48	
No 8	r	中	90	5	47	r − ℓ = 2Z =	180	11	40	
	l		269	54	7	90 ± α = Z =	90	5	50	
			359	59	54	No 8 α =	−0	5	50	

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

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Instrument Ht meters Signal Ht.		
1.18	Station: No 7	Observer: Y. Kuwahata.
	Date: 11 - 7 - 84	Booker:
	Ins. No. WILD T2 No 244814	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No 8	r	0	1	10:50	0	5	20	0	0	0	
No.0 (BM83)			2		107	6	42	107	1	22	41+3
	l		2		287	6	45	107	1	18	
			1		180	5	26	0	0	0	
	l	90	1		270	15	48	0	0	0	
			2		17	17	18	107	1	20	31-8
	r		2		197	17	12	107	1	11	
			1	07	90	16	1	0	0	0	
No 8								0	0	0	
No.0 (BM83)								107	1	18	

Station	Face	Target	V. Reading °	′	″		Reduced. Read'g °	′	″	Remarks
No 8	r	T	90	0	46	r − l = 2Z =	180	11	45	
	l		269	48	1	90 ± α − Z =	90	5	52	
			359	48	47	(No 8) α =	−0	5	52	常数検校.
No.0 (BM83)	l	T	267	47	3	r − l = 2Z =	184	21	21	
	r		92	10	44	90 ± α − Z =	92	10	40	
			359	58	47	No.0 α =	−2	10	40	
						r − l = 2Z =				
						90 ± α − Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

88

Instrument Ht meters Signal Ht.	Station: No 11	Observer: Y Kuwahara
1.33	Date: 12 - 7 - 86	Booker:
	Ins. No. Wild T2 No 248834	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No 10	r	0	1	11.54	0	5	34	0	0	0	
SKP 17			2		47	5	43	47	0	8	14 + 4
	l		2		227	5	42	47	0	5	
			1		180	5	37	0	0	0	
	l	90	1		270	16	18	0	0	0	
			2		317	16	23	47	0	5	10 20
	r		2		147	16	26	47	0	5	
			1	11.58	90	16	20	0	0	0	
No 10								0	0	0	
SKP 17								47	0	6	

Station	Face	Target	V. Reading °	′	″		Reduced. Read'g °	′	″	Remarks
No 10	r	[illegible]	89	[illegible]	[illegible]	r − l = 2Z =	179	58	[illegible]	
	l		270	0	40	90 ± α = Z =	89	[illegible]	[illegible]	
			[illegible]	[illegible]	[illegible]	Wo 10 α =	+ 0	0	5	
SKP 17	l	[illegible]	271	17	52	r − l = 2Z =	177	24	36	
	r		88	42	8	90 ± α = Z =	88	42	18	
			[illegible]	[illegible]	40	SKP 17 α =	+ 1	17	42	
						r − l = 2Z =				
						90 ± α = Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

PF

Instrument Ht meters Signal Ht.

0.31

Station: HB SKP 17	Observer: Y. KUWABARA
Date: 12-7-84	Booker:
Ins. No. WILD T2 No 26K834	Checked:
Weather: Fine	

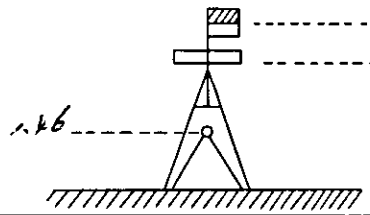
Station	Face	Circle	No	Time	H, Reading °	'	"	Reduced. Read'g °	'	"	Remarks
No 11	r	0	1	1210	0	1	10	0	0	0	/
116T 19			2		68	33	7	68	31	57	/ 103 + 11
	l		2		268	33	45	68	31	46	/
			1		180	1	29	0	0	0	/ 較差大の為
	l	90	1		270	12	46	0	0	0	//
			2		338	44	50	68	32	4	// 11 − 3 //
	r		2		158	44	41	68	32	7	//
			1		90	12	34	0	0	0	//
	r	0	1		0	2	30	0	0	0	//
			2		68	34	43	68	32	13	// 14 − 12 //
	l		2		248	34	44	68	32	1	//
			1	19	180	2	43	0	0	0	//
No 11								0	0	0	//
116T 19								68	32	6	//

Station	Face	Target	V. Reading °	'	"		Reduced. Read'g °	'	"	Remarks
No 11	l	中	268	41	43	r − l = 2Z =	182	36	24	//
	r		91	18	7	90 ± α − Z =	91	18	12	//
			359	59	50	(No 11) α =	− 1	18	12	//
No 11	r	中	91	18	1	r − l = 2Z =	182	36	16	
	l		268	41	45	90 ± α − Z =	91	18	13	常数失格.
			359	59	46	α =	1	18	13	
						r − l = 2Z =				
						90 ± α − Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

100

Instrument Ht meters Signal Ht.



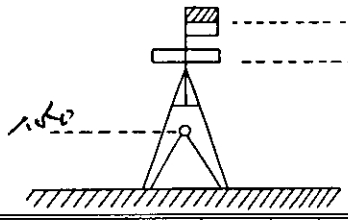
Station: No 10	Observer: Y KUWAHATA
Date: 12 - 7 - 86	Booker:
Ins. No. WILD T2 No 266284	Checked:
Weather: Fine	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
No 9	I	O	1	9 10	0	0	0	0	0	0	//
No 11			2		186	47	25	186	46	16	// 17 + 5 //
	II		2		6	47	23	186	46	11	//
			1		180	1	16	0	0	0	//
	I	P1	1		179	12	1	0	0	0	//
			2		86	48	12	186	46	11	// 18 - 4 //
	II		2		176	48	4	186	46	7	//
			1	9 17	90	11	55	0	0	0	//
No 9								0	0	0	//
No 11								186	46	11	//

Station	Face	Target	V. Reading			Reduced. Read'g			Remarks
No 9	II	FP	93	3	00	r - ℓ - 2Z =	182	7	48 //
	I		96	44	50	90 ± α - Z =	93	3	48 //
			89	47	38	(No 9) α =	- 2	3	48 //
No 11	I	FP	269	58	-	r - ℓ - 2Z =	180	3	48 //
	II		90	1	41	90 ± α - Z =	90	1	48 //
			359	59	49	(No 11) α =	- 0	1	48 //
						r - ℓ - 2Z =			
						90 ± α - Z =			
						α =			

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

101



Station: No 7 | Observer: Y. FUKUHARA

Date: 10-7-84 | Booker:

Ins. No. WILD T2 264836 | Checked:

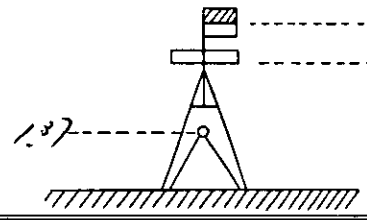
Weather:

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
No 6	R	O	1	6:44	0°	11'	17"	0°	0'	0"	
No 8			2		82°	57'	40"	82°	40'	23"	41+3
	L		2		262°	4'	41"	82°	40'	20"	
			1		180°	11'	29"	0°	0'	0"	
	R	90	1		270°	1'	44"	0°	0'	0"	
			2		352°	41'	58"	82°	40'	16"	32+4
	L		2		172°	41'	43"	82°	40'	18"	
			1	7:12	90°	1'	34"	0°	0'	0"	
No 6								0°	0'	0"	
No 8								82°	40'	19"	

Station	Face	Target	V. Reading			Reduced. Read'g			Remarks
No 6	R	FP	90°	22'	44"	r-l-2Z=	180°	46'	8"
	L		269°	36'	47"	90±α-Z=	90°	23'	4"
			359°	59'	42"	(No 6) α=	-0	23'	4"
No 8	L	FP	269°	24'	50"	r-l-2Z=	179°	8'	8"
	R		90°	23'	48"	90±α-Z=	90°	24'	4"
			359°	47'	38"	(No 8 α=	-0	24'	4"
						r-l-2Z=			
						90±α-Z=			
						α=			

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

102



Station: No 11	Observer: Y. Kawahata
Date: 4 9 84	Booker:
Ins. No. Wild T2 26848	Checked:
Weather: Fine	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
No 10	R	0	1	12.25	0	1	18	0	0	0	
No 14			2		122	28	18	122	26	60	112 + 8
	L		2		302	28	4	122	26	42	
			1		180	1	14	0	0	0	
	L	90	1		270	12	10	0	0	0	
			2		92	32	10	122	26	60	115 - 5
	R		2		212	32	18	122	26	54	
			1		90	12	18	0	0	0	
	R	90	1		90	12	20	0	0	0	
			2		212	32	14	122	26	54	108 ± 0
	L		2		92	32	4	122	26	42	
			1	12.40	270	12	10	0	0	0	

Station	Face	Target	V. Reading			Reduced. Read'g				Remarks
No 14	L	甲	262	42	10	r - l = 2Z =				
	R		97	16	50	90 ± α = Z =				
			352	58	0	( ) α =	観測大.			
No 14	R	甲	97	16	40	r - l = 2Z =				
	L		262	43	12	90 ± α = Z =				
			352	59	52	No 14 α =	- 7	16	46	
No 14	L	甲	262	43	16	r - l = 2Z =				
	R		97	16	42	90 ± α = Z =	常数変換.			
			352	59	58	α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

103

Instrument Ht meters Signal Ht.		
1.44	Station: No 14	Observer: Y. Kuwahata
	Date: 4. 9 84	Booker:
	Ins. No. 264894	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No 11	r	0	1	8:40	0	1	12	0	0	0	
No 15			2		135	8	7	135	6	55	105+5
	l		2		315	8	2	135	6	50	
			1		180	1	12	0	0	0	
	l	90	1		270	12	2	0	0	0	
			2		45	18	54	135	6	52	94−10
	r		2		225	18	54	135	6	42	
			1		90	12	12	0	0	0	
	r	0	1		90	12	10	0	0	0	
			2		225	19	2	135	6	52	103+1
	l		2		45	18	54	135	6	41	
			1	9:20	270	12	3	0	0	0	
								0	0	0	
								135	6	52	

Station	Face	Target	V. Reading °	′	″		Reduced. Read'g °	′	″	Remarks
No 11	l	甲	277	15	21	r − ℓ = 2Z =				
	r		82	44	31	90 ± α = Z =				
			359	59	52	(No 11) α =	+7	15	28	
No 15	r	甲	86	1	43	r − ℓ = 2Z =				
	l		273	58	13	90 ± α = Z =				
			359	59	56	No 15 α =	+3	58	15	
						r − ℓ = 2Z =				
						90 ± α = Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.		
1.46	Station: No 16	Observer: Y. Furuhata
	Date: 5-9-84	Booker:
	Ins. No. 264384	Checked:
	Weather: fine	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
No2	r	0	1	11:20	0	1	13	0	0	0	
No15			2		265	32	38	265	31	25	43+7
	l		2		85	32	28	265	31	18	
			1		180	1	10	0	0	0	
	l	90	1		270	12	20	0	0	0	
			2		175	43	22	265	31	22	36-8
	r		2		355	43	50	265	31	14	
			1		90	12	36	0	0	0	
	r	90	1		90	12	30	0	0	0	
			2		355	43	58	265	31	28	51+5
	l		2		175	43	50	265	31	23	
			1	11:30	270	12	27	0	0	0	
								0	0	0	
								265	31	24	

(The second set of readings, circle 90 with the first face l, is struck through on the form.)

