DATA BOOK
FOR
THE DARLAC IRRIGATION PROJECT
IN
THE UPPER SREPOK BASIN

THE OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO

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C O N T E N T S

I. GEOLOGICAL INVESTIGATION

LOCATION MAP OF BORE HOLES AT EA KRONG ANA INTAKE WEIR SITE

SCALE 1 : 2,000

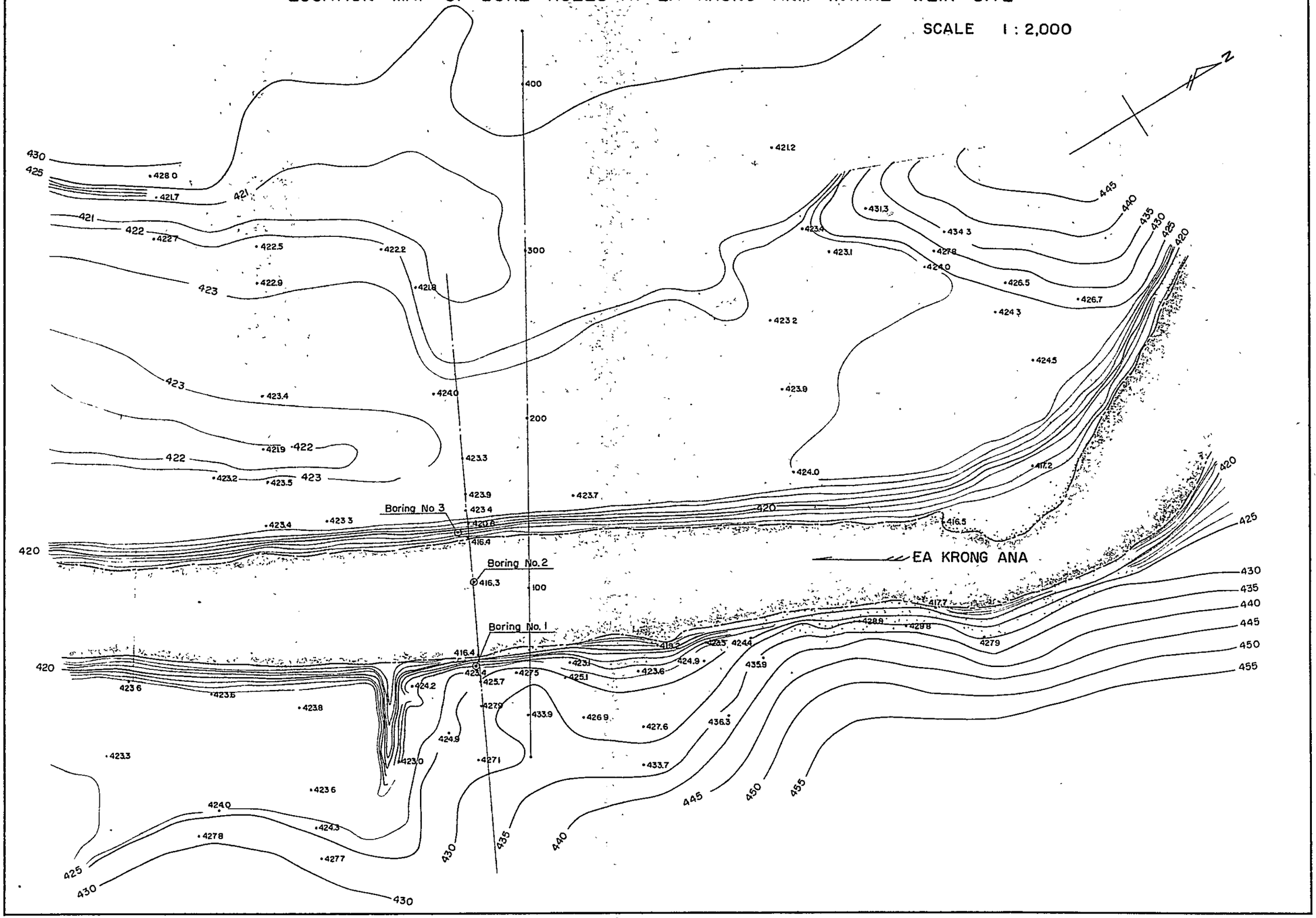
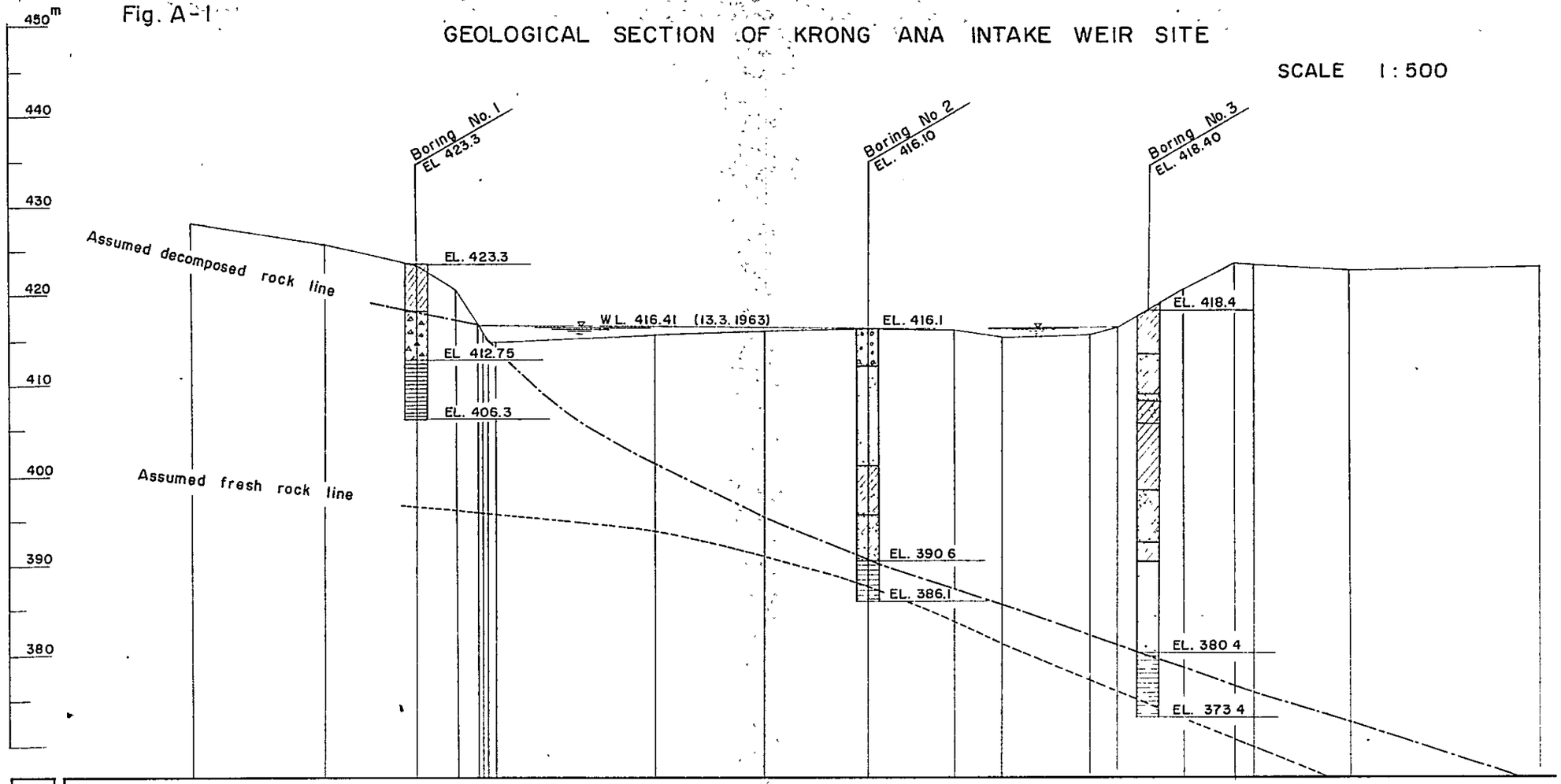


Fig. A-1

GEOLOGICAL SECTION OF KRONG ANA INTAKE WEIR SITE

SCALE 1 : 500



St.	Dist.	Accu. dist.	G. H.
C 1			427.93
C 2	14.52	14.52	426.68
C 3	10.10	24.62	423.37
C 4	4.29	28.91	420.64
C 5	2.39	31.30	416.41
C 6	0.50	31.80	415.86
C 7	0.50	32.30	414.81
C 8	0.80	33.10	414.81
C 9	17.48	50.58	415.55
C 10	12.82	62.40	416.00
C 11	11.44	73.84	416.33
C 12	9.70	83.54	415.97
C 13	5.00	88.54	415.66
C 14	9.74	98.28	415.66
C 15	3.00	101.28	416.41
C 16	7.41	108.69	420.57
C 17	5.63	114.32	423.48
C 18	2.30	116.62	423.37
C 19	10.37	126.99	422.89
C 20	20.93	147.92	423.32

St. . Station Dist. : Distance Accu. dist. · Accumlative distance G.H. : Ground height

GEOLOGICAL RECORD OF BORE HOLE

HOLE NO. 1

PROJECT . Upper Srepok project
LOCATION ; Krong Ana Damsite
DATE STARTED ; 12, mar '63
DATE COMPLETED ; 14, mar
DIAMETER OF HOLE, MM
MACHINE .

ELEVATION OF SURFACE, 423.M3
ELEV. BOTTOM OF HOLE, 406.M3
INCLINATION OF HOLE,
DRLLED BY Shirayama
GEOL LY LOGGED BY M. Sakaita

NIPPON KOEI K K, TOKYO

DATE	DEPTH m	ELEV TOP OF STRATUM m	CLASSIFICATION OF ROCKS	COLUMNAR SECTION	THICKNESS OF STRATUM m	ACCUMLATIVE TIHCKNESS OF STRATA m	CORE RECOVERY %	DESCRIPTION
		422.55	Silt		0.75	0.75		light yellow
	1							
	2		silty clay					light yellow
	3	419.65			2.9	3.65		
	4		silty clay					light brown
		418.5			1.15	4.8		
	5	417.8	decayed sandy slate		0.7	5.5		float stone
	6		decayed					slime
	7		sandy					
	8		slate					
	9							
	10	412.75			5.05	10.55		
	11		phyllitic slate					light grey, spotted
		411.8			0.95	11.5		
	12							leakage
	13		ditto					
	14	408.05			2.75	14.25		
	15							dark grey
	16		slate					
	17	406.3			2.75	17.00		
	18							
	19							
	20							

GEOLOGICAL RECORD OF BORE HOLE

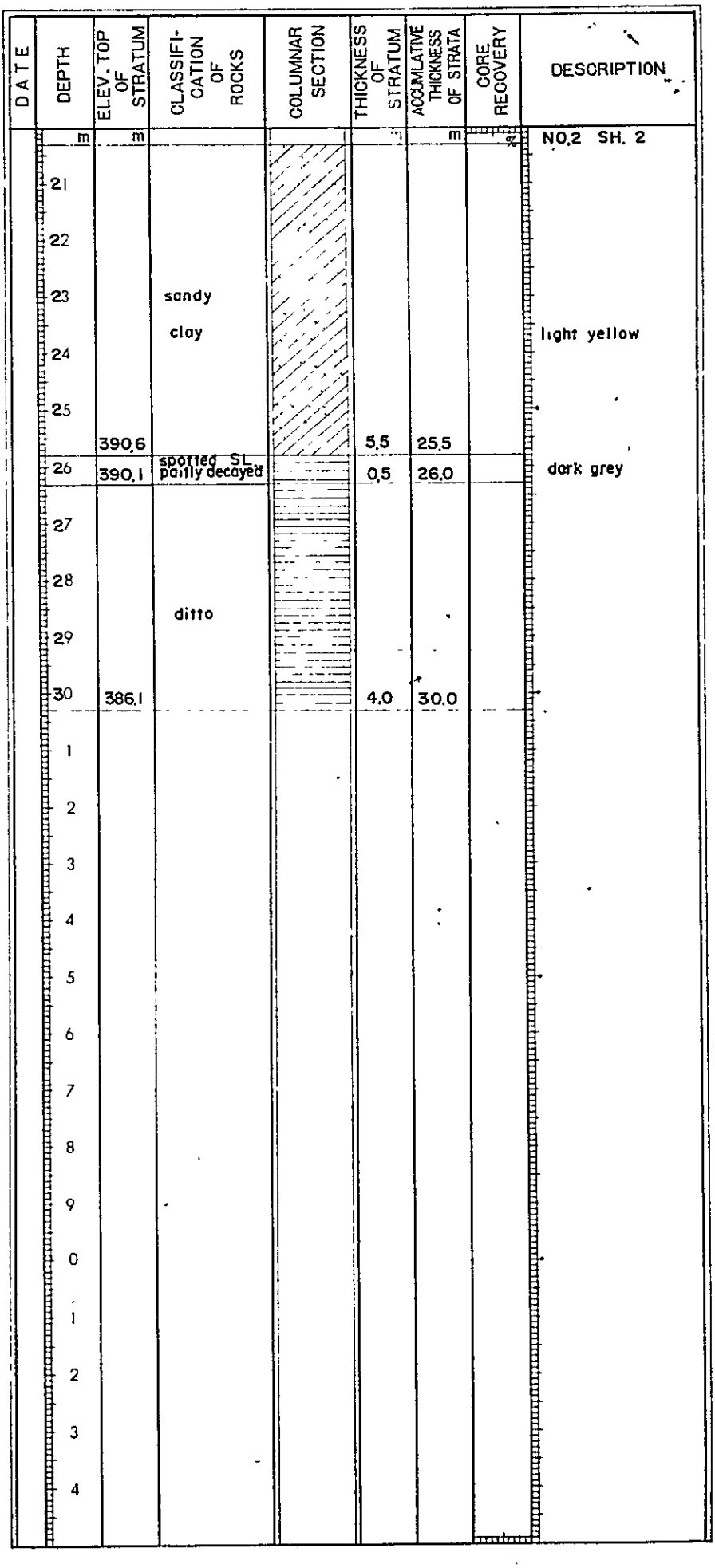
HOLE NO. 2

PROJECT , Upper Srepok project
LOCATION , Krong Ana' Damsite
DATE STARTED . 16, mar '63
DATE COMPLETED : 20, mar,
DIAMETER OF HOLE; MM
MACHINE .

ELEVATION OF SURFACE, 416.1 M
ELEV. BOTTOM OF HOLE.386 M
INCLINATION OF HOLE.
DRILLED BY Shirayama
GEOL. LY LOGGED BY M, Sakaita

NIPPON KOEI K K, TOKYO

DATE	DEPTH	ELEV. TOP OF STRATUM	CLASSIFICATION OF ROCKS	COLUMNAR SECTION	THICKNESS OF STRATUM	ACCUMLATIVE THICKNESS OF STRATA	CORE RECOVERY	DESCRIPTION
	m	m	water		m	m	%	NO 2 SH 1
	1		Subangular coarse quartz sand					light yellow tint
	2							
	3							ϕ : − 4 m/m
	4	412.1			4.0	4.0		
	5		white subangular coarse sand					
	6							
	7							ϕ − 2.5 m/m
	8							
	9							
	10	406.1			6.0	10.0		
	11		fine sand					light grey
	12							
	13							ϕ 0.1 m/m
	14							
	15	401.1			5.0	15.0		
	16		silt with clay					
	17							light grey
	18							
	19							
	20	396.1			5.0	20.0		


DATE
DEPTH
ELEV. TOP OF STRATUM
CLASSIFICATION OF ROCKS
COLUMNAR SECTION
THICKNESS OF STRATUM
ACCUMULATIVE THICKNESS OF STRATA
CORE RECOVERY
DESCRIPTION
m
m
m
%
NO.2 SH. 2
21
22
23
24
25
26
27
28
29
30
1
2
3
4
5
6
7
8
9
0
1
2
3
4
sandy
clay
light yellow
390.6
5.5
25.5
spotted SL
partly decayed
390.1
0.5
26.0
dark grey
ditto
386.1
4.0
30.0

GEOLOGICAL RECORD OF BORE HOLE

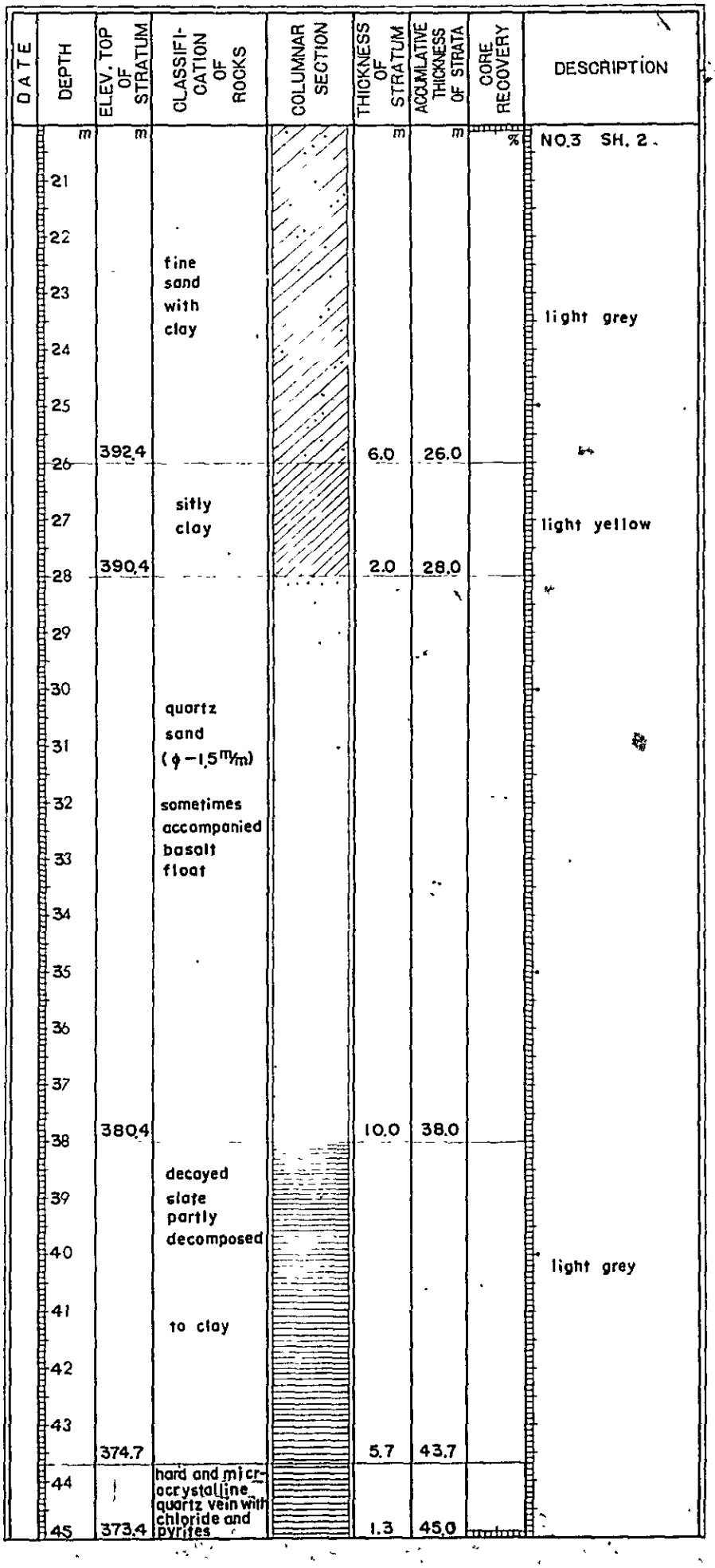
HOLE NO 3

PROJECT ; Upper Srepok
LOCATION , Krong Ana Damsite
DATE STARTED ; 13, mar '63
DATE COMPLETED ; 18 mar
DIAMETER OF HOLE, MM
MACHINE ;

ELEVATION OF SURFACE, 418 M4
ELEV. BOTTOM OF HOLE, 373 M4
INCLINATION OF HOLE,
DRLLED BY A. Ogata
GEOL LY LOGGED BY M. Sakaita

NIPPON KOEI K K., TOKYO

DATE	DEPTH	ELEV TOP OF STRATUM	CLASSIFICATION OF ROCKS	COLUMNAR SECTION	THICKNESS OF STRATUM	ACCUMLATIVE TIHCKNESS OF STRATA	CORE RECOVERY	DESCRIPTION
	m	m			m	m	%	NO.3 SH. 1
	1		clayey silt					light yellow containing mica particle
	2	416.4			2.0	2.0		
	3		silty clay					light yellow
	4							
	5	413.4			3.0	5.0		
	6	412.4	clayey sand		1.0	6.0		light yellow
	7		coarse sand with clay					
	8							
	9	408.9			3.5	9.5		
	10	408.4	coarse sand		0.5	10.0		
	11		coarse sand with clay					
	12							
		405.7			2.7	12.7		
	13	405.4	sandy clay		0.3	13.0		light grey
	14		sticky clay					light grey
	15	403.4			2.0	15.0		
	16							
	17		clayey silt					
	18							light grey
	19							
	20	398.4			5.0	20.0		

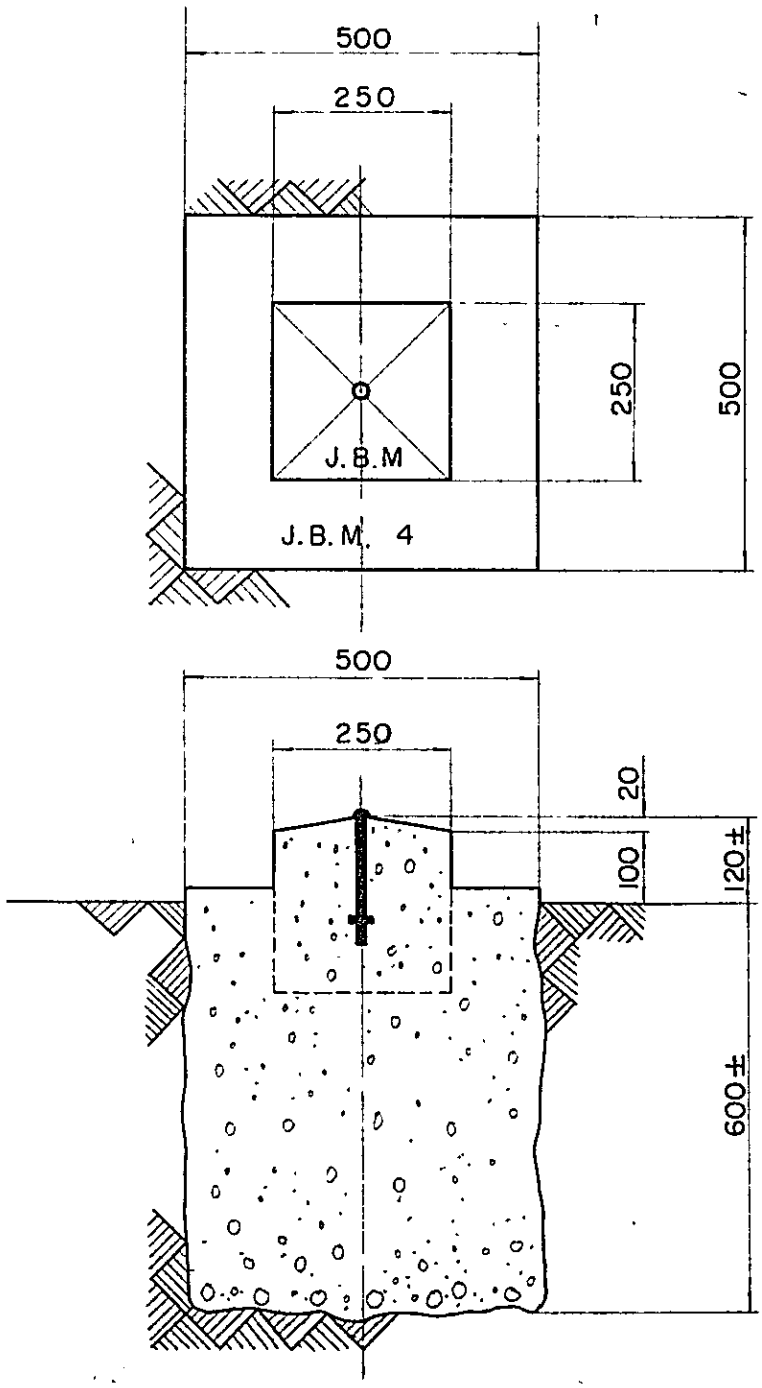

DATE
DEPTH
ELEV. TOP OF STRATUM
CLASSIFICATION OF ROCKS
COLUMNAR SECTION
THICKNESS OF STRATUM
ACCUMULATIVE THICKNESS OF STRATA
CORE RECOVERY
DESCRIPTION
m
m
m
%
NO.3 SH. 2.
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
fine sand with clay
light grey
392.4
6.0
26.0
sitly clay
light yellow
390.4
2.0
28.0
quartz sand (ϕ-1.5 m/m)
sometimes accompanied basalt float
380.4
10.0
38.0
decayed slate partly decomposed
light grey
to clay
374.7
5.7
43.7
hard and micr-ocrystalline quartz vein with chloride and pyrites
373.4
1.3
45.0

II. SURVEYING

C O N T E N T S

TYPICAL SIZE OF BENCH-MARK

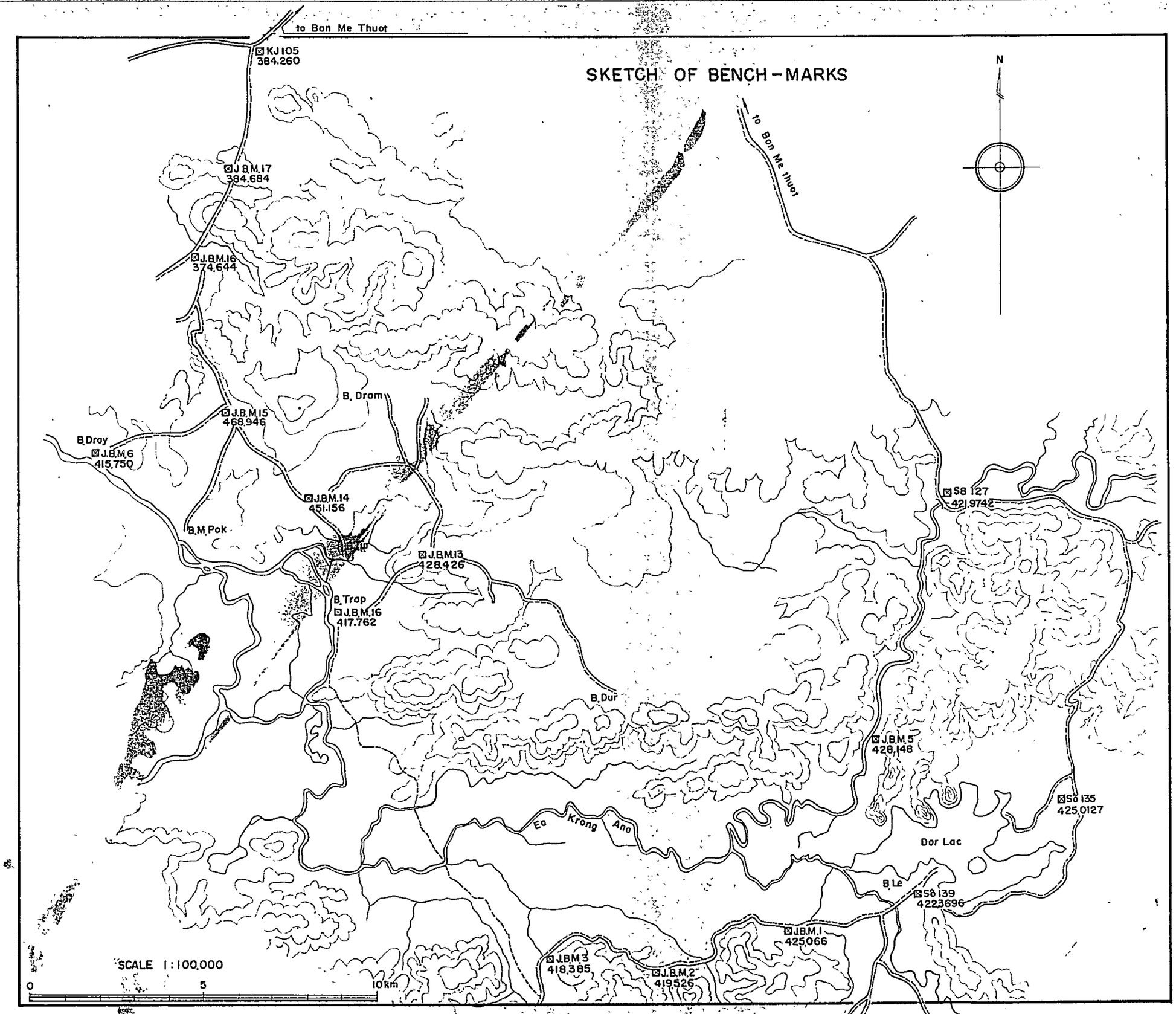
Cast in place post

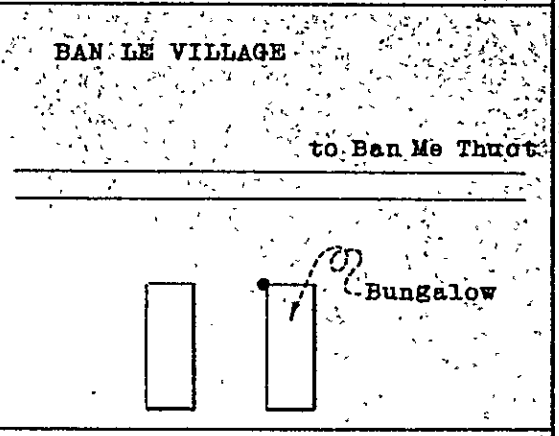
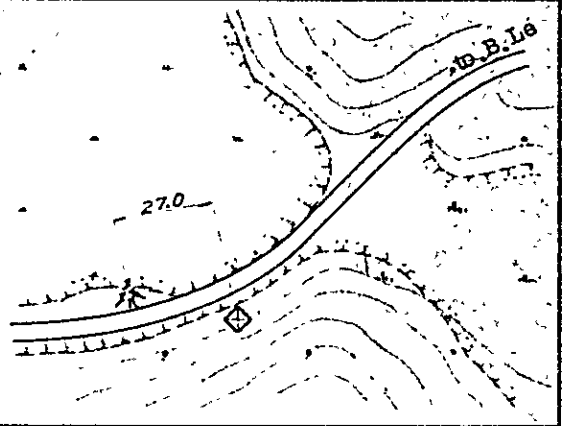
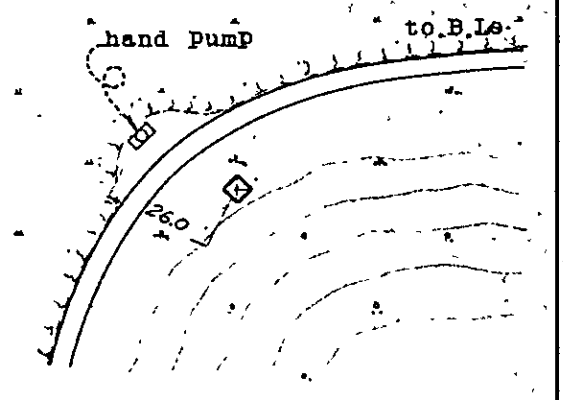
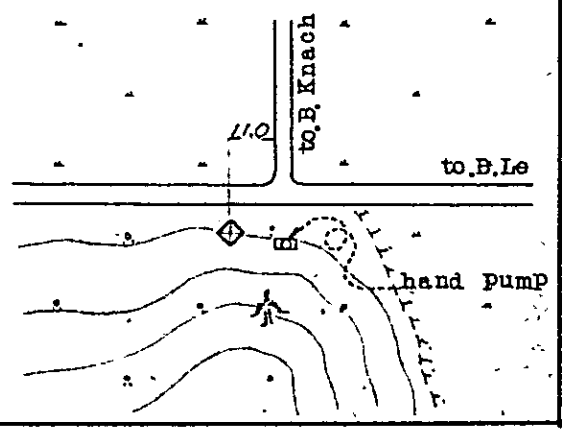


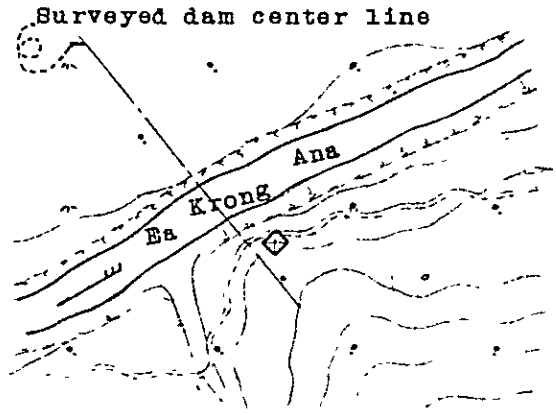
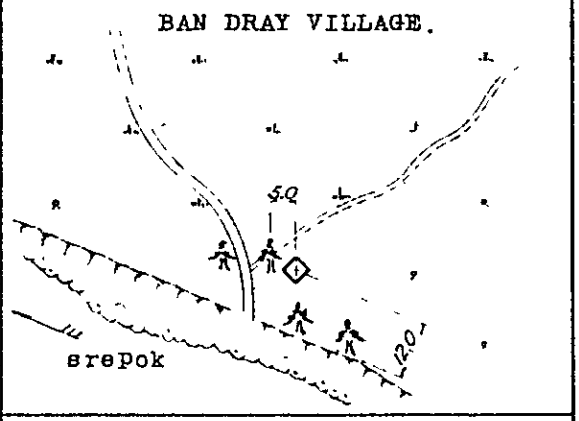
Unit in millimeters

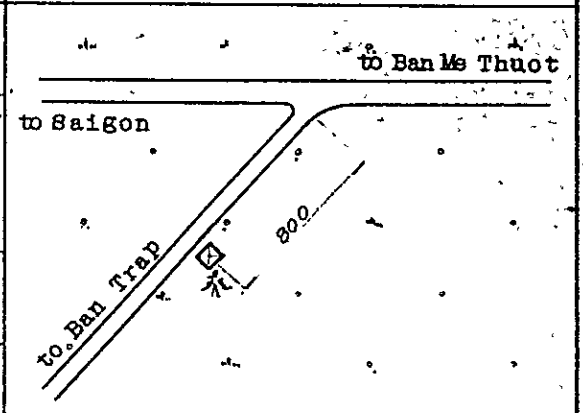
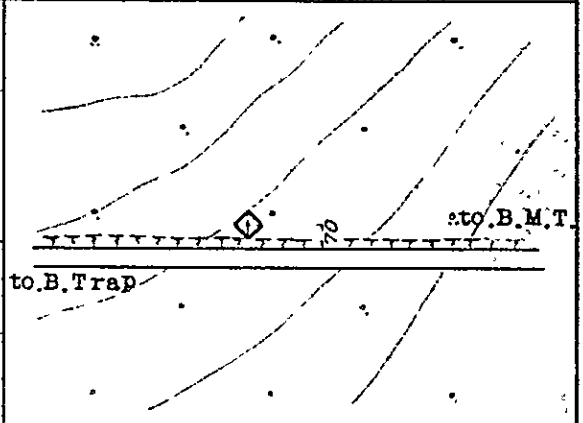
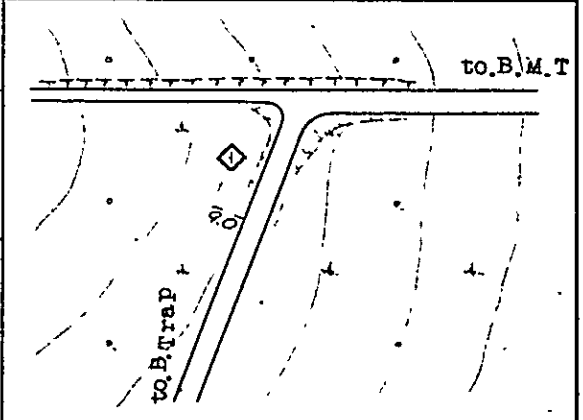
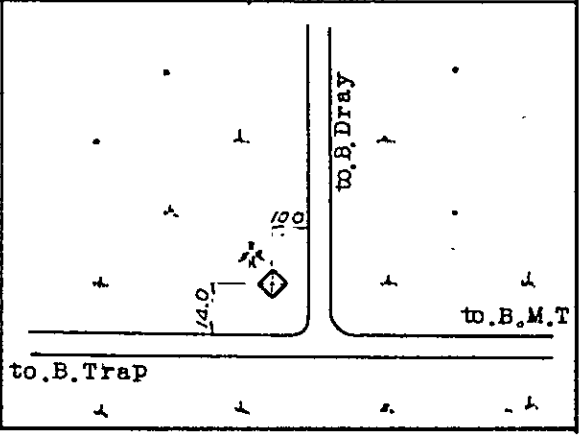
RESULTS OF LEVELING