Station	Face	Target	V. Reading				Reduced. Read'g			Remarks
No2	l	中	272	12	34	r − l − 2Z =				
	r		87	47	16	90 ± α − Z =				
			359	59	50	(No2) α =	+2	12	39	
No15	r	中	86	42	27	r − l − 2Z =				
	l		273	17	19	90 ± α − Z =				
			359	59	46	No 15 α =	+3	17	26	
						r − l − 2Z =				
						90 ± α − Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.	Station: No 15	Observer: Y. Kawakatsu
1.48	Date: 5 . 9 - 84	Booker:
	Ins. No. 264834	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No17	r	0	1	1310	0	1	28	0	0	0	
No14			2		347	20	21	347	18	52	108 - 4
No16			3		225	41	34	225	40	5	7 + 3
	l		3		45	41	26	225	40	2	
			2		167	20	20	347	18	56	
			1		180	1	24	0	0	0	
	l	90	1		270	12	8	0	0	0	
			2		257	31	9	347	18	61	111 - 11
			3		135	52	13	225	40	5	7 - 3
	r		3		315	52	16	225	40	2	
			2		77	31	4	347	18	50	
			1	1317	90	12	14	0	0	0	
No17								0	0	0	
No14								347	18	55	(2° 41′ 5″)
No16								225	40	4	(134° 9′ 56″)

Station	Face	Target	V. Reading °	′	″	Reduced. Read'g	°	′	″	Remarks
No17	r	中	90	12	0	r − ℓ = 2Z =				
	l		269	47	51	90 ± α − Z =				
			359	59	51	No17 α =	− 0	12	4	
No 14	l	中	266	0	58	r − ℓ = 2Z =				
	r		93	58	58	90 ± α − Z =				
			359	59	56	No14 α =	− 3	59	0	
No16	r	中	93	18	38	r − ℓ = 2Z =				
	l		266	41	22	90 ± α − Z =				
			359	59	60	α =	− 3	18	38	

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

106

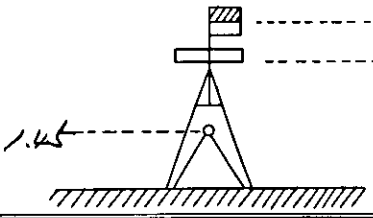
Instrument Ht meters Signal Ht.	Station: No17	Observer: Y Kuwahata
114	Date: 5 - 7 - 84	Booker:
	Ins. No. 266854	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
NO18	r	0	1	3:40	0	1	10	0	0	0	
NO15			2		228	14	48	228	13	[illegible]	72 r 6
	l		2		118	14	[illegible]	228	1[illegible]	[illegible]	
			1		180	1	4	0	0	0	
	l	90	1		270	11	58	0	0	0	
			2		208	24	[illegible]	228	13	[illegible]	70 t 0
	r		2		28	24	[illegible]	228	13	[illegible]	
			1	3:47	90	11	58	0	0	0	
								0	0	0	
								228	13	36	

Station	Face	Target	V. Reading			Reduced. Read'g				Remarks
NO18	r	〒	8[illegible]	46	8	r − l = 2Z =				
	l		266	10	43	90 ± α − Z =				
			[illegible]	[illegible]	[illegible]	NO18 α =	− 5	46	12	
NO15	l	〒	270	11	0	r − l = 2Z =				
	r		89	48	[illegible]	90 ± α − Z =				
			[illegible]	[illegible]	[illegible]	NO15 α =	+ 0	11	2	
						r − l = 2Z =				
						90 ± α − Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

107



Station: No 18	Observer: Y. Kuzunoto
Date: 6 : 9 - 84	Booker:
Ins. No. 266834	Checked:
Weather: Fine	

Station	Face	Circle	No	Time	H. Reading	Reduced. Read'g	Remarks
No 19	R	0		1034	0 0 00	0 0 00	
No 17					146 18 37	146 17 34	38 + 30
	L				326 18 20	146 17 54	
					180 1 16	0 0 00	
	L	0			180 1 21	0 0 00	
					326 18 26	146 17 34	33 + 17
	R				146 18 40	146 17 54	
					0 1 54	0 0 00	
	R	90			90 11 45	0 0 00	
					236 26 33	146 17 28	28 + 28
	L				116 26 2	146 17 0	
				1037	270 12 2	0 0 00	

Station	Face	Target	V. Reading	Reduced. Read'g	Remarks
No 19	L	中	268 22 11	r − l = 2Z =	
	R		91 37 50	90 ± α = Z =	
			357 59 61	No 19 α = − 1 27 56	
No 17	R	中	86 14 30	r − l = 2Z =	
	L		273 45 18	90 ± α = Z =	
			359 59 48	No 17 α = + 3 44 24	
No 19	L	中	268 22 2	r − l = 2Z =	
	R		91 37 01	90 ± α = Z =	
			359 59 03	No 19 α = − 1 27 54	

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

108

Instrument Ht meters Signal Ht.		
Instrument Ht: 1.53	Station: No19	Observer: Y. Kuwahata
	Date: 6.9.84	Booker:
	Ins. No. 264804	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No18	r	0	1	1:17	0	1	18	0	0	0	
No20			2		146	14	46	146	13	28	76 20
	l		2		326	14	48	146	13	28	
			1		180	1	20	0	0	0	
	l	90	1		270	11	46	0	0	0	
			2		56	25	21	146	13	35	68 - 2
	r		2		236	25	27	146	13	33	
			1	1:24	90	11	54	0	0	0	
								0	0	0	
								146	13	36	(213 46 24)

Station	Face	Target	V. Reading °	′	″		Reduced. Read'g °	′	″	Remarks
No18	r	甲	88	33	20	r − l = 2Z =				
	l		271	26	27	90 ± α = Z =				
			359	59	47	No18 α =	+ 1	26	32	
~~No20~~	~~l~~	~~甲~~	~~268~~	~~39~~	~~35~~	r − l = 2Z =				
	~~r~~		~~91~~	~~20~~	~~28~~	90 ± α = Z =				
			~~359~~	~~59~~	~~63~~	No20 α =				
No20	r	甲	91	20	22	r − l = 2Z =				
	l		268	39	31	90 ± α = Z =				
			359	59	53	No20 α =	− 1	20	26	

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

109

Instrument Ht meters Signal Ht.		
	Station: No 20	Observer: Y. Kuwahata
	Date: 6 - 9 - 84	Booker:
	Ins. No. 264836	Checked:
	Weather: Fine	

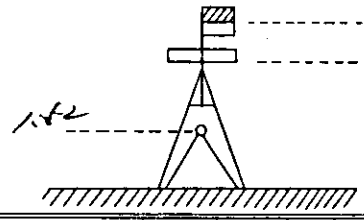
Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No 3	r	0	1	3:00	0	1	8	0	0	0	
No 19 (26 corrected)			2		73	52	45	73	51	37	77 - 3
	l	180	2		253	52	37	73	51	40	
			1		180	0	57	0	0	0	
	l	90	1		~~270~~	~~11~~	~~17~~	~~0~~	~~0~~	~~0~~	
			2		~~344~~	~~2~~	~~44~~	~~73~~	~~51~~	~~27~~	50 - 4
	r		2		~~164~~	~~2~~	~~44~~	~~73~~	~~51~~	~~29~~	
			1		~~90~~	~~11~~	~~31~~	~~0~~	~~0~~	~~0~~	
	r	90	1		90	11	27	0	0	0	
			2		164	3	7	74	51	40	76 + 4
	l		2		344	2	58	74	51	36	
			1	3:07	270	11	22	0	0	0	
								0	0	0	
								74	51	38	

Station	Face	Target	V. Reading °	′	″	Reduced. Read'g	°	′	″	Remarks
No 3	l	甲	270	40	7	r − l = 2Z =				
	r		89	19	52	90 ± α = Z =				
			359	59	59	(No 3) α =	± 0	40	8	
No 19 (26 corrected)	r	甲	88	40	31	r − l = 2Z =				
	l		271	19	36	90 ± α = Z =				
			359	59	66	No 19 α =	+ 1	19	39	
						r − l = 2Z =				
						90 ± α = Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

110

Instrument Ht meters Signal Ht.



Station: No 3	Observer: Y. Kawahata
Date: 6-9-84	Booker:
Ins. No. 26408.46	Checked:
Weather: Fine	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
No 3	R	0	1	15:40	0	1	8	0	0	0	
No 20			2		19	17	10	19	16	2	5-1
	L		2		199	17	5	19	16	3	
			1		180	1	2	0	0	0	
	L	90	1		270	12	12	0	0	0	
			2		289	28	14	19	16	3	2-2
	R		2		109	28	20	19	16	1	
			1	15:46	90	12	19	0	0	0	
								0	0	0	
								19	16	2	

Station	Face	Target	V. Reading			Reduced. Read'g				Remarks
No 20	R	甲	90	41	9	r-l-2Z=				
	L		269	18	47	90±α-Z=				
			359	59	56	360±α=	-0	41	49	
No 20	L	甲	269	18	47	r-l-2Z=				
	R		90	41	10	90±α-Z=				
			359	59	57	α=	-0	41	12	
						r-l-2Z=				
						90±α-Z=				
						α=				

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HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.		
1.40	Station: No2	Observer: Y. Kuwahata
	Date: 8 - 9 - 84	Booker:
	Ins. No. Wild T2 264834	Checked:
	Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No3	r	0°	1	12:00	0	1	22	0	0	0	
No16			2		345	44	45	345	43	23	64 + 2
IP12			3		10	31	55	10	30	33	59 − 7
	l		3		190	31	41	10	30	26	
			2		165	44	46	345	43	31	
			1		180	1	15	0	0	0	
	l	90	1		270	12	41	0	0	0	
			2		255	56	15	345	43	34	64 − 4
			3		280	43	14	10	30	33	59 − 7
	r		3		100	43	18	10	30	36	
			2		75	56	22	345	43	40	
			1	12:18	90	12	42	0	0	0	
No3								0	0	0	
No16								345	43	32	
IP12								10	30	32	

Station	Face	Target	V. Reading °	′	″		Reduced. Read'g °	′	″	Remarks
No16	r	中	92	14	48	r − ℓ = 2Z =				
	l		267	44	50	90 ± α = Z =				
			359	59	38	(No16) α =	− 2	15	4	
IP12	l	中	262	32	48	r − ℓ = 2Z =				
	r		97	27	15	90 ± α = Z =				
			359	59	63	α =	+ 7	27	18	
						r − ℓ = 2Z =				
						90 ± α = Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.

1.26

Station: IP 12	Observer: Y. Kuwahata
Date: 8-9-84	Booker:
Ins. No. Wild T2 264834	Checked:
Weather: Fine	

Station	Face	Circle	No	Time	H, Reading			Reduced. Read'g			Remarks
					°	′	″	°	′	″	

Station	Face	Target	V. Reading				Reduced. Read'g			Remarks
			°	′	″		°	′	″	
No 2	r	𐊧	82	33	21	r − ℓ = 2Z =				
	ℓ		277	26	22	90 ± α = Z =				
			359	59	43	(No 2) α =	+7	26	30	
No 2	ℓ	𐊧	277	26	22	r − ℓ = 2Z =				
	r		82	33	24	90 ± α = Z =				
			359	59	46	α =				
						r − ℓ = 2Z =				
						90 ± α = Z =				
						α =				

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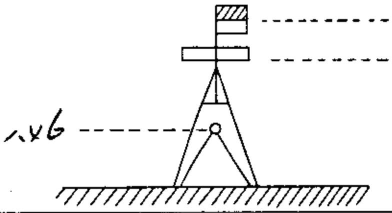
HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.	Station: No. 6	Observer: Y. Kuwahata
	Date: 8 [illegible] 84	Booker:
	Ins. No. Wild T2. 264884	Checked:
	Weather: Fine	

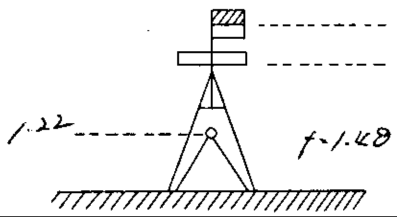


Station	Face	Circle	No	Time	H, Reading ° ′ ″	Reduced. Read'g ° ′ ″	Remarks

Station	Face	Target	V. Reading °	′	″		Reduced. Read'g °	′	″	Remarks
No 2	r	中	87	46	35	r − ℓ = 2Z =				
	ℓ		272	13	45	90 ± α = Z =				
			359	59	48	(No2) α =	+ 2	13	54	
~~No 2~~	~~ℓ~~	~~中~~	~~272~~	~~13~~	~~45~~	r − ℓ = 2Z =				
	~~r~~		~~87~~	~~46~~	~~2~~	90 ± α = Z =				
			~~359~~	~~59~~	~~47~~	α =				
						r − ℓ = 2Z =				
						90 ± α = Z =				
						α =				

HORIZONTAL & VERTICAL ANGLE OBSERVATIONS

Instrument Ht meters Signal Ht.



Station: NO4	Observer: Y.Kuwahata
Date: 25 8 84	Booker:
Ins. No. T2. Wild. 364834	Checked:
Weather: Fine	

Station	Face	Circle	No	Time	H, Reading °	′	″	Reduced. Read'g °	′	″	Remarks
No T0	r	0	1	11.35	0	1	13	0	0	0	
No12			2		96	23	53	96	22	40	83-37
	l		2		276	23	50	96	22	43	
			1		180	1	7	0	0	0	
	l	90	1		270	11	34	0	0	0	
			2		6	34	24	96	22	45	83-74
	r		2		186	34	24	96	22	38	
			1	11.37	90	11	46	0	0	0	
T0								0	0	0	
No12								96	22	42	

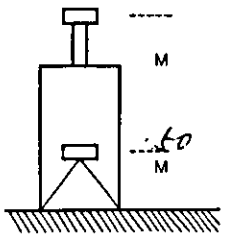
Station	Face	Target	V. Reading °	′	″		Reduced. Read'g °	′	″	Remarks
No12	r	甲	89	10	12	r − l = 2Z =	-178	20	40	
	l		270	49	52	90 ± α = Z =	89	10	20	
			359	59	44	(No12) α =	+0	49	40	
~~No12~~	~~l~~	~~甲~~	~~270~~	~~49~~	~~51~~	r − l = 2Z =				
	~~r~~		~~89~~	~~10~~	~~57~~	90 ± α = Z =				常数失検.
			~~359~~	~~59~~	~~36~~					
						r − l = 2Z =				
						90 ± α = Z =				
						α =				

DISTANCE MEASUREMENT

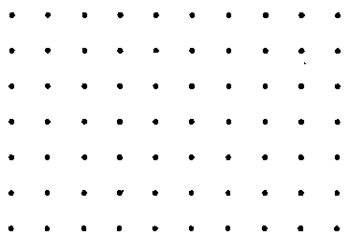
DISTANCE MEASUREMENT
DIRECT READING

Station : No. 6

Inst Height ----- M



Eccentricity Diagram



Date : 7 7 84

Weather : Fine

Visibility : good

Observer : Y. KUWAHARA

Booker :

Checked :

Stn. Page of

File Page

Inst. No

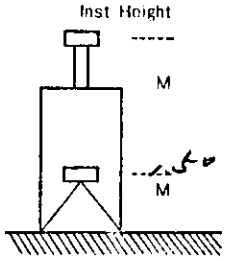
PACIFIC AERO SURVEY CO.,LTD.

Reflecter Stn.		NO 6 TP			
Reflecter No.					
Reflecter Height		M .	M .	M .	M .
Time					
Measuring	1	M 1021 . 942	M .	M .	M .
	2	1 . 942	.	.	.
	3	1021 . 948	.	.	.
	4	. 946	.	.	.
	5	.	.	.	.
Mean		1021 . 9434	.	.	.
Atmospheric Observ.		Temp.(℃) Press.(mb)	Temp.(℃) Press.(mb)	Temp.(℃) Press.(mb)	Temp.(℃) Press.(mb)
Inst.	1				
Refl.	1	31 923			
Inst.	2				
Refl.	2				
Sum					
Mean					
Correction Ecc. Corr.		M .	M .	M .	M .
Reflecter Constant		.	.	.	.
Instrument Constant		.	.	.	.
Atm. Corr.		(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.		.	.	.	.
Distance Observed Dist.		.	.	.	.
Slope Dist.		.	.	.	.

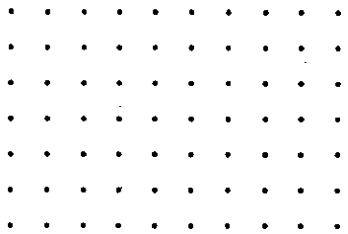
Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No. 6



Eccentricity Diagram



Inst. No

Date : 10-7-84
Weather : Fine
Visibility : Good.
Observer : Y. Kuwahara
Booker :
Checked :

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of

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PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.	No 1			
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 1986.701	M .	M .	M .
2	.704	.	.	.
3	1986.698	.	.	.
4	.698	.	.	.
5	.	.	.	.
Mean	1986.700	.	.	.

Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1								
Refl. 1	29	723						
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No 8

Inst Height
M
M
Inst. No

Eccentricity Diagram

Date : 10-7-84
Weather : Fine
Visibility : Good
Observer : Y. KUWAHATA
Booker :
Checked :

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of
File Page

PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.	No 7			
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 216P.201	M .	M .	M .
2	.200	.	.	.
3	216P.226	.	.	.
4	.222	.	.	.
5	.	.	.	.
Mean	216P.228	.	.	.

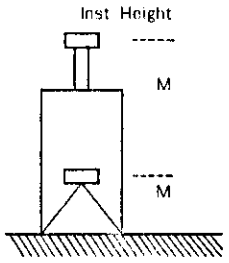
Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1								
Refl. 1	32	722.						
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

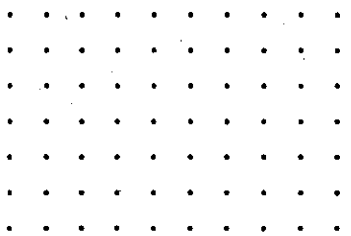
Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No 5 P



Eccentricity Diagram



Inst. No

Date : 11-7-84
Weather : Fine
Visibility : Good.
Observer : Y. Kuwahara
Booker :
Checked :

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of
File Page

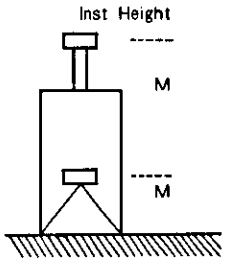
PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.		No 10		No.0 (BM83)			
Reflecter No.							
Reflecter Height		M .		M .		M .	M .
Time							
Measuring	1	M 2080.661		M 170.827		M .	M .
	2	.671		.835		.	.
	3	2080.658		170.827		.	.
	4	.680		.822		.	.
	5	.682		.		.	.
Mean		2080.674		170.825		.	.
Atmospheric Observ.		Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃) Press.(mb)	Temp.(℃) Press.(mb)
Inst.	1						
Refl.	1	29°c	704	29°c	704		
Inst.	2						
Refl.	2						
Sum							
Mean							
Correction		M		M		M	M
Ecc. Corr.		.		.		.	.
Reflecter Constant		.		.		.	.
Instrument Constant		.		.		.	.
Atm. Corr.		(PPM) .		(PPM) .		(PPM) .	(PPM) .
Sum Corr.		.		.		.	.
Distance							
Observed Dist.		.		.		.	.
Slope Dist.		.		.		.	.

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No 11



Eccentricity Diagram

Date : 12-7-84
Weather : Fine
Visibility : good
Observer : Y. KUWABARA
Booker :
Checked :

Stn. Page
of
File Page

PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.	No 10	Skp 17		
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 1888 · P18	M 1068 · 020	M .	M .
2	· P22	1068 · 026	.	.
3	1888 · P18	1068 · 017	.	.
4	· P04	· 023	.	.
5	.	.	.	.
Mean	1888 · P16	1068 · 022	.	.

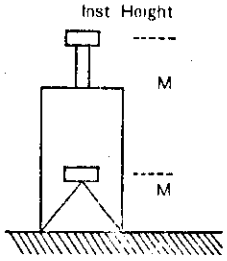
Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1								
Refl. 1	29°C	710	30°C	710				
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

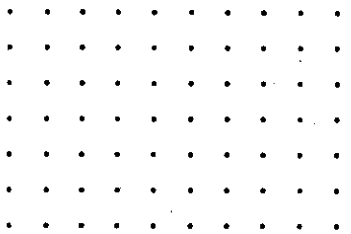
Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No 8



Eccentricity Diagram



Inst. No

Date : 13 - 7 - 84

Weather : Fine

Visibility : Good

Observer : Y.KUWABATA

Booker :

Checked :

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PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.	No. 1			
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 2362.178	M .	M .	M .
2	.178	.	.	.
3	2362 .178	.	.	.
4	.178	.	.	.
5	.	.	.	.
Mean	2362.178 //	.	.	.

Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1								
Refl. 1	28	725Hg						
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction Eco. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No11

Inst Height
M
M
Inst. No

Eccentricity Diagram

Date : 4-9-84
Weather : Fine
Visibility : good
Observer : Y. Furuhata
Booker :
Checked :

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of
File Page

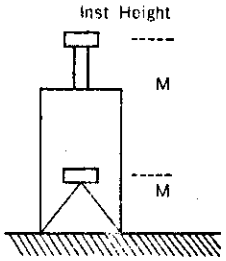
PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.		NO 16						
Reflecter No.								
Reflecter Height		M .		M .		M .		M .
Time		12 : 10		12 : 18				
Measuring	1	M 2371.946		M 2371.960		M .		M .
	2	.948		.956		.		.
	3	2371.928		.950		.		.
	4	.966		.		.		.
	5	.948		.		.		.
Mean		.		2371.9684		.		.
Atmospheric Observ.		Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst.	1	26.2℃	719						
Refl.	1								
Inst.	2								
Refl.	2								
Sum									
Mean									
Correction		M		M		M		M	
Eco. Corr.		.		.		.		.	
Reflecter Constant		.		.		.		.	
Instrument Constant		.		.		.		.	
Atm. Corr.		(PPM) .		(PPM) .		(PPM) .		(PPM) .	
Sum Corr.		.		.		.		.	
Distance									
Observed Dist.		.		.		.		.	
Slope Dist.		.		.		.		.	

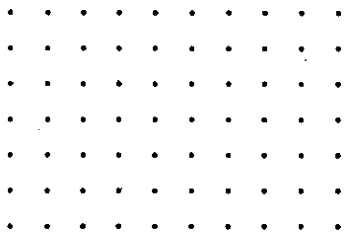
Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No 1K



Eccentricity Diagram



Inst. No

Date : 4-9-8K
Weather : Fine
Visibility : good
Observer : Y. Kuwahata
Booker :
Checked :

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of

File Page

PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.		No 1K					
Reflecter No.							
Reflector Height		M .		M .		M .		M .
Time							
Measuring	1	M 41P.142		M 41P.140		M .		M .
	2	.110		.099		.		.
	3	41P.124		41P.118		.		.
	4	.096		.111		.		.
	5	.088		.102		.		.
Mean		.		41P.116		.		.
Atmospheric Observ.		Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst.	1	28	718						
Refl.	1								
Inst.	2								
Refl.	2								
Sum									
Mean									
Correction		M		M		M		M	
Ecc. Corr.		.		.		.		.	
Reflecter Constant		.		.		.		.	
Instrument Constant		.		.		.		.	
Atm. Corr.		(PPM) .		(PPM) .		(PPM) .		(PPM) .	
Sum Corr.		.		.		.		.	
Distance									
Observed Dist.		.		.		.		.	
Slope Dist.		.		.		.		.	

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : x/c 15 (16)

Inst Height: ----- M / ----- M	Eccentricity Diagram	Date : 4-8-84
		Weather : Fine
		Visibility : Good
		Observer : Y. Kawahata
		Booker :
Inst. No		Checked :

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File Page

PACIFIC AERO SURVEY CO., LTD

Reflecter Stn.	NO 15			
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	1838.766 M	1838.774 M	M .	M .
2	.781	.781	.	.
3	1838.748	1838.805	.	.
4	.743	.781	.	.
5	.762	.768	.	.
Mean	.	1838.774	.	.