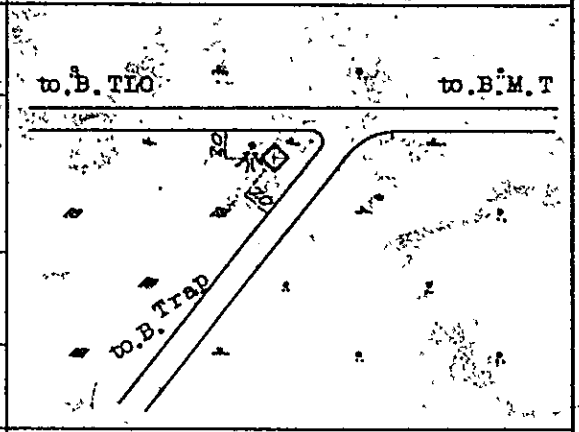
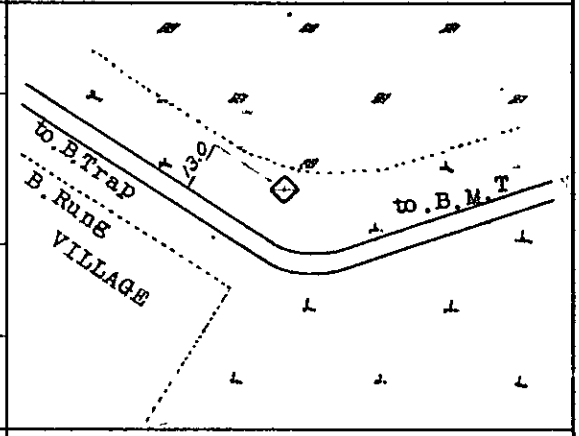
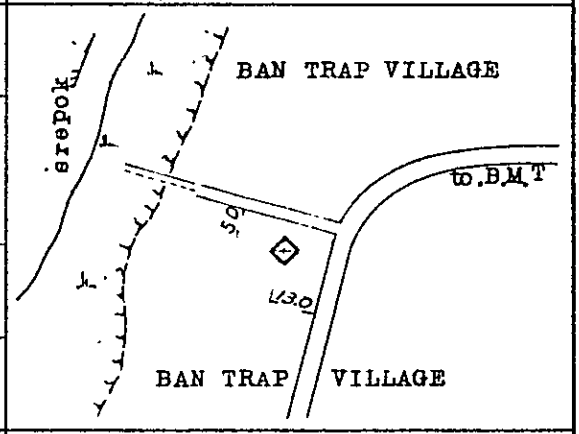
SKETCH OF BENCH-MARKS



B.M. No.	DESCRIPTIONS	SKETCH
B.M. No 139	ELEVATION 422.3696 LOCATION ESTABLISHED ON	
J. B. M. 1	ELEVATION 425.066 LOCATION Ban Le (B,Ouk) ESTABLISHED ON 6 March 1963 Concrete post cast in place	
J. B. M. 2	ELEVATION 419.526 LOCATION Ban Le (B.Mongue) ESTABLISHED ON 6 March 1963 Concrete post cast in place	
J. B. M. 3	ELEVATION 418.385 LOCATION Ban Le (B.Knach) ESTABLISHED ON 7 March 1963 Concrete post cast in place	

B.M. No.	DESCRIPTIONS	SKETCH
	ELEVATION	
	LOCATION	
	ESTABLISHED ON	
J. B. M. 5	ELEVATION 428.148	
	LOCATION Krong Ana Dam Site (Ban Le)	
	ESTABLISHED ON 18, March 1963	
	Concrete Post cast in Place	
J. B. M. 6	ELEVATION 415.750	
	LOCATION Ban Dray	
	ESTABLISHED ON 26 March 1963	
	Concrete Post cast in Place	
	ELEVATION	
	LOCATION	
	ESTABLISHED ON	

B.M. No.	DESCRIPTIONS	SKETCH
K-J 105	ELEVATION 384.2609	
	LOCATION	
	ESTABLISHED ON	
J. B. M. 17	ELEVATION 384.684	
	LOCATION Be situated in the Scattered trees	
	ESTABLISHED ON 31 January 1963	
	Concrete post cast in place	
J. B. M. 16	ELEVATION 374.644	
	LOCATION Be situated at the junction of old nationale route	
	ESTABLISHED ON 31 January 1963	
	Concrete post cast in place	
J. B. M. 15	ELEVATION 468.946	
	LOCATION Be situated at the junction of road from B.Dray	
	ESTABLISHED ON 26 March 1963	
	Concrete post cast in place	

B.M. No.	DESCRIPTIONS	SKETCH
J. B. M. 14	ELEVATION 451.156 LOCATION Be situated at the junction of road from B.TLO,B.Trap ESTABLISHED ON 27 March 1963 Concrete post cast in place	
J. B. M. 13	ELEVATION 428.426 LOCATION Ban Rung Village ESTABLISHED ON 27 March 1963 Concrete post cast in place	
J. B. M. 12	ELEVATION 417.762 LOCATION Ban Trap Village ESTABLISHED ON 26 March 1963 Concrete post cast in place	
	ELEVATION LOCATION ESTABLISHED ON	

B.M.	DIFFERENCE OF ELEVATION				ELEVATION	REMARKS
	1	2	1 − 2	MEAN		
No 139					422.696	B.M. No 139
TP 3	− 0.712	− 0.714	0.002	− 0.713	421.657	
〃 4	− 0.383	− 0.371	0.012	− 0.377	421.280	
II − 1	+ 2.414	+ 2.411	0.003	+ 2.412	423.692	
III − 1	+ 0.401	+ 0.400	0.001	+ 0.400	424.092	
〃 − 2	− 2.838	− 2.836	0.002	− 2.837	421.255	
III − 3	− 2.728	+ 2.726	0.002	+ 2.727	423.982	
B.M. 1	+ 1.084	+ 1.084	0.000	+ 1.084	425.066	
III − 3					423.982	
〃 − 4	− 3.732	− 3.745	0.013	− 3.738	420.244	
〃 − 5	− 1.066	− 1.062	0.004	− 1.064	419.180	
〃 − 6	+ 0.297	+ 0.300	0.003	+ 0.298	419.478	
〃 − 7	− 0.482	− 0.469	0.013	− 0.475	419.003	
III − 8	− 1.232	− 1.238	0.006	− 1.235	417.768	
B.M. 2	+ 1.759	+ 1.758	0.000	+ 1.758	419.526	

B.M. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ELEVATION	REMARKS
					m	
III− 8					417.768	
	m	m	m	m		
〃− 9	+ 1.966	+ 1.964	0.002	+ 1.965	419.733	
〃−10	+ 14.574	+ 14.571	0.003	+ 14.572	434.305	
〃−11	− 15.940	− 15.943	0.003	− 15.942	418.363	
III−12	− 0.414	− 0.316	0.005	− 0.318	418.225	
J.BM 3	+ 0.160	+ 0.160	0.000	+ 0.160	418.385	
					m	
TP 3					421.657	
I−1	− 2.095	− 2.094	0.001	− 2.094	419.563	
〃−2	+ 0.212	+ 0.205	0.007	+ 0.208	419.771	
〃−3	+ 0.616	+ 0.619	0.003	+ 0.618	420.389	
〃−4	+ 1.298	+ 1.299	0.001	+ 1.298	421.687	
〃−5	+ 1.927	+ 1.926	0.001	+ 1.926	423.613	
〃−6	− 1.256	− 1.264	0.008	− 1.260	422.353	
I−7	+ 1.003	+ 0.994	0.009	+ 0.999	423.352	
J.BM 5	+ 4.796	+ 4.795	0.001	+ 4.796	428.148	

B.M.		DIFFERENCE OF ELEVATION						ELEVATION	REMARKS
		1		2		1 − 2	MEAN		
Sohieu Kj.105								m. 384.260	B.M.K−J.105 is taken from the results of Viet−Nam Dia diem
		m		m		m	m		
105−1	−	1.817	−	1.823		0.006	− 1.820	382.441	
〃 −2	+	0.459	+	0.458		0.001	+ 0.459	382.900	
105−3	−	4.530	−	4.531		0.001	− 4.531	378.369	
TP17	+	5.915	+	5.917		0.002	+ 5.916	384.285	
J.BM 17	+	0.399	+	0.399		0.000	+ 0.399	384.684	
TP17								384.285	
17−1	−	4.065	−	4.072		0.007	− 4.069	380.216	
〃 2	−	1.138	−	1.135		0.003	− 1.137	379.079	
TP16	−	4.444	−	4.447		0.003	− 4.445	374.634	
J.BM 16	+	0.010	+	0.010		0.000	+ 0.010	374.644	
TP16								374.634	
16−1	+	3.606	+	3.611		0.005	+ 3.609	378.243	
〃 −2	+	15.189	+	15.187		0.002	+ 15.188	393.431	
〃 −3	+	48.311	+	48.317		0.006	+ 48.314	441.745	
16−4	+	20.214	+	20.218		0.004	+ 20.216	461.961	
TP15	+	7.050	+	7.054		0.004	+ 7.052	469.013	
J.BM 15	−	0.067	−	0.067		0.000	− 0.067	468.946	

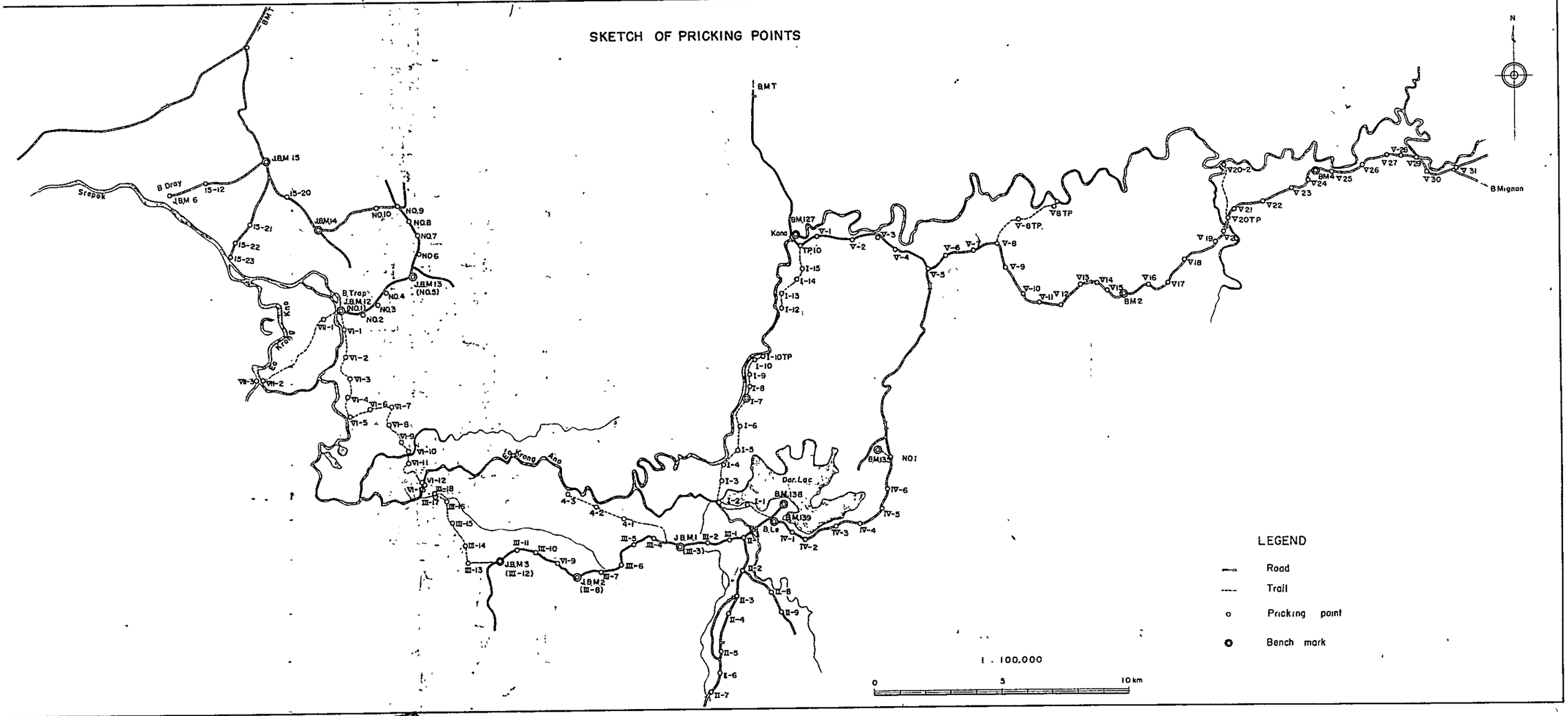
B.M. No.	DIFFERENCE OF ELEVATION 1		2		1 − 2		MEAN		ELEVATION	REMARKS
									m	
TP15									469.013	
15−1	−	3.395	−	3.399		0.004	−	3.397	465.616	
〃 −2	+	3.175	+	3.181		0.006	+	3.178	468.794	
〃 −3	+	2.725	+	2.726		0.001	+	2.726	471.520	
15−4	−	15.873	−	15.875		0.002	−	15.874	455.646	
TP14	−	4.462	−	4.460		0.002	−	4.461	451.185	
J.BM 14	−	0.029	−	0.029		0.000	−	0.029	451.156	
TP14									451.185	
14−1	+	2.507	+	2.506		0.001	+	2.506	453.691	
〃 −2	−	1.670	−	1.668		0.002	−	1.669	452.022	
TP10	−	6.975	−	6.972		0.003	−	6.974	445.048	
〃 9	−	6.518	−	6.514		0.004	−	6.516	438.532	
〃 8	−	15.932	−	15.933		0.001	−	15.932	422.600	
〃 7	+	1.215	+	1.216		0.001	+	1.216	423.816	
TP 6	−	7.274	−	7.278		0.004	−	7.276	416.540	
J.BM 13	+	11.881	+	11.890		0.009	+	11.886	428.426	

B.M. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ELEVATION	REMARKS
					m	
TP 6					416.540	
〃 5	+ 12.123	+ 12.128	0.005	+ 12.126	428.666	
〃 4	− 10.767	− 10.768	0.001	− 10.768	417.898	
〃 3	+ 13.310	+ 13.315	0.005	+ 13.312	431.210	
〃 2	− 8.954	− 8.957	0.003	− 8.956	422.254	
TP 1	− 6.032	− 6.029	0.003	− 6.030	416.224	
J.BM 12	+ 1.538	+ 1.537	0.001	+ 1.538	417.762	
TP15					469.013	
15−10	− 3.781	− 3.782	0.001	− 3.782	465.231	
〃 −11	− 11.969	− 11.969	0.000	− 11.969	453.262	
〃 −12	− 15.364	− 15.366	0.002	− 15.365	437.897	
〃 −13	− 12.335	− 12.328	0.003	− 12.331	425.566	
15−14	− 8.839	− 8.841	0.002	− 8.840	416.726	
J.BM 6	− 0.977	− 0.975	0.002	− 0.976	415.750	

RESULTS OF LEVELING

(PRICKING)

SKETCH OF PRICKING POINTS



RESULTS OF LEVELING

COURSE I

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
BM139							422.370	
TP3	-0.712	-0.714	0.002	-0.713			421.657	
TP	-1.473	-1.472	0.001	-1.472			420.185	Bridge
TP	+0.934	+0.934	0.000	+0.934			421.119	Root
I-1	-1.556	-1.556	0.000	-1.556			419.563	
I-2	+0.212	+0.205	0.007	+0.208			419.771	
I-3	+0.616	+0.619	0.003	+0.618			420.389	
I-4	+1.298	+1.299	0.001	+1.298			421.687	
I-5	+1.927	+1.926	0.001	+1.926			423.613	
I-6	-1.256	-1.264	0.008	-1.260			422.353	
TP	-2.512	-2.512	0.000	-2.512			419.841	Swamp
TP	+3.250	+3.243	0.007	+3.246			423.087	Root
TP	-6.426	-6.434	0.008	-6.430			416.657	W.L.
I-7	+6.696	+6.697	0.001	+6.696			423.353	
I-8	+0.732	+0.738	0.006	+0.735			424.088	
TP	-2.597	-2.597	0.000	-2.597			421.491	Root
TP	-1.215	-1.216	0.001	-1.216			420.275	Paddy field
I-9	+4.484	+4.482	0.002	+4.483			424.758	
I-10	+0.071	+0.068	0.003	+0.070			424.828	
TP1	-3.378	-3.376	0.002	-3.377			421.451	
TP2	-4.538	-4.535	0.003	-4.536			416.915	

+20.220 +20.211

-25.663 -25.676

- 5.443 - 5.465

- 5.465

0.022

$3^{cm}\sqrt{S(K)}=3\sqrt{10^{K}}$

$=3^{cm}_{x}\ 3$

$\doteq 0.090$

$= 0.022$

RESULTS OF LEVELING

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
TP-10							422.933	
I-15	-0.884	-0.881	0.003	-0.882			422.051	
I-14	+1.800	+1.781	0.019	+1.790			423.841	
I-13	-0.488	-0.493	0.005	-0.490			423.351	
TPI-12	-0.042	-0.029	0.013	-0.036			423.315	
I-12	-2.268	-2.268	0.000	-2.268			421.047	

RESULTS OF LEVELING

COURSE II

T P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
TP3							421.657	
TP4	-0.383	-0.371	0.012	-0.377			421.280	
TP	+2.096	+2.096	0.000	+2.096			423.376	Bridge
II-1	+0.318	+0.315	0.003	+0.316			423.692	
TP	+0.170	+0.172	0.002	+0.171			423.863	
II-2	+0.538	+0.540	0.002	+0.539			424.402	
No9TP	+2.715	+2.714	0.001	+2.714			427.116	
II-3	-2.487	-2.488	0.001	-2.488			424.628	
TP	+1.210	+1.207	0.003	+1.208			425.836	(II-4')
II-4	+0.691	+0.688	0.003	+0.690			426.526	
II-5	+11.462	+11.454	0.008	+11.458			437.984	
II-6	-3.831	-3.833	0.002	-3.832			434.152	
TP.	+0.827	+0.827	0.000	+0.827			434.979	Bridge
II-7	+4.059	+4.051	0.008	+4.055			439.034	
	+24.086	+24.064						
	- 6.701	- 6.692						
	+17.385	+17.372						
	17.372			$3^{(cm)}\sqrt{S\ (K)}=3^{(cm)}\sqrt{6}^{(K)}$				
	0.013			=0.030x2				
				=0.060				
				=0.013				
II-?							424.402	
II-8	-2.161	+2.161	0.000	+2.161			426.563	
II-9	+3.426	+3.432	0.006	+3.429			429.992	

RESULTS OF LEVELING

COURSE III

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
II-1							423.692	
TP	-2.663	-2.663	0.000	-2.663			421.029	Culvert
TP	-1.037	-1.037	0.000	-1.037			419.992	Paddy field
III-1	+4.101	+4.100	0.001	+4.100			424.092	
III-2	-2.838	-2.836	0.002	-2.837			421.225	
TP	-0.413	-0.417	0.004	-0.415			420.840	Culvert
TP	+0.583	+0.583	0.000	+0.583			421.423	
III-3	+2.558	+2.560	0.002	+2.559			423.982	
TP	-6.528	-6.533	0.005	-6.530			417.452	Paddy field
III-4	+2.796	+2.788	0.008	+2.792			420.244	
III-5	-1.066	-1.062	0.004	-1.064			419.180	
III-6	+0.297	+0.300	0.003	+0.298			419.478	
TP	+2.334	+2.337	0.003	+2.336			421.814	Bridge
III-7	-2.816	-2.806	0.010	-2.811			419.003	
III-8	-1.232	-1.238	0.006	-1.235			417.768	
III-9	+1.966	+1.964	0.002	+1.965			419.733	
TP	+4.015	+4.017	0.002	+4.016			423.749	
III-10	+10.559	+10.554	0.005	+10.556			434.305	
III-11	-15.940	-15.943	0.003	-15.942			418.363	
III-12	- 0.141	- 0.136	0.005	- 0.138			418.225	
III-13	+ 1.381	+ 1.387	0.006	+ 1.384			419.609	
III-14	- 1.855	- 1.855	0.002	- 1.854			417.755	
III-15	- 2.761	- 2.769	0.008	- 2.765			414.990	
III-16	- 0.210	- 0.218	0.008	- 0.214			414.776	
III-17	+ 0.483	+ 0.492	0.009	+ 0.488			415.264	
III-18	- 0.306	- 0.320	0.014	- 0.313			414.951	
	+31.073	+31.082						
	-39.806	-39.831		$3\sqrt{5}$	$3\sqrt[cm]{16}(K)$			
	- 8.733	- 8.749		$3^{cm} \times 4 = 0.120$				
	- 8.749							
	0.016				0.016			

RESULTS OF LEVELING

COURSE IV

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
BM135							425.013	
No.1	+0.009	+0.014	0.005	+0.012	2	-0.010	425.023	
IV-6	-0.075	-0.076	0.001	-0.076	3	-0.079	424.944	
IV-5	-3.161	-3.163	0.002	-3.162	3	-3.165	421.779	
TP	-1.899	-1.903	0.004	-1.901	2	-1.903	419.876	Paddy field
IV-4	+0.802	+0.808	0.006	+0.805	3	+0.802	420.678	
WL	-1.136	-1.134	0.002	-1.135	0	-1.135	419.543	
IV-3	+10.087	+10.087	0.000	+10.087	3	+10.084	429.627	
TD	- 9.330	- 9.330	0.000	- 9.330	3	- 9.333	420.294	Bridge
TD	- 0.575	- 0.574	0.001	- 0.574	0	- 0.574	419.720	Bridge
TD	+ 1.053	+ 1.050	0.003	+ 1.052	3	+ 1.049	420.769	Paddy field
IV-2	+ 7.689	+ 7.690	0.001	+ 7.690	0	+ 7.690	428.459	
IV-1	- 0.840	- 0.838	0.002	- 0.839	3	- 0.842	427.617	
BM139	- 5.243	- 5.245	0.002	- 5.244	3	- 5.247	422.370	
	+19.640	+19.649			0.028			
	-22.259	-22.263		+19.646			422.370	
	- 2.619	- 2.614		-22.261			425.013	
	2.614			- 2.615			- 2.643	
	0.005			- 2.643				
				- 0.028				

$$1.5\frac{(cm)}{\sqrt{8}}K$$

$$1.5 \times 2.8 = 4.2^{(cm)}$$

$$0.005$$

RESULTS OF LEVELING

COURSE V

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 — 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
BM127							421.974	
TP	+2.762	+2.765	0.003	+2.764			424.738	Bridge
TP10	-1.808	-1.802	0.006	-1.805			422.933	
V-1	-0.879	-0.882	0.003	-0.880			422.053	
V-2	+1.710	+1.713	0.003	+1.712			423.765	
V-3	-0.274	-0.291	0.017	-0.282			423.483	
V-4	+3.257	+3.269	0.012	+3.263			426.746	
V-5	+0.495	+0.502	0.007	+0.498			427.244	
V-6	+6.950	+6.961	0.011	+6.956			434.200	
V-7	-6.438	-6.445	0.007	-6.442			427.758	
V-8	+1.884	+1.886	0.002	+1.885			429.643	
V-9	+5.437	+5.435	0.002	+5.436			435.079	
V-10	-0.657	-0.665	0.008	-0.661			434.418	
V-11	+6.889	+6.890	0.001	+6.890			441.308	
V-12	+0.064	+0.062	0.002	+0.063			441.371	
V-13	-1.223	-1.232	0.009	-1.228			440.143	
V-14	-1.419	-1.409	0.010	-1.414			438.729	
BM2	+2.589	+2.593	0.004	+2.591			441.320	
V-15	+6.382	+6.383	0.001	+6.382			447.702	
V-16	-2.962	-2.958	0.004	-2.960			444.742	
V-17	-3.989	-3.977	0.012	-3.983			440.759	
V-18	-1.452	-1.452	0.000	-1.452			439.307	
V-19	-5.865	-5.858	0.007	-5.862			433.445	
V-20	-4.065	-4.005	0.010	-4.060			429.385	
V20TP	+1.937	+1.936	0.001	+1.936			431.321	
V-21	+4.136	+4.140	0.004	+4.138			435.459	
V-22	-4.466	-4.459	0.007	-4.462			430.997	
V-23	+8.987	+8.999	0.012	+8.993			439.990	
V-24	-9.931	-9.924	0.007	-9.928			430.062	
BM4	+0.752	+0.759	0.007	+0.756			430.818	
V-25	+0.501	+0.497	0.004	+0.499			431.317	

RESULTS OF LEVELING

COURSE VI

T P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
No.1							416.224	
VI-1	-1.531	-1.528	0.003	-1.530			414.694	
VI-2	-0.781	-0.779	0.002	-0.780			413.914	
VI-3	+1.691	+1.690	0.001	+1.690			415.604	
VI-4	+1.469	+1.472	0.003	+1.470			417.074	
VI-5	-0.846	-0.842	0.004	-0.844			416.230	
VI-6	-0.415	-0.410	0.005	-0.412			415.818	
VI-7	+2.466	+2.459	0.007	+2.462			418.280	
VI-8	+16.115	+16.119	0.003	+16.116			434.396	
VI-9	-5.396	-5.398	0.002	-5.397			428.999	
VI-10	-12.608	-12.609	0.001	-12.608			416.391	
VI-11	+1.938	+1.938	0.000	+1.938			418.329	
VI-12	-2.162	-2.164	0.002	-2.163			416.66	
VI-13	+0.084	+0.084	0.000	+0.084			416.250	
	+50.411	+50.420						
	-79.216	-79.213						
	28.805	28.793		1.5 S				
	28.793			$=1.5\ 16^{K}$				
	0.012			1.5 x 4 = 0.060				
				= 0.012				

RESULTS OF LEVELING

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
V-25							431.317	
V-26	+0.698	+0.704	0.006	+0.701			432.018	
V-27	+5.267	+5.276	0.009	+5.272			437.290	
V-28	-2.227	-2.225	0.002	-2.226			435.064	
V-29	+2.429	+2.442	0.013	+2.436			437.500	
V-30	-4.253	-4.248	0.005	-4.250			433.250	
V-31	+3.634	+3.635	0.001	+3.634			436.884	
	+66.760	66.847						
	-51.908	51.882						
	14.852	14.965						
	14.965			$3\sqrt{32}^{K}$				
	0.113							
				0.03 x 5				
				≒ 0.150				
				=0.113				

RESULTS OF LEVELING

T. P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
V-31							436.884	
TPV31	-0.506						437.390	
V-8							429.643	
TPV8	-5.485	-5.480	0.005	-5.482			424.161	
TPV8-1	+4.509	+4.520	0.011	+4.514			428.675	

RESULTS OF LEVELING

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
M−5							416.230	
TP1	− 2.396			− 2.396			413.834	
M−1							414.694	
△M7A	+ 0.747			+ 0.747			415.441	
△M3A							419.406	
TP4−1	− 1.701	− 1.682	0.019	− 1.692			417.714	
△M4	+ 0.371	+ 0.399	0.028	+ 0.380			418.094	
TP4−2	− 0.341	− 0.344	0.003	− 0.342			417.752	
△M4							418.094	
TP4−3	− 0.045	− 0.044	0.001	− 0.044			418.050	
III−11							418.363	
△M5A	− 2.119	− 2.119	0.000	− 2.119			416.244	
JBM 6							415.750	
1	−10.976	−10.981		−10.978			404.772	403.77
2	− 8.566	− 8.560		− 8.563			396.209	395.96
3	− 4.233	− 4.235		− 4.234			391.975	391.48

RESULTS OF LEVELING

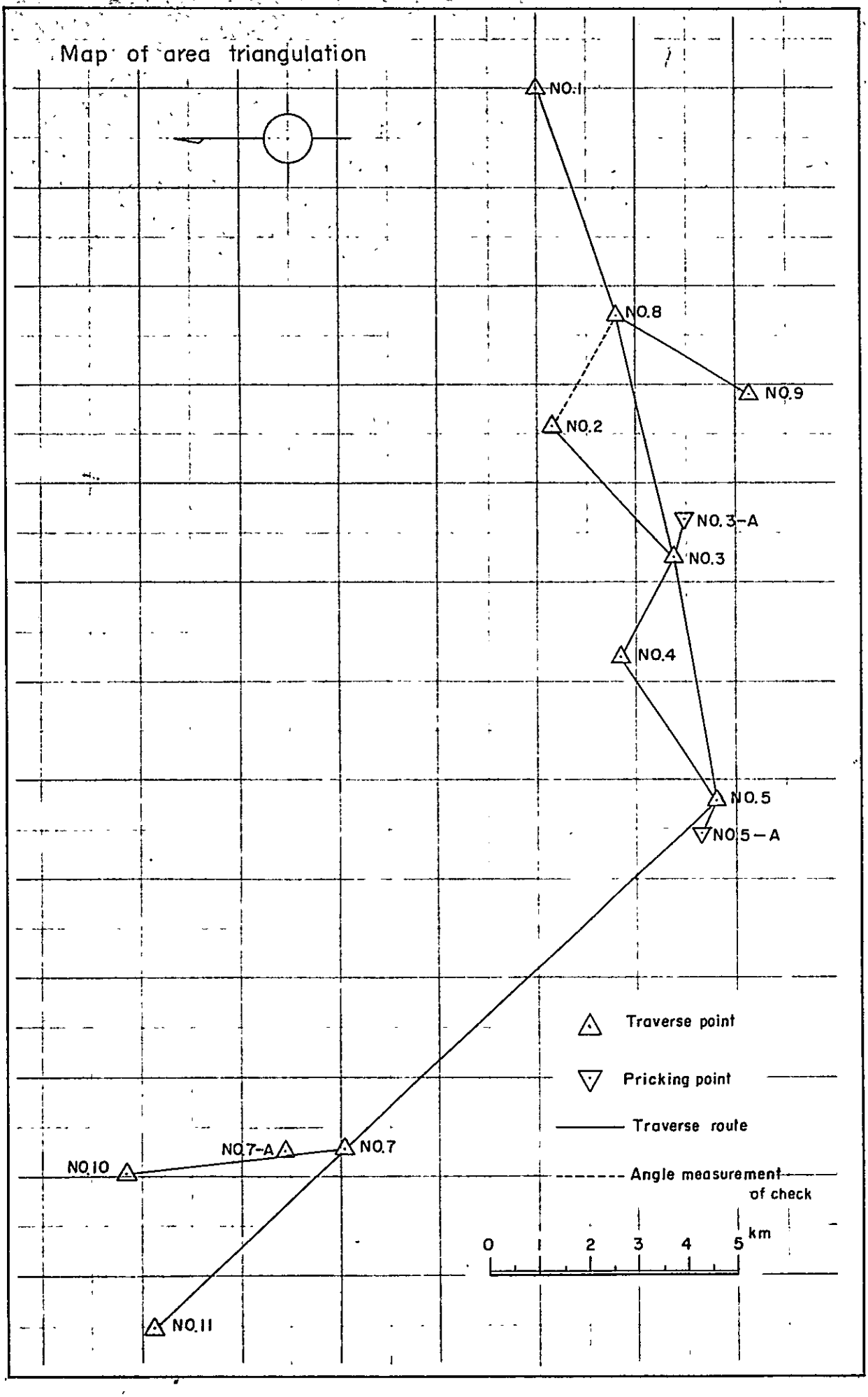
T P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
I−3							420.389	
△No.2	− 1.038	− 1.037	0.001	− 1.038			419.351	
I−1							419.563	
WL	− 1.062	− 1.065	0.003	− 1.064			418.499	
I−2							419.771	
WL	− 1.375	− 1.373	0.002	− 1.374			418.397	
I−4							421.687	
WL	− 5.288			− 5.288			416.399	
WD	− 1.600			− 1.600			414.799	
I−9							424.758	
WL	− 8.040			− 8.040			416.718	
TP1							421.451	
WL	− 4.683			− 4.683			416.768	
TP2							427.116	
WL	− 0.100			− 0.100			437.854	
△No.9 TP							494.061	
△No.9	+10.737	+10.740	0.003	10.738			493.778	
BM138								
△No.8	− 0.283			− 0.283				

RESULTS OF LEVELING

T.P. No.	DIFFERENCE OF ELEVATION 1	2	1 − 2	MEAN	ADJUST	ADJUSTED DIFFERENCE	ELEVATION	REMARKS
BM135							425.013	
△No.1	+ 0.009	+ 0.014	0.005	+ 0.012			425.025	
TD	+ 0.530	+ 0.534	0.004	+ 0.532			425.557	Bridge
WL	− 3.600						421.957	
WD	0.400						421.557	

Base Points Data

POINT NO	X	Y	H	REMARKS
△ No. 1	+ 20,000.00	+ 30,000.00	425.02	
△ No. 2	+ 19,691.10	+ 23,142.28	419.35	
△ No. 3	+ 17,247.94	+ 20,468.76	453.09	
△ No. 3A	+ 17,055.18	+ 21,273.94	419.41	
△ No. 4	+ 18,281.98	+ 18,528.33	418.09	
△ No. 5	+ 16,396.63	+ 15,560.47	538.84	
△ No. 5A	+ 16,726.68	+ 14,894.35	416.24	
△ No. 7	+ 23,925.74	+ 8,534.35	457.53	
△ No. 7A	+ 25,113.16	+ 8,491.26	415.44	
△ No. 8	+ 18,421.61	+ 25,382.09	493.78	
△ No. 9	+ 15,675.79	+ 23,842.00	437.85	
△ No. 10	+ 28,331.68	+ 8,069.95	414.81	
△ No. 11	+ 27,780.30	+ 4,906.86	413.76	


Map of area triangulation
NO.1
NO.8
NO.9
NO.2
NO.3-A
NO.3
NO.4
NO.5
NO.5-A
NO.7-A
NO.7
NO.10
NO.11
Traverse point
Pricking point
Traverse route
Angle measurement
of check
0
1
2
3
4
5
km

Computation of Triangulation

Triangulation point	X = km m cm + 20 000 00	Observer · H. Kusakari	Sketch
△ No. 1	Y = + 30 000 00	Recorder H. Kusakari	Road
	H = 425 02	Computer : H. Kusakari	

Angle station / Direction			1 Magnetic north C1 = - P1	2 △ No 8 C2 = = P2	3 C3 = = P3	4 C4 = = P4	5 C5 = = P5
Horizontal angle observation	I	R	0 00 00	251 07 51			
		L	00	44			
	II	R	00	50			
		L	00	42			
B0 = = C0	III	R					
B0 = = P0		L					
C0 = = P0	Mean		0 00 00	251 07 47			
Eccentric Correction	Angle station						
	Target						
Correction to zero	number						
Summation of correction							
Direction angle at central point							
Included angle							
Standard angle							
Direction angle							
Direction angle	Approx mean						
	Mean						
Side length	Approx						
	Mean						
Side length (from to) eccentric point							
Vertical angle				+ 0 53 48			
Sketch of target							
Target height			m cm	m cm 6 09	m cm	m cm	m cm
Instrument height				1 38			
Page to be refferred	Horizontal angle	Observation					
		Eccentricity I					
		II					
	Vertical angle						
	Target height						
	Direction angle						
	Side length	Approx					
		Accurate					
	Eccentric point						

Target and instrument height height from stone (peg) marker

B. Center of angle station C: Center of stone (peg) marker P. Center of target

Computation of Triangulation

Triangulation point	X = km m cm + 19 691 10	Observer : U. Kawakami	Sketch
△ No. 2	Y = + 23 142 28	Recorder N Kawakami	
	H = 419 35	Computer : N Kawakami	

Angle station \ Direction				1 △ No.8 C1 = = P1	2 △ No 3 C2 = = P2	3 △ No5 C3 = = P3	4 C4 = = P4	5 C5 = = P5
B0 = = C0 / B0 = = P0 / C0 = = P0	Horizontal angle observation	I	R	0 00 00	108 01 05	126 57 29		
			L	00	09	25		
		II	R	00	05	27		
			L	00	12	25		
		III	R					
			L					
	Mean			0 00 00	108 01 08	126 57 26		
Eccentric Correction	Angle station							
	Target							
Correction to zero	number							
Summation of correction								
Direction angle at central point								
Included angle								
Standard angle								
Direction angle								
Direction angle	Approx.mean							
	Mean							
Side length	Approx							
	Mean							
Side length (from to) eccentric point								
Vertical angle				+ 1 51 11	+ 0 35 40	+ 0 49 55		
Sketch of target								
Target height				m cm 6 09	m cm 7 10	m cm 7 95	m cm	m cm
Instrument height				1 38	1 38	1 38		
Page to be refferred	Horizontal angle	Observation						
		Eccentricity	I					
			II					
	Vertical angle							
	Target height							
	Direction angle Side length	Approx						
		Accurate						
		Eccentric point						