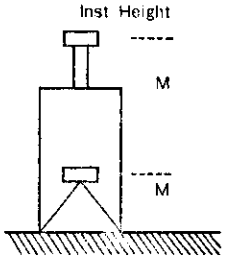
Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1	30°C	768.5						
Refl. 1								
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No 17



Eccentricity Diagram

Inst. No

Date : 6-Feb-84

Weather : Fine

Visibility : good

Observer : Y. Kuwahara

Booker :

Checked :

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PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.		No 15						
Reflecter No.								
Reflecter Height		M .		M .		M .		M .
Time								
Measuring	1	M 2137.341		M .		M .		M .
	2	.346		.		.		.
	3	2137.347		.		.		.
	4	.351		.		.		.
	5	.343		.		.		.
Mean		2137.346		.		.		.
Atmospheric Observ.		Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst.	1	22°C	730						
Refl.	1								
Inst.	2								
Refl.	2								
Sum									
Mean									
Correction Ecc. Corr.		M .		M .		M .		M .	
Reflecter Constant		.		.		.		.	
Instrument Constant		.		.		.		.	
Atm. Corr.		(PPM) .		(PPM) .		(PPM) .		(PPM) .	
Sum Corr.		.		.		.		.	
Distance Observed Dist.		.		.		.		.	
Slope Dist.		.		.		.		.	

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No10

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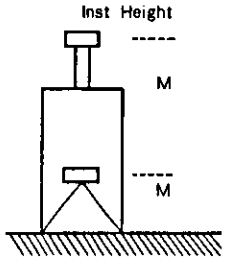
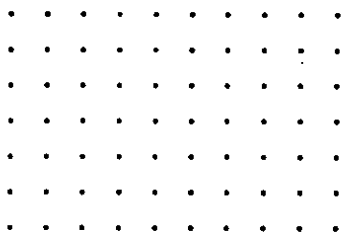


Eccentricity Diagram



Inst. No

Date : 6-9-84

Weather : Fine

Visibility : Good.

Observer : Y. Kuwahata

Booker :

Checked :

PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.	No18		No 17	
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 2086.562	M 2086.566	M 528.704	M .
2	.547	086.546	.708	.
3	2086.544	.	528.698	.
4	.541	.	5 .705	.
5	.570	.	.702	.
Mean	~~2086.567~~	2086.556	528.704	.

Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1	28°C.	746			ww	746		
Refl. 1								
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction				
Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No 20

Inst Height
M
M
Inst. No

Eccentricity Diagram

Date : 8-P-84
Weather : Fine
Visibility : Good.
Observer : J. Kuwahata
Booker :
Checked :

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PACIFIC GEO SURVEY CO., LTD.

Reflecter Stn.	No 2	No 1P		
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 717.342	M 1034.006	M 1034.017	M .
2	.347	1033.997	1033.997	.
3	717.346	1034.018	1033.997	.
4	.341	.026	.	.
5	.342	.037	.	.
Mean	717.342	1034.018	.	.

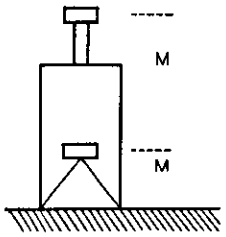
Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1	31	750						
Refl. 1								
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

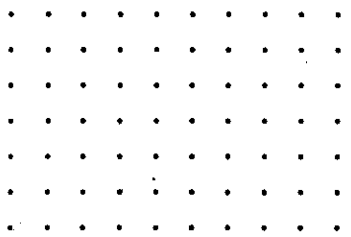
Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : TP 12



Eccentricity Diagram



Inst. No

Date : 8-9-84
Weather : Fine
Visibility : good.
Observer : Y. Kuwahata
Booker :
Checked :

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of

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PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.	No2			
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 617.771	M .	M .	M .
2	.764	.	.	.
3	617.770	.	.	.
4	.774	.	.	.
5	.	.	.	.
Mean	617.770	.	.	.

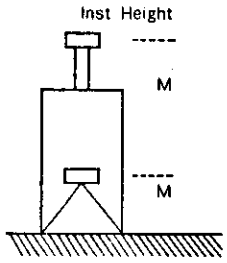
Atmospheric Observ.	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst. 1	30°C	764						
Refl. 1								
Inst. 2								
Refl. 2								
Sum								
Mean								

Correction Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

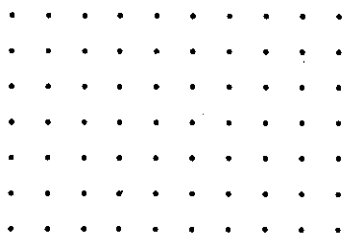
Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No16



Eccentricity Diagram



Inst. No

Date : 8-9-84
Weather : Fine
Visibility : Good
Observer : Y. Kawahata
Booker :
Checked :

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of

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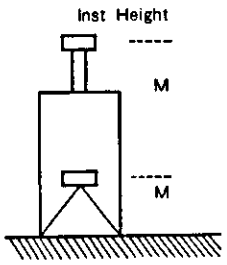
PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.		No 2						
Reflector No.								
Reflector Height		M .		M .		M .		M .
Time								
Measuring	1	M 2208.746		M 2208.754		M .		M .
	2	.736		.717		.		.
	3	2208.748		.725		.		.
	4	.724		.		.		.
	5	.743		.		.		.
Mean		.		2208.736		.		.
Atmospheric Observ.		Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)	Temp.(℃)	Press.(mb)
Inst.	1	32°C	746						
Refl.	1								
Inst.	2								
Refl.	2								
Sum									
Mean									
Correction		M		M		M		M	
Ecc. Corr.		.		.		.		.	
Reflecter Constant		.		.		.		.	
Instrument Constant		.		.		.		.	
Atm. Corr.		(PPM) .		(PPM) .		(PPM) .		(PPM) .	
Sum Corr.		.		.		.		.	
Distance									
Observed Dist.		.		.		.		.	
Slope Dist.		.		.		.		.	

Remarks

DISTANCE MEASUREMENT
DIRECT READING

Station : No P



Eccentricity Diagram

Inst. No

Date : 25-P-84

Weather : Fine

Visibility : good

Observer : Y. Iwamatsu

Booker :

Checked :

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of

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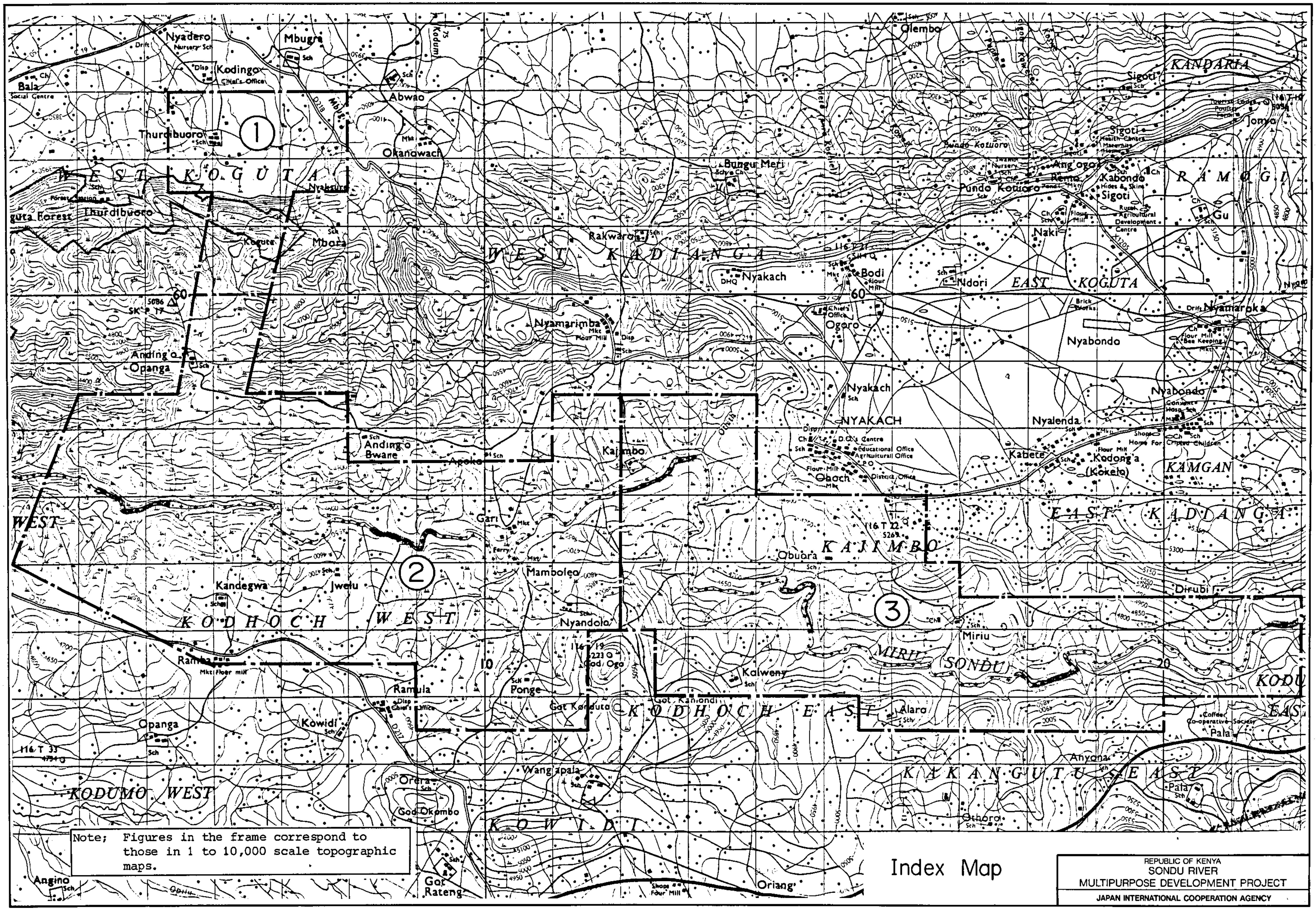
PACIFIC AERO SURVEY CO., LTD.

Reflecter Stn.	No 12	No 12	No 12	
Reflecter No.				
Reflecter Height	M .	M .	M .	M .
Time				
Measuring 1	M 1863.522	M 1863.467	1863.562	M .
2	.528	.512	.502	.
3	1863.548	1863.562	1863.546	.
4	.525	.535	.566	.
5	.	.	.	.
Mean	.	.	1863.536	.
Atmospheric Observ.	Temp.(℃) / Press.(mb)	Temp.(℃) / Press.(mb)	Temp.(℃) / Press.(mb)	Temp.(℃) / Press.(mb)
Inst. 1	32 / 722			
Refl. 1				
Inst. 2				
Refl. 2				
Sum				
Mean				
Correction Ecc. Corr.	M .	M .	M .	M .
Reflecter Constant	.	.	.	.
Instrument Constant	.	.	.	.
Atm. Corr.	(PPM) .	(PPM) .	(PPM) .	(PPM) .
Sum Corr.	.	.	.	.
Distance Observed Dist.	.	.	.	.
Slope Dist.	.	.	.	.