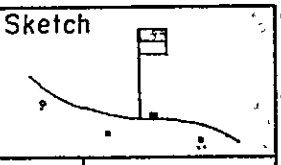
Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P. Center of target

Computation of Triangulation

Triangulation point	X = km m cm + 17 247 94	Observer : M. Kusaka
△ No. 3	Y = + 20 468 76	Recorder : K. Kawai
	H = 453 09	Computer : K. Kawai

Sketch



Direction / Angle station				1 △ No 8 C1 = = P1	2 △ No 3A C2 = = P2	3 △ No. 5 C3 = = P3	4 △ No. 4 C4 = = P4	5 △ No. 2 C5 = = P5
Horizontal angle observation	I	R		0 00 00	26 53 51	183 35 44	221 29 09	331 00 41
		L		00	55	40	08	45
	II	R		00	50	45	07	46
		L		00	55	38	02	47
B0 = = C0	III	R						
B0 = = P0		L						
C0 = = P0	Mean			0 00 00	26 53 53	183 35 42	221 29 06	331 00 45
Eccentric Correction	Angle station							
	Target							
Correction to zero	number							
Summation of correction								
Direction angle at central point								
Included angle								
Standard angle								
Direction angle								
Direction angle	Approx.mean							
	Mean							
Side length	Approx.							
	Mean							
Side length (from to) eccentric point								
Vertical angle				+ 0 33 01	− 2 20 02	+ 1 02 20	− 0 46 45	− 0 25 02
Sketch of target								
Target height				m cm 6 09	m cm 1 38	m cm 7 95	m cm 6 90	m cm 9 73
Instrument height				1 38	1 38	1 38	1 38	1 38
Page to be refferred	Horizontal angle	Observation						
		Eccentricity	I					
			II					
	Vertical angle							
	Target height							
	Direction angle							
	Side length	Approx						
		Accurate						
		Eccentric point						

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P: Center of target

Computation of Triangulation

Triangulation point	X = km m cm + 18 281 98	Observer : J Kusakari	Sketch
△ No. 4	Y = + 18 528 33	Recorder : H Kusakari	
	H = 418 09	Computer : H Kusakari	

Angle station \ Direction	1 △ No.3 C1 = = P1	2 △ No.5 C2 = = P2	3 C3 = = P3	4 C4 = = P4	5 C5 = = P5
Horizontal angle observation I R	0 00 00	119 31 11			
I L	00	12			
II R	00	12			
II L	00	00			
III R					
III L					
B0 = = C0 / B0 = = P0 / C0 = = P0 Mean	0 00 00	119 31 10			
Eccentric Correction Angle station					
Eccentric Correction Target					
Correction number to zero					
Summation of correction					
Direction angle at central point					
Included angle					
Standard angle					
Direction angle					
Direction angle Approx.mean					
Direction angle Mean					
Side length Approx.					
Side length Mean					
Side length (from to) eccentric point					
Vertical angle	+ 1 02 40	+ 2 03 23			
Sketch of target					
Target height	m cm 7 10	m cm 7 95	m cm	m cm	m cm
Instrument height	1 38	1 38			
Page to be refferred: Horizontal angle Observation I					
Horizontal angle Eccentricity I					
Horizontal angle Eccentricity II					
Vertical angle					
Target height					
Direction angle Side length Approx.					
Direction angle Side length Accurate					
Direction angle Side length Eccentric point					

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P: Center of target

Computation of Triangulation

Triangulation point	X = km m cm	Observer · M Kusakari	Sketch
△ No. 5	X = + 16 396 63	Recorder · M Kusakari	
	Y = + 15 560 47	Computer : M Kusakari	
	H = 538 84		

Angle station \ Direction				1 △ No 3 C1 = = P1	2 △ No5A C2 = = P2	3 △ No7 C3 = = P3	4 △ No4 C4 = = P4	5 △ No2 C5 = = P5
B0 = = C0 / B0 = = P0 / C0 = = P0	Horizontal angle observation	I	R	0 00 00	216 11 50	236 49 18	337 24 63	346 21 28
			L	00	54	04	56	25
		II	R	00	49	11	61	23
			L	00	47	00	58	28
		III	R					
			L					
	Mean			0 00 00	216 11 50	236 49 08	337 25 00	346 21 26
Eccentric Correction	Angle station							
	Target							
Correction to zero	number							
Summation of correction								
Direction angle at central point								
Included angle								
Standard angle								
Direction angle								
Direction angle	Approx.mean							
	Mean							
Side length	Approx							
	Mean							
Side length (from to) eccentric point								
Vertical angle				− 0 56 42	− 9 22 09	− 0 27 19	− 1 53 50	− 0 48 16
Sketch of target								
Target height				m cm 7 10	m cm 1 38	m cm 8 45	m cm 6 90	m cm 9 73
Instrument height				1 38	1 38	1 38	1 38	1 38
Page to be refferred Direction angle	Horizontal angle	Observation						
		Eccentricity	I					
			II					
	Vertical angle							
	Target height							
Side length	Approx.							
	Accurate							
	Eccentric point							

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P: Center of target

Computation of Triangulation

Triangulation point	X = km m cm	Observer :	Sketch
	Y =	Recorder	
	H =	Computer :	

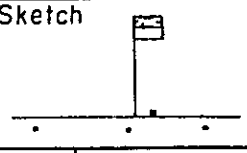
Angle station \ Direction	1 △ No 8 C1 = = P1	2 C2 = = P2	3 C3 = = P3	4 C4 = = P4	5 C5 = = P5
Horizontal angle observation I R	358 11 34				
I L	32				
II R	32				
II L	29				
III R					
III L					
$B_o = = C_o$					
$B_o = = P_o$					
$C_o = = P_o$ Mean	358 11 32				
Eccentric Angle station					
Correction Target					
Correction to zero number					
Summation of correction					
Direction angle at central point					
Included angle					
Standard angle					
Direction angle					
Direction angle Approx.mean					
Direction angle Mean					
Side length Approx					
Side length Mean					
Side length (from to) eccentric point					
Vertical angle	− 0 14 32				
Sketch of target					
Target height	m cm 6 09	m cm	m cm	m cm	m cm
Instrument height	1 38				
Page to be refferred: Horizontal angle Observation					
Horizontal angle Eccentricity I					
Horizontal angle Eccentricity II					
Vertical angle					
Target height					
Direction angle Side length Approx					
Direction angle Side length Accurate					
Eccentric point					

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P. Center of target

Computation of Triangulation

Triangulation point	X = km m cm + 23 925 74	Observer · J Kimura
△ No. 7	Y = + 8 534 35	Recorder J Kimura
	H = 457 53	Computer : N Nagasaki

Sketch 

Angle / Direction / station			1 △ No 5 C1 = = P1	2 △ No 11 C2 = = P2	3 △ No 10 C3 = = P3	4 △ No 7A C4 = = P4	5 C5 = = P5
Horizontal angle observation	I	R	0 00 00	179 45 36	217 00 18	221 13 43	
		L	00	34	14	41	
	II	R	00	34	18	47	
		L	00	28	08	42	
$B_0 = = C_0$	III	R					
$B_0 = = P_0$		L					
$C_0 = = P_0$	Mean		0 00 00	179 45 33	217 00 14	221 13 43	
Eccentric Correction	Angle station						
	Target						
Correction to zero	number						
Summation of correction							
Direction angle of central point							
Included angle							
Standard angle							
Direction angle							
Direction angle	Approx mean						
	Mean						
Side length	Approx						
	Mean						
Side length (from to) eccentric point							
Vertical angle			+ 0 23 30	− 0 26 24	− 0 28 56	− 2 01 56	
Sketch of target							
Target height			m cm 5 91	m cm 7 39	m cm 8 24	m cm 1 38	m cm
Instrument height			1 38	1 38	1 38	1 38	
Page to be refferred	Horizontal angle	Observation					
		Eccentricity I					
		II					
	Vertical angle						
	Target height						
	Side length Direction angle	Approx					
		Accurate					
		Eccentric point					

Target and instrument height height from stone (peg) marker

B. Center of angle station C: Center of stone (peg) marker P: Center of target

Computation of Triangulation

Triangulation point	X = km m cm + 18 421 61	Observer : [illegible]	Sketch
△ No. 8	Y = + 25 382 09	Recorder : [illegible]	
	H = 493 78	Computer : [illegible]	

Angle station \ Direction			1 △ No 1 $C_1 = = P_1$	2 △ No 9 $C_2 = = P_2$	3 △ No 3 $C_3 = = P_3$	4 $C_4 = = P_4$	5 $C_5 = = P_5$
$B_o = = C_o$	Horizontal angle observation	I R	0 00 00	138 09 24	185 26 07		
$B_o = = P_o$		I L	00	32	10		
$C_o = = P_o$		II R	00	26	07		
		II L	00	20	10		
		III R					
		III L					
	Mean		0 00 00	138 09 28	185 26 08		
Eccentric Correction	Angle station						
	Target						
Correction to zero	number						
Summation of correction							
Direction angle at central point							
Included angle							
Standard angle							
Direction angle							
Direction angle	Approx mean						
	Mean						
Side length	Approx						
	Mean						
Side length (from to) eccentric point							
Vertical angle			− 0 49 20	− 0 38 52	− 0 28 32		
Sketch of target							
Target height			m cm 6 82	m cm 9 17	m cm 7 10	m cm	m cm
Instrument height			1 38	1 38	1 48		
Page to be refferred	Horizontal angle	Observation					
		Eccentricity I					
		Eccentricity II					
	Vertical angle						
	Target height						
	Side length	Approx.					
	Direction angle	Accurate					
		Eccentric point					

Target and instrument height . height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P. Center of target

Computation of Vertical angle

Triangulation point	X = km m cm	Observer :	Sketch
△ No. 3A	X = + 17,055.18	Recorder	
	Y = + 21,273.94	Computer :	Road
	H = 419.41		

Angle station / Direction	1 △ No 3 C1 = = P1	2 C2 = = P2	3 C3 = = P3	4 C4 = = P4	5 C5 = = P5
Horizontal angle observation I R	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Horizontal angle observation I L					
Horizontal angle observation II R					
Horizontal angle observation II L					
Horizontal angle observation III R					
Horizontal angle observation III L					
$B_0 = = C_0$					
$B_0 = = P_0$					
$C_0 = = P_0$					
Mean					
Eccentric Correction: Angle station					
Eccentric Correction: Target					
Correction number to zero					
Summation of correction					
Direction angle at central point					
Included angle	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Standard angle	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Direction angle					
Direction angle: Approx.mean					
Direction angle: Mean					
Side length: Approx					
Side length: Mean					
Side length (from to) eccentric point					
Vertical angle	° ′ ″ + 2 19 28	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Sketch of target					
Target height	m cm 1.38	m cm	m cm	m cm	m cm
Instrument height	1.38				
Page to be referred: Horizontal angle Observation I					
Page to be referred: Horizontal angle Eccentricity I					
Page to be referred: Horizontal angle Observation II					
Page to be referred: Horizontal angle Eccentricity II					
Page to be referred: Vertical angle					
Page to be referred: Target height					
Page to be referred: Direction angle Side length Approx.					
Page to be referred: Direction angle Side length Accurate					
Page to be referred: Eccentric point					

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P. Center of target

Computation of Vertical angle

Triangulation point	X = km m cm	Observer :	Sketch
△ No. 5A	X = + 16,726.68	Recorder	
	Y = + 14,894.35	Computer :	
	H = 416.24		

Angle station \ Direction	1 △ No 5 C1 = = P1	2 C2 = = P2	3 C3 = = P3	4 C4 = = P4	5 C5 = = P5
Horizontal angle observation I R	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Horizontal angle observation I L					
Horizontal angle observation II R					
Horizontal angle observation II L					
Horizontal angle observation III R					
Horizontal angle observation III L					
B0 = = C0					
B0 = = P0					
C0 = = P0					
Mean					
Eccentric Correction Angle station					
Eccentric Correction Target					
Correction to zero number					
Summation of correction					
Direction angle at central point					
Included angle					
Standard angle					
Direction angle					
Direction angle Approx mean					
Direction angle Mean					
Side length Approx					
Side length Mean					
Side length (from to) eccentric point					
Vertical angle	+ 9 21 39				
Sketch of target					
Target height	m cm 1.38	m cm	m cm	m cm	m cm
Instrument height	1.38				
Page to be refferred Horizontal angle Observation I					
Page to be refferred Horizontal angle Eccentricity II					
Page to be refferred Vertical angle					
Page to be refferred Target height					
Page to be refferred Direction angle Side length Approx.					
Page to be refferred Direction angle Side length Accurate					
Page to be refferred Direction angle Side length Eccentric point					

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P. Center of target

Computation of Vertical angle

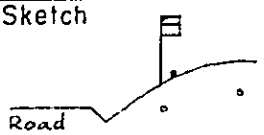
Triangulation point	X = km m cm + 25,113.16	Observer :	Sketch
△ N.º 7A	Y = + 8,491.26	Recorder :	
	H = 415.44	Computer :	

Angle / Direction / station			1 △ No.7 $C_1 = = P_1$	2 $C_2 = = P_2$	3 $C_3 = = P_3$	4 $C_4 = = P_4$	5 $C_5 = = P_5$
Horizontal angle observation	I	R	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
		L					
	II	R					
		L					
$B_o = = C_o$	III	R					
$B_o = = P_o$		L					
$C_o = = P_o$	Mean						
Eccentric Correction	Angle station						
	Target						
Correction to zero	number						
Summation of correction							
Direction angle at central point							
Included angle			° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Standard angle			° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Direction angle							
Direction angle	Approx.mean						
	Mean						
Side length	Approx						
	Mean						
Side length (from to) eccentric point							
Vertical angle			+ 2 01 33	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Sketch of target							
Target height			m cm	m cm	m cm	m cm	m cm
Instrument height			1.38				
			1.38				
Page to be refferred Horizontal angle	Observation						
	Eccentricity	I					
		II					
Vertical angle							
Target height							
Direction angle / Side length	Approx						
	Accurate						
	Eccentric point						

Target and instrument height : height from stone (peg) marker

B Center of angle station C : Center of stone (peg) marker P : Center of target

Computation of Vertical angle

Triangulation point	X = km m cm + 15,675.79	Observer	Sketch
△ No. 9	Y = + 23,842.00	Recorder	
	H = 437.85	Computer :	

Angle station / Direction	1 △ No. 8 C_1 = = P_1	2 C_2 = = P_2	3 C_3 = = P_3	4 C_4 = = P_4	5 C_5 = = P_5
Horizontal angle observation I R	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Horizontal angle observation I L					
Horizontal angle observation II R					
Horizontal angle observation II L					
B_o = = C_o Horizontal angle observation III R					
B_o = = P_o Horizontal angle observation III L					
C_o = = P_o Mean					
Eccentric Correction Angle station					
Correction to zero Target number					
Summation of correction					
Direction angle at central point					
Included angle	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Standard angle	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Direction angle					
Direction angle Approx mean					
Direction angle Mean					
Side length Approx					
Side length Mean					
Side length (from to) eccentric point					
Vertical angle	° ′ ″ + 1 10 42	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Sketch of target					
Target height	m cm 6,09	m cm	m cm	m cm	m cm
Instrument height	1 38				
Page to be refferred Horizontal angle Observation I					
Horizontal angle Eccentricity I					
Horizontal angle Observation II					
Horizontal angle Eccentricity II					
Vertical angle					
Target height					
Direction angle					
Side length Approx					
Side length Accurate					
Eccentric point					

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P: Center of target

Computation of Vertical angle

Triangulation point	X = km m cm	Observer :	Sketch
△ N.o. 10	+ 28,331.68	Recorder :	
	Y = ± 8,069.95	Computer :	
	H = 414.81		

Angle / Direction / station	1 △ No 7 $C_1 = = P_1$	2 $C_2 = = P_2$	3 $C_3 = = P_3$	4 $C_4 = = P_4$	5 $C_5 = = P_5$
Horizontal angle observation I R	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
I L					
II R					
II L					
III R					
III L					
$B_o = = C_o$					
$B_o = = P_o$					
$C_o = = P_o$					
Mean					
Eccentric Angle station					
Correction Target					
Correction number					
Correction to zero					
Summation of correction					
Direction angle at central point					
Included angle					
Standard angle	° ′ ″	°	° ′ ″	° ′ ″	° ′ ″
Direction angle					
Direction angle Approx mean					
Direction angle Mean					
Side length Approx					
Side length Mean					
Side length (from to) eccentric point					
Vertical angle	° ′ ″ + 0 37 42	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Sketch of target					
Target height	m cm 8.45	m cm	m cm	m cm	m cm
Instrument height	1.38				
Page to be refferred Horizontal angle Observation I					
Horizontal angle Eccentricity II					
Vertical angle					
Target height					
Direction angle Side length Approx					
Accurate					
Eccentric point					

Target and instrument height height from stone (peg) marker

B Center of angle station C: Center of stone (peg) marker P. Center of target

Computation of Vertical angle

Triangulation point	X = km m cm + 27,780.30	Observer	Sketch
△ No. 11	Y = + 4,906.86	Recorder	
	H = 413.76	Computer	

Angle station / Direction	1 △ No 7 C1 = = P1	2 C2 = = P2	3 C3 = = P3	4 C4 = = P4	5 C5 = = P5
Horizontal angle observation I R					
Horizontal angle observation I L					
Horizontal angle observation II R					
Horizontal angle observation II L					
Horizontal angle observation III R					
Horizontal angle observation III L					
B0 = = C0					
B0 = = P0					
C0 = = P0					
Horizontal angle observation Mean					
Eccentric Correction Angle station					
Eccentric Correction Target					
Correction to zero number					
Summation of correction					
Direction angle at central point					
Included angle					
Standard angle					
Direction angle					
Direction angle Approx.mean					
Direction angle Mean					
Side length Approx					
Side length Mean					
Side length (from to) eccentric point					
Vertical angle	+ 0 31 00				
Sketch of target					
Target height	m cm 8.45	m cm	m cm	m cm	m cm
Instrument height	1.38				
Page to be refferred Horizontal angle Observation I					
Page to be refferred Horizontal angle Eccentricity II					
Page to be refferred Vertical angle					
Page to be refferred Target height					
Page to be refferred Direction angle Side length Approx					
Page to be refferred Direction angle Side length Accurate					
Page to be refferred Direction angle Eccentric point					

Target and instrument height : height from stone (peg) marker

B: Center of angle station C: Center of stone (peg) marker P. Center of target

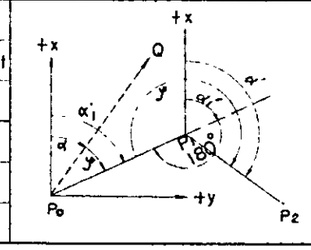
Computation of Traversing

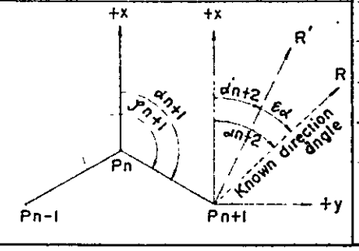
Accuracy | Closue error | Direction angle / Coordinate | m cm | n = / [Sn] = | Tolerance | m cm | good · Not / good · Not

Angle station		Direction / Direction	Direction angle / Included angle / Derection angle	Correction / Included angle / Direction angle	Element of computation / Side longht / Correction of direction angle	Coardinate difference (Δx, Δy) / log Sn / (log) cos δn / log Δx	log Sn / (log) sin δn / log Δy	Correction / Δxn / Correction of Δx / Corrected of δxn	Δyn / Correction of Δy / Corrected of δyn	Corrected coordinate / Lat. / δ xn / xn + 1	Dep / δ yn / yn + 1	Angle station
			180 0 0		0							
No. 1		Magnetic north	0 00 00.									
		No 8	251 07 47.		4880.21					+ 20,000.00.	+ 30,000.00.	No 1
			251 07 47.		251 07 47.	.323427	.946253					
			180 0 0		0							
No. 8		No 1	71 07 47.					- 1578.39.	- 4617.91.	- 1578.39.	- 4.617.91.	
		No. 3	185 26 08.		5,051.56.					+ 18,421.61.	+ 25.382.09.	No 8
			256 33 55.		256 33 55.	.232338	.972636					
			180 0 0		0							
No. 3		No 8	76 33 55.					- 1173.67.	- 4913.33.	- 1,173.67.	- 4.913.33.	
		No. 5	183 35 42.		4.981.57.					+ 17,247.94.	+ 20.468.76.	No 3
			260 09 37.		260 09 37.	.170892	.985290					
			180 0 0		0							
No 5		No 3	80 09 37.					- 851.31.	- 4908.29.	- 851.31.	- 4,908.29.	
		No. 7	236 49 08.		10,298.25.					+ 16,396.63.	+ 15,560.47.	No 5
			316 58 45.		316 58 45.	.731106	.682264					
			180 0 0		0							
No 7		No 5	136 58 45.					+ 7,529.11.	- 7,026.12.	+ 7,529.11.	- 7.026.12.	
		No 11	179 45 33.		5,293.05.					+ 23,925.74.	+ 8,534.35.	No 7
			316 44 18.		316 44 18.	.728231	.685331					
			180 0 0		0							
								+ 3,854.56.	- 3,627.49.	+ 3,854.56.	- 3,627.49.	
										+ 27,780.30.	+ 4,906.86.	No 11
		Known direction angle	180 0 0	[Sn] km m cm	0							
		Closur error	εα					[Δx] or [Δy]				
		Nos of angle station	(n+2)					Dx or Dy				
		Mean correction	εα/(n+2)					Closure error	εx	εy		CP
			Point					Nos of side (n+1)				S.P
								Mean correction				known coordinate
											Dx	Dy

Pege to be reffe-rred

Known direction angle	GE-3
Included angle	GD-3 / GE-4, GE-4-1
Side length	GD-5 GD-5-1 / GE-4 GE-4-1





Note C.P Closing point S P Starting point

εx = computation of Derection angle − Known Derection angle

Δxn = Sn cos αn

Δyn = Sn sin αn

εx = (Δx) − Dx εy = (Δy) − Dy xn+1 = xn + δxn yn+1 = yn + δyn

Computation of Traversing

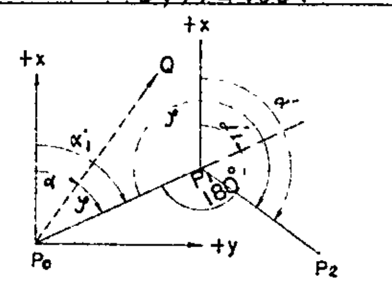
Accuracy	Closure error	Direction angle	° ′ ″	n =	Tolerance	° ′ ″	good · Not
		Coordinate	m cm	[Sn] =		m cm	good · Not

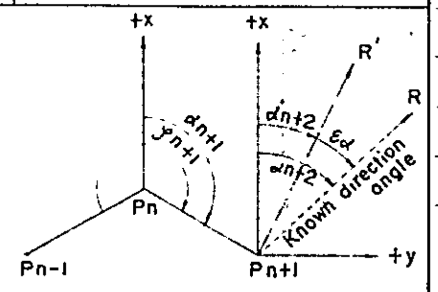
Angle station	Direction / Direction	Direction angle / Included angle / Derection angle	Correction: Included angle / Direction angle	Element of computation: Side longht / Correction of direction angle	Coordinate difference (Δx, Δy): log Sn / (log) cos αn / log Δx	log Sn / (log) sin αn / log Δy
		180 0 0		0		
No 3	No 8	76 33 55				
		221 29 06	08	2198.28		
	No 4	298 03 01	03 09	298 03 09	.470281	.882517
		180 0 0		0		
No 4	No 3	118 03 01				
		119 31 10	09	3,516.10		
	No 5	237 34 11	34 28	237 34 28	.536203	.844089
		180 0 0		0		
No 5	No 4	57 34 11				
		22 35 00	09			
	No 3	80 09 11	09 37	80 09 37		
		180 0 0		0		
		180 0 0		0		
		180 0 0		0		
		180 0 0		0		
Known direction angle		80 09 37	[Sn]	5,714.88		

Closur error	εα − 26″		
Nos of angle station	(n+2)	Point	
Mean correction	εα/(n+2)		

Page to be refferred:

Known direction angle	GE-3
Included angle	GD-3, GE-4, GE-4-1
Side length	GD-5, GD-5-1, GE-4, GE-4-1





Correction: Δxn / Correction of Δx / Corrected of δxn	Δyn / Correction of Δy / Corrected of δyn	Corrected coordinate: Lat / δxn / xn+1	Dep / δyn / yn+1	Angle station
±1,034.04	−1,940.46	+ 17,247.94	+ 20,468.76	No 3
00	+ 03			
+1,034.04	−1,940.43	+ 1,034.04	− 1,940.43	
−1,885.34	−2,967.90	+ 18,281.98	+ 18,528.33	No 4
− 01	+ 04			
−1,885.35	−2,967.86	− 1,885.35	− 2,967.86	
		+ 16,396.63	+ 15,560.47	No 5

	m cm	m cm	km m cm	km m cm	
[Δx] or [Δy]	−851.30	−4908.36			
Dx or Dy	−851.31	−4908.29			
Closure error	εx +0.01	εy −0.07	+ 16,396.63	+ 15,560.47	CP No5
Nos of side (n+1)			+ 17,247.94	+ 20,468.76	S.P No3
Mean correction			Dx − 851.31	Dy − 4,908.29	Known coordinate

Note C.P. Closing point S P Starting point

εx = computation of Derection angle − Known Derection angle

$\Delta x_n = S_n \cos \alpha_n$

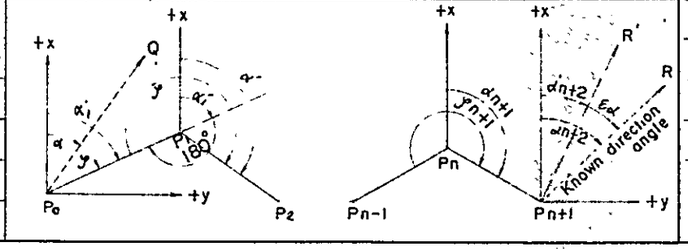
$\Delta y_n = S_n \sin \alpha_n$

$\varepsilon x = (\Delta x) - Dx$ $\varepsilon y = (\Delta y) - Dy$ $x_{n+1} = x_n + \delta x_n$ $y_{n+1} = y_n + \delta y_n$

Computation of Traversing

Accuracy	Closue error	Direction angle		n =	Tolerance		good · Not
		Coordinate	m cm	[Sn] =		m cm	good · Not

Angle station		Direction / Direction	Direction angle / Included angle / Derection angle	Correction / Included angle / Direction angle	Element of computation / Side lenght / Correction of direction angle	Coardinate difference (Δx, Δy) log Sn (log) cos αn log Δx	log Sn (log) sin αn log Δy	Correction Δxn / Correction of Δx / Corrected of δxn	Δyn / Correction of Δy / Corrected of δyn	Corrected coordinate Lat. δxn xn+1	Dep. δyn yn+1	Angle station
			180 0 0		0							
No 8		No 1	71 09 47.					m cm	m cm	km m cm	km m cm	
		No 9	138 09 28.		3148.24.					+ 18,421.61.	+ 25,382.09.	No 8
			209 17 15.		209 17 15.	.872174	.489192					
			180 0 0		0			-2,745.82	-1,540.09	- 2,745.82.	- 1,540.09.	
					m cm					+ 15,675.79.	+ 23,842.00.	No 9
			180 0 0		0							
					m cm							
			180 0 0		0							
No 3		No 8	26 33 55.		m cm							
		No. 2	331 09 45.		3.621.71.	.674589	.738194			+ 17,247.94.	+ 20,468.76.	No 3
			47 34 40.		47 34 40.							
			180 0 0		0			+2443.16.	+2,673.52.	+ 2,443.16.	+ 2,673.52.	
					m cm							
			180 0 0		0					+ 19,691.10.	+ 23,142.28.	No 2
					m cm							
		Known direction angle	180 0 0		0							
				[Sn]	km m cm							
		Closur error	εα					[Δx] or [Δy]				
		Nos of angle station	(n+2)	Point				Dx or Dy				
		Mean correction	εα/(n+2)					Closure error	εx	εy		CP
								Nos of side (n+1)				SP
Pege to be reffe-rred		Known direction angle	GE-3					Mean correction			Dx	Dy
		Included angle	GD-3 GE-4, GE-4-1									Known coordinate
		Side length	GD-5, GD-5-1 GE-4 GE-4-1									



Note C.P. Closing point S P Starting point

εx = computation of Derection angle − Known Derection angle

Δxn = Sn cos αn

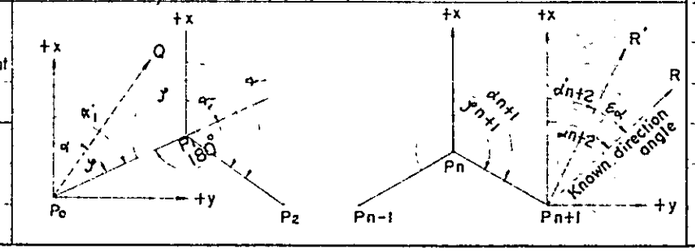
Δyn = Sn sin αn

εx = (Δx) − Dx εy = (Δy) − Dy xn+1 = xn + δxn yn+1 = yn + δyn

Computation of Traversing

Accuracy	Closue error: Direction angle	m cm	n =	Tolerance	"	m cm	good · Not
	Coordinate		[Sn] =				good · Not

Angle station		Direction / Direction	Direction angle: Included angle / Derection angle	Correction: Included angle / Direction angle	Element of computation: Side longht / Correction of direction angle	Coordinate difference (Δx, Δy): log Sn (log) cos αn / log Δx	log Sn (log) sin αn / log Δy	Correction: Δxn / Correction of Δx / Corrected of δxn	Δyn / Correction of Δy / Corrected of δyn	Corrected coordinate: Lat. δ xn / xn+1	Dep δ yn / yn+1	Angle station
			° ′ ″	″	° ′ ″			m cm	m cm	km m cm	km m cm	
No 7			180 0 0		0							
		No 5	136 58 45.									
		No 10	217 00 14.		4430.35.					+ 23,925.74.	+ 8,534.35.	No 7
			353 58 59.		353 58 59.	.994490	.104823					
			180 0 0		0			+4,405.94.	- ,464.40.	+ 4,405.94.	- ,464.40.	
					m cm							
					° ′ ″					+ 28,331.68.	+ 8,069.95.	No 10
			180 0 0		0							
					m cm							
					° ′ ″							
No 3		No. 8	180 0 0		0							
			76 33 55.		m cm							
		No 3A	26 53 53.		827.93.					+ 17,247.94.	+ 20,468.76.	No 3
			103 27 48.		103 27 48.	.232823	.972519					
			180 0 0		0			- ,192.76.	+ ,805.18.	- ,192.76.	+ ,805.18.	
					m cm							
					° ′ ″					+ 17,055.18.	+ 21,273.94.	No 3A
			180 0 0		0							
					m cm							
					° ′ ″							
		Known direction angle	180 0 0	[Sn]	km m cm 0			[Δx] or [Δy]	m cm	m cm		
		Closur error	εd					Dx or Dy				
		Nos of angle station	(n+2) Point					Closure error	εx	εy		C.P
		Mean correction	εd/(n+2)					Nos of side (n+1)				S.P
Pege to be reffe-rred		Known direction angle	GE-3					Mean correction	m cm	m cm	km m cm Dx	km m cm Dy	known coordinate
		Included angle	GD-3									
			GE-4, GE-4-1									
		Side length	GD-5 GD-5-1									
			GE-4 GE-4-1									



Note C.P Closing point S P Starting point

εx = computation of Derection angle − Known Derection angle

Δxn = Sn cos αn

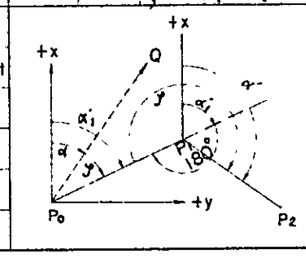
Δyn = Sn sin αn

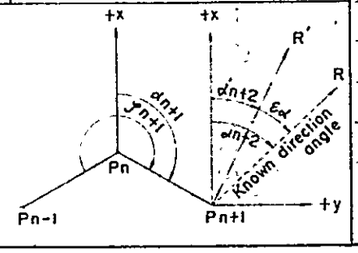
εx = (Δx) − Dx εy = (Δy) − Dy xn+1 = xn + δxn yn+1 = yn + δyn

Computation of Traversing

Accuracy	Closue error	Direction angle	m cm	n =	Tolerance	"	m cm	good · Not
		Coordinate		[Sn] =				good · Not

Angle station		Direction / Direction	Direction angle / Included angle / Derection angle	Correction: Included angle / Direction angle	Element of computation: Side lenght / Correction of direction angle	Coordinate difference (Δx, Δy): log Sn / (log) cos αn / log Δx	log Sn / (log) sin αn / log Δy	Correction: Δxn / Correction of Δx / Corrected of δxn	Δyn / Correction of Δy / Corrected of δyn	Corrected coordinate: Lat δ xn / xn + 1	Dep. δ yn / yn + 1	Angle station
			180 0 0		0							
No 5		No 3	80 09 37.									
		No 5A	216 11 50.		743.41					+ 16,396.63	+ 15,560.47	No. 5
			296 21 27.		296 21 27.	.443971	.896041					
			180 0 0		0			+ ,330.05	− ,666.12	+ ,330.05	− ,666.12	
					m cm					+ 16,726.68	+ 14,894.35	No. 5A
			180 0 0		0							
					m cm							
			180 0 0		0							
No 7		No 5	136 58 45.									
		No 7A	221 13 43.		1,188.00					+ 23,925.74	+ 8,534.35	No 7
			358 12 28.		358 12 28.	.999511	.036275					
			180 0 0		0			+ 1,187.42	− ,43.09	+ 1,187.42	− ,43.09	
					m cm					+ 25,113.16	+ 8,491.26	No 7A
			180 0 0		0							
					m cm							
		Known direction angle	180 0 0		0							
				[Sn]	km m cm							
		Closur error	εα									
		Nos of angle station	(n+2)		Point							
		Mean correction	εα/(n+2)									
Pege to be reffe-rred		Known direction angle	GE-3									
		Included angle	GD-3									
			GE-4 GE-4-1									
		Side length	GD-5, GD-5-1									
			GE-4 GE-4-1									





[Δx] or [Δy]	m cm	m cm	km m cm	km m cm	C.P
Dx or Dy					S.P
Closure error	εx	εy			known coordinate
Nos of side (n+1)					
Mean correction	m cm	m cm	Dx	Dy	

Note C.P Closing point S P Starting point

εx = computation of Derection angle − Known Derection angle

Δxn = Sn cos αn

Δyn = Sn sin αn

εx = (Δx) − Dx εy = (Δy) − Dy xn+1 = xn + δxn yn+1 = yn + δyn

Elevation computation

Unknown point	(1)	△ No 3A			△ No. 5A			△ No. 7A	
Known point	(2)	△ No. 3			△ No 5			△ No 7	
Method of survey									
Vertical angle	θ	+ 2 19 45	° ' "		+ 9 21 54	° ' "		+ 2 01 44	° ' "
Side length		827 93	m cm	m cm	743 41	m cm	m cm	1188 00	m cm
log tan θ		.040674			.164921			035426	
log S.									
log h									
Diff of height	h	+ 33 68	m cm	m cm	+ 122 60	m cm	m cm	+ 42 09	m cm
E C and R.	K								
Instrument height	i	+ 2 76			+ 2 76			+ 2 76	
Target height	f	− 2 76			− 2 76			− 2 76	
El of known point	H1	+ 419 41	+		+ 416 24	+		+ 415 44	
El. of unknown point	H2	453 09			538 84			457 53	
Mean									
Correction value									
Determined value			m cm	m cm		m cm	m cm		m cm
Page to be refferred	θ (GE-2)								
	log S (GE-2)								
	i (GE-2)								
	f (GE-2)								
	H (GE-2)								
Unknown point	(1)								
Known point	(2)								
Method of survey									
Vertical angle	θ		° ' "	° ' "		° ' "	° ' "		° ' "
Side length			m cm	m cm		m cm	m cm		m cm
log tan θ									
log S.									
log h									
Diff. of height	h		m cm	m cm		m cm	m cm		m cm
E.C and R.	K								
Instrument height	I								
Target height	f								
El of known point	H1	+		+		+		+	
El. of unknown point	H2								
Mean									
Correction value									
Determined value			m cm	m cm		m cm	m cm		m cm
Page to be refferred	θ (GE-2)								
	log S (GE-2)								
	i (GE-2)								
	f (GE-2)								
	H (GE-2)								