Remarks

TOPOGRAPHIC MAP



Nyadero
Mbugra
Kodingo
Olembo
KANDARIA
Sigoti
Bala
Social Centre
Abwao
Jomyo
1
Thurdibuoro
Okanowach
Sigoti
Bungu Meri
Pundo Kotuoro
Ang'ogo
Kabondo
Sigoti
WEST KOGUTA
RAMOGI
Thurdibuoro
Gu
Koguta
Mbora
Rakwaro
Naki
WEST KADIANGA
Nyakach
Bodi
Ndori
EAST KOGUTA
Nyamaroka
60
Ogoro
Nyamarimba
Nyabondo
Anding'o Opanga
Nyakach
Nyabondo
NYAKACH
Nyalenda
Anding'o Bwane
Apoko
Kajimbo
Kabete
Kodong'a (Kokelo)
KAMGAN
Oboch
WEST
Gari
EAST KADIANGA
KAJIMBO
Obuora
2
Mamboleo
Kandegwa
Jwelu
Dirubi
3
KODHOCH WEST
Nyandolo
Miriu
MIRIU (SONDU)
Ramba
10
God Ogo
Kalweny
20
Ramula
Ponge
KODU
Got Konduto
Got Kamondi
KODHOCH EAST
Alara
EAS
Opanga
Kowidi
Pala
Anyona
Wang'apala
KAKANGUTU EAST
Orera
Pala
KODUMO WEST
God Okombo
KOWIDI
Othora
Angino
Got Rateng
Oriang
Note; Figures in the frame correspond to those in 1 to 10,000 scale topographic maps.
Index Map
REPUBLIC OF KENYA
SONDU RIVER
MULTIPURPOSE DEVELOPMENT PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

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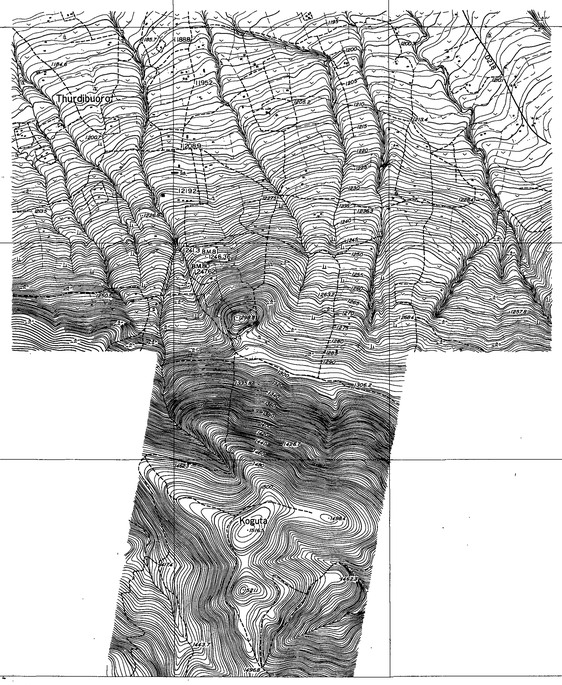
THE SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

SHEET NO. 1

9967 702 — 712 9967

KISUMU DISTRICT

WEST KOGUTA



9960 702 — 712 9960

LEGEND

- Road
- Main Track
- Track and Footpath
- Road under Construction (Approx. Align.)
- Cutting and Embankment
- Watercourse
- Watercourse (wide)
- Watercourse (indefinite)
- Direction of Flow
- Ferry
- Lake
- Revetment
- Well
- Water Tank
- Foot Bridge · Culvert · Bridge
- Building
- Ch Church
- Mus Mosque
- Sch School
- Mkt Market
- Dsp Dispensary
- Wall
- Fence
- Power Transmission Line
- Tower
- Trigonometrical Station Primary
- Trigonometrical Station Secondary
- B.M Bench Mark
- Traverse Point
- Minor Leveling Point
- Spot Height
- Boundary of Land Use
- Cemetery
- Levee between Fields
- Forest
- Thicket
- Scattered Tree
- Scrub
- Palms
- Plantation
- Orchard
- Swamp
- Seasonal Swamp
- Sand or Mud
- Cultivated Land Boundary
- Standard Contour Line
- Index Contour Line
- Supplementary 1/2 Interval Contour Line
- Depression
- Slope
- Cliff
- Outcrop Rock
- Boundary District

Spheroid	Clarke 1880
Projection	Transverse Mercator
Aerial Photography	December 1978
Field Survey	March 1984
Mapping	July 1984

Metres 1,000 0 1.0 Kilometres

SCALE 1 : 10,000 (HEIGHTS IN METRES)

JAPAN INTERNATIONAL COOPERATION AGENCY

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THE SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

SHEET NO. 2

9960 702 — 712 9960

WEST KOGUTA

Anding'o Opanga

KISUMU DISTRICT

KAKANGUTU WEST

Anding'o Bware

WEST KADIANGA

Kajimbo

Gari

MIERU ESCARPMENT

Jwelu

Kandegwa

Kamboleo

Nyandolo

KODHOCH WEST

KODHOCH EAST

Ramba

Ramula

Ponge

Got-Konduto

SOUTH NYANZA DISTRICT

9953 702 — 712 9953

LEGEND

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- Road under Construction (Approx. Align.)
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- Watercourse
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- Watercourse (indefinite)
- Direction of Flow
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- Lake
- Revetment
- Well
- Water Tank
- Foot Bridge • Culvert • Bridge
- Building
- Ch Church
- Mos Mosque
- Sch School
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- Disp Dispensary
- Wall
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- Power Transmission Line
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- Trigonometrical Station Primary
- Trigonometrical Station Secondary
- B.M. Bench Mark
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- Orchard
- Swamp
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- Cultivated Land Boundary
- Standard Contour Line
- Index Contour Line
- Supplementary 1/2 Interval Contour Line
- Depression
- Slope
- Cliff
- Outcrop Rock
- Boundary District

Spheroid	Clarke 1880
Projection	Transverse Mercator
Aerial Photography	December 1978
Field Survey	March 1984
Mapping	July 1984

Metres 2,000 0 1.0 Kilometre

SCALE 1 : 10,000 (HEIGHTS IN METRES)

JAPAN INTERNATIONAL COOPERATION AGENCY

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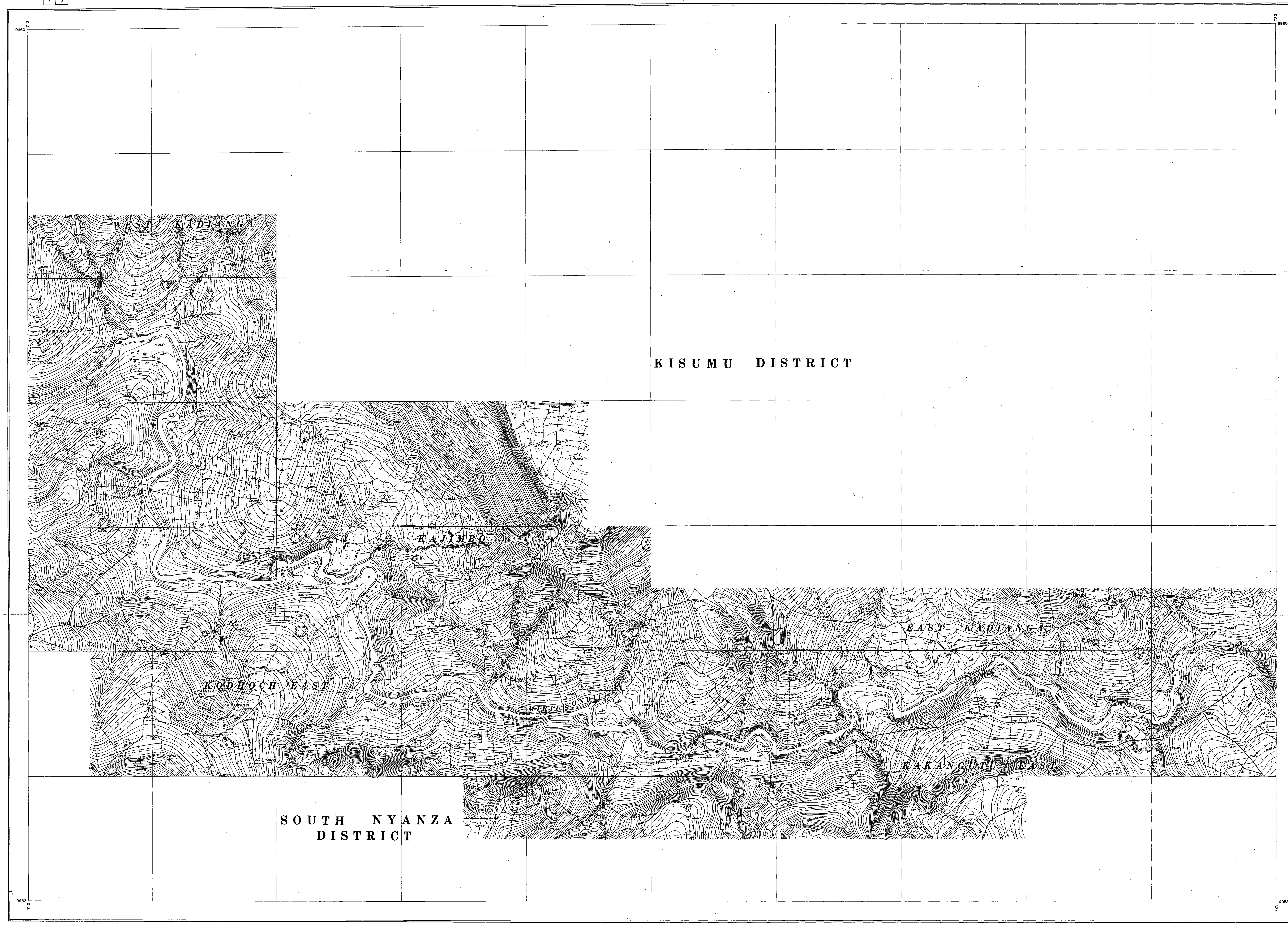
THE SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

SHEET NO. 3



LEGEND

Road
Main Track
Track and Footpath
Road under Construction (Approx. Align.)
Cutting and Embankment

Watercourse
Watercourse (wide)
Watercourse (indefinite)
Direction of Flow
Ferry
Lake
Revetment
Well
Water Tank
Foot Bridge • Culvert • Bridge

Building
Ch Church
Mos Mosque
Sch School
Mkt Market
Disp Dispensary

Wall
Fence
Power Transmission Line
Tower

Trigonometrical Station Primary
Trigonometrical Station Secondary
B.M Bench Mark
Traverse Point
Minor Leveling Point
Spot Height

Boundary of Land Use
Cemetery

Levee between Fields
Forest
Thicket
Scattered Tree
Scrub
Palms
Plantation
Orchard
Swamp
Seasonal Swamp
Sand or Mud
Cultivated Land Boundary

Standard Contour Line
Index Contour Line
Supplementary 1/2 Interval Contour Line
Depression
Slope
Cliff
Outcrop Rock

Boundary District

Spheroid	Clarke 1880
Projection	Transverse Mercator
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Field Survey	March 1984
Mapping	July 1984

SCALE 1 : 10,000 (HEIGHTS IN METRES)

JAPAN INTERNATIONAL COOPERATION AGENCY

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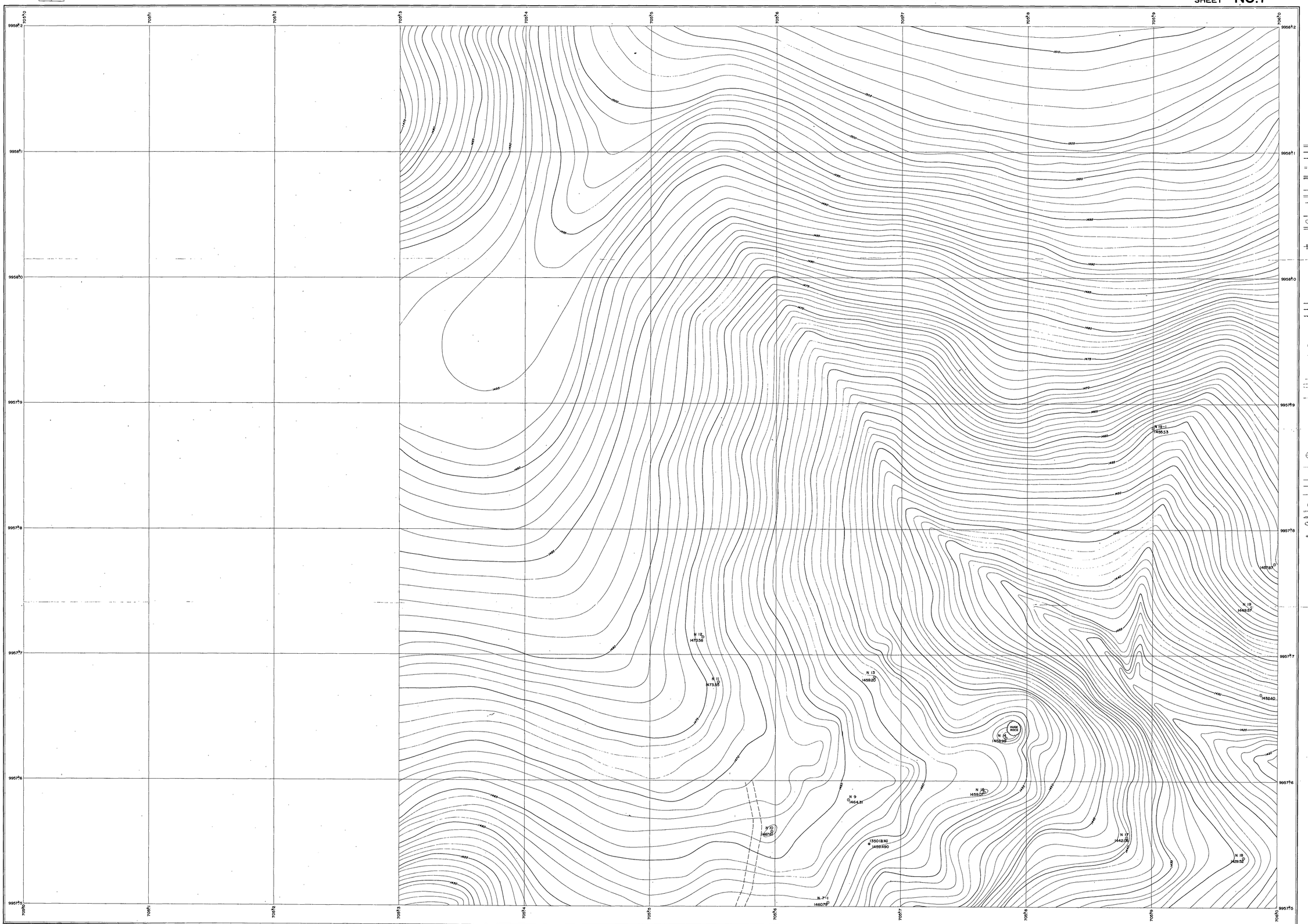
THE SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

SHEET NO. 1



LEGEND

- Road
- Main Track
- Track and Footpath
- Road under Construction (Approx. Align.)
- Cutting and Embankment
- Watercourse
- Watercourse (wide)
- Watercourse (indefinite)
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- Wall
- Water Tank
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- Ch — Church
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- Sch — School
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- Index Contour Line
- Supplementary 1/2 Interval Contour Line
- Depression
- Slope
- Cliff
- Outcrop Rock
- Boundary District

Spheroid Clarke 1880
Projection Transverse Mercator
Field Survey November 1984

Meters 100 0 100 Meters

SCALE 1 : 1,000 (HEIGHTS IN METRES)

JAPAN INTERNATIONAL COOPERATION AGENCY

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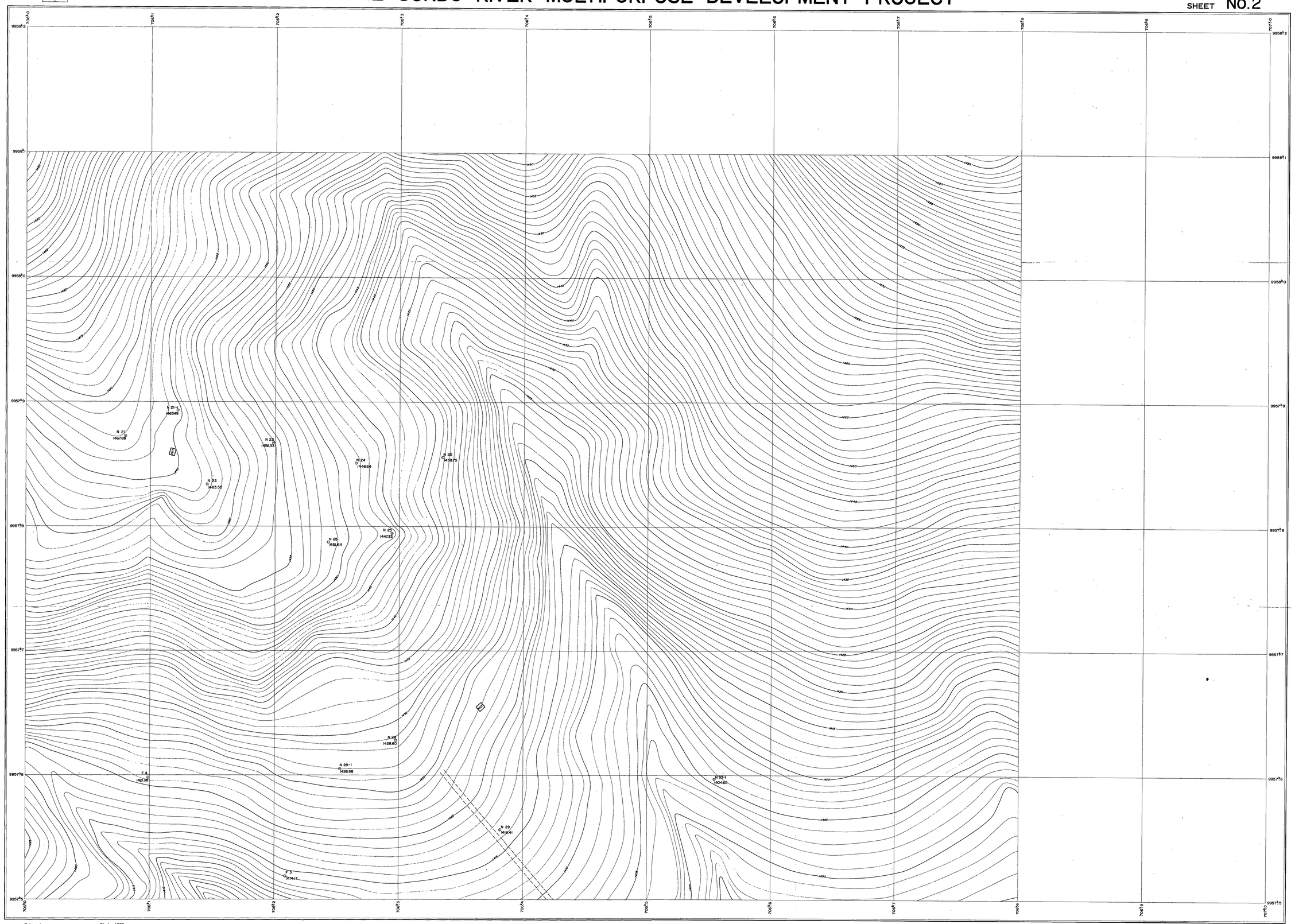
THE SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

SHEET NO.2



LEGEND

- Road
- Main Track
- Track and Footpath
- Road under Construction (Approx. Align.)
- Cutting and Embankment
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- Watercourse (wide)
- Watercourse (indefinite)
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Spheroid	Clarke 1880
Projection	Transverse Mercator
Field Survey	November 1984

Meters 100 0 100Meters

SCALE 1 : 1,000 (HEIGHTS IN METRES)

JAPAN INTERNATIONAL COOPERATION AGENCY

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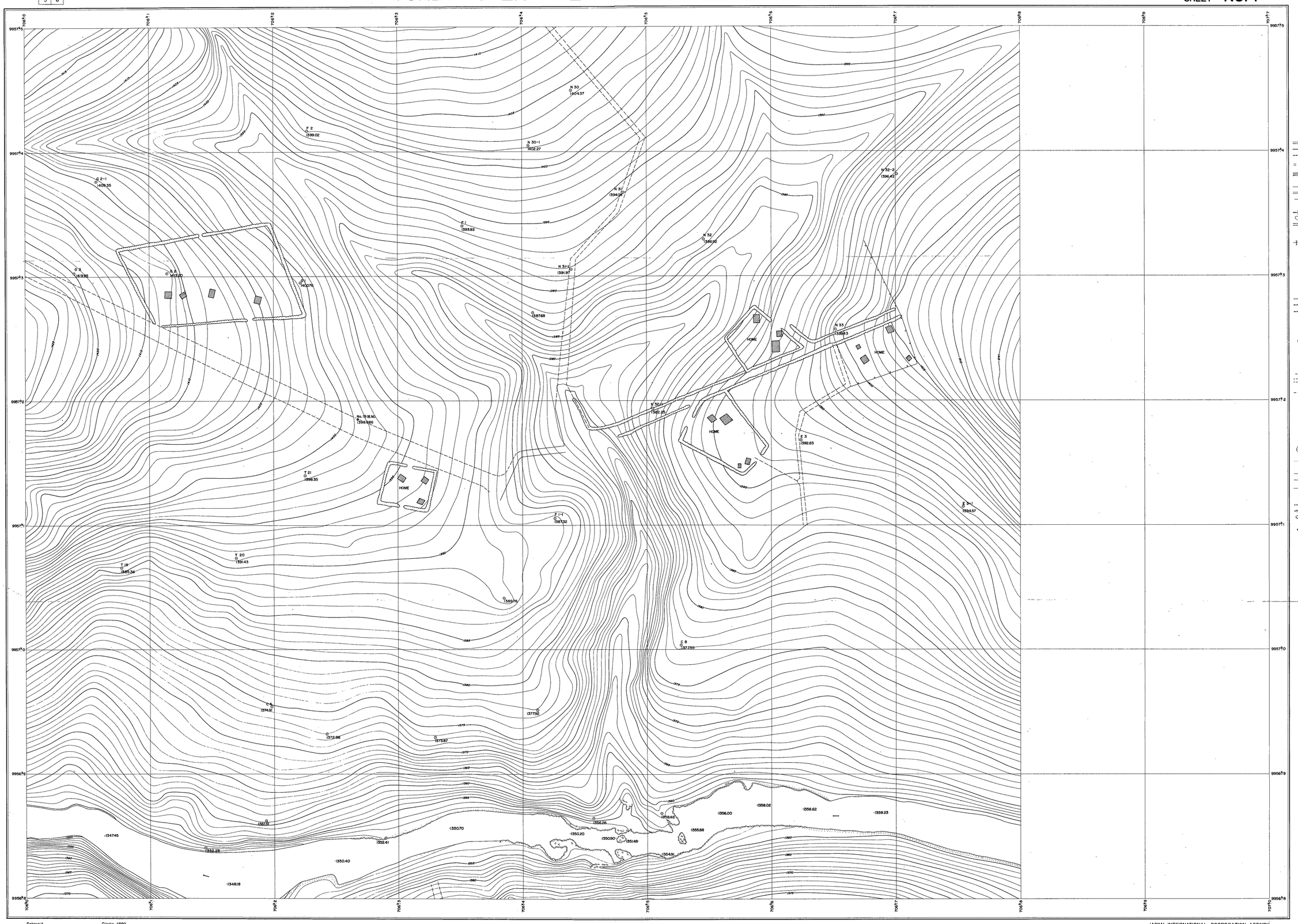
THE SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

SHEET NO.4



LEGEND

- Road
- Main Track
- Track and Footpath
- Road under Construction (Approx. Align.)
- Cutting and Embankment
- Watercourse
- Watercourse (wide)
- Watercourse (indefinite)
- Direction of Flow
- Ferry
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- Revetment
- Well
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- Trigonometrical Station Primary
- Trigonometrical Station Secondary
- B.M. Bench Mark
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- Spot Height
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- Scrub
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- Plantation
- Orchard
- Swamp
- Seasonal Swamp
- Sand or Mud
- Cultivated Land Boundary
- Standard Contour Line
- Index Contour Line
- Supplementary 1/2 Interval Contour Line
- Depression
- Slope
- Cliff
- Outcrop Rock
- Boundary District