Note $H_2 = \pm S \tan\theta \pm K \mp (f - i) + H_1$

COMPUTATION OF ECCENTRICITY

Station	Deflection	Azimuth	Distance	cos	sin.	Lat x	Dep y	Coordinates LAT, (X)	Coordinates DEP, (Y)	Station
No.1								+ 20.000.00	+ 30,000.00	No.1
P 1		177° 00′	16.00	.998 630	.052 336	- 15.98	+ 0.84	+ 19,984.02	+ 30,000.84	P 1
P 2		345° 10′	39.70	.966 675	.256 008	+ 38.38	- 10.10	+ 20,038.00	+ 29,989.84	P 2
No.2								+ 19,691.00	+ 23,142.00	No.2
P 1		139° 10′	57.70	.756 615	.653 861	- 43.66	+ 37.73	+ 19,647.44	+ 23,180.01	P 1
P 2		290° 20′	55.04	.347 481	.937 687	+ 19.12	- 51.61	+ 19,710.22	+ 23,090.67	P 2
P 3		314° 00′	54.09	.694 658	.719 340	+ 37.57	- 38.91	+ 19,728.67	+ 23,103.37	P 3
No.4								+ 18,294.82	+ 18,528.33	No.4
P 1		22° 00′	13.85	.927 184	.374 607	+ 12.84	+ 5.19	+ 18,294.82	+ 18,533.52	P 1
P 2		40° 50′	37.10	.756 615	.653 861	+ 28.07	+ 24.26	+ 18,310.o5	+ 18,552.59	P 2
P 3		88° 50′	5.30	.020 361	.999 793	+ 0.11	+ 5.30	+ 18,282.09	+ 18,533.63	P 3
No.7A								+ 25,113.16	+ 8,491.26	No.1
P1		205° 20′	7.05	.903 834	.427 884	- 6.37	- 3.02	+ 25,106.79	+ 8,488.24	P 1
P2		284° 10′	8.95	.244 743	.969 588	+ 2.19	- 8.68	+ 25,115.35	+ 8.482.58	P 2
No.10								+ 28,331.68	+ 8,069.95	No.10
P1		189° 00′	65.40	.987 688	.156 434	- 64.59	- 10.23	+ 28,267.09	+ 8,059.72	P 1
P2		208° 30′	68.35	.878 817	.477 159	- 60.07	- 32.61	+ 28,271.61	+ 8,037.34	P 2
No.11								+ 27,780.30	+ 4,906.86	No.11
P1		42° 20′	7.30	.739 239	.673 443	+ 5.40	+ 4.92	+ 27,785.70	+ 4,911.78	P 1
P2		135° 20′	42.00	.711 209	.702 981	- 29.87	+ 29.53	+ 27,750.43	+ 4,936.39	P 2
P3		341° 30′	2.50	.948.324	.317 305	+ 2.37	- 0.79	+ 27,782.67	+ 4,906.07	P 3

Station	Deflection	Azimuth	Distance	cos	sin.	Lat	Dep	Goordinates		Station
						x	y	Lat. (X)	DEP. (Y)	
No.5A								+ 16.726.68	+ 14.894.35	No.5A
P 1		163° 50′	7.85	.960.456	.278.432	- 7.54	+ 2.18	+ 16.719.14	+ 14.896.53	P 1
P 2		205° 50	17.70	.900.005	.435.755	-15.93	- 7.71	+ 16.710.75	+ 14.886.64	P 2
No.8								+ 18.421.61	+ 25.382.09	No.8
P 1		274° 40′	17.70	.081.359	.996.685	+ 1.44	-17.64	+ 18.423.05	+ 25.364.45	P 1
P 2		340° 10′	20.30	.940.684	.339.285	+ 19.10	- 6.89	+ 18.440.71	+ 25.375.20	P 2
No.9								+ 15.675.79	+ 23.842.00	No.9
P 1		102° 20′	18.10	.213.599	.976.921	- 3.87	+17.68	+ 15.671.92	+ 23.859.68	P 1
P 2		133° 10′	7.00	.684.123	.729.367	- 4.79	+ 5.10	+ 15.671.00	+ 23.847.10	P 2
P 3		249° 50′	6.60	.344.752	.938.694	- 2.28	- 6.20	+ 15.673.51	+ 23.835.80	P 3

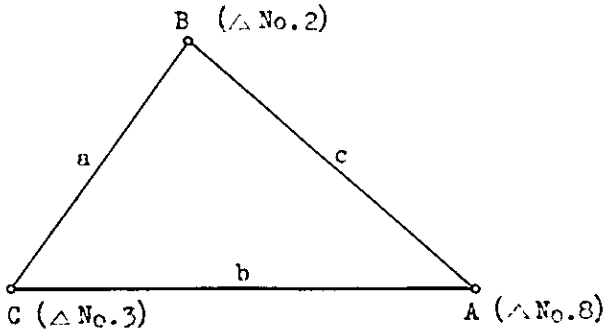
Target height & Base point elevation

Base point	Target height	Base point elevation	REMARKS
△ No. 1	6.82	425.02	
" 2	9.73	419.35	
" 3-A	7.10	453.09	
" 3-A		419.41	
" 4	6.90	418.09	
" 5	5.91	538.84	
" 5-A		416.24	
" 7	8.45	457.53	
" 7-A		415.44	
" 8	6.09	493.78	
" 9	9.17	437.85	
" 10	8.24	414.81	
" 11	7.39	413.76	

Computation of vertical angle for Tellurometer

Siding Master — Remort	Vertical angle	Approx. dis.	Correction	Determined value
△ No.1 - △ No.8	- 0° 49' 50"	4,881,19	- 230 "	- 0° 53' 40"
" 2 - " 3	- 0 25 02	3,622,14	- 475	- 0 32 57
" 9 - " 8	- 0 58 52	3,149.08	- 510	- 1 07 22
" 3 - " 8	- 0 28 36	5,052.18	- 234	- 0 32 30
" 4 - " 3	- 0 46 45	2,199.23	- 518	- 0 55 23
" 4 - " 5	- 1 53 50	3,518.51	- 324	- 1 59 14
" 3 - " 5	- 0 56 42	4,985.02	- 287	- 1 00 39
" 7 - " 10	+ 0 37 42	4,430.83	- 239	+ 0 32 13
" 7 - " 11	+ 0 31 00	5,294.55	- 275	+ 0 26 25
" 7 - " 7A	+ 2 21 38	1,188.82	- 1227	+ 2 01 11
" 5 - " 7	+ 0 23 30	10,299.20	- 91	+ 0 21 59

Computation of Triangle



∠ A =	42°	59'	37"	. . . . Supplementary. angle
∠ B =	108	01	08	
∠ C =	28	59	15	
	180	00	00	

a = 3, 621. 71 b = 5, 051. 56

sin ∠ A = 681 916

sin ∠ B = 905 955

sin ∠ C = 484 619

$$\frac{b}{\sin B} = \frac{a}{\sin A}$$

$$\sin A = \frac{a \cdot \sin B}{b} = 681\ 786$$

681 916

681 786

130 . . . . . Difference of antilograrithm

$$\frac{b}{\sin B} = 5712.092$$

a = 3622. 40 3622. 40

3621. 71

Difference of distance 0. 69

Computation of Tellurometer

Survey station △ No. 1 (M : No3, Kokusai)
△ No. 8 (R : No2, Kokusai)

26 - 2 - 1963
Weathes

	NO	CAVITY	A+ / A−	(A+)−(A−) u	A+R / A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
Accurate reading I	1		75.5		26.5			
		2.0	26.5	49.0	77.5	49.0	49.0	74.5
	2		75.0		28.5			
		4.0	28.0	47.0	78.5	50.0	48.5	74.2
	3		75.5		26.5			
		6.0	26.0	49.5	78.0	48.5	49.0	74.5
	4		76.5		27.5			
		8.0	26.5	50.0	78.5	49.0	49.5	74.8
	5		76.5		26.5			
		10.0	25.5	51.0	77.5	49.0	50.0	75.0
	6		76.0		26.5			
		12.0	26.5	49.5	76.5	50.0	49.8	74.9
	7		75.5		26.0			
		14.0	26.0	49.5	76.5	49.5	49.5	74.8
	8		79.0		26.5			
		16.0	26.5	52.5	75.5	51.0	51.8	75.9
	9		77.0		26.5			
		18.0	25.5	51.5	76.5	50.5	51.0	75.5
	10		75.0		24.0			
		20.0	23.5	51.5	75.5	48.5	50.0	75.0
	11							
	12							
	Mean =							74.91
Accurate reading II	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	T = Mean / Total mean =							

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	25.0	20.0	
II	26.0	19.5	
Mean	25.5	19.8	

tc − tc' = 5.7 ° dp = − mmHg

Beginning time 10h 3m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
76.0			
43.0	49.0	18.10	20.0
33.0	27.0	58.0	52.0

mμs
T1 = 32576,00

Ending time 10h 13m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
76.0			
43.0	50.0	19.0	24.0
33.0	26.0	57.0	52.0

mμs
T1 = 32576,00

K = −0, (|k|<5)
T'/10^7 = 0.0 (T<2×10)
ΔT = π = −0, (ΔT=0)
mμs
T' =
ΔT = 0'
T = 3257K.91

Remarks

Instrument height
M = 1.38
R = 1.58

Calculation of distance

a'(No8−No1) =	− 0 53 40
a' =	− 53.7
0.291 a' =	− 15.6
0.291D (km) =	− 76.m1
H (No 8) =	493.8
H (No 1) =	417.7

K =	1.00000000
	0.999
δ =	−0,000
Δ = δ10^3 =	

e

e' =	+ 17.2
A =	− 2.9
B =	− 0.1
C =	− 0.0
e =	14.2

n'

I =	+ 264
=	+ 78
III =	− 0
n'10^3 =	− 342
n' =	0.342

D

m

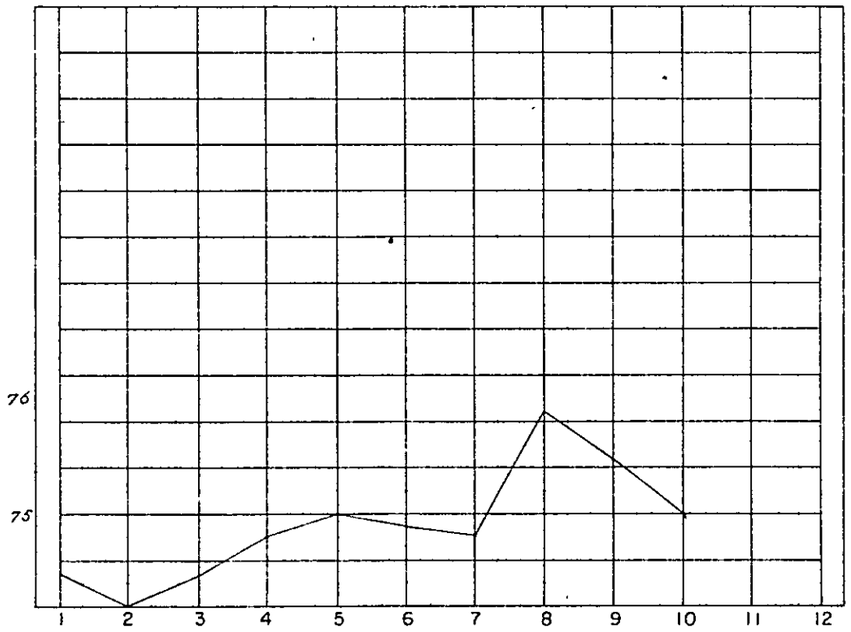
(km)D0 =	4882.86
D n' =	− 1.67
D =	4881.19
cos α =	0.999878
D cos α =	4880.59
dD1 =	− .38
dD2 =	−
S =	4880,21

e = e' − A − B − C

: Sign of C, opposite to Sign of dp

n'10^3 = I + II + III II=(2)ek III=(3)dp Sign of III, same to sign of dp

D^m = D0 − Dkm n' D0^m = 0.14989625T dD1^m = −H1 D/R dD2^m = ΔD (km)



Computation of Tellurometer

Survey station △No 2 (M : No3, Kokosai)
△No 3 (R : No2, Kokosai)

27 - 2 - 1963
Weathes

Accurate reading I

NO	CAVITY	A+ A−	(A+)−(A−) u	A+R A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
1		69.0		29.5			
	2.0	31.5	37.5	81.5	48.0	42.8	71.4
2		70.0		29.0			
	4.0	31.5	38.5	81.0	48.0	43.2	71.6
3		70.5		32.0			
	6.0	31.5	39.0	81.5	50.5	44.8	72.4
4		71.5		31.5			
	8.0	31.5	40.0	81.5	50.0	45.0	72.5
5		72.0		29.5			
	10.0	29.5	42.5	81.0	48.5	45.5	72.8
6		71.0		28.0			
	12.0	29.0	42.0	80.0	47.5	44.8	72.4
7		74.0		31.0			
	14.0	31.0	43.0	80.5	50.5	46.8	73.4
8		74.5		30.5			
	16.0	31.0	43.5	80.0	50.5	47.0	73.5
9		73.5		30.0			
	18.0	29.5	44.0	80.5	49.5	46.8	73.4
10		72.0		30.0			
	20.0	29.0	43.0	80.0	50.0	46.5	73.2
11							
12							
Mean =							72,66

Accurate reading II

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	20.5 °	17.5 °	
II	20.5	17.5	
Mean	20.5	17.5	

tc − tc' = 3.0 ° dp = − mmHg

Beginning time 8 h 49 m

Approx. reading I

A+ B−	A+ C−	A+ D−	A+ A−
69,0			
25,0	28,0	51,0	31,0
24,0	41,0	18,0	38,0

mμs

T = 24169,00

Ending time h m

Approx. reading II

A+ B−	A+ C−	A+ D−	A+ B+
72,0			
47,0	30,0	54,0	29,0
25,0	42,0	18,0	43,0

mμs

T = 24174,50

K = −0, (|k|<5)
T'/10⁷ = 0,0 (T<2x10⁷)
ΔT = π = −0, (ΔT=0)
mμs
T' =
ΔT = 0,
T = 24172,66

Remarks

Instrument height
M = 1,38
R = 1,38

Calenlation of distance

a'(No3~No2) =	− 0 32 57
a' =	− 33,0
0,291 a' =	− 9,6
0,291D (km) =	− 34m8
H (No 2) =	419,4
H (No 3) =	454,2

K =	1,00000000
δ =	0,999
Δ = δ10³ =	−0,000
...	

e n' D

e' =	+ 14,9
A =	− 1,5
B =	− 0,0
C =	− 0,0
e =	13,4

I =	+ 268
=	+ 76
III =	− 0
n'10³ =	− 344
n' =	0,344

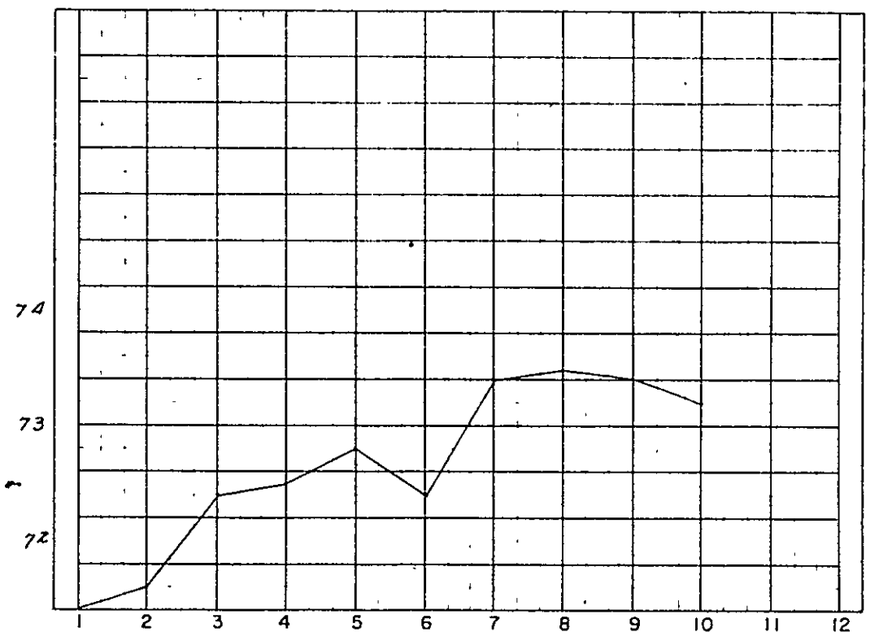
m

(km) D_o =	3623,39
D n' =	1,25
D =	3622,14
cos α =	0,999854
D cos α =	3621,97
dD_1 =	− ,26
dD_2 =	−
S =	3621,71

e = e' − A − B − C

. Sign of C, opposite to Sign of dp

n'10³ = I + II + III : II = (2)ek III = (3)dp Sign of III, same to sign of dp
$D^m = D_o - Dkm_{n'}$: D_o^m = 0149896257 $dD_1^m = -Hi\,D/R$ $dD_2^m = \Delta D$ (km)



Computation of Tellurometer

Survey station △ No. 3A (M : No3. Kokusai)
△ No. 3 (R : No2, Kokusai)

28 - 2 - 1963
Weathes

Accurate reading I

NO	CAVITY	A+ / A−	(A+)−(A−) u	A+R / A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
1		37.5		64.0			
	2.0	63.5	74.0	18.5	45.5	59.8	29.9
2		37.5		64.0			
	4.0	64.0	73.5	19.0	45.0	59.2	29.6
3		39.0		63.5			
	6.0	64.0	75.0	18.5	45.0	60.0	30.0
4		39.0		62.5			
	8.0	63.0	76.0	17.5	45.0	60.5	30.2
5		38.5		62.5			
	10.0	63.0	75.5	17.0	45.5	60.5	30.2
6		39.5		62.0			
	12.0	62.0	77.5	17.5	44.5	61.0	30.5
7		40.0		63.5			
	14.0	63.5	76.5	17.5	46.0	61.2	30.6
8		39.5		63.5			
	16.0	62.5	77.0	18.0	45.5	61.2	30.6
9		38.5		62.0			
	18.0	62.0	76.5	17.5	44.5	60.5	30.2
10		38.5		61.0			
	20.0	61.0	77.5	16.0	45.0	61.2	30.6
11							
12							
Mean =							30.24

Accurate reading II

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	24.5	19.0	
II	25.0	19.0	
Mean	24.8	19.0	

tc − tc' = 5.8 ° dp = −1 mmHg

Beginning time 10h 55m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
37.0			
32.0	80.0	82.0	64.0
05.0	57.0	55.0	73.0

mμs
T1 = 05536.00

Ending time 11h 3m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
39.0			
34.0	82.0	84.0	61.0
05.0	57.0	55.0	78.0

mμs
T1 = 05539.00

K = 0, (|k| < 5)
T'/10^7 = 0.0 (T < 2×10^7)
ΔT = π = 0, (ΔT = 0)
mμs
T' =
ΔT = 0'
T = 05530.24

Remarks

Instrument height
M • 1.38
R • 1.38

Calculation of distance

a'(No3 ~ No3A) = − 2° 20' 02"
a' = 140.0
0.291 a' = 40.7
0.291 D (km) = − 33m.7
H (No3A) = 419.4
H (No3) = 453.1

K = 1.00000000
δ = 0.999
Δ = δ10^3 = −0.000

e n' D

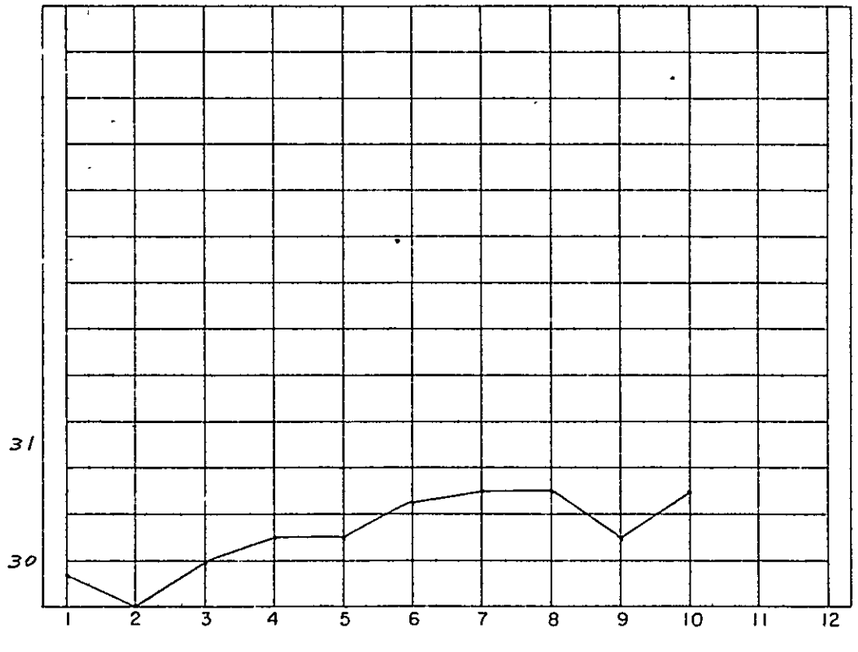
e' = + 16.3
A = − 2.9
B = − 0.1
C = − 0.0
e = 13.3

I = + 264
= + 73
III = − 0
n'10^3 = − 337
n' = 0.337

m
(km) D0 = 828.96
D n' = 0.28
D = 828.68
cos α = 0.999171
D cos α = 827.99
dD1 = − .06
dD2 = −
S = 827.93

e = e' − A − B − C : Sign of C, opposite to Sign of dp

n'10^3 = I + II + III . II = (2) ek III = (3) dp Sign of III, same to sign of dp
D^m = D0 − Dkmn' D0^m = 0.14989625T dD1^m = −H1 D/R dD2^m = ΔD (km)



Computation of Tellurometer

Survey station △ No 9 (M : No3, Kokusai)
△ No 8 (R : No2, Kokusai)

27 - 2 - 1963
Weathes

	NO	CAVITY	A+ A−	(A+)−(A−) u	A+R A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
Accurate reading I	1		6.5		91.5			
		2.0	93.0	13.5	44.5	47.0	30.2	15.1
	2		6.5		92.5			
		4.0	93.0	13.5	44.0	47.5	30.5	15.2
	3		6.5		92.5			
		6.0	93.0	13.5	45.5	47.0	30.2	15.1
	4		6.5		92.0			
		8.0	92.0	14.5	45.0	47.0	30.8	15.4
	5		7.0		90.5			
		10.0	91.0	16.0	43.5	47.0	31.5	15.8
	6		6.0		91.0			
		12.0	91.5	14.5	44.0	47.0	30.8	15.4
	7		7.5		92.0			
		14.0	91.5	16.0	44.0	48.0	32.0	16.0
	8		8.0		91.5			
		16.0	92.5	15.5	43.0	48.5	32.0	16.0
	9		6.5		92.0			
		18.0	91.5	15.0	44.5	47.5	31.2	15.6
	10		7.0		91.0			
		20.0	91.5	15.5	44.5	46.5	31.0	15.5
	11							
	12							
Mean =			15.51					
Accurate reading II	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
T = Mean / Total mean =								

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	22.5°	18.0°	
II	24.5°	19.0	
Mean	23.5°	18.5	

tc − tc' = 5.0° dp = − mmHg

Beginning time 14h 8m

Approx. reading I (mμs)

A+/B	A+/C	A+/D	A+/A−
6.0			
85.0	79.0	71.0	92.0
21.0	09.0	99.0	14.0

T1 = 210070.00

Ending time h m

Approx reading II (mμs)

A+/B	A+/C	A+/D	A+/A−
7.0			
88.0	97.0	8.0	91.0
19.0	10.0	99.0	16.0

T1 = 210008.00

K = − 0 (|k|<5)
T'/10^7 = 0.0 (T<2x10^7)
ΔT = π = − 0 (ΔT=0)
mμs
T' =
ΔT = 0
T = 21015.51

Remarks

Instrument height
M = 1.38
R = 1.38

Calenlation of distance

a'(No8~No9) =	− 1° 07' 22"
a' =	− 67.4
0.291 a' =	− 19.6
0.291D (km) =	− 61m 7
H (No8) =	493.8
H (No9) =	432.1

K =	1.00000000
δ =	0.999
Δ = δ10^3 =	−0.000
...	

e

e' =	+ 15.8
A =	− 2.5
B =	− 0.1
C =	− 0.0
e =	13.2

n'

I =	+ 266
=	+ 74
III =	− 0
n'10^3 =	− 340
n' =	0.340

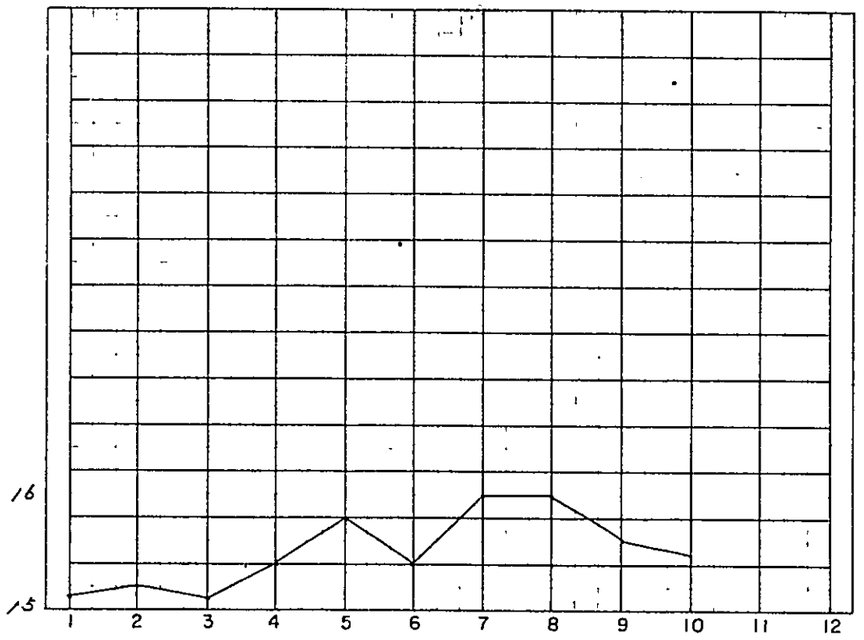
D

(km) D_o =	3150.15
D n' =	− 1.07
D =	3149.08
cos α =	0.999808
D cos α =	3148.48
dD_1 =	− .24
dD_2 =	− ...
S =	3148.24

e = e' − A − B − C : Sign of C, opposite to Sign of dp

n'10^3 = I + II + III : II = (2)ek III = (3)dp Sign of III, same to sign of dp

$D^m = D_o - Dkmn'$: $D_o^m = 014989625T$ $dD_1^m = -Hi\,D/R$ $dD_2^m = \Delta D$ (km)



Computation of Tellurometer

Survey station △ No. 3 (M : No3 kokusai)
△ No 8 (R : No2. kokusai)

27-2-1963

Weathes

	NO	CAVITY	A+ A−	(A+)−(A−) u	A+R A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
Accurate reading I	1		6.5		91.5			
		2.0	91.5	15.0	42.5	49.0	32.0	16.0
	2		6.0		92.5			
		4.0	92.5	13.5	43.5	49.0	31.2	15.6
	3		6.5		92.5			
		6.0	93.0	13.5	43.5	49.0	31.2	15.6
	4		7.0		92.5			
		8.0	91.5	15.5	43.5	49.0	32.2	16.1
	5		6.5		91.5			
		10.0	91.5	15.0	44.0	47.5	31.2	15.6
	6		6.5		93.5			
		12.0	93.5	13.0	45.5	48.0	30.5	15.2
	7		7.0		92.5			
		14.0	91.5	15.5	44.5	48.0	31.8	15.9
	8		9.0		91.0			
		16.0	92.5	16.5	42.5	48.5	32.5	16.2
	9		8.5		91.0			
		18.0	90.0	18.5	42.0	49.0	33.8	16.9
	10		9.0		91.5			
		20.0	90.5	18.5	43.5	48.0	33.2	16.6
	11							
	12							
					Mean =			
Accurate reading II	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							

T = Mean = / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	22.5 °	18.0 °	
II	22.0	18.0	
Mean	22.2	18.0	

tc − tc' = 4.2 ° dp = − mmHg

Beginning time 15h 1m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
7.0			
23.0	21.0	36.0	92.0
34.0	36.0	71.0	15.0

mμs

T1 = 3 3 7 0 7 , 5 0

Ending time 15h 9m

Approx reading II

A+/B	A+/C	A+/D	A+/B+
7.0			
24.0	22.0	37.0	90.0
33.0	34.0	70.0	17.0

mμs

T1 = 3 3 7 0 8 . 5 0

K = − 0 , (|k|≤5)
T'/10^7 = 0.0 (T<2×10^7)
ΔT = π = − 0, (ΔT=0)
mμs
T' =
ΔT = 0,
T = 3 3 7 1 5 . 9 7

Remarks

Instrument Height
M = 1.38
R = 1.58

Calenlation of distance

a'(No8−No3) =	− 0° 32' 30"
a' =	− 32.5
0,291 a' =	− 9.5
0,291D (km) =	− 48m0
H (No.8) =	493.8
H (No.3) =	445.8

K =	1,00000000
	0,999
δ =	−0,000
Δ = δ10^3 =	

e

e' =	+ 15.3
A =	− 2.1
B =	− 0.0
C =	− 0.0
e =	13,2

n'

I =	+ 267
=	+ 74
III =	− 0
n'10^3 =	− 341
n' =	0.341

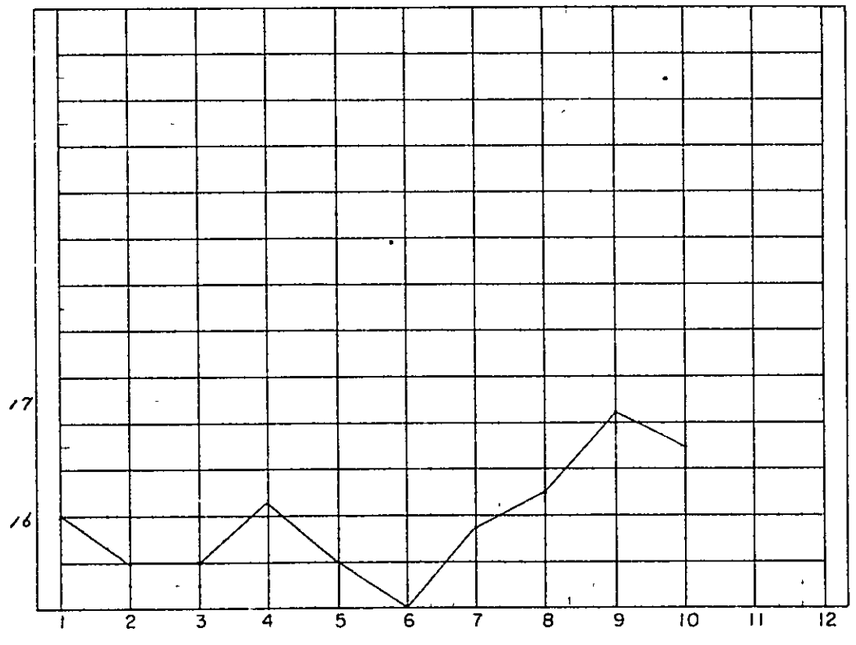
D

m

(km) D0 =	5053,90
D n' =	1,72
D =	5052,18
cos α =	0, 999955
D cos α =	5051,95
dD1 =	− ,39
dD2 =	− ,
S =	5051,56
=	

e = e' − A − B − C : Sign of C, opposite to Sign of dp

n'10^3 = I + II + III . II = (2) ek III = (3) dp Sign of III, same to sign of dp
D^m = D0 − D^k m_n' D0^m = 0.14989625T dD1^m = − H1 D/R dD2^m = ΔD (km)



Computation of Tellurometer

Survey station △ No 4 (M : No3, Kokusai)
△ No 3 (R : No2, Kokusai)

2 - 3 - 1963
Weathes

	NO	CAVITY	A+ / A−	(A+)−(A−) u	A+R / A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
Accurate reading I	1		74.5		21.5			
		2.0	22.0	52.5	73.5	48.0	50.2	75.1
	2		75.0		23.5			
		4.0	23.5	51.5	74.5	49.0	50.2	75.1
	3		75.0		22.0			
		6.0	22.5	52.5	74.0	48.0	50.2	75.1
	4		79.0		20.5			
		8.0	19.5	59.5	70.0	50.5	55.0	77.5
	5		79.0		21.0			
		10.0	20.0	59.0	71.0	50.0	54.5	77.2
	6		79.0		19.0			
		12.0	19.0	60.0	70.5	48.5	54.2	77.1
	7		79.5		20.0			
		14.0	20.0	59.5	70.0	50.0	54.8	77.4
	8		80.5		19.5			
		16.0	19.0	61.5	70.0	49.5	55.5	77.8
	9		80.0		20.5			
		18.0	19.0	61.0	70.0	50.5	55.8	77.9
	10		79.0		19.0			
		20.0	19.0	60.0	70.0	49.0	54.5	77.2
	11							
	12							
				Mean =				76.74
Accurate reading II	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	15.5°	15.0°	
II	16.0	15.5	
Mean	15.8	15.2	

tc−tc' = 0.6° dp = = mmHg

Beginning time 8h 33m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
24.0			
61.0	29.0	8.0	22.0
14.0	46.0	67.0	53.0

mμs
T1 = 14677.50

Ending time 8h 41m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
79.0			
64.0	32.0	12.0	20.0
15.0	47.0	67.0	59.0

mμs
T1 = 14679.50

K = −0 (|k|<5)
T'/10^7 = 0.0 (T<2×10^7)
ΔT = π = −0 (ΔT=0)

mμs
T =
ΔT = 0
T = 14676.74

Remarks

Instrument height
M = 1.38
R = 1.38

Calenlation of distance

a'(No3~No4) =	− 0 55 23
a' =	− 55.6
0,291 a' =	− 16.2
0,291 D (km) =	− 35m.6
H (No4) =	418.1
H (No3) =	453.7

K =	1,00000000
δ =	0,999
Δ = δ10^3 =	−0,000

e

e' =	+ 12.8
A =	− 0.3
B =	− 0.0
C =	− 0.0
e =	12.5

n'

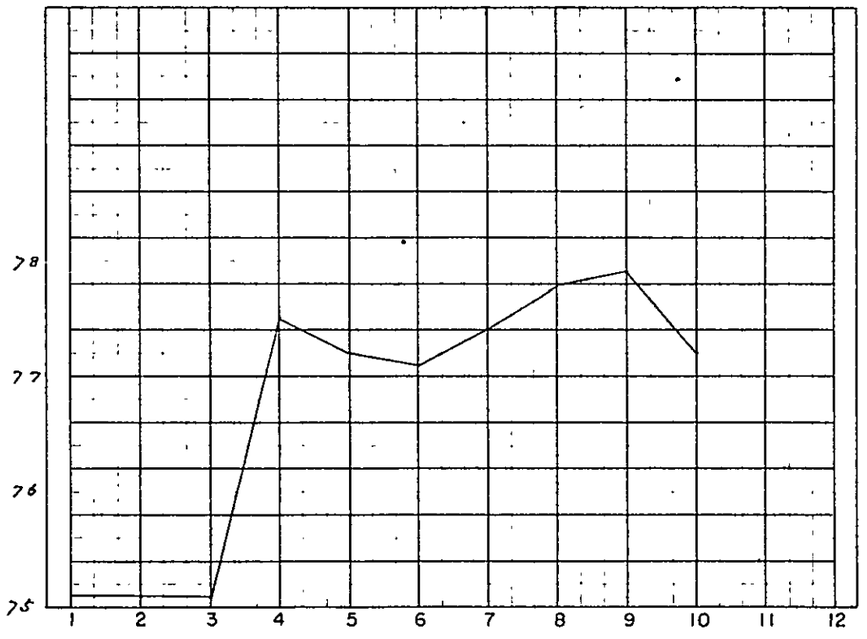
I =	+ 272
=	+ 74
III =	− 0
n'10^3 =	− 346
n' =	0,346

D

	m
(km) D0 =	2199,99
D n' =	76
D =	2199.23
cos α =	0.999870
D cos α =	2198.94
dD1 =	− .16
dD2 =	−
S =	2198.78

e = e' − A − B − C : Sign of C, opposite to Sign of dp

n'10^3 = I + II + III : II = (2) ek III = (3) dp Sign of III, same to sign of dp
D^m = D0 − Dkm n' : D0^m = 014989625T dD1^m = −Hi D/R dD2^m = ΔD (km)



Computation of Tellurometer

Survey station △ No. 4 (M : No.3 Kokusai)
△ No. 5 (R : No.2 Kokusai)

2-3-1963
Weathes

	NO	CAVITY	A+ / A−	(A+)−(A−) u	A+R / A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
Accurate reading I	1		84.5		12.0			
		2.0	12.0	72.5	64.0	48.0	60.2	80.0
	2		84.5		12.0			
		4.0	12.0	72.5	64.5	47.5	60.0	80.0
	3		87.5		11.5			
		6.0	12.0	75.5	62.5	49.0	62.2	81.1
	4		87.5		10.5			
		8.0	11.0	76.5	62.5	48.0	62.2	81.1
	5		86.5		11.0			
		10.0	10.0	76.5	62.0	49.0	62.8	81.4
	6		86.5		11.5			
		12.0	11.0	75.5	62.5	49.0	62.2	81.1
	7		86.5		11.5			
		14.0	11.5	75.0	62.5	49.0	62.0	81.0
	8		87.0		12.0			
		16.0	12.0	75.0	62.0	49.5	62.2	81.1
	9		88.5		10.0			
		18.0	9.5	79.0	60.5	49.5	64.2	82.1
	10		87.5		11.0			
		20.	10.5	77.0	61.5	49.5	63.2	81.6
	11							
	12							
Accurate reading II	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							

Mean = 81.06

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	20.5°	17.5°	
II	21.0°	18.0°	
Mean	20.8	17.8	

tc − tc' = 3.0° dp = − mm Hg

Beginning time 9h 47m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
85.0			
61.0	50.0	38.0	12.0
24.0	35.0	47.0	73.0

m μs
T1 = 23486,50

Ending time h m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
87.0			
64.0	53.0	40.0	11.0
23.0	34.0	47.0	76.0

m μs
T1 = 23488,00

K =	0, (|k|<5)
T'/10^7 =	0,0 (T<2x10^7)
ΔT = π =	−0, (ΔT=0)
	m μs
T' =	
ΔT =	0,
T =	23481,06

Remarks

Instrument Height
H = 1,38
R = 1,38

Calculation of distance

a'(No.5 ~ No.4) =	− 1 59 14
a' =	− 119,2
0,291 a' =	− 34,7
0,291D (km) =	− 122m1
H (No.5) =	418,1
H (No.4) =	540,2

K =	1,00000000
	0,999
δ =	−0,000
Δ = δ10^3 =	

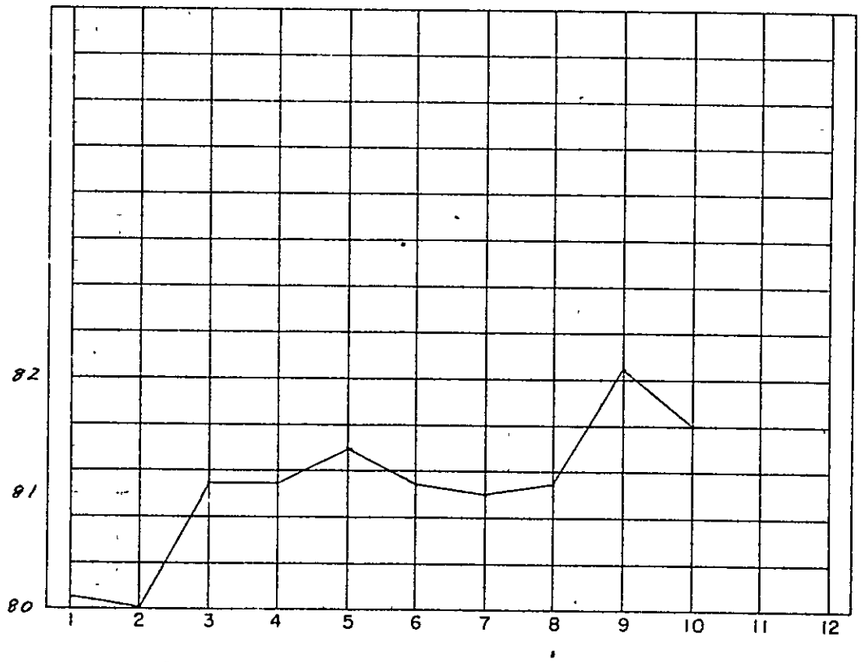
e	n'	D
e' = + 15,1	I = + 267	(km) D_o = 3519,72 m
A = − 1,5	= + 77	D n' = − 1,21
B = − 0,0	III = − 0	D = 3518,51
C = − 0,0	$n'10^3$ = − 344	cos α = 0,999399
e = 13,6	n' = C,344	D cos α = 3516,40
		dD_1 = − ,30
		dD_2 = − ,
		S = 3516,10

e = e' − A − B − C

: Sign of C, opposite to Sign of dp

$n'10^3$ = I + II + III II = (2) ek III = (3) dp Sign of III, same to sign of dp

$D^m = D_o - Dkm_{n'}$ D_o^m = 0,14989625T $dD_1^m = -H_1 D/R$ $dD_2^m = \Delta D$ (km)



Computation of Tellurometer

Survey station △ No. 3 (M : No.3 Kokunai)
△ No. 5 (R : No.2 Kokunai)

2 - 3 - 1963

Weathes

Accurate reading I

NO	CAVITY	A+ / A−	(A+)−(A−) u	A+R / A−R	(A+R)−(A−R) V	(u+V)/2 W'	W/2+50
1		59.0		46.5			
	2.0	58.5	0.5	47.0	4.5	2.0	51.5
2		60.0		53.5			
	4.0	60.5	99.5	46.5	9.0	4.2	52.1
3		62.5		60.5			
	6.0	61.0	1.5	49.5	11.0	6.2	53.1
4		63.5		60.5			
	8.0	61.0	2.5	49.5	11.0	6.8	53.4
5		63.0		57.0			
	10.0	59.5	3.5	48.5	10.5	7.0	53.5
6		63.5		53.5			
	12.0	59.5	4.0	49.0	10.5	7.2	53.6
7		63.5		53.5			
	14.0	59.5	4.0	49.0	10.5	7.2	53.6
8		64.0		53.5			
	16.0	59.5	4.5	49.5	10.0	7.2	53.6
9		66.0		57.0			
	18.0	57.0	8.0	47.0	10.0	9.0	54.5
10		66.0		58.0			
	20.0	57.5	7.5	47.5	10.5	9.0	54.5
11							
12							

Mean = 53.34

Accurate reading II

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal. temperature
I	23.5°	20.5°	
H	23.0	20.0	
Mean	23.2	20.2	

tc − tc' = 3.0° dp = − mmHg

Beginning time 10h 47m

Approx. reading H

A+/B	A+/C	A+/D	A+/A−
59.0			
27.0	28.0	23.0	59.0
32.0	31.0	26.0	0.0

mμs
T1 = 3325 0,00

Ending time 10h 56m

Approx reading II

A+/B	A+/C	A+/D	A+/B+
64.0			
32.0	35.0	41.0	58.0
32.0	30.0	26.0	7.0

mμs
T1 = 3325 3,50

K = −0,1 (|k| < 5)
T'/10^7 = 0.0 (T < 2×10^7)
ΔT = π = −0,1 (ΔT = 0)
mμs
T' =
ΔT = 0'
T = 3325 3,34

Remarks

Instrument Reight
M = 1.38
R = 1.38

Calenlation of distance

a'(No5-No3) =	1 00 39	
a' =	− 60.6	
0.291 a' =	− 17.6	
0.291 D (km) =	− 87m7	
H (No5) =	539.5	
H (No3) =	451.8	

K =	1.00000000
δ =	0,999
Δ = δ10^3 =	−0,000

e

e' =	+ 17.6
A =	− 1.5
B =	− 0.0
C =	− 0.0
e =	16.1

n'

I =	+ 266
=	+ 91
III =	− 0
n'10^3 =	− 357
n' =	0,2457

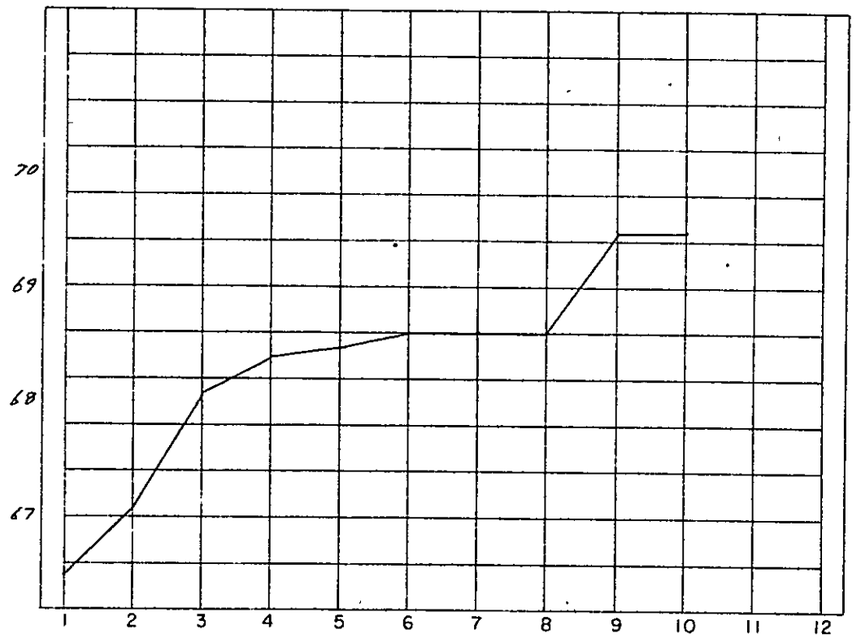
D

(km) D0 =	4984,55
D n' =	− 1.28
D =	4982.77
cos α =	0.999844
D cos α =	4981.99
dD1 =	− .42
dD2 =	
S =	4981.57

e = e' − A − B − C : Sign of C, opposite to Sign of dp

n'10^3 = I + II + III : II = (2)ek III = (3)dp Sign of III, same to sign of dp

D^m = D0 − Dkmn' : D0^m = 014989625T dD1^m = −H1 D/R dD2^m = ΔD (km)



Computation of Tellurometer

Survey station △ No. 5A (M : No.3 Kokusai)
△ No. 5 (R : No.2 Kokusai)

2-3-1963

Weathes

Accurate reading I	NO	CAVITY	A+ A−	(A+)−(A−) u	A+R A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
	1		21.5		72.0			
		2.0	71.0	6.0 S	26.5	45.5	43.0	26.5
	2		33.5		70.0			
		4.0	70.5	63.0	24.0	46.0	54.5	27.2
	3		37.5		67.5			
		6.0	67.0	70 S	19.5	47.5	59.2	29.6
	4		32.0		69.0			
		8.0	68.0	69.0	20.5	47.5	58.8	29.4
	5		34.5		70.0			
		10.0	69.5	64.0	22.0	47.5	46.2	28.1
	6		34.5		65.0			
		12.0	66.0	69.5	19.5	46.5	57.5	28.8
	7		36.5		68.0			
		14.0	68.0	68.5	21.0	47.0	57.8	28.9
	8		37.5		66.5			
		16.0	67.0	70.5	20.5	46.0	58.2	29.1
	9		35.5		64.0			
		18.0	66.0	70.5	18.5	46.5	58.5	29.2
	10		39.0		64.0			
		20.0	66.0	72.0	17.0	48.0	60.5	30.2
	11							
	12							

Mean = 28.70

Accurate reading II								
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							

T = Mean =
Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	24.0 °	19.5 °	
H	26.0	21.0	
Mean	25.0	20.2	

tc−tc' = 4.8 ° dp = − mmHg

Beginning time 11h 44m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
32.0			
27.0	80.0	27.0	70.0
04.0	52.0	04.0	62.0

T1 = 05031,00 mμs

Ending time 11h 51m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
39.0			
34.0	88.0	35.0	65.0
04.0	51.0	04.0	74.0

T1 = 05037,00 mμs

K = − 0, (|k| < 5)
T'/10^7 = 0.0 (T < 2×10)
ΔT = π = − 0, (ΔT = 0)
mμs
T' = 0,
ΔT = 0,
T = 05028,70

Remarks

Instrument Reight
M = 1,38
R = 1,38

Calentation of distance

a'(No5 ~No5A) =	− 9° 22' 09"
a' =	− 562,2
0,291 a' =	− 163,6
0,291 D (km) =	− 123m3
H (No.5A) =	416,2
H (No5) =	539,5

K =	1,00000000
	0,999
δ =	−0,000
Δ = δ10^3 =	

e

e' =	+ 17,6
A =	− 2,4
B =	− 0,1
C =	− 0,0
e =	15,1

n'

I =	+ 264
=	+ 84
III =	− 0
n'10^3 =	− 348
n' =	C,348

D

m

(km) D0 =	753,78
D n' =	− 26
D =	753,52
cos α =	0,986662
D cos α =	743,47
dD1 =	− ,6
dD2 =	− ,
S =	743,41

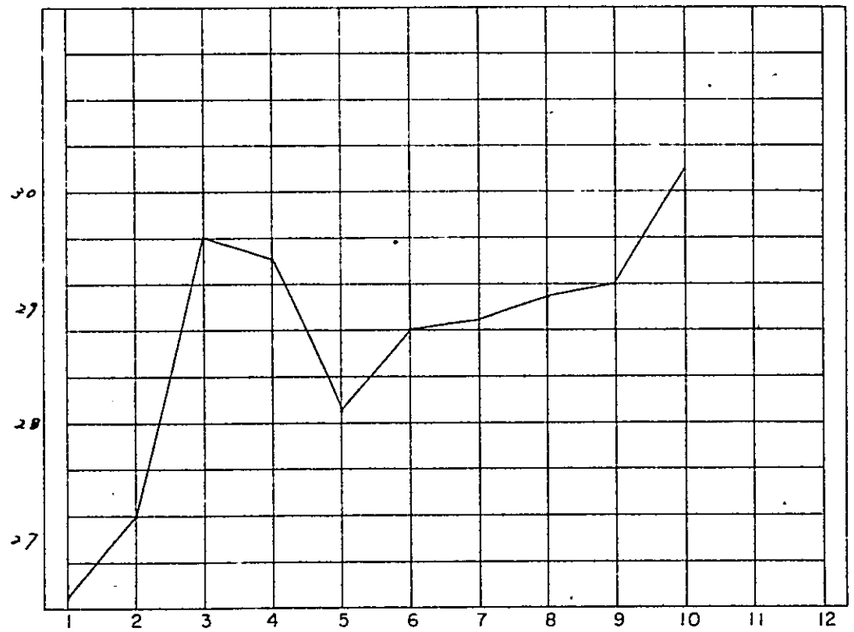
=

e = e' − A − B − C

· Sign of C, opposite to Sign of dp

n'10^3 = I + II + III II = (2) ek III = (3) dp Sign of III, same to sign of dp

D^m = D0 − Dkmn' D0^m = 014989625T dD1^m = −H1 D/R dD2^m = ΔD'(km)



Computation of Tellurometer

Survey station △ No. 7 (M : No.3 Kokusai)
△ No. 10 (R : No.2 Kokusai)

29 − 3 − 1963

Weathes

Accurate reading I

NO	CAVITY	A+ A−	(A+)−(A−) u	A+R A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
1		62.5		34.5			
	2.0	34.5	27.0	8.5.5	50.0	38.5	69.2
2		62.5		36.0			
	4.0	34.5	27.0	86.0	50.0	28.5	69.2
3		62.5		36.0			
	6.0	35.0	27.5	8.5.5	49.5	28.5	69.2
4		64.5		33.0			
	8.0	33.0	31.5	33.5	49.5	40.5	70.2
5		62.0		36.0			
	10.0	35.5	26.5	8.5.5	50.5	38.5	69.2
6		62.0		34.0			
	12.0	34.5	28.5	83.0	51.0	39.0	69.5
7		62.0		36.5			
	14.0	34.0	27.0	8.5.5	51.0	39.0	69.5
8		62.5		36.0			
	16.0	35.0	27.5	85.0	51.0	39.0	69.5
9		64.5		32.5			
	18.0	32.0	32.5	82.0	50.5	41.5	70.8
10		64.5		32.5			
	20.0	31.0	33.5	82.5	49.5	41.5	70.8
11							
12							

Mean = 69.76

Accurate reading II

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	22.5 °C	19.5 °C	
H	23.0	20.0	
Mean	23.8	19.8	

tc − tc' = 3.0 °C dp = = mmHg

Beginning time 10h 20m

Approx. reading H

A+/B	A+/C	A+/D	A+/A−
63.0			
34.0	68.0	6.10	34.0
28.0	35.0	57.0	29.0

mμs

T1 = 29 5.64,50

Ending time 10h 29m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
63.0			
34.0	67.0	7.0	32.0
29.0	36.0	56.0	31.0

mμs

T1 = 29 5.64,50

K = − 0, (|k| ≤ 5)
T'/10^7 = 0.0 (T < 2×10^7)
ΔT = π = − 0, (ΔT = 0)

mμs

T' =
ΔT = 0'
T = 29 5 69.76

Remarks

Instrument. height

M = 1.38

R = 1.38

Calculation of distance

a'(No.10 ~No.7) =	+ 0 32 13	
a' =	+ 32.2	
0.291 a' =	− 9.4	
0.291 D (km) =	− 41.6	
H (No.10) =	414.8	
H (No.7) =	456.4	

K =	1.00000000
	0.999
δ =	−0.000
Δ = δ10^3 =	

e

e' =	+ 17.2
A =	− 1.5
B =	− 0.0
C =	− 0.0
e =	15.7

n'

I =	+ 266
=	+ 88
III =	− 0
n'10^3 =	− 354
n' =	C, 354

D

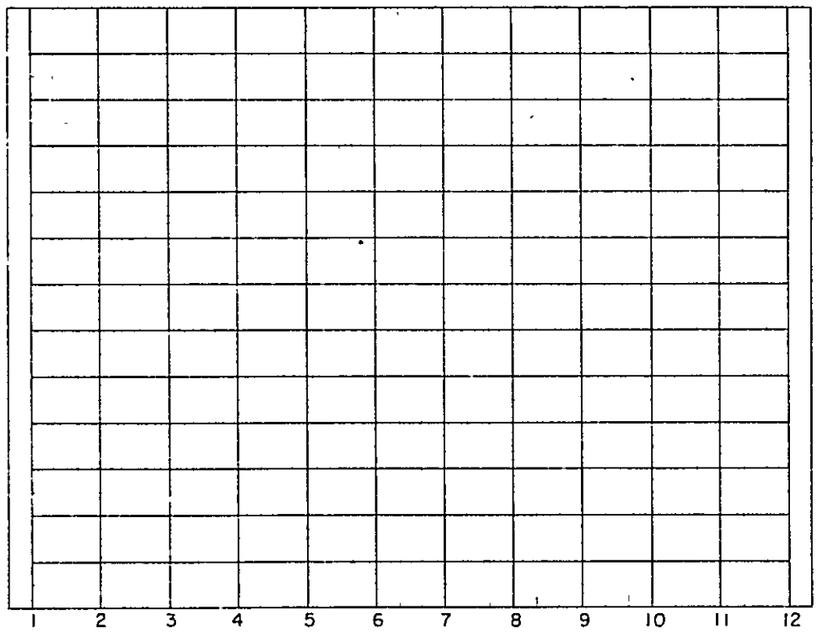
	m
(km) D0 =	4432,40
D n' =	− 1.57
D =	4430.83
cos α =	0. 999846
D cos α =	4430.64
dD1 =	− .29
dD2 =	−
S =	4430.35

e = e' − A − B − C

: Sign of C, opposite to Sign of dp

n'10^3 = I + II + III II = (2) ek III = (3) dp Sign of III, same to sign of dp

D^m = D0 − D km n' D0^m = 014989625T dD1^m = − H1 D/R dD2^m = ΔD (km)



Computation of Tellurometer

Survey station △ No. 7 (M : No.3 Kokusai)
△ No. 11 (R : No.2 Kokusai)

29 - 3 - 1963
Weathes

Accurate reading I

NO	CAVITY	A+ / A−	(A+)−(A−) u	A+R / A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
1		28.5		22.5			
	2.0	71.5	57.0	23.5	49.0	53.0	26.5
2		29.5		21.0			
	4.0	71.5	58.0	23.5	47.5	52.8	26.4
3		30.0		20.5			
	6.0	71.0	59.0	24.0	45.5	52.2	26.1
4		22.5		68.5			
	8.0	69.5	64.0	23.5	44.0	54.5	27.2
5		23.5		68.0			
	10.0	67.5	66.0	23.5	44.0	55.2	27.6
6		20.0		68.5			
	12.0	68.5	61.5	23.5	45.0	53.2	26.6
7		22.5		69.0			
	14.0	70.5	63.0	21.5	47.5	55.2	27.6
8		22.0		70.0			
	16.0	67.5	64.5	21.5	48.5	56.5	28.2
9		22.5		69.5			
	18.0	67.0	66.5	21.5	48.0	57.2	28.6
10		34.0		69.5			
	20.0	69.5	64.5	22.5	47.0	55.8	27.9
11							
12							

Mean = 27.27

Accurate reading II

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	29.0	23.0	
H	30.5	23.5	
Mean	29.8	23.2	

tc − tc' = 6.6 dp = − mmHg

Beginning time 13 h 3 m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
28.0			
32.0	32.0	32.0	69.0
36.0	56.0	33.0	59.0

T₁ = 35329,50 mμs

Ending time h m

Approx reading II

A+/B	A+/C	A+/D	A+/B+
34.0			
38.0	81.0	1.0	69.0
36.0	53.0	33.0	64.2

T₁ = 35332,50 mμs

K = − 0, (|k| < 5)
T'/10⁷ = 0.0 (T < 2×10⁷)
ΔT = π = − 0, (ΔT = 0)
mμs
T' =
ΔT = 0'
T = 35307,27

Remarks

Instrument height
H = 1.38
R = 1.38

Calenlation of distance

a'(No 11 ~ No 7) =	+ 0° 26' 25"
a' =	− 26.4
0,291 a' =	− 7.7
0,291 D (km) =	− 40.8
H (No 11) =	413.8
H (No 7) =	454.6

K =	1,00000000
	0,999
δ =	−0,000
Δ = δ10³ =	

e n' D

e' =	+ 21,1
A =	− 3,3
B =	− 0.1
C =	− 0,0
e =	17,7

I =	+ 260
=	+ 94
III =	− 0
n'10³ =	− 354
n' =	0,354

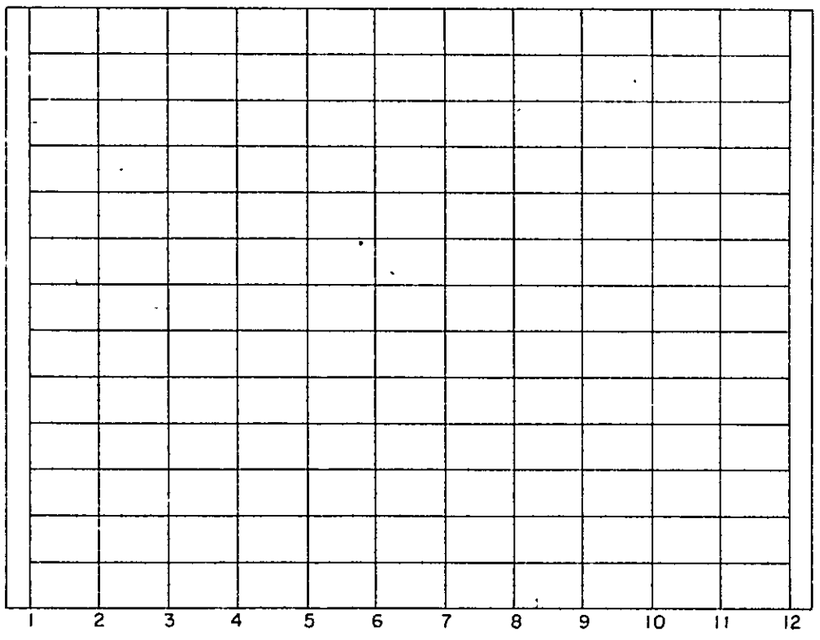
m

(km) D₀ =	5295,42
D n' =	− 1,87
D =	5293,55
cos α =	0,999970
D cos α =	5293,39
dD₁ =	− ,34
dD₂ =	
S =	5293,05

e = e' − A − B − C

. Sign of C, opposite to Sign of dp

n'10³ = I + II + III . II = (2) ek III = (3) dp Sign of III, same to sign of dp
D^m = D₀ − D km n' D₀^m = 0,14989625 T dD₁^m = −Hi D/R dD₂^m = ΔD (km)



Computation of Tellurometer

Survey station △ No. 5 (M : No.3 Kokusai)
△ No. 7 (R : No.2 Kokusai)

30 − 3 − 1963

Weathes

Accurate reading I

NO	CAVITY	A+ A−	(A+)−(A−) u	A+R A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
1		46.6		58.0			
	2.0	58.0	87.0	12.0	44.0	66.5	33.2
2		47.0		58.0			
	4.0	58.5	88.5	12.0	46.0	67.2	33.6
3		47.5		58.0			
	6.0	58.5	89.0	12.5	46.5	67.2	33.6
4		48.0		57.0			
	8.0	57.0	91.0	11.0	46.0	68.5	34.2
5		47.5		58.5			
	10.0	58.5	89.0	11.5	47.0	68.0	34.0
6		46.0		56.5			
	12.0	56.5	89.5	11.5	46.5	66.8	33.4
7		46.5		57.5			
	14.0	56.5	89.0	10.5	47.0	68.0	34.0
8		47.5		57.0			
	16.0	57.5	90.0	10.0	47.0	68.5	34.2
9		48.0		56.5			
	18.0	57.5	90.5	10.5	46.0	68.2	34.1
10		47.5		57.0			
	20.0	57.5	90.0	10.5	46.5	68.2	34.1
11							
12							

Mean = 33.84

Accurate reading II

1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	28.0 °	22.5 °	
H	26.5	23.0	
Mean	27.2	22.8	

tc − tc' = 4.4 ° dp = − mmHg

Beginning time 10h 12m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
45.0			
77.0	67.0	70.0	58.0
68.0	88.0	74.0	87.0

mμs
T1 = 68743,50

Ending time 10h 21m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
47.0			
77.0	68.0	72.0	57.0
70.0	88.0	74.0	90.0

mμs
T1 = 68744,00

K = − 0, (|k| ≤ 5)
T'/10^7 = 0.0 (T < 2×10^7)
ΔT = π = − 0, (ΔT = 0)

mμs
T' =
ΔT = 0,
T = 68733.84

Remarks

Instrument height
M = 1.38
R = 1.38

Calculation of distance

a'(No7∼No5) =	+ 0° 21' 59"
a' =	− 22' 0"
0.291 a' =	− 6.4
0.291 D (km) =	− 65m 9
H (No.7) =	457 5
H (No 5) =	523 4

K =	1.00000000
δ =	0,999
Δ = δ10^3 =	−0,000

e

e' =	+ 20.6
A =	− 2.2
B =	− 0.1
C =	− 0.0
e =	18,3

n'

I =	+ 262
II =	+ 101
III =	− 0
n'10^3 =	− 363
n' =	C, 363

D

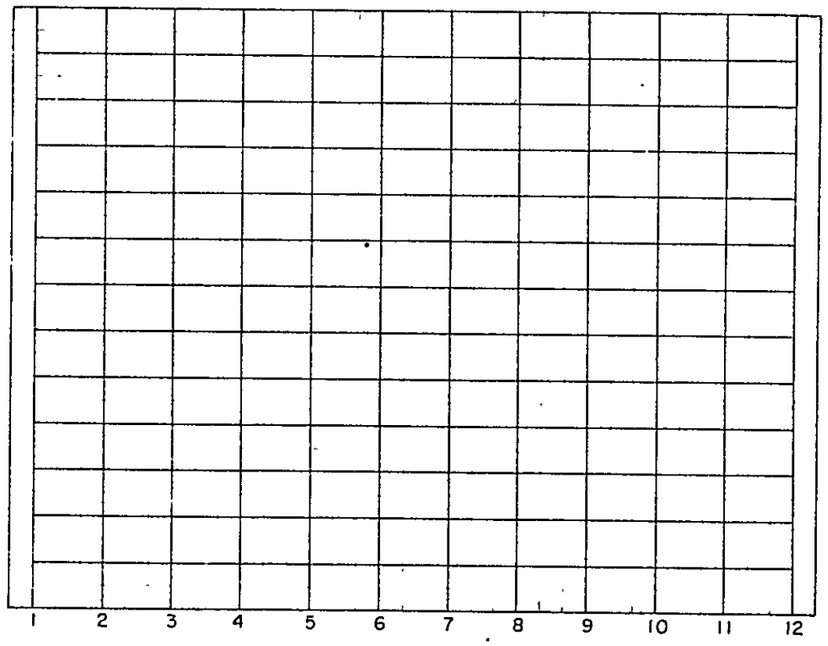
m

(km) D0 =	10302,94
D n' =	− 3,74
D =	10299,20
cos α =	0, 999980
D cos α =	10298,99
dD1 =	− ,74
dD2 =	−
S =	10298 25

e = e' − A − B − C

: Sign of C, opposite to Sign of dp

n'10^3 = I + II + III . II = (2) ek III = (3) dp Sign of III, some to sign of dp
D^m = D0 − Dkm n' D0^m = 014989625T dD1^m = −HiD/R dD2^m = ΔD (km)



Computation of Tellurometer

Survey station △ No. 7 (M.: No3 Kokusai)
△ No. 7A (R : No2 Kokusai)

29 - 3 - 1963

Weathes

NO	CAVITY	A+ / A−	(A+)−(A−) u	A+R / A−R	(A+R)−(A−R) V	(u+V)/2 W	W/2+50
1		43.5		47.5			
	2.0	47.0	86.5	11.5	46.0	66.2	33.1
2		44.5		47.0			
	4.0	48.0	86.5	12.0	45.0	66.8	33.9
3		46.0		48.0			
	6.0	48.0	87.0	11.5	46.5	66.8	33.4
4		44.5		46.5			
	8.0	47.0	87.5	11.0	45.5	66.5	33.2
5		46.0		46.5			
	10.0	46.5	88.5	11.5	45.0	66.8	33.4
6		45.5		45.5			
	12.0	46.5	90.0	11.5	44.0	67.0	33.5
7		47.5		46.5			
	14.0	46.0	91.5	10.0	46.5	69.0	34.5
8		48.5		46.5			
	16.0	46.5	92.5	9.5	47.0	69.8	34.9
9		45.5		46.0			
	18.0	46.0	89.5	8.0	48.0	68.8	34.4
10		46.0		45.0			
	20.0	46.0	90.0	8.0	47.0	68.5	34.2
11							
12							

Accurate reading I

Mean = 33.75

Accurate reading II

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

T = Mean / Total mean =

M	Dry bulb (tc)	Wet bulb (tc')	Crystal temperature
I	21.0	19.5	
H	21.0	19.5	
Mean	21.0	19.5	

tc − tc' = °C dp = = mmHg

Beginning time 9h 48m

Approx. reading I

A+/B	A+/C	A+/D	A+/A−
44.0			
26.0	63.0	49.0	87.0
8.0	81.0	95.0	87.0

mμs

T1 = 0.7.9.4.3, 50

Ending time 9h 55m

Approx. reading II

A+/B	A+/C	A+/D	A+/B+
44.0			
26.0	64.0	50.0	88.0
9.0	81.0	95.0	90.0

mμs

T1 = 0.7.9.4.5, 00

K = − 0 , (|k|≤5)

T'/10' = 0.0 (T<2×10')

ΔT = π = − 0, (ΔT=0)

mμs

T' =

ΔT = 0

T = 0.7.9.3.3, 75

Remarks

Instrument height

M = 1.38

R = 1.38

Calculation of distance

a'(No7A ~ No7) = + 2° 01' 33"

a' = − 121.6

0,291 a' = − 35.4

0,291 D (km) = − 42m1

H (No7A) = 415.4

H (No7.) = 457.5

K = 1,00000000

δ = 0,999 −0,000

Δ = δ10³ =

e

e' = + 16,8

A = − 0.8

B = + 0.0

C = − 0,0

e = 16.0

n'

I = + 267

= + 91

III = − 0

n'10³ = − 358

n' = C, 358

D

(km) D_o = 1189, 24 m

D n' = − 42

D = 1188,82

cos α = 0, 999995

D cos α = 1188.08

dD_1 = − ,08

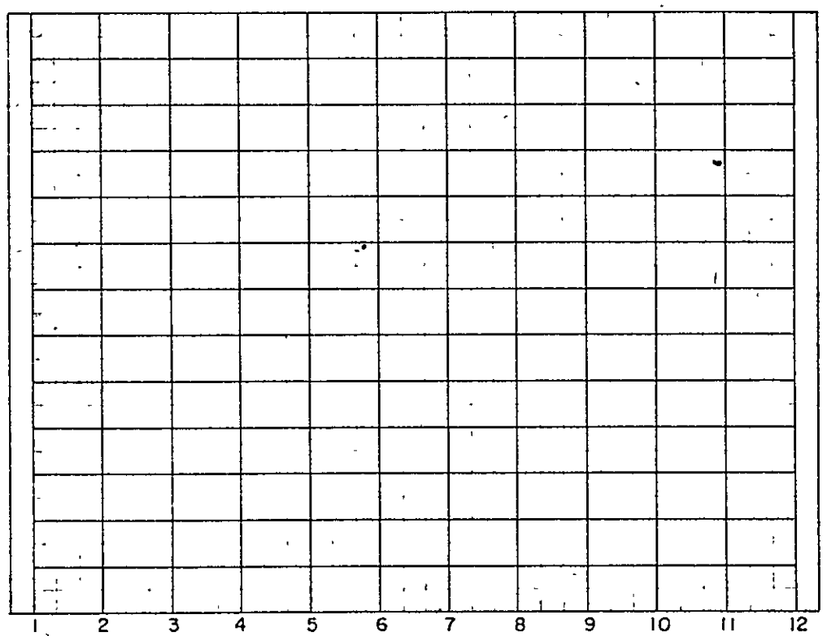
dD_2 = −

S = 1188.00

$e = e' - A - \frac{1}{2}B - C$. Sign of C, opposite to Sign of dp

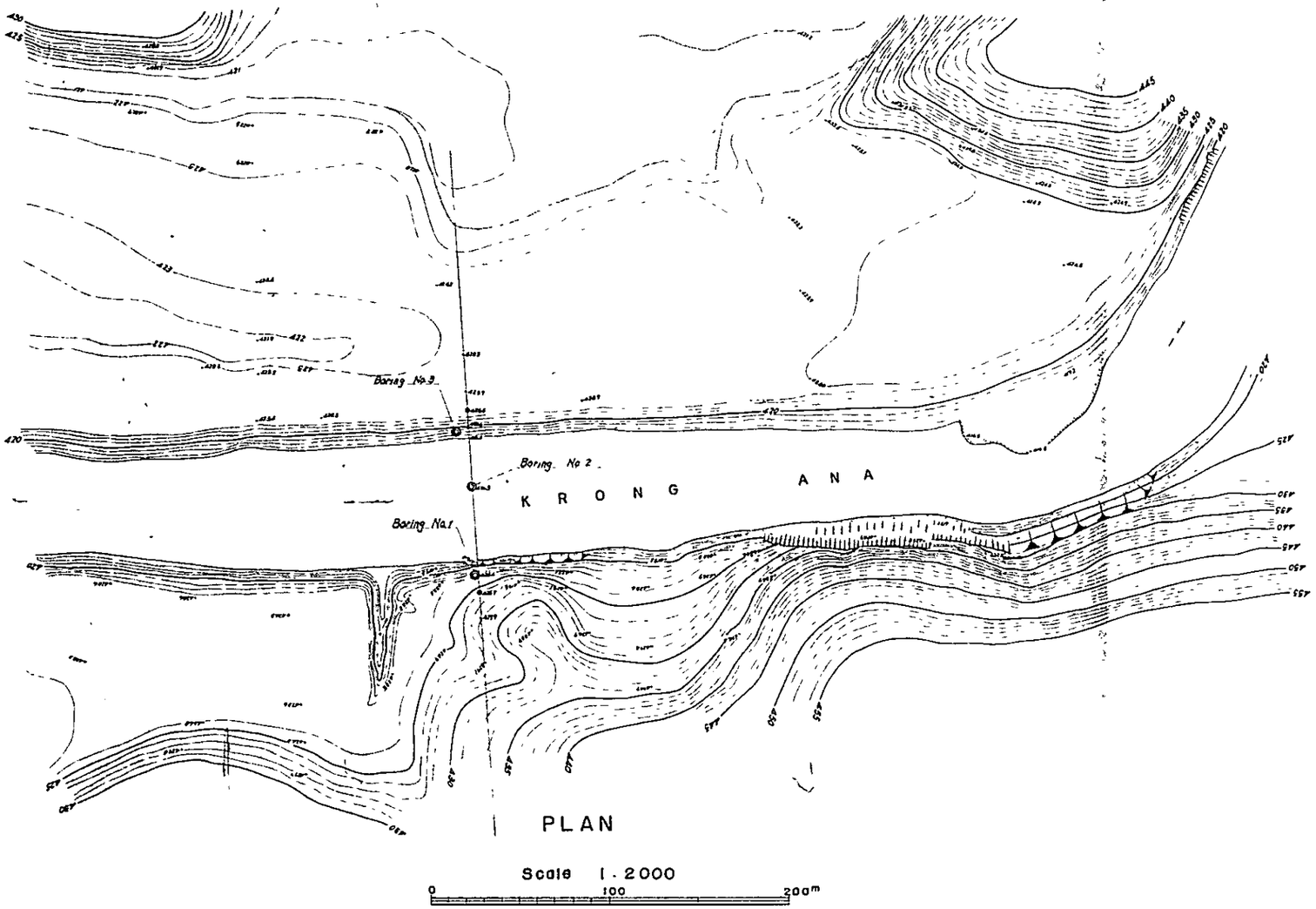
$n'10^3 = I + II + III$ II=(2)ek III=(3)dp Sign of III, same to sign of dp