Spheroid Clarke 1880
Projection Transverse Mercator
Field Survey November 1984

Meters 100 0 100 Meters

SCALE 1 : 1,000 (HEIGHTS IN METRES)

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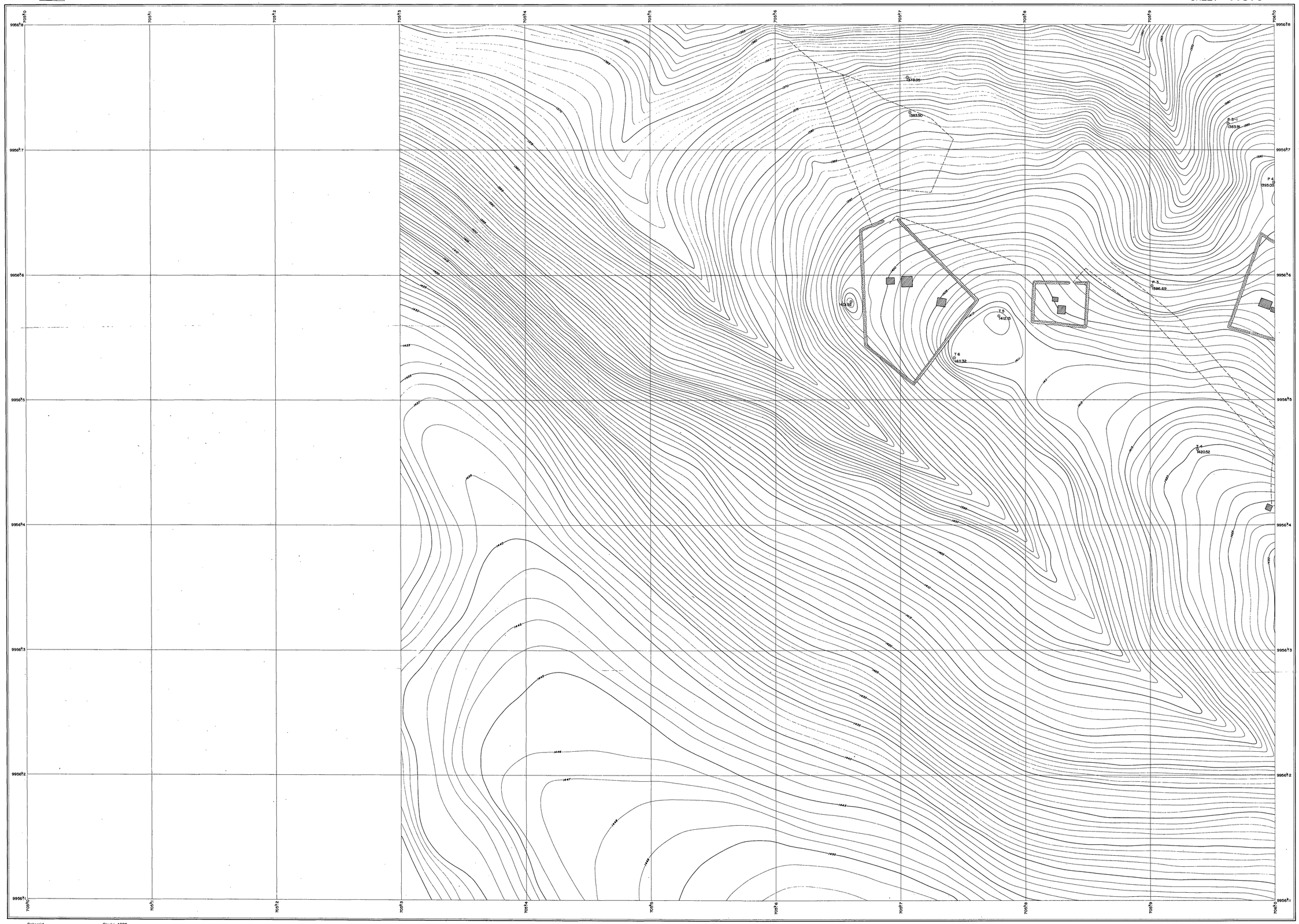
THE SONDU RIVER MULTIPURPOSE DEVELOPMENT PROJECT

SHEET NO.5



LEGEND

- Road
- Main Track
- Track and Footpath
- Road under Construction (Approx. Align.)
- Cutting and Embankment
- Watercourse
- Watercourse (wide)
- Watercourse (indefinite)
- Direction of Flow
- Ferry
- Lake
- Revetment
- Well
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- Building
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Spheroid Clarke 1880
Projection Transverse Mercator
Field Survey November 1984

Meters 100 0 100Meters

SCALE 1 : 1,000 (HEIGHTS IN METRES)

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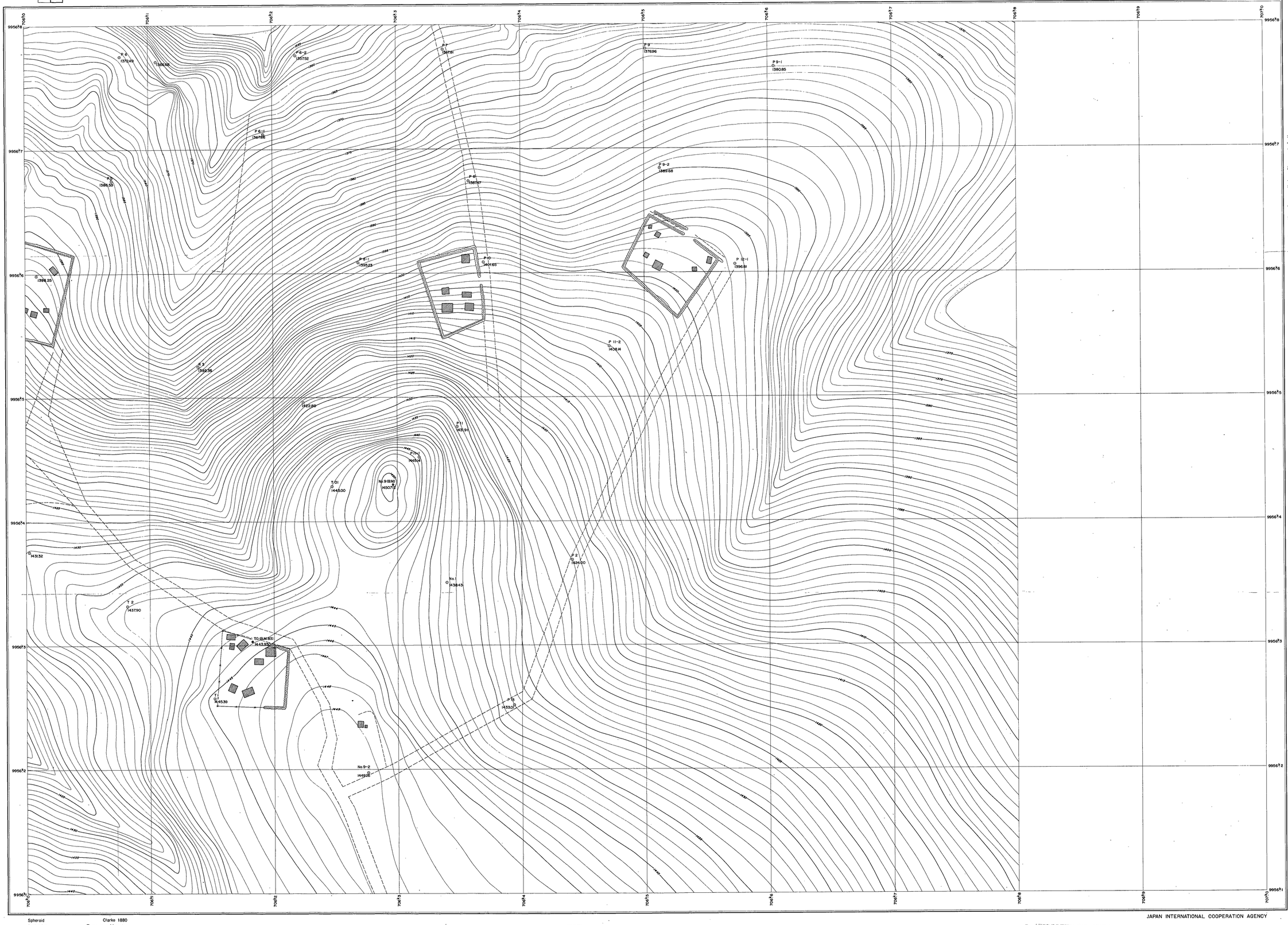
SHEET NO.6



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SCALE 1 : 1,000 (HEIGHTS IN METRES)

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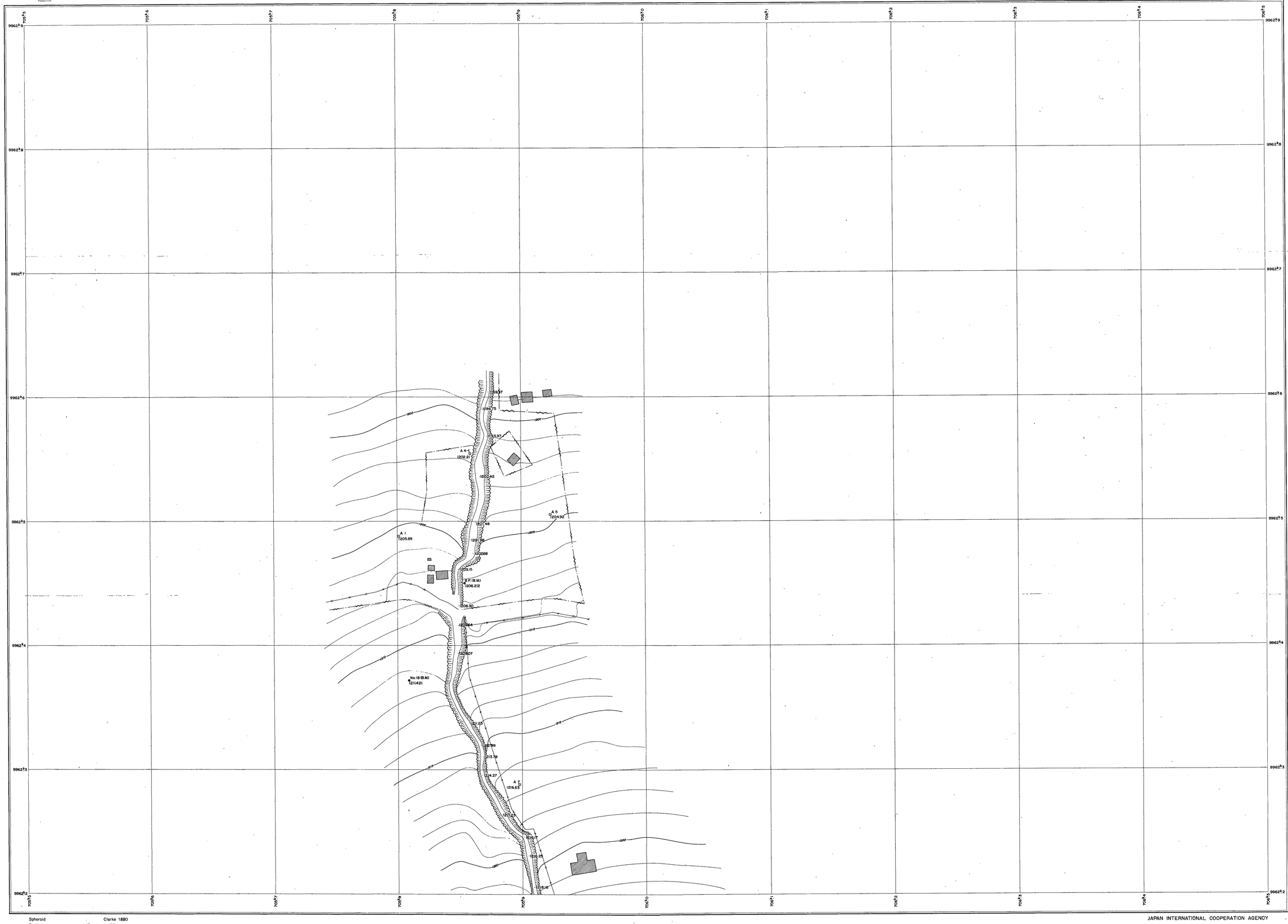
SHEET NO.7