$D^m = D_o - Dkm_{n'}$ $D_o^m = 014989625T$ $dD_1^m = -Hi\,D/R$ $dD_2^m = \Delta D\,(km)$



III. METEOROLOGICAL AND HYDROLOGICAL DATA

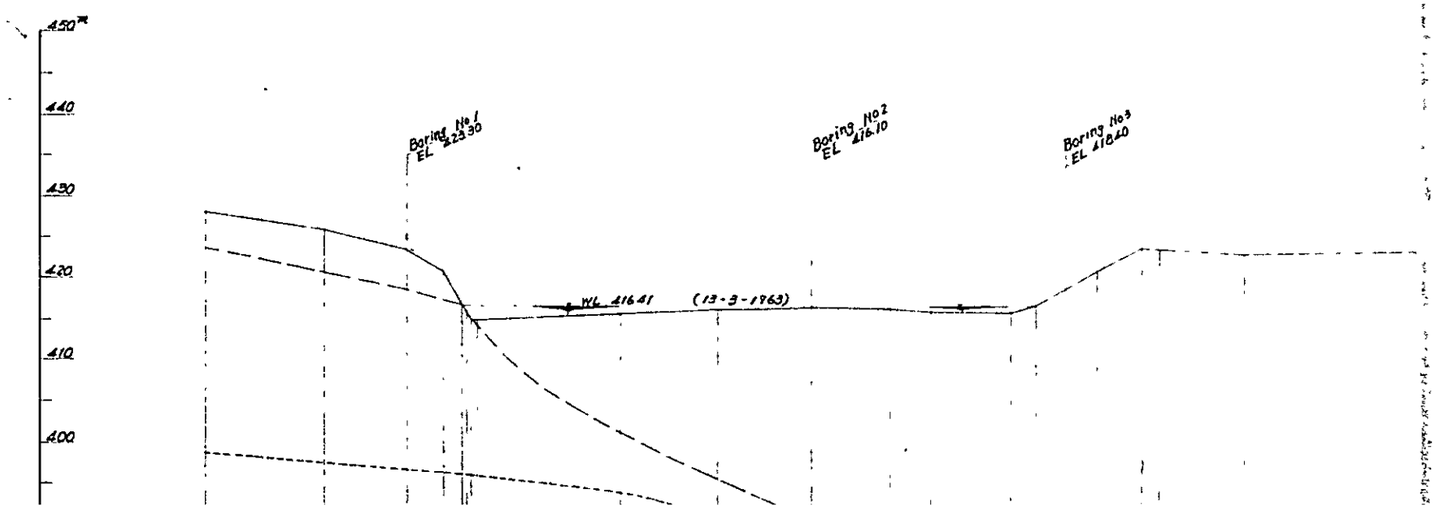
C O N T E N T S

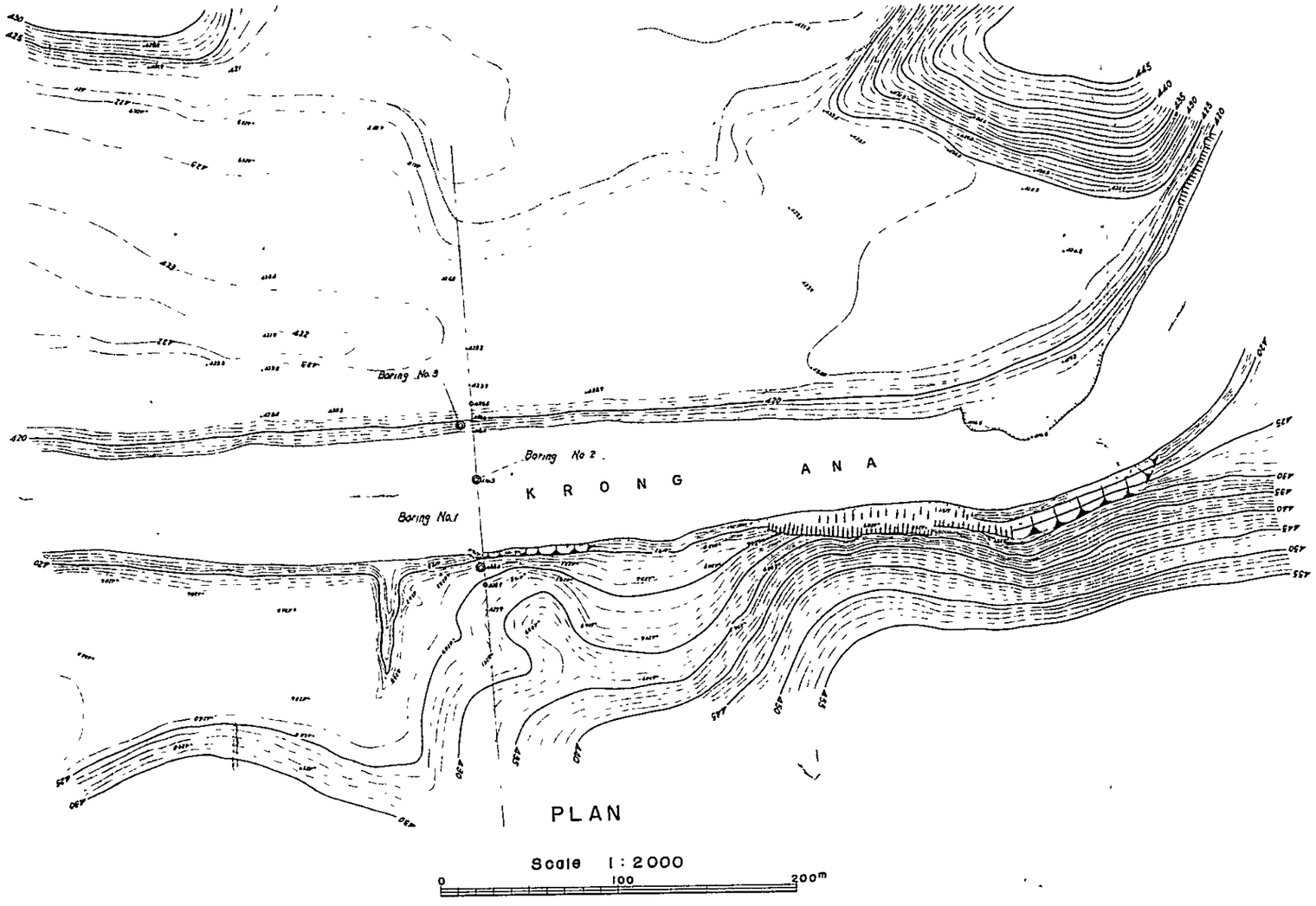


PLAN

Scale 1 : 2000

0 100 200m

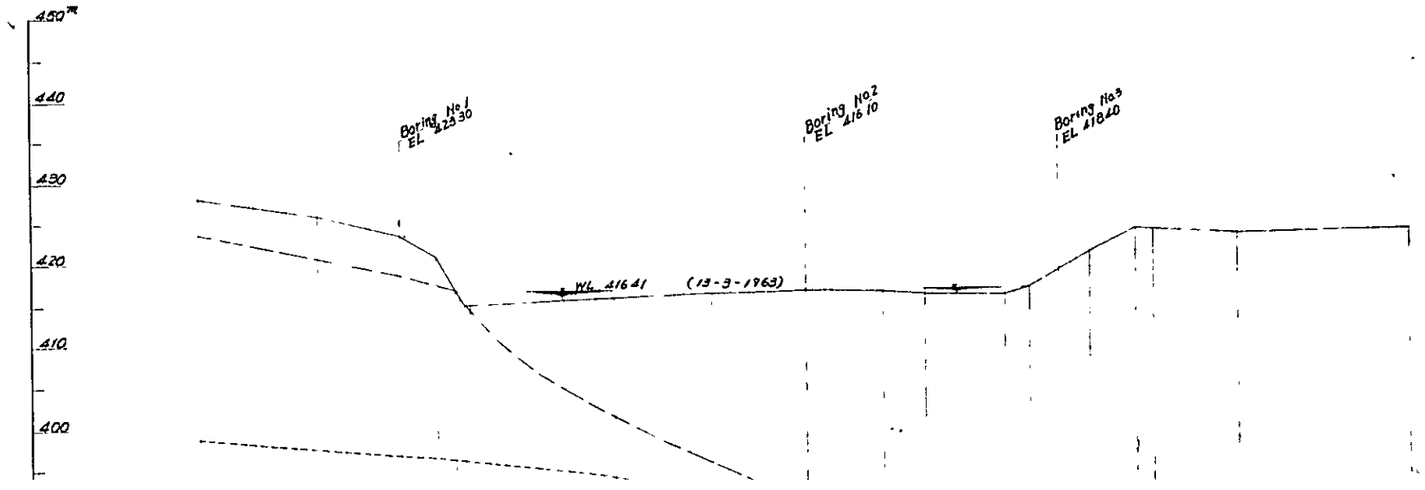


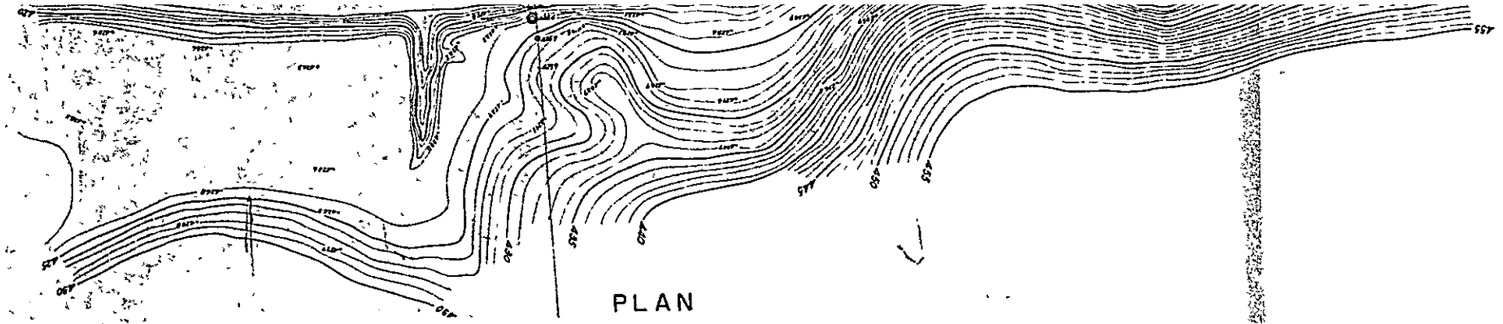


PLAN

Scale 1 : 2000

0 100 200m

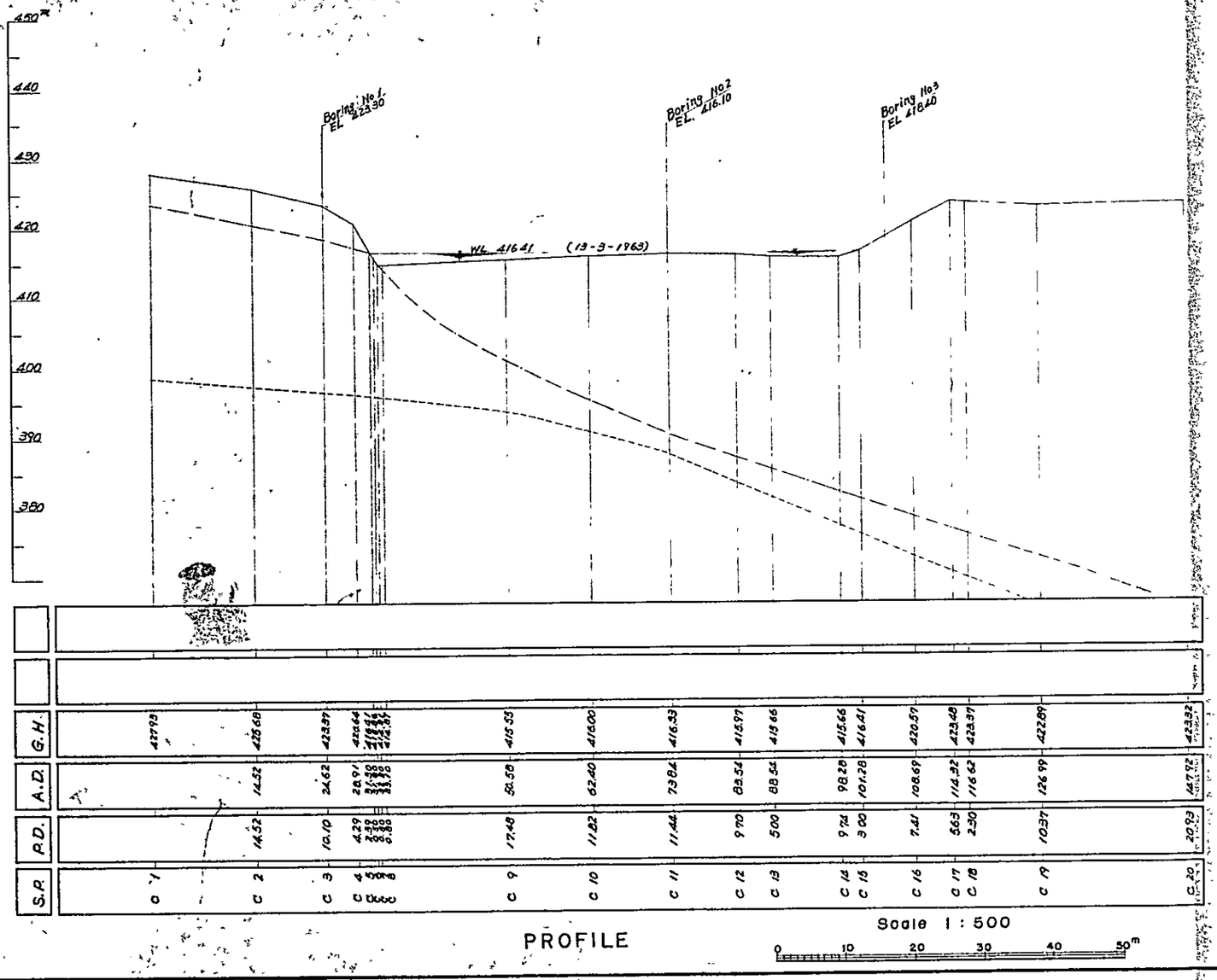




PLAN

Scale · 1 : 2000

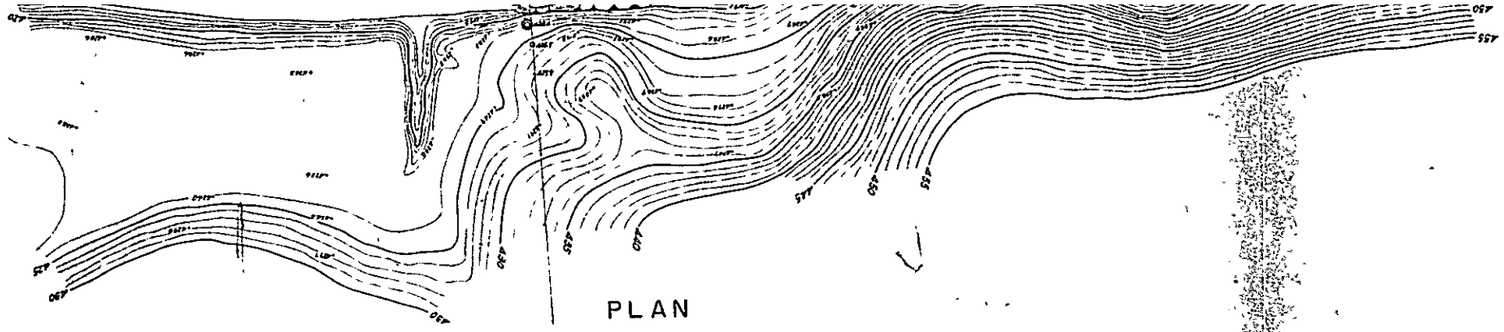
0 100 200m



PROFILE

Scale 1 : 500

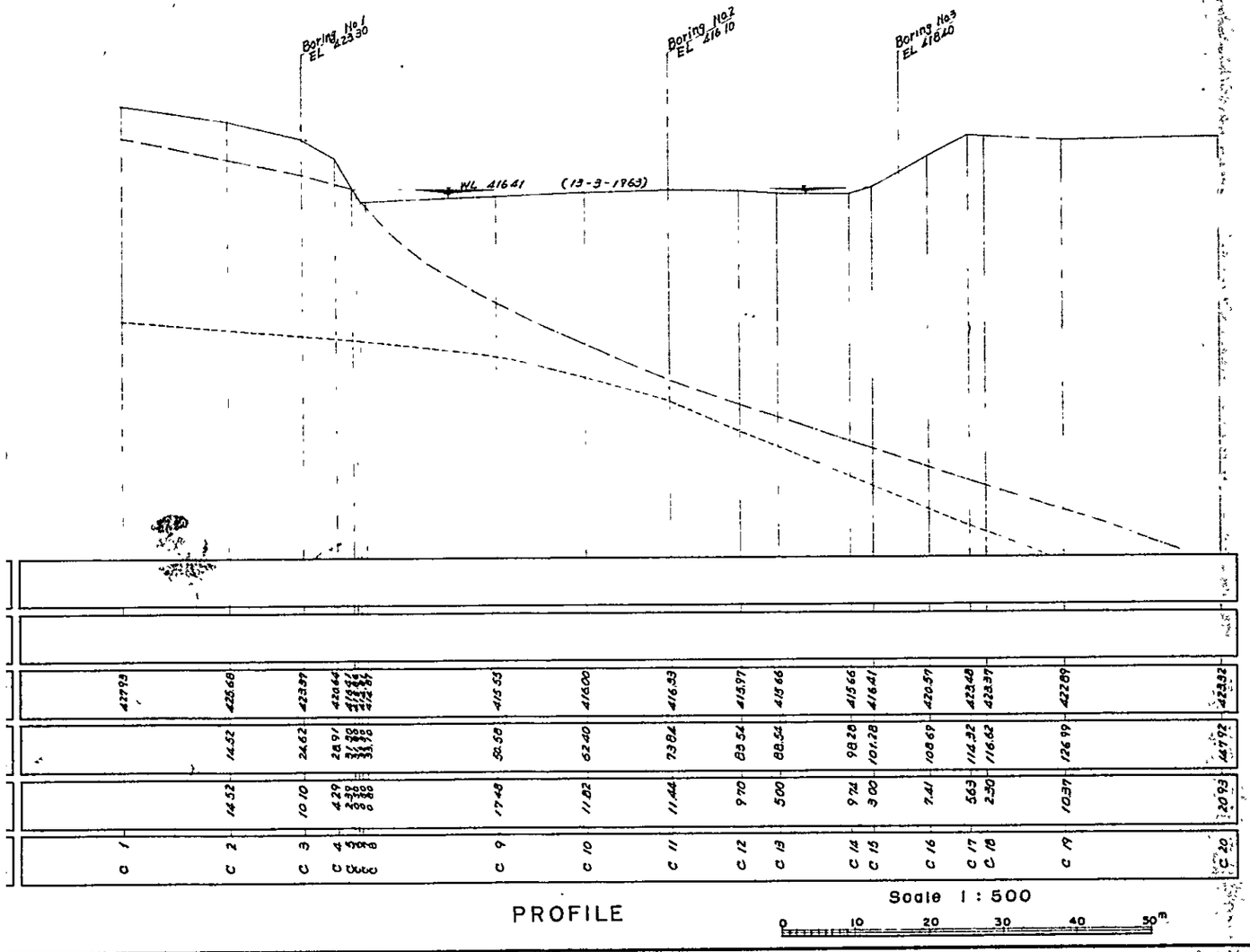
0 10 20 30 40 50m



PLAN

Scale 1 : 2000

0 100 200m



PROFILE

Scale 1 : 500

0 10 20 30 40 50m

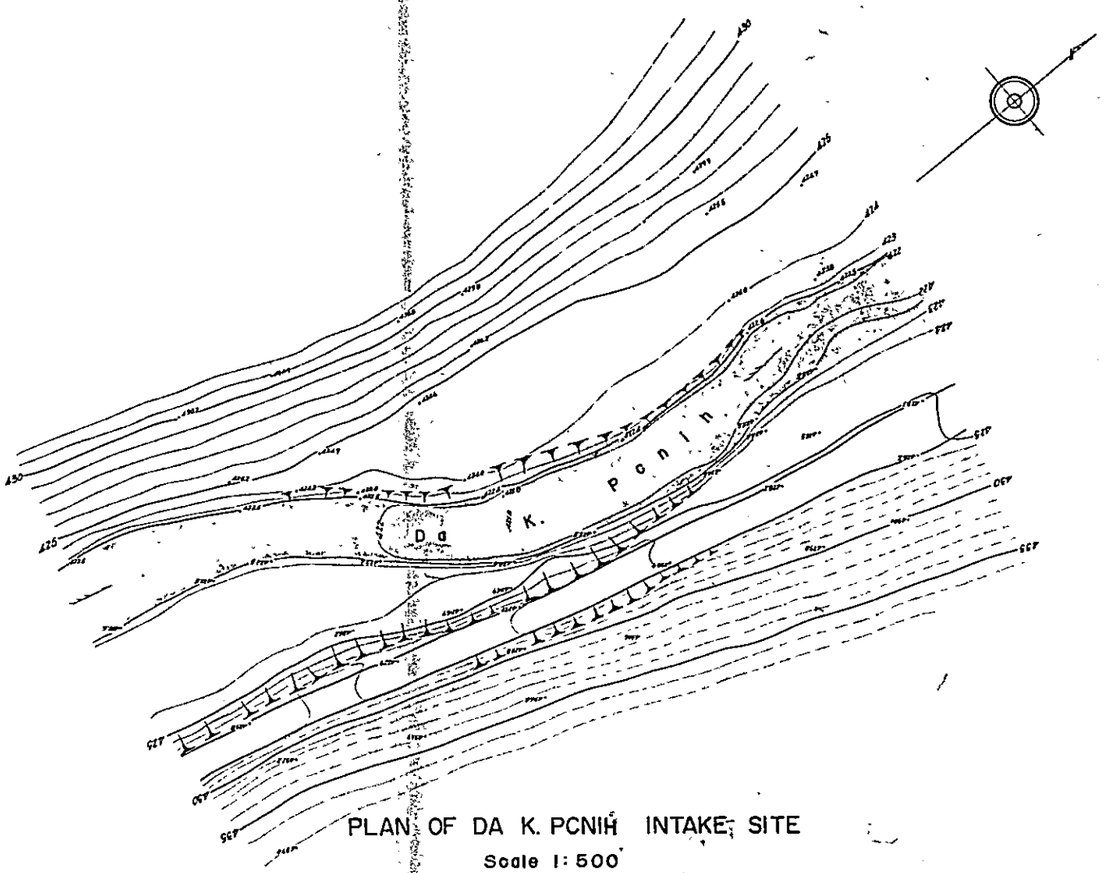
OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK - DAR LAC PROJECT

PLAN AND PROFILE OF KRONGANA INTAKE WEIR SITE

NIPPON KOEI CO., LTD. TOKYO
(CONSULTING ENGINEERS)

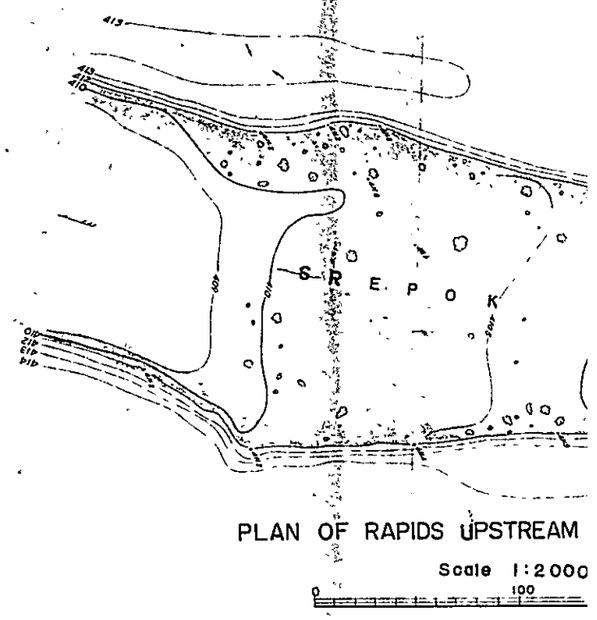
DRAWN	OFFICE TOKYO	DWG NO.
CHECKED	DATE MAY 30 1963	
SUBMITTED	RECOMMENDED	SHEET NO.
APPROVED		