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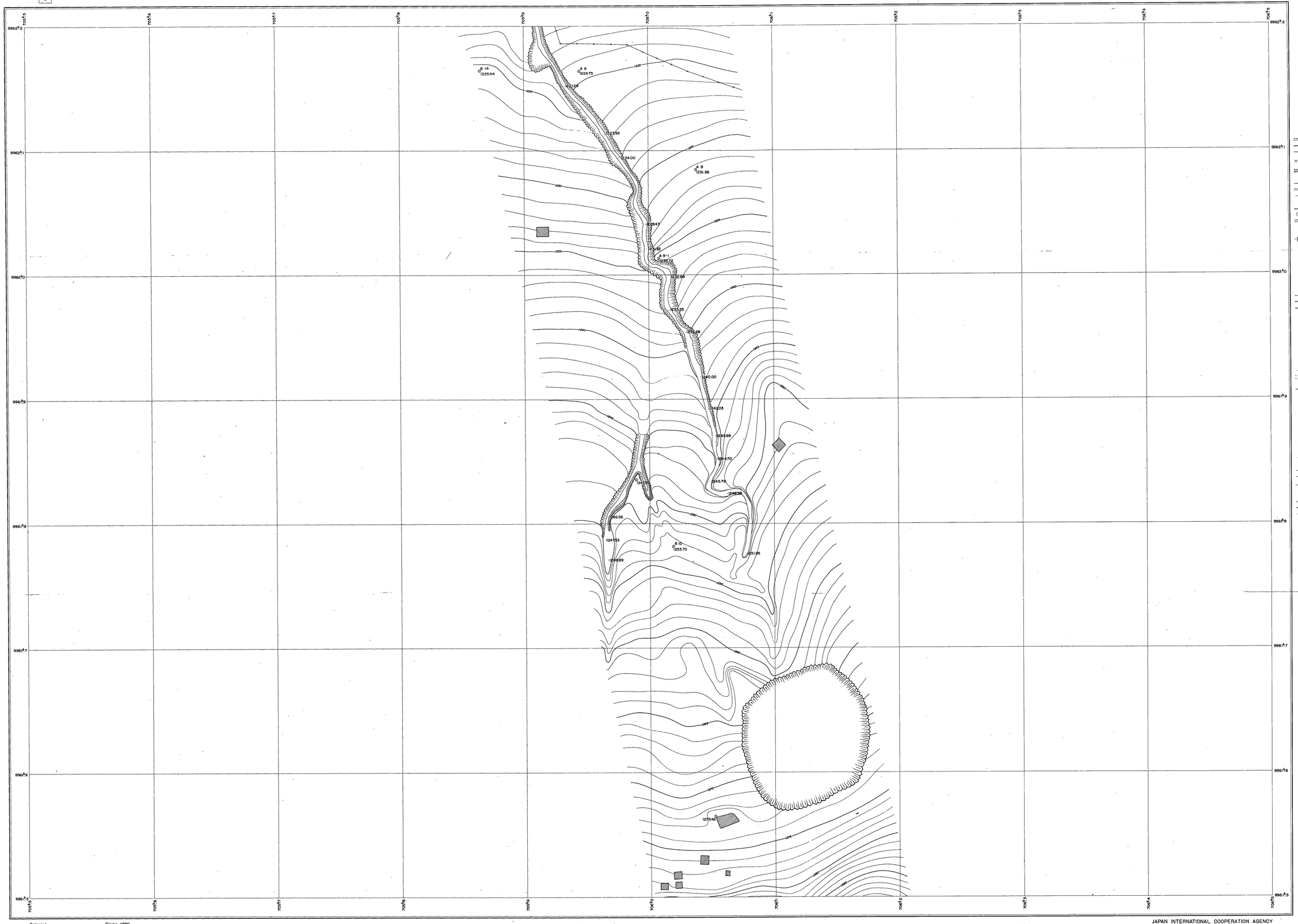
SHEET NO.8



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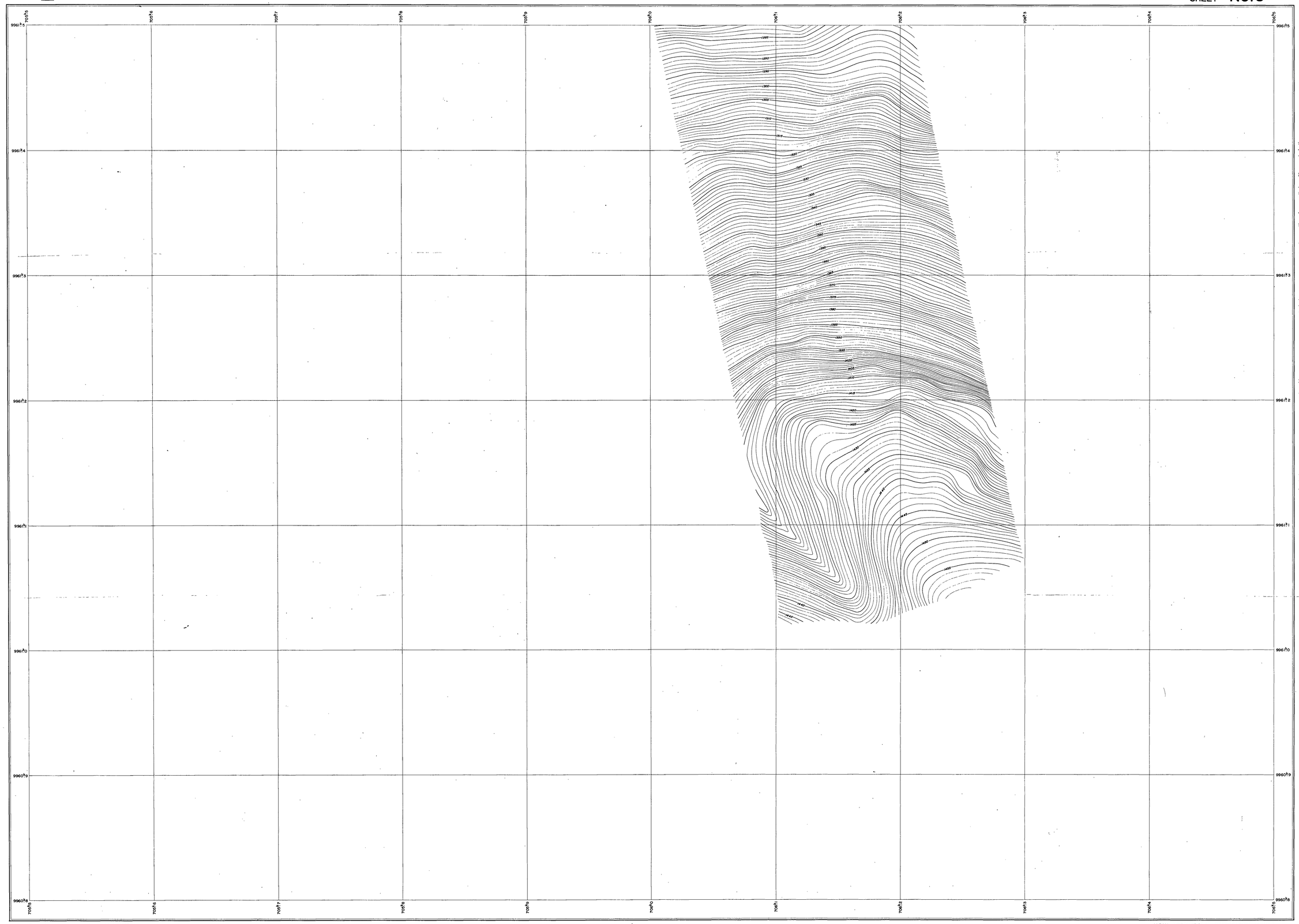
SHEET NO.9



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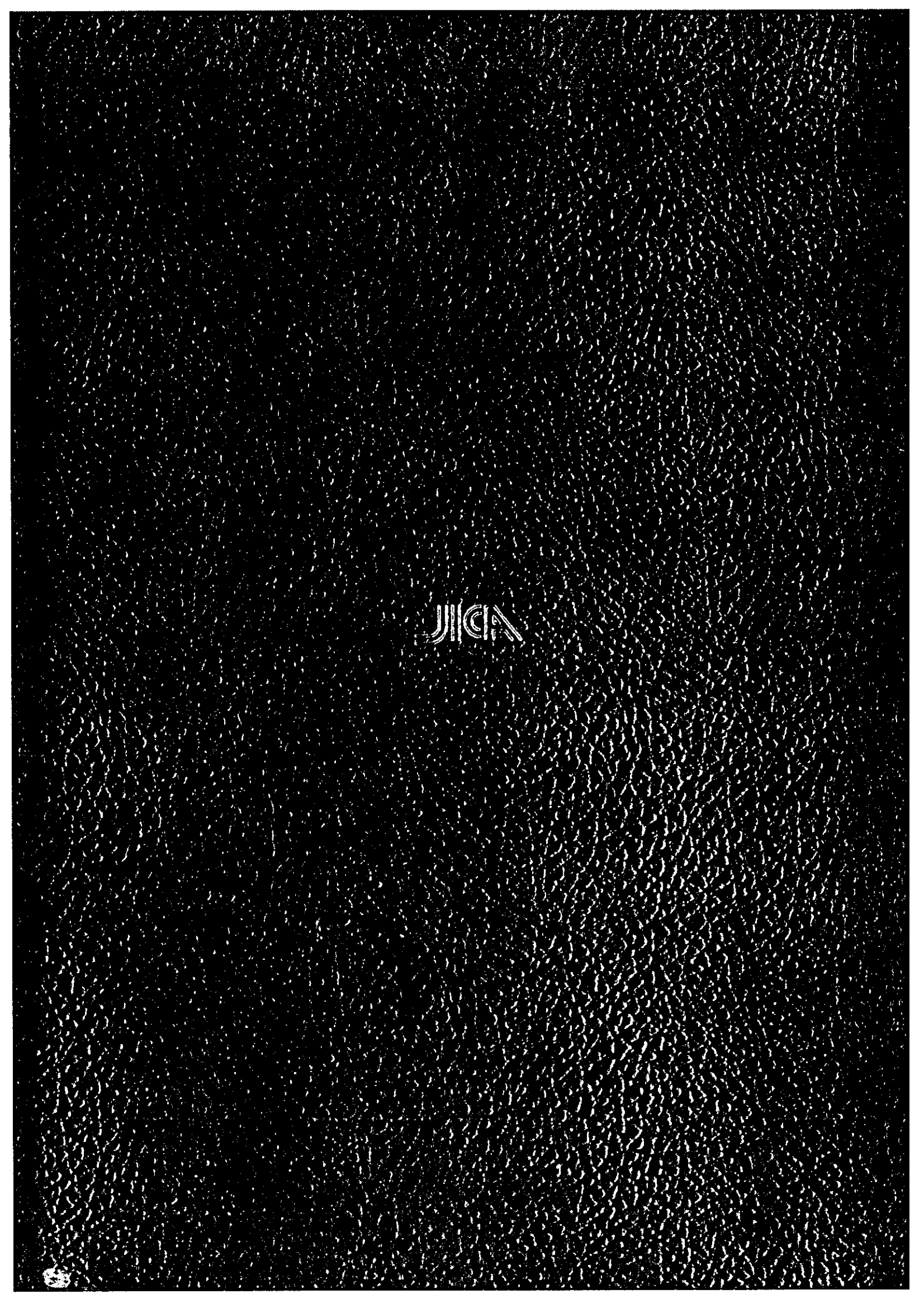
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