PLAN OF DA K. PCNIH INTAKE SITE

Scale 1:500

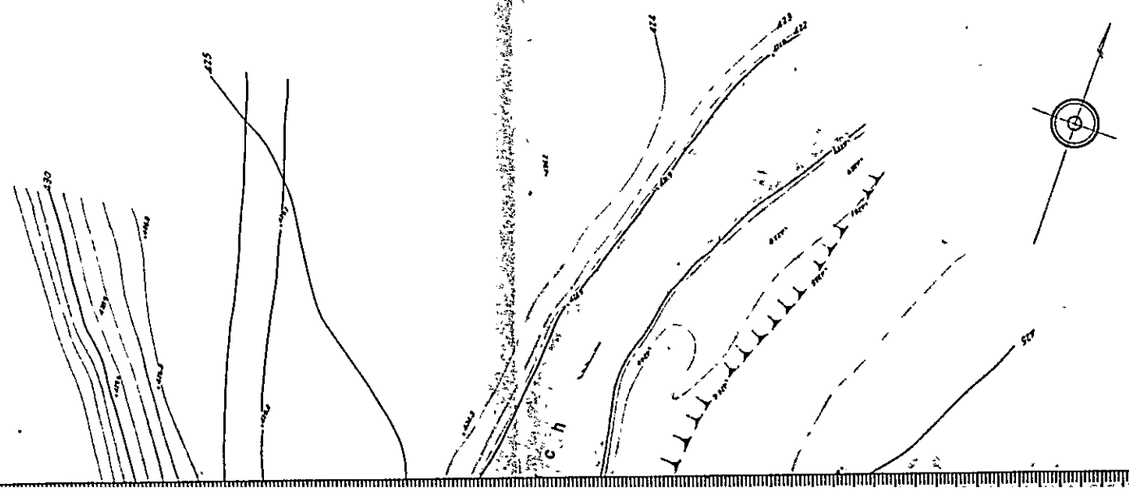
0 10 20 30 40 50m

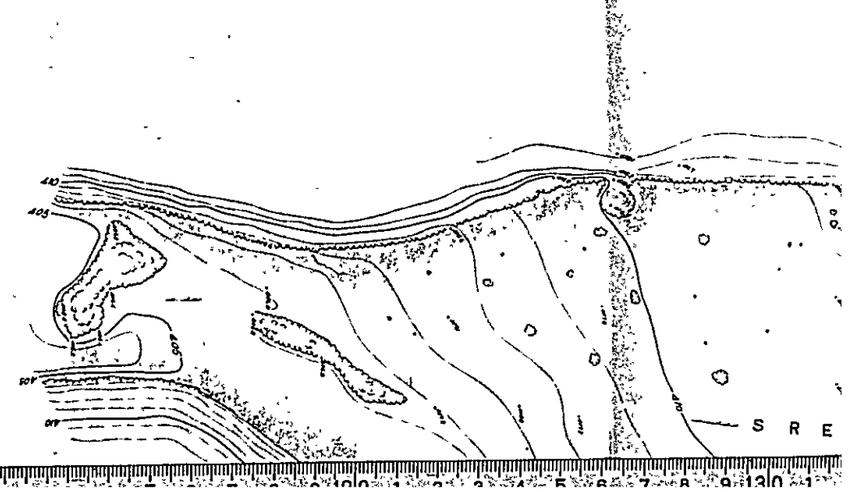


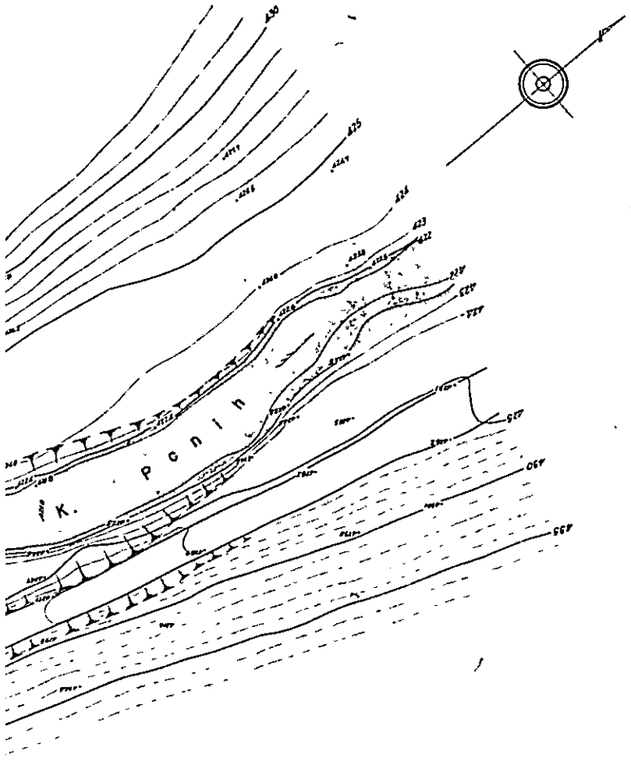
PLAN OF RAPIDS UPSTREAM

Scale 1:2000

0 100



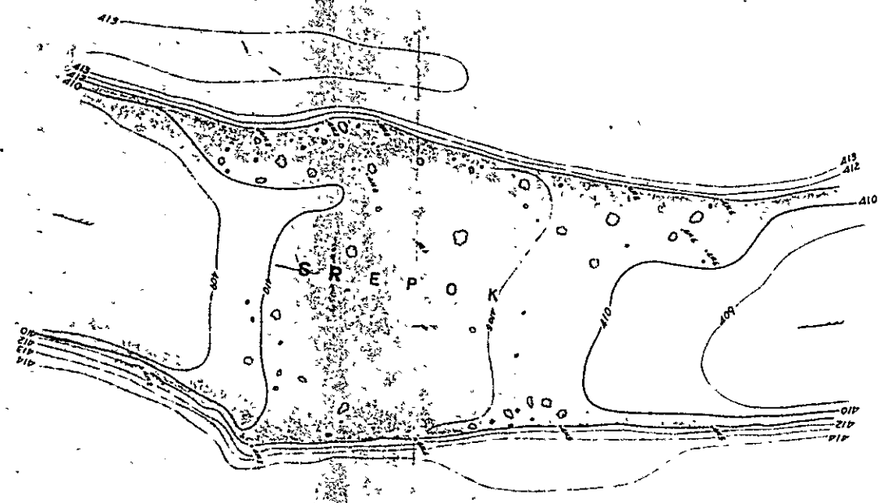




DA K. PCNIH INTAKE SITE

Scale 1:500

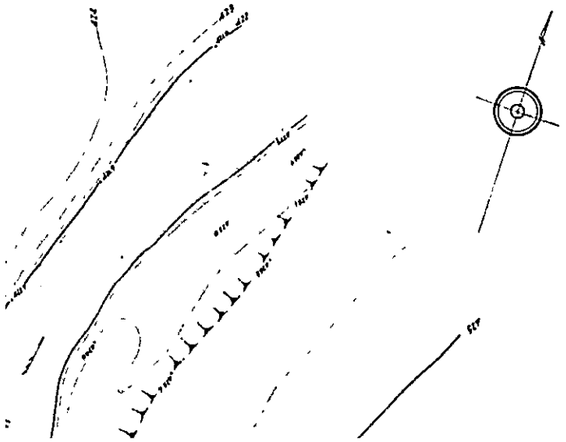
20 30 40 50m

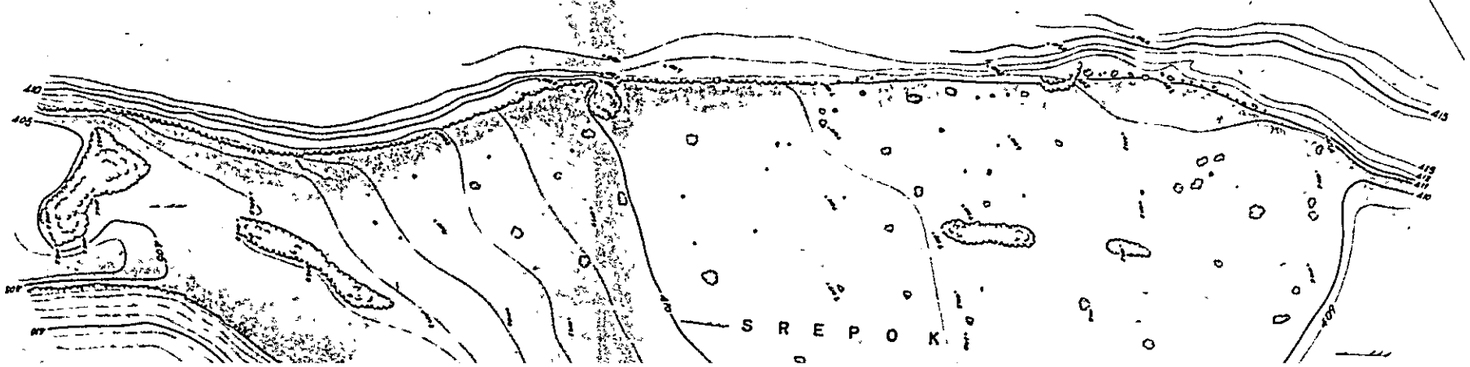


PLAN OF RAPIDS UPSTREAM FROM B. DRAY

Scale 1:2000

0 100 200m





PLAN OF DA K. PCNIH INTAKE SITE

Scale 1:500

0 10 20 30 40 50m

PLAN OF RAPIDS UPSTREAM

Scale 1:2000

0 100

PLAN OF EA LICH INTAKE SITE

Scale 1:500

0 10 20 30 40 50m

PLAN OF RAPIDS DOWNST

Scale 1:2

0 100

PLAN OF RAPIDS UPSTREAM FROM B. DRAY

Scale 1:2000

0 100 200m

PCNIH. INTAKE SITE

1:500

30 40 50m

S R E P O K

PLAN OF RAPIDS DOWNSTREAM FROM B. DRAY

Scale 1:2000

0 100 200m

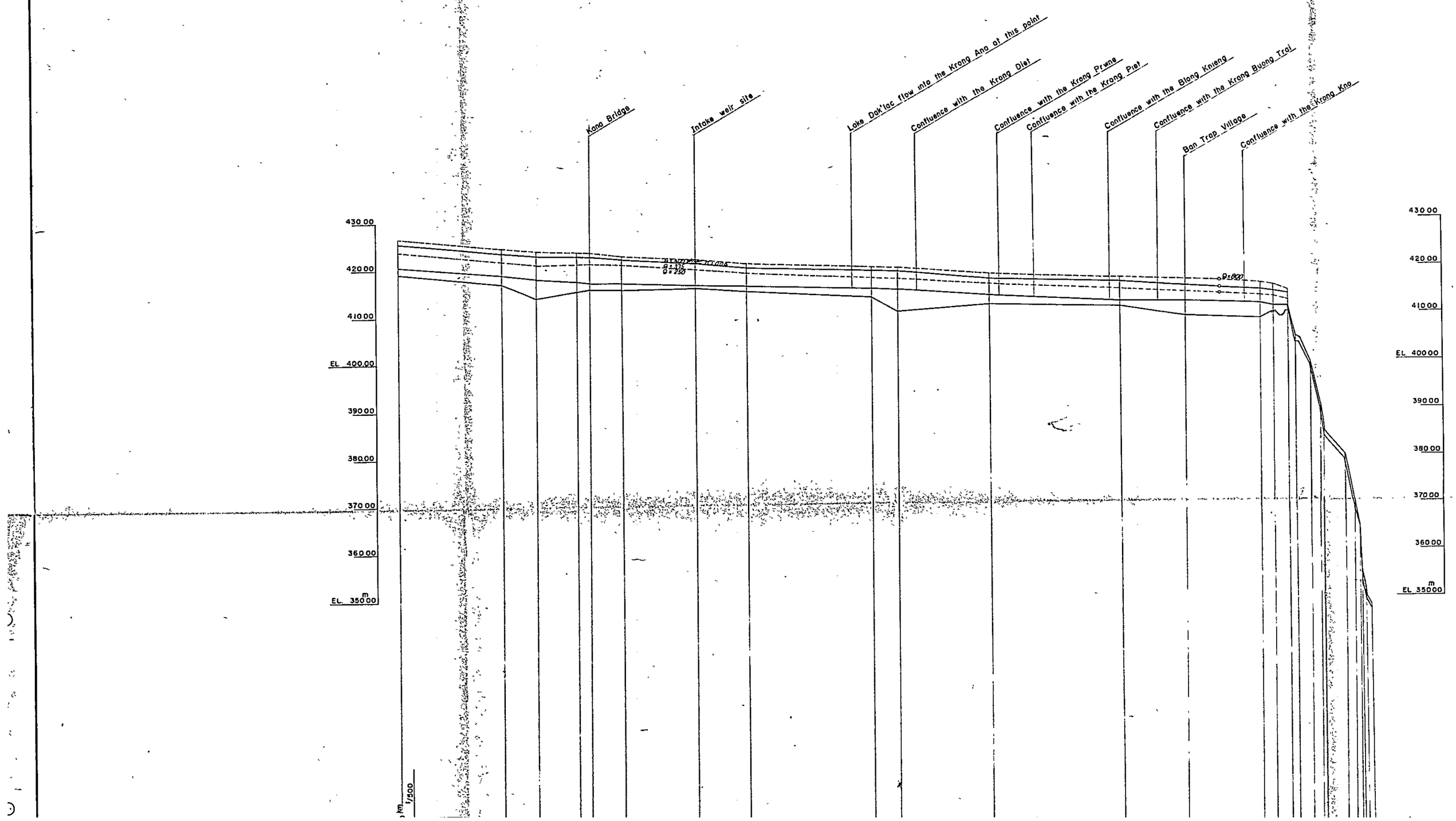
NTAKE SITE

500

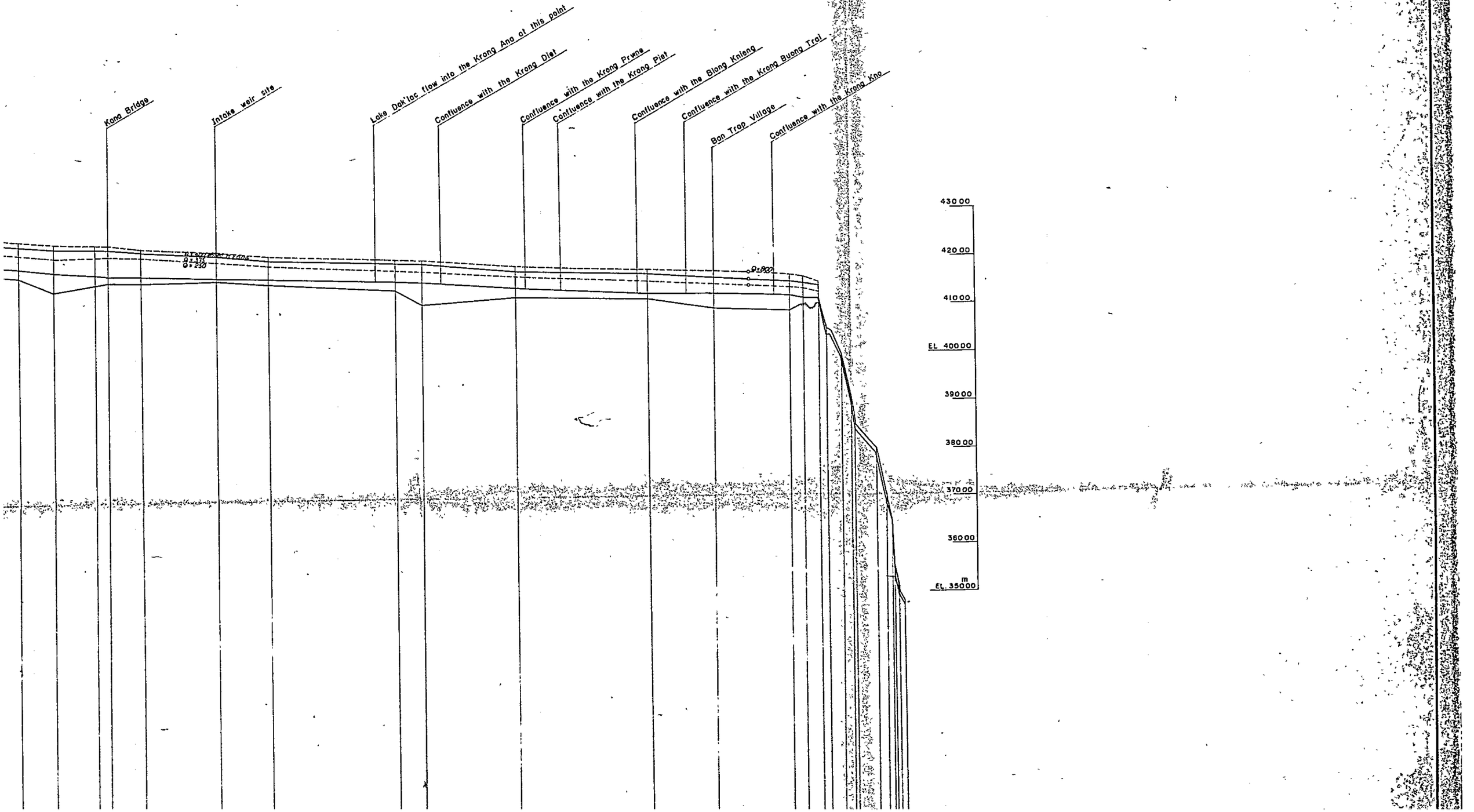
30 40 50m

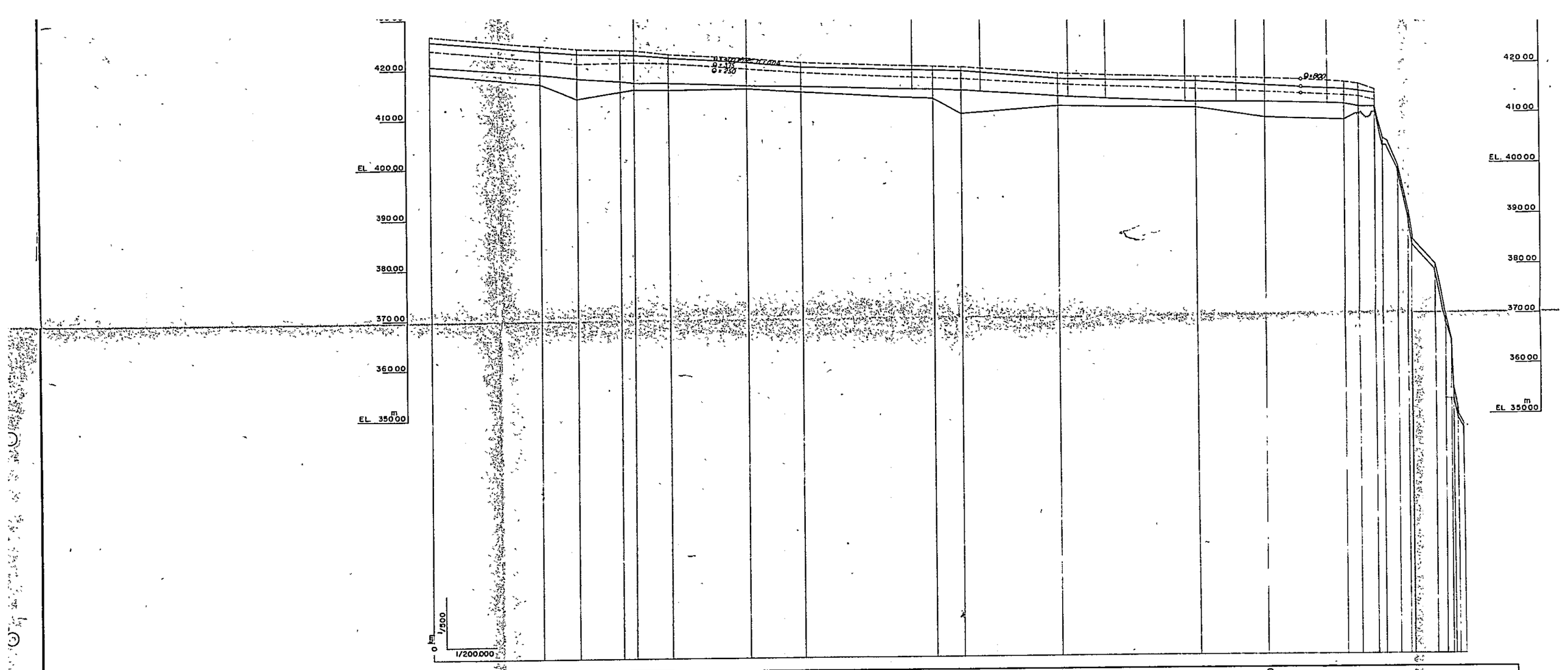
OVERSEAS TECHNICAL COOPERATION AGENCY TOKYO JAPAN	
UPPER SREPOK-DAR LAC PROJECT SURVEY MAPS	
NIPPON KOEI CO., LTD. TOKYO (CONSULTING ENGINEERS)	
DRAWN OFFICE TOKYO CHECKED DATE MAY 30 1963 SUBMITTED RECOMMENDED APPROVED	DWG NO. SHEET NO.

Longitudinal Section of Ea Krong Ana

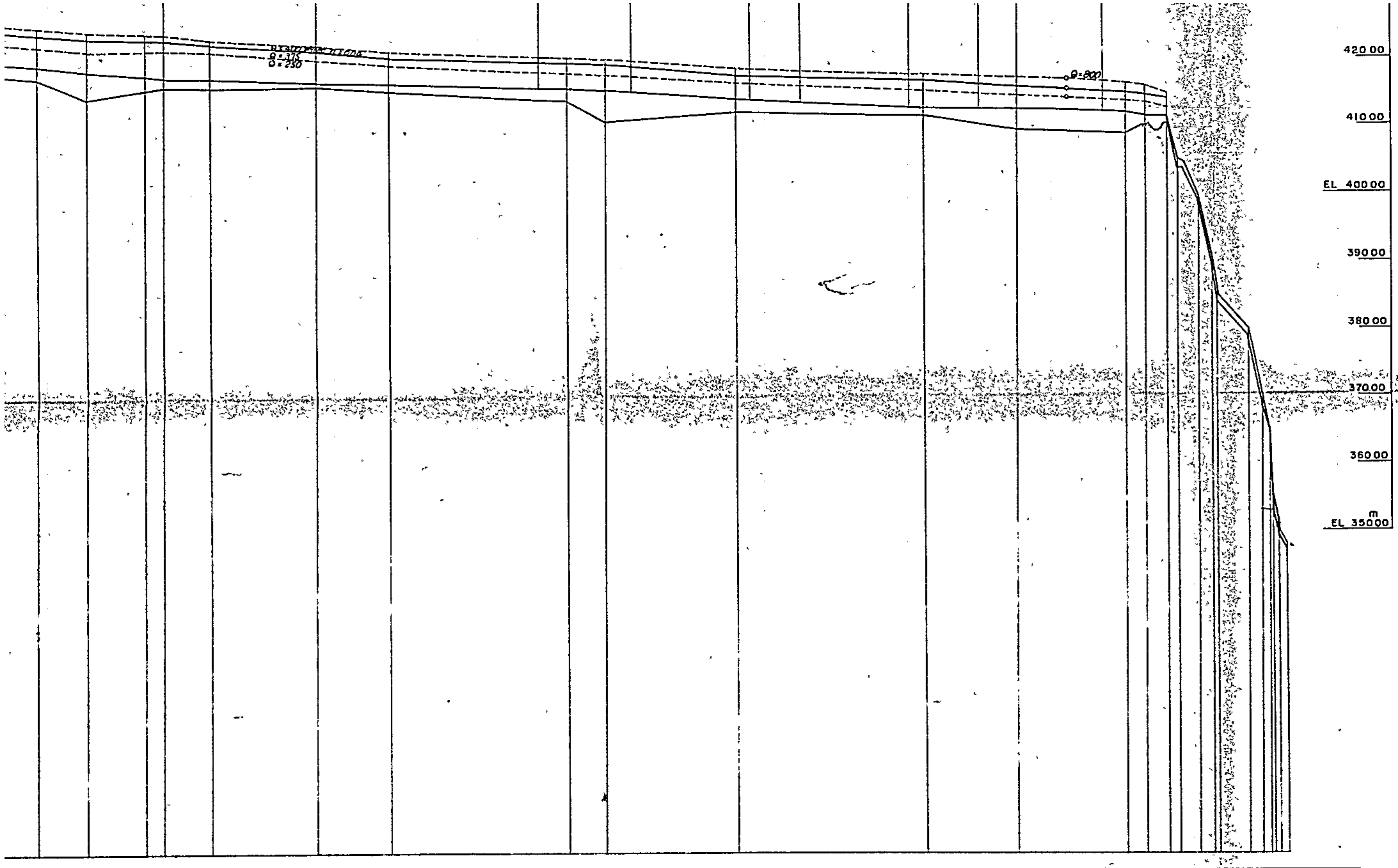


Longitudinal Section of Ea Krong Ana





S.P.	P.D.	A.D.	R.B.H	W.H.		Date
NO 1	0.000	0.000	41.922	42.063		3.16
NO. 2	8.930	8.930	41.691	41.871		3.8
NO 3	2.940	11.870	41.396	41.811		3.8
NO 4	3.510	15.380	41.525	41.745		3.7
NO. 5	1.080	16.460	41.569	41.719		3.16
NO. 5'	2.840	19.300	41.565	41.700		3.19
NO. 6	6.300	25.600	41.586	41.641		3.6
NO 7	4.350	29.950	41.517	41.627		
NO 9	10.780	40.730	41.373	41.543		3.4
NO 10	2.230	42.960	41.051	41.521		3.4
NO 11	7.950	50.910	41.185	41.386		3.29
NO 13	11.240	62.150	41.143	41.253		3.31
NO 15	5.610	67.760	40.915	41.235		3.30
NO. 16	6.430	74.190	40.869	41.190		3.31
NO. 17	1.110	75.300	40.810	41.140		
NO 18	1.390	76.690	40.650	41.130		
NO 19	0.610	77.300	40.390	40.500		
NO 20	1.170	78.470	39.910	40.000		
NO.21	0.960	79.430	39.930	39.000		
NO.22	0.530	79.960	38.380	38.500		
NO 23	1.530	81.490	37.920	38.000		
NO 24	0.710	82.200	36.870	36.000		
NO 26	0.130	82.330	35.300	35.000		
NO 27	0.130	82.460	34.930	34.000		
NO 28	0.450	82.910	34.710	34.000		



NO. 2	8.930	8.930	416.91	418.71	3.8
NO. 3	2.940	11.870	413.96	418.11	3.8
NO. 4	3.510	15.380	415.25	417.45	3.7
NO 5	1.080	16.460	415.69	417.19	3.16
NO 5'	2.840	19.300	415.65	417.00	3.19
NO 6	6.300	25.600	415.86	416.41	
NO 7	4.350	29.950	415.17	416.27	3.6
NO 9	10.780	40.730	413.73	415.43	3.4
NO. 10	2.230	42.960	410.51	415.21	3.4
NO. 11	7.950	50.910	411.85	413.86	3.29
NO 13	11.240	62.150	411.43	412.53	3.31
NO 15	5.610	67.760	409.15	412.35	3.30
NO. 16	6.430	74.190	408.69	411.90	3.31
NO 17	1.110	75.300	410.10	411.40	
NO. 18	1.390	76.690	410.50	411.30	
NO. 19	0.610	77.300	403.90	405.00	
NO. 20	1.170	78.470	399.10	400.00	
NO 21	0.960	79.430	389.30	390.00	
NO 22	0.530	79.960	383.80	385.00	
NO. 23	1.530	81.490	379.20	380.00	
NO 24	0.370	82.280	368.70	370.00	
NO 25	0.550	82.830	364.10	365.00	
NO 26	0.130	82.960	353.60	355.00	
NO 27	0.350	83.310	349.30	350.00	
NO 28	0.450	83.760	347.10	348.00	

H.L. SCALE 1 : 200,000
V.L. SCALE 1 : 500

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

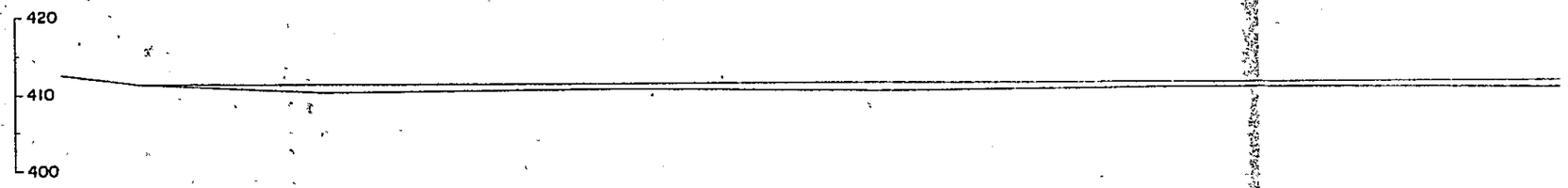
UPPER SREPOK – DAR LAC PROJECT

LONGITUDINAL SECTION OF EA KRONG ANA

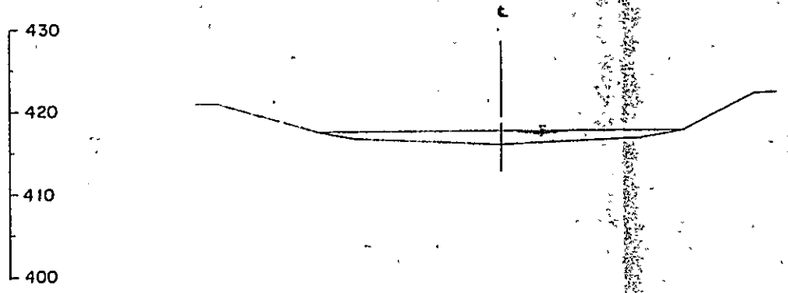
NIPPON KOEI CO., LTD. TOKYO
(CONSULTING ENGINEERS)

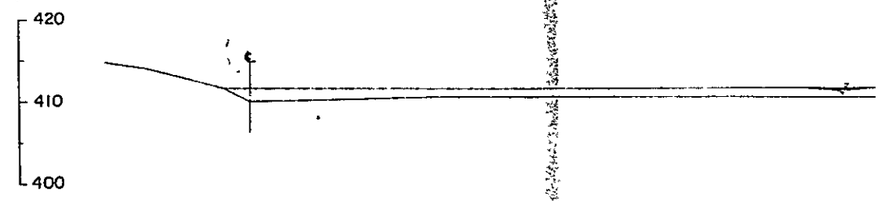
DRAWN	OFFICE TOKYO	DWG NO.
CHECKED	DATE MAY 30 1963	
SUBMITTED	RECOMMENDED	SHEET NO.
APPROVED		

EA KRONG ANA CROSS SECTION

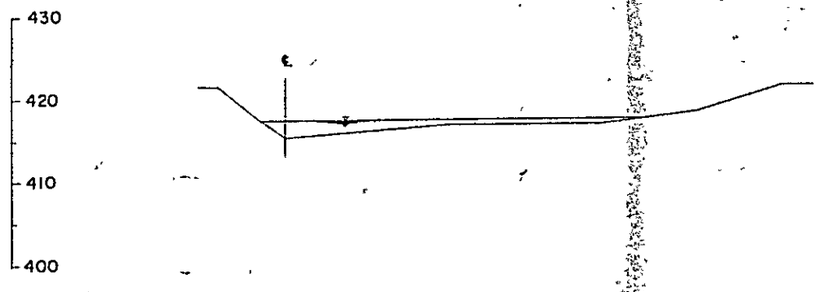


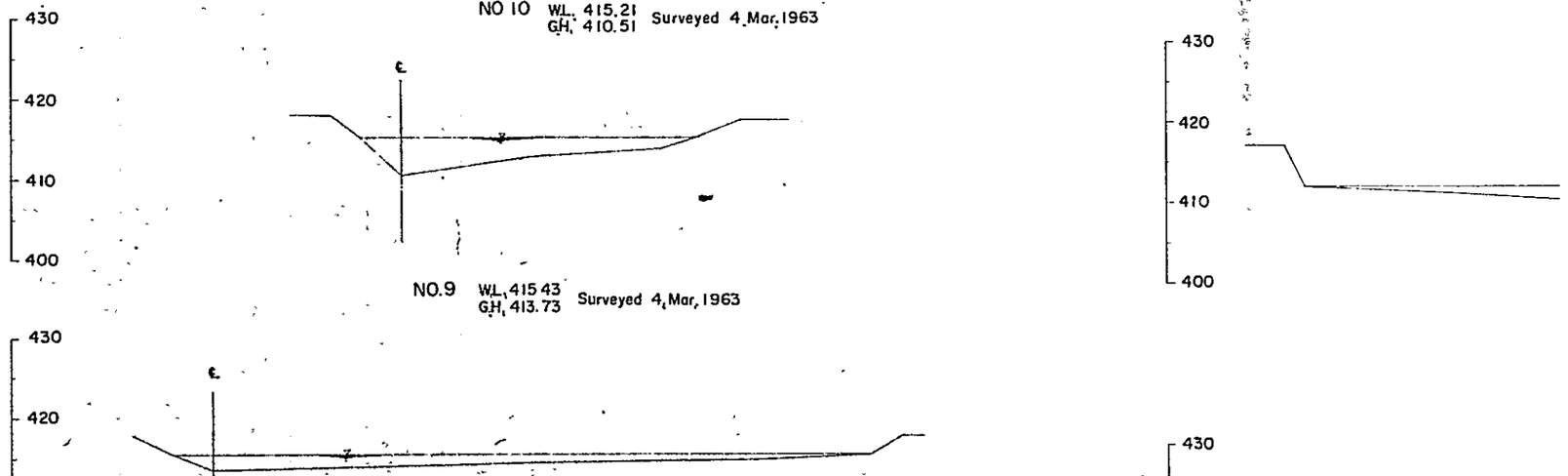
NO.5. W.L. 417.19 G.H. 415.69 Surveyed 16. Mar. 1963





NO.4. W.L. 417.45 G.H. 415.25 Surveyed 7. Mar. 1963



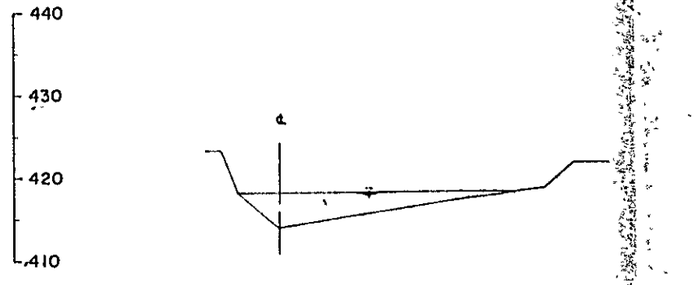


NO 10 W.L. 415.21 G.H. 410.51 Surveyed 4. Mar. 1963

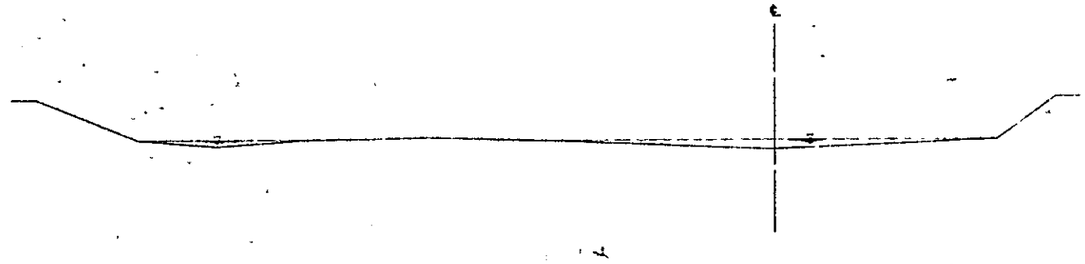
NO.9 W.L. 415.43 G.H. 413.73 Surveyed 4. Mar. 1963

NO.3. W.L. 418.11 G.H. 413.96 Surveyed 8. Mar. 1963

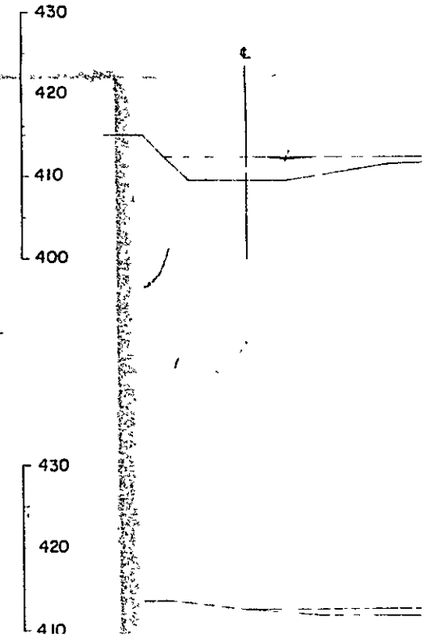
NO. 7. W.L. 416.27 G.H. 415.17 Surveyed 6. Mar. 1963



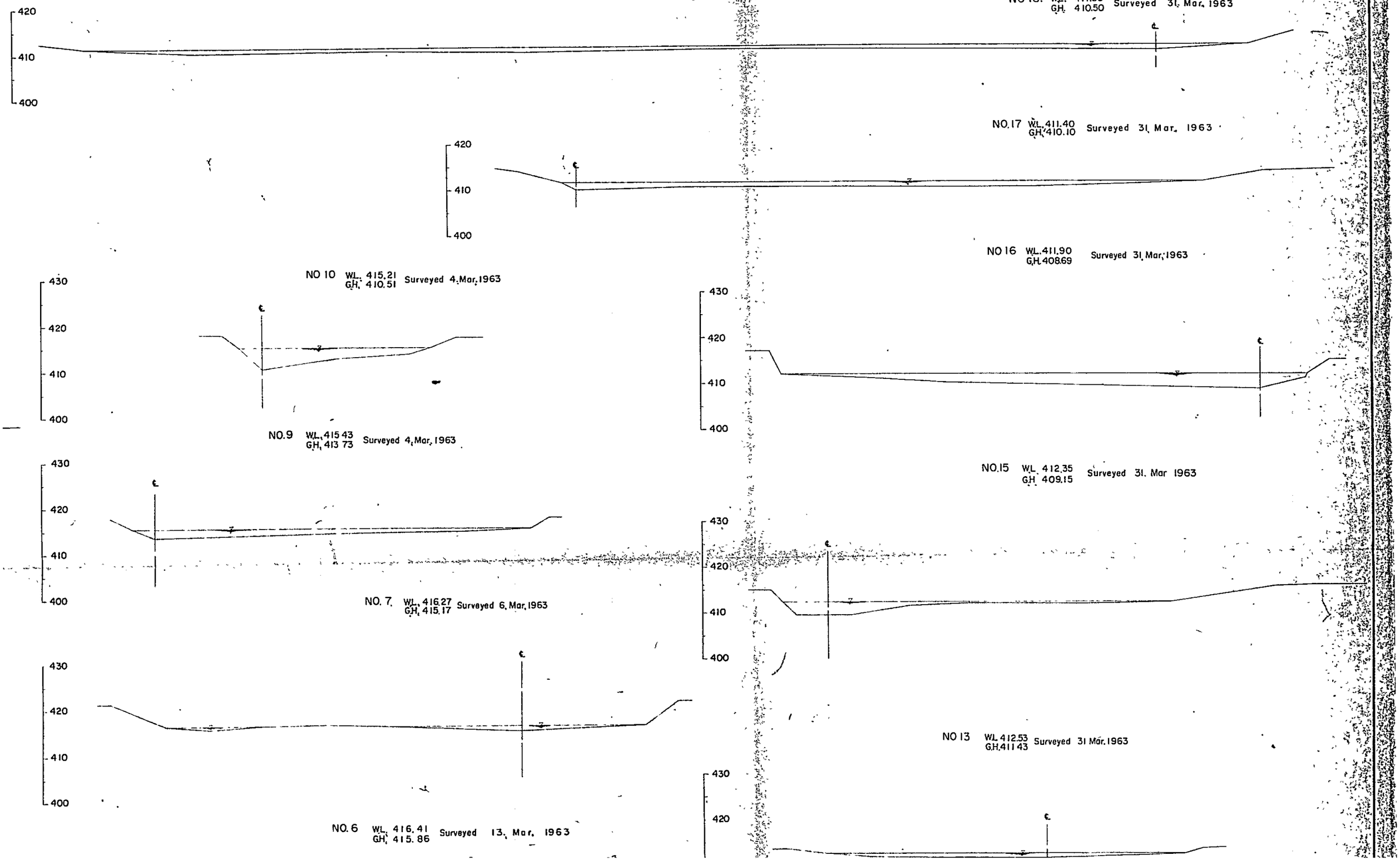
NO.2 W.L. 418.71 G.H. 416.91 Surveyed 8. Mar. 1963



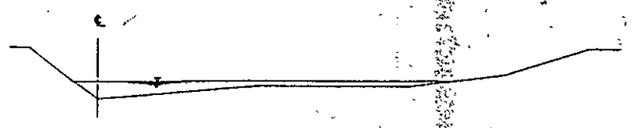
NO. 6 W.L. 416.41 G.H. 415.86 Surveyed 13. Mar. 1963

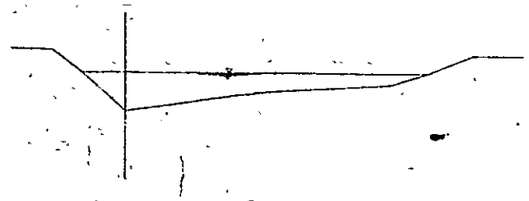


EA KRONG ANA CROSS SECTION

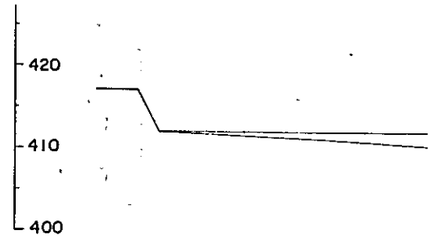


NO.4. WL. 417.45 G.H. 415.25 Surveyed 7. Mar. 1963

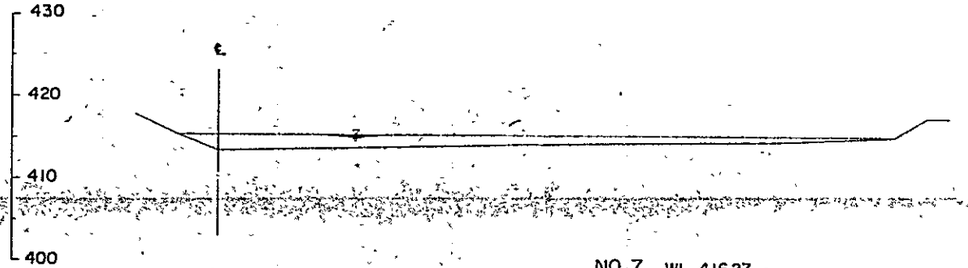




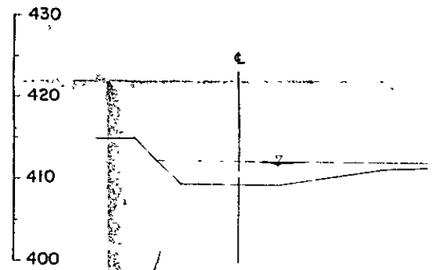
NO.9 WL. 415.43 G.H. 413.73 Surveyed 4. Mar. 1963

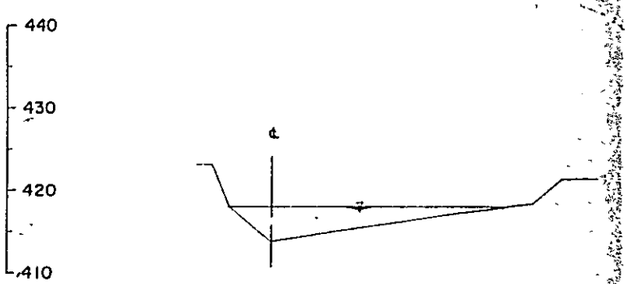


NO.3. WL. 418.11 G.H. 413.96 Surveyed 8. Mar. 1963

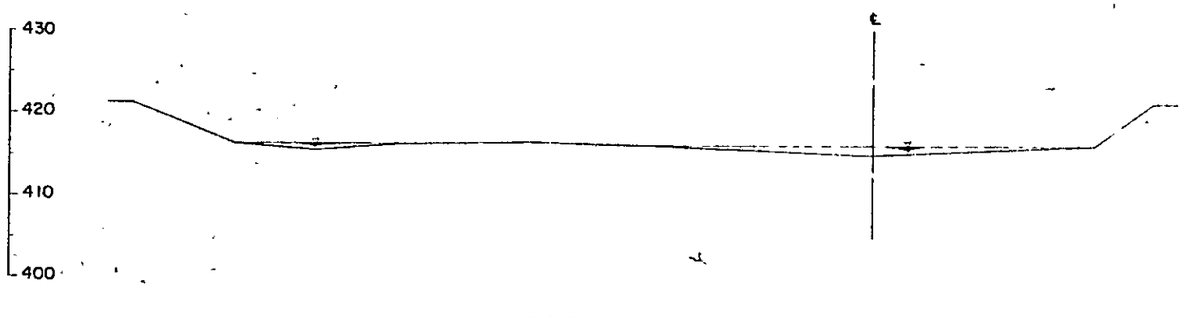


NO. 7. WL. 416.27 G.H. 415.17 Surveyed 6. Mar. 1963

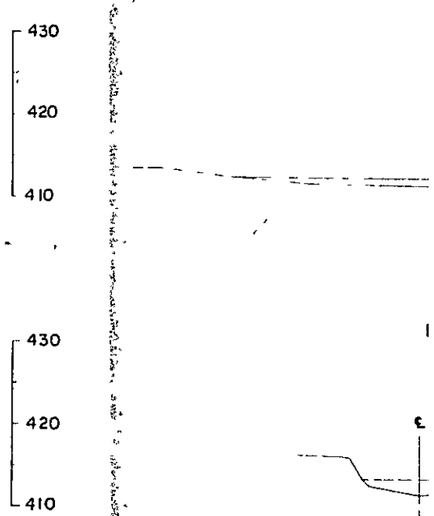


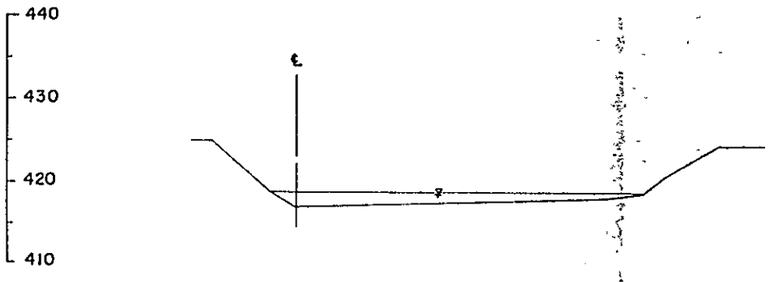


NO.2 WL. 418.71 G.H. 416.91 Surveyed 8. Mar. 1963



NO 6 WL. 416.41 GH. 415.86 Surveyed 13. Mar. 1963





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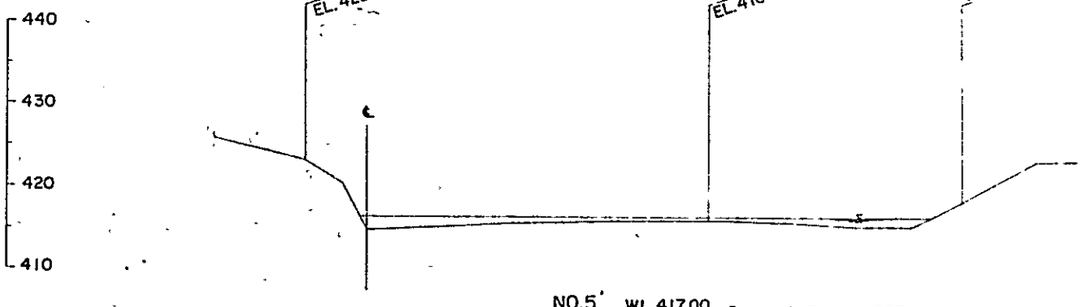
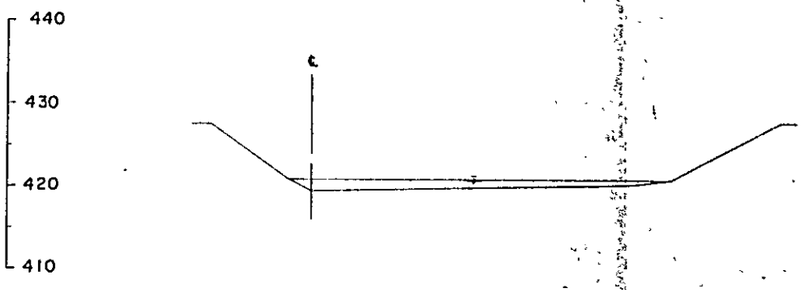
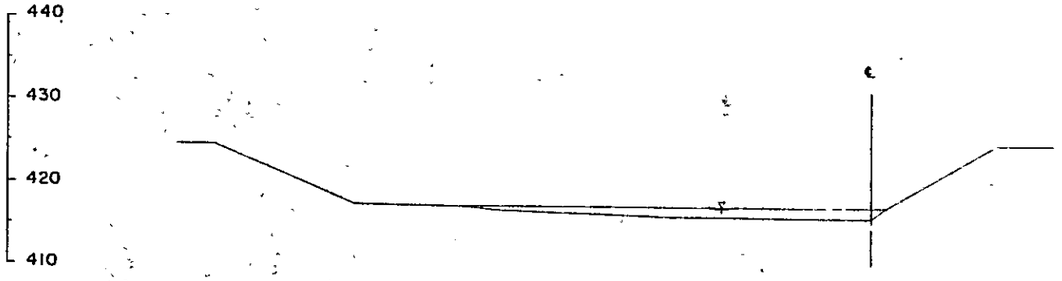
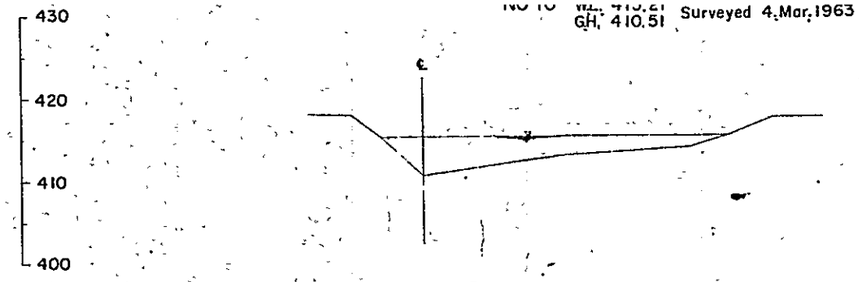


NO.5 WL. 417.00 G.H. 415.65 Surveyed 19. Mar. 1963

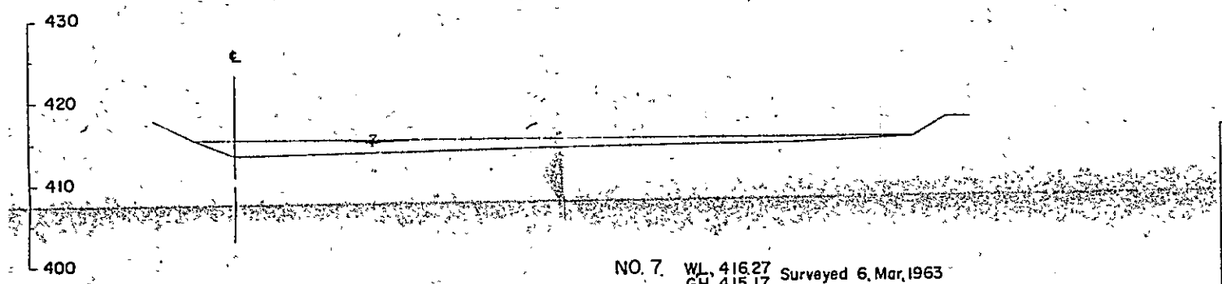




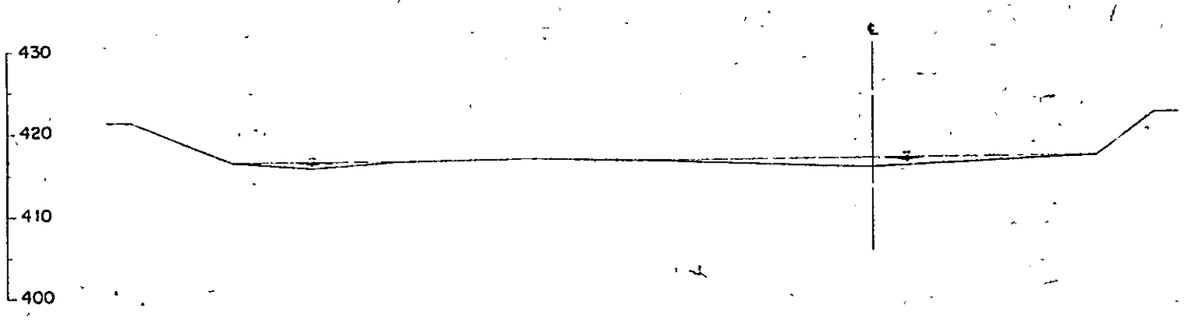
NO.10 W.L. 410.21
G.H. 410.51 Surveyed 4, Mar, 1963



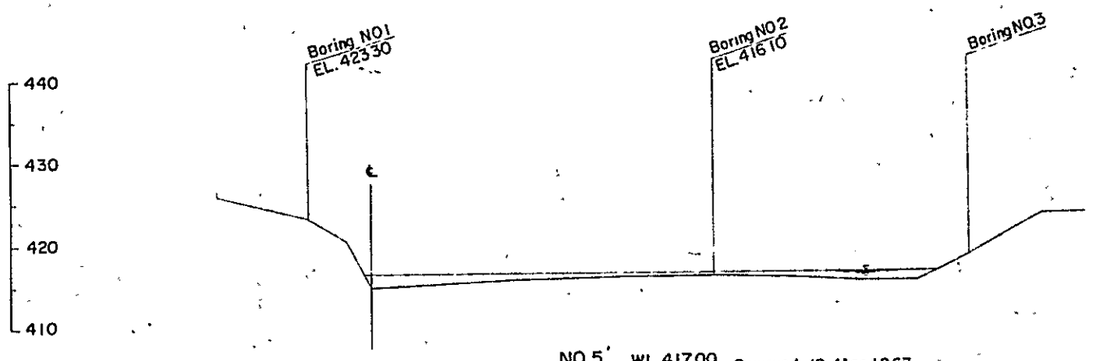
NO.9 W.L. 415.43
G.H. 413.73 Surveyed 4, Mar, 1963



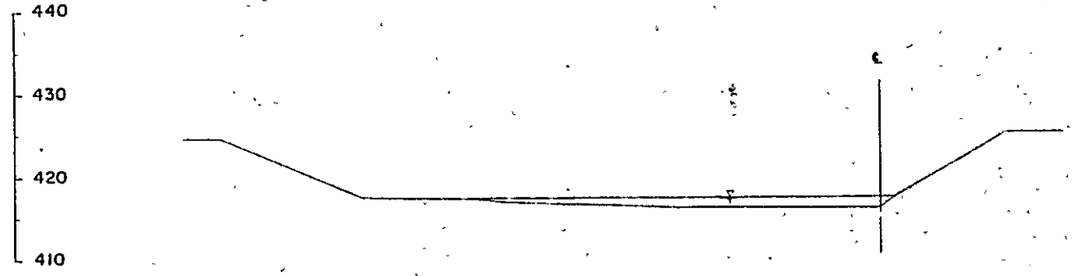
NO. 7. W.L. 416.27
G.H. 415.17 Surveyed 6, Mar, 1963

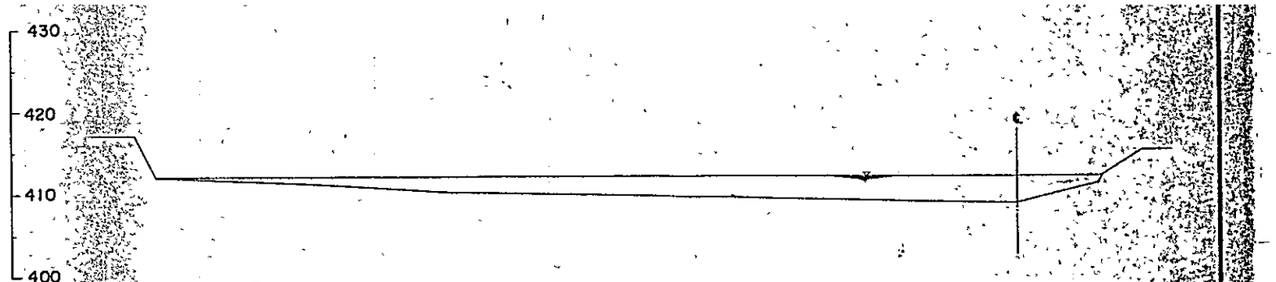


NO. 6 W.L. 416.41
G.H. 415.86 Surveyed 13, Mar, 1963



NO.5 W.L. 417.00
G.H. 415.65 Surveyed 19, Mar, 1963





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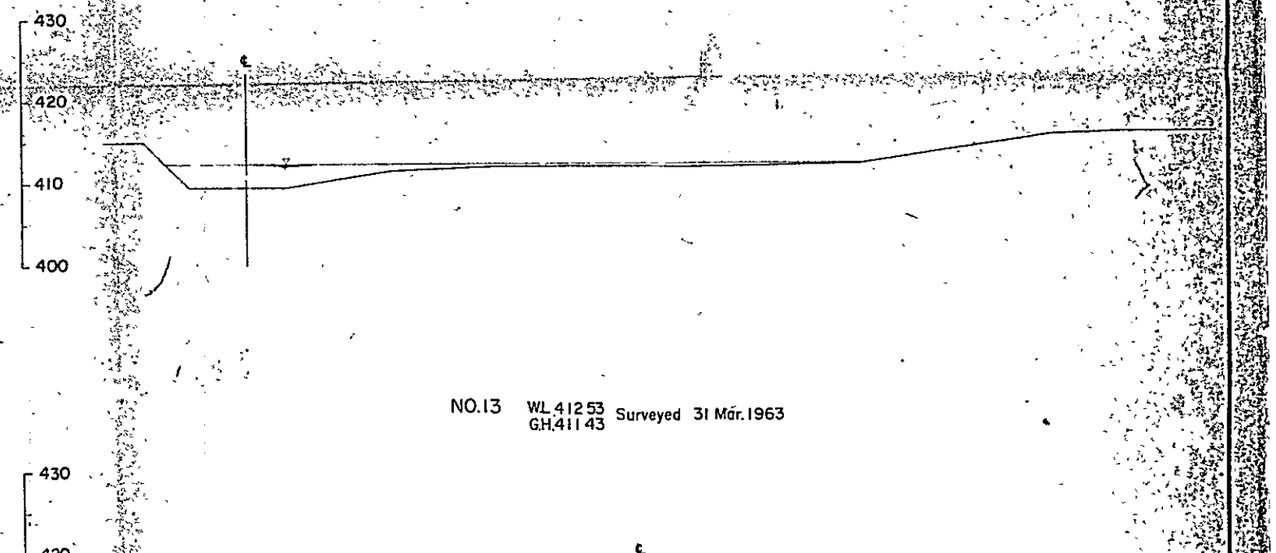
G.H. 409.15 Surveyed 31, Mar, 1963



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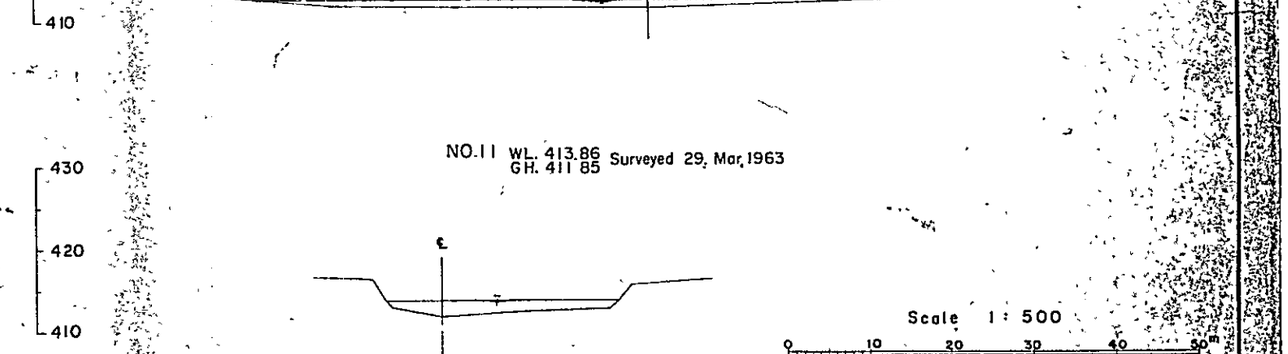
G.H. 411.43 Surveyed 31 Mar. 1963

NO.11 W.L. 413.86
G.H. 411.85 Surveyed 29, Mar, 1963



Scale 1 : 500

0 10 20 30 40 50 m

OVERSEAS TECHNICAL COOPERATION AGENCY.
TOKYO JAPAN

UPPER SREPOK - DAR LAC PROJECT

KRONG ANA CROSS SECTION

NIPPON KOEI CO., LTD. TOKYO
(CONSULTING ENGINEERS)

DRAWN	OFFICE TOKYO	DWG NO.
CHECKED	DATE MAY 30 1963	
SUBMITTED	RECOMMENDED	SHEET NO.
APPROVED		

MEKONG

DAR LAC

LEGEND — LEGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Mule track	Route muletière
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes; rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Région sablonneuse
Swamp, marsh	Marécage marais
Steep slope	Talus escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte terre herbe

E Ring

Ea Krong Ana

B Mlieng

Dar Lac

B Juinh

B Le

B Yuk

B Yuk La

B Krami

B Ouk

B Dang

B Krongue

B Dia

B Dreng

B Dien

B Don Krin

B Drung

B Chur Jien

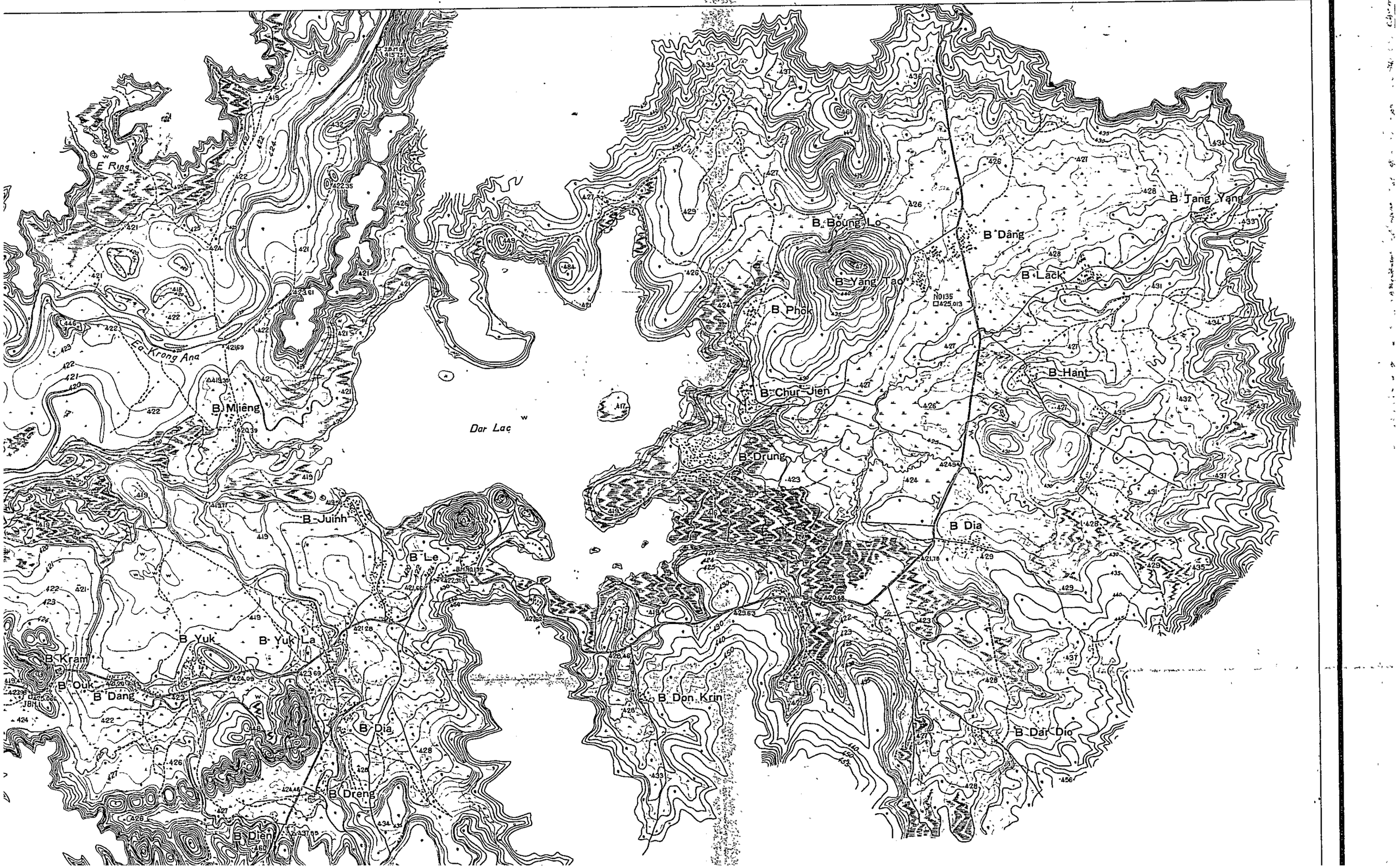
B Yang

B Phok

B Boung Lo

DAR LAC

A


E Ring
Ea Krong Ana
B Mliêng
B Juinh
B Le
B Yuk
B Yuk La
B Kram
B Ouk
B Dang
B Dia
B Dreng
B Dien
Dar Lac
B Drung
B Don Krin
B Chur Jien
B Boung Lo
B Yang Tao
B Phok
B Dia
B Jang Yang
B Dâng
B Lack
B Hant
B Dia
B Dar Dio

Triangulation point — Point geodesique
Bench mark — Point de repère
Spot elevation — Point coté
National highway — Route nationale
Motor road — Autoroute
Mule track — Route muletière
Trail — Sentier
Railway — Chemin de fer
Perennial river — Rivière
Non perennial river — Cours d'eau intermittent
Falls, rapids — Chutes; rapides
River course — Ecoulement d'une rivière
Non perennial lake — Lac intermittent
Pond — Etang
Sandy land — Region sablonneuse
Swamp, marsh — Marécage marais
Steep slope — Talus escarpé
Fields — Champ
Paddy Field — Rizière
Orchard — Verger
Trees — Arbres
Waste land, Grass land — Terre inculte terre herbe

B Juihh
B Le
B Yuk
B Yuk La
B Kram
B Ouk
B Dang
B Dia
B Don Krin
B Krongue
B Dreng
B Dien
Ea Lien
Dak Pouih
C Dri
B Dhan

Compiled by photogrammetric methods aerial photography dated February 1958 furnished by U S Army

A Control points required for compilation established by control point survey at the sites Final results of aerial triangulation and control points were utilized for compilation Areas where control point survey could not be performed were compiled by utilizing rivers or topographic features around the vicinity

B It is recommended that the areas where no control surveys were performed be adjusted when better control is available.

LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

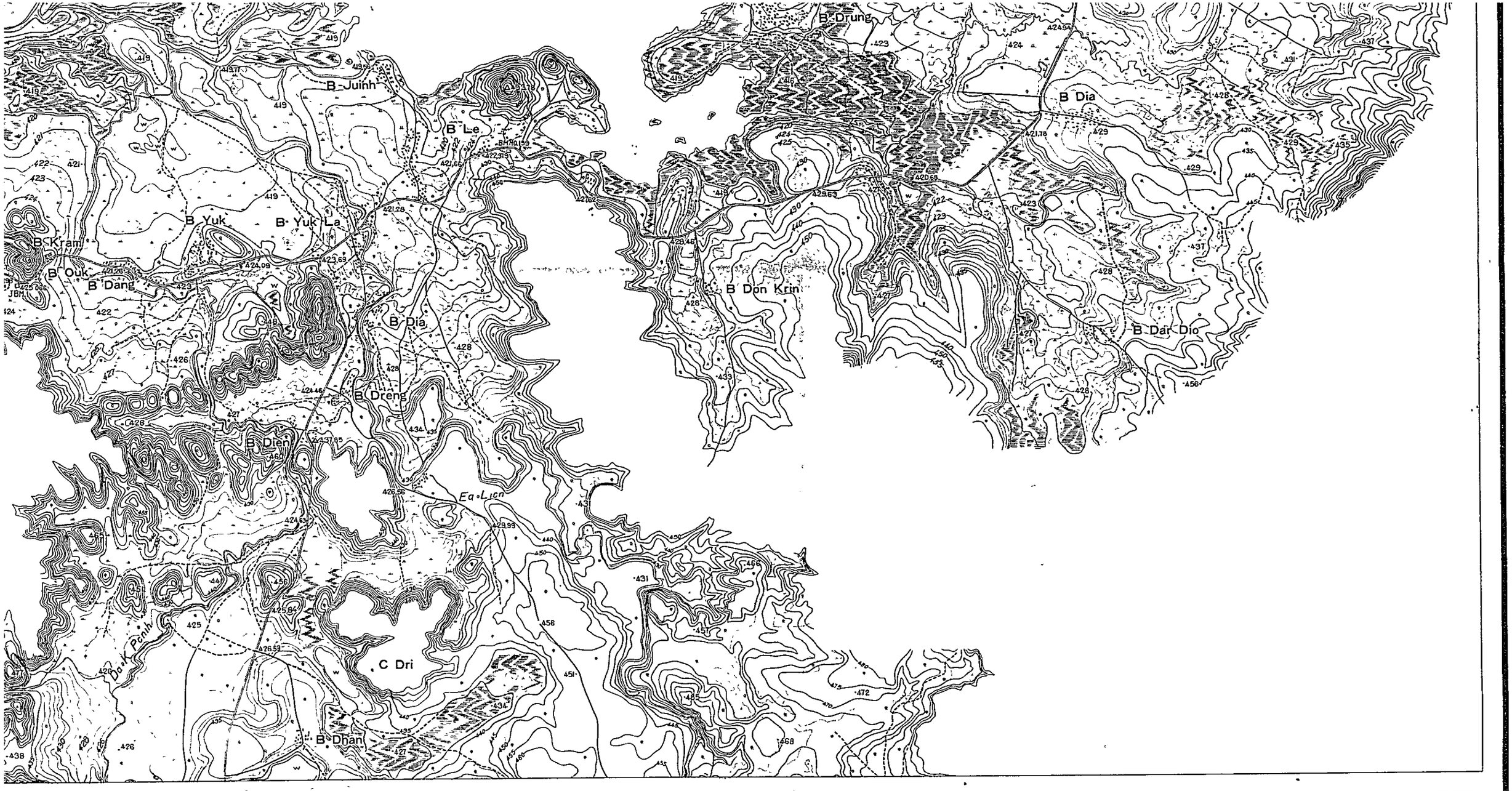
SCALE 1:20,000

MILE 1 0 1

METERS 1000 0 1000 2000 3000 METERS

FORM LINE INTERVAL 5 METER

81
0



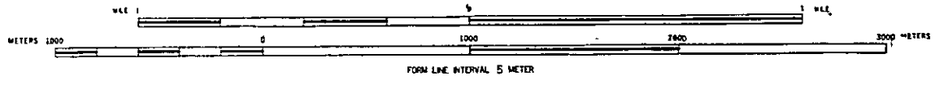
LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

SCALE 1:20,000



OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD
(CONSULTING ENGINEERS)

Compiled
Checked
Approved

Wo =

SHEET NO

MEKONG

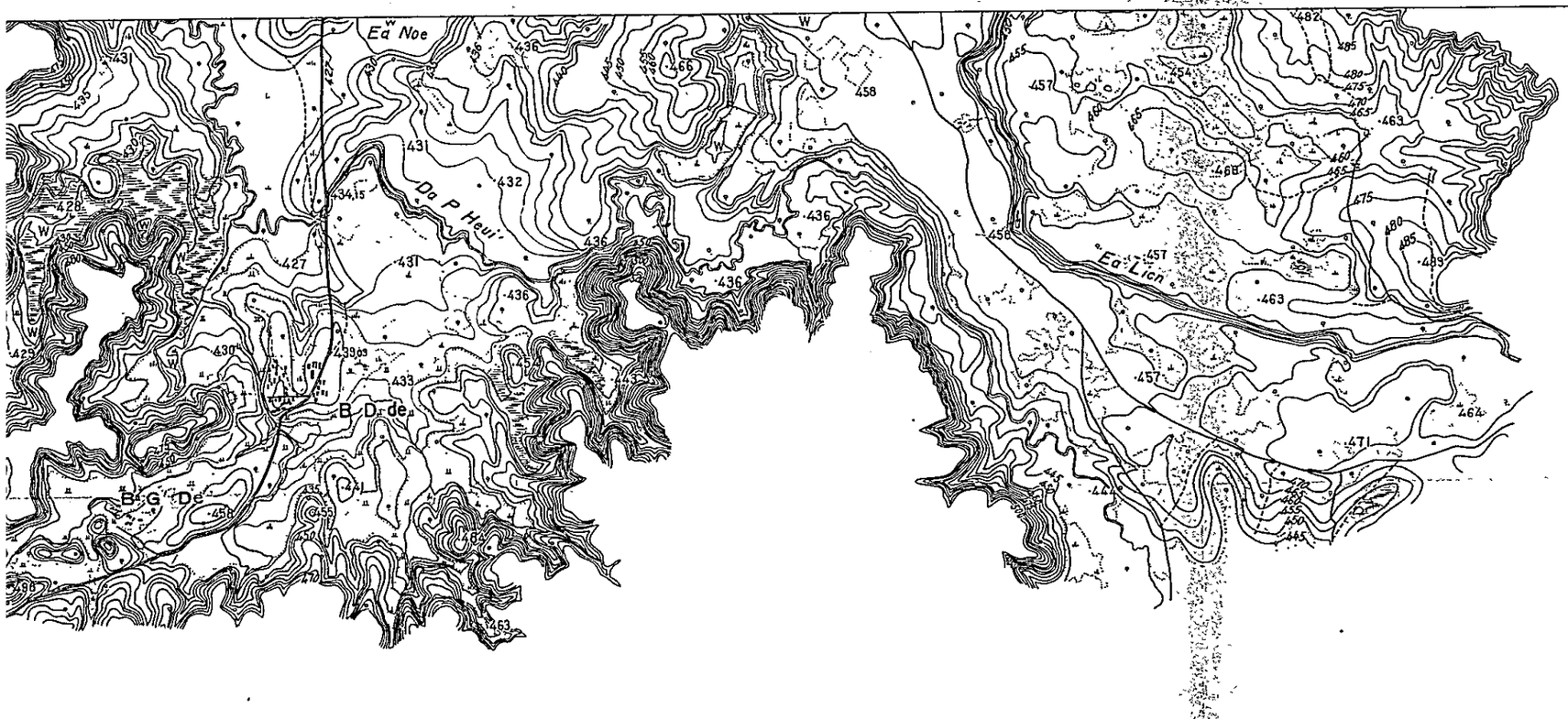
DAR LAC

LEGEND— LÉGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Mule track	Route muletière
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Région sablonneuse
Swamp, marsh	Marécage, marais
Steep slope	Talus escarpé
Field	Champ
Paddy field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte, terre herbe

DAR LAC

B.



LEGEND — LÈGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Mule track	Route muletière
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Région sablonneuse
Swamp, marsh	Marécage, marais
Steep slope	Talus escarpé
Field	Champ
Paddy field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte, terre herbe

Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by U.S. Army

A Control points required for compilation established by control point survey at the sites. Final results of aerial triangulation and control points were utilized for compilation. Areas where control point survey could not be performed were compiled by utilizing rivers or topographic features around the vicinity.

B It is recommended that the areas where no control surveys were performed be adjusted when better control is available

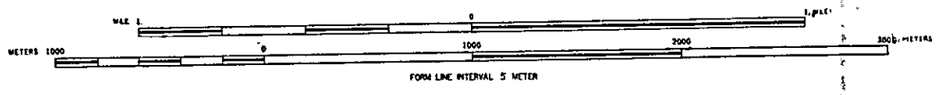
LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

SCALE 1:20,000



FORM LINE INTERVAL 5 METER

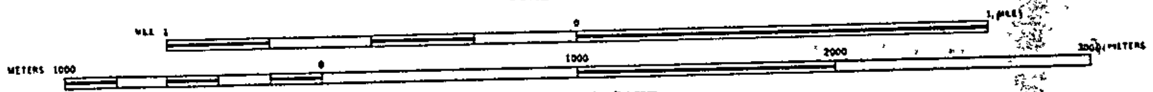
LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

SCALE 1:20,000



FORM LINE INTERVAL 5 METER

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD.
(CONSULTING ENGINEERS)

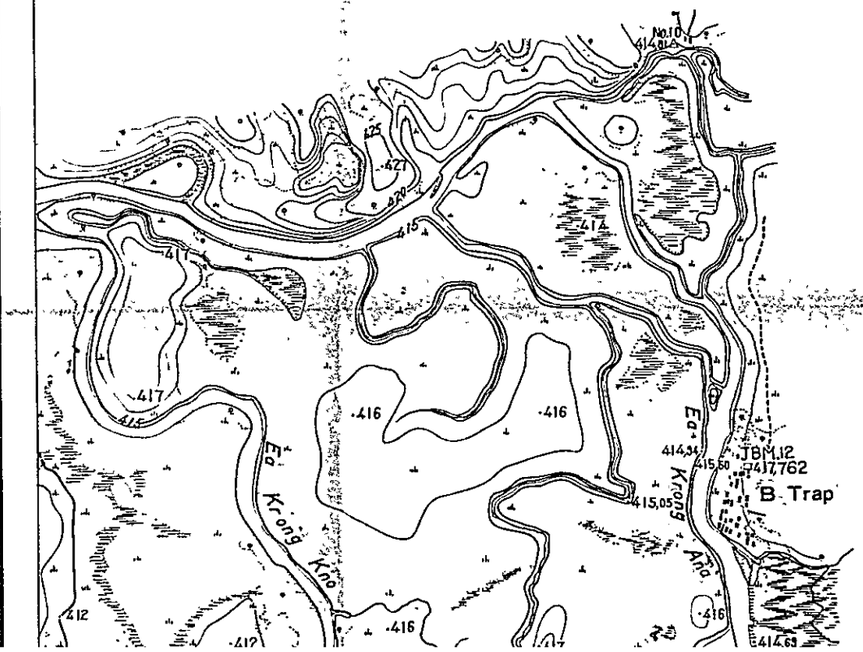
Compiled	No #
Checked	
Approved.	SHEET NO

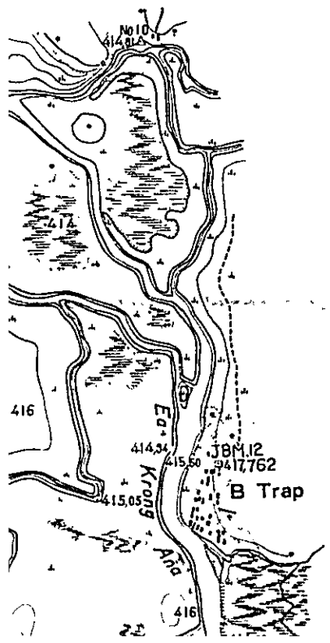
MEKONG

DAR LAC

LEGEND — LÉGENDE

Triangulation point	△	Point géodésique
Bench mark	□	Point de repère
Spot elevation	·	Point coté
National highway		Route nationale
Motor road		Autoroute
Mule track		Route muletière
Trail		Sentier
Railway		Chemin de fer
Perennial river		Rivière
Non perennial river		Cours d'eau intermittent
Falls, rapids	F R	Chutes, rapides
River course		Ecoulement d'une rivière
Non perennial lake		Lac permanent
Pond	W	Etang
Sandy land		Region sablonneuse
Swamp, marsh		Marécage marais
Steep slope		Talus escarpe
Field		Champ
Paddy Field		Rizière
Orchard		Verger
Trees		Arbres
Waste land, Grass land		Terre inculte terre herbe




No10
414.81
416
Ea
414.34
415.50
JBM.12
9417.762
B Trap
415.05
Kroong
Ana
416

LEGEND — LÉGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
Fair weather highway	Route nationale
Motor road	Autoroute
Mule track	Route muletiere
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une rivere
Non perennial lake	Lac intermanent
Pond	Etang
Sandy land	Region sablonneuse
Swamp, marsh	Marécage marais
Steep slope	Talus escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte terre herbe

Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by U.S., Army.

A Control points required for compilation established by control point survey at the sites. Final results of aerial triangulation and control points were utilized for compilation. Areas where control point survey could not be performed were compiled by utilizing rivers or topographic features around the vicinity

B It is recommended that the areas where no control surveys were performed be adjusted when better control is available

LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

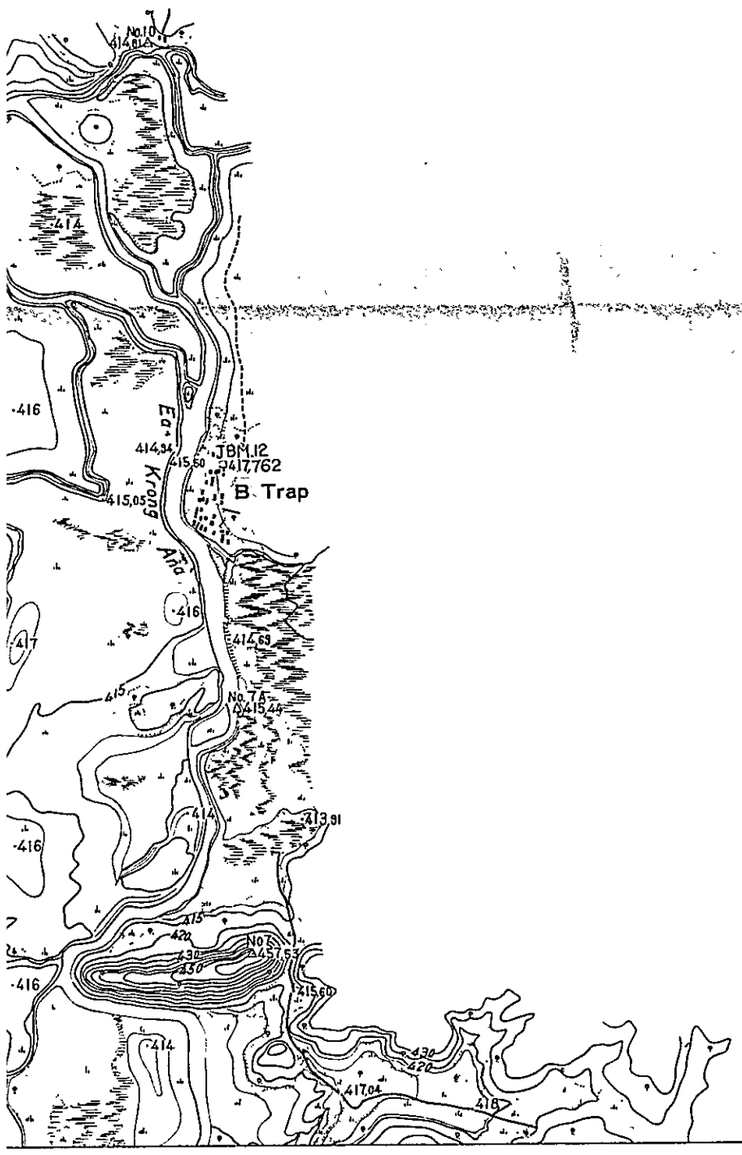
VIET NAM

SCALE 1:20,000

MILE 1 0 1 MILE

METERS 1000 0 1000 2000 3000 METERS

FORM LINE INTERVAL 5 METER



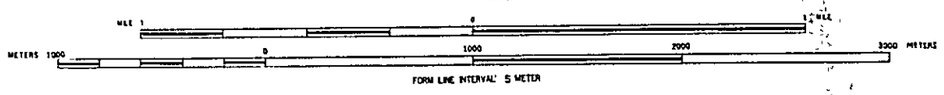
LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

SCALE 1:20,000



FORM LINE INTERVAL 5 METER

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD.
(CONSULTING ENGINEERS)

Compiled
Checked
Approved

Wo #

SHEET NO.

MEKONG

DAR LAC

LEGEND – LEGENDE

Triangulation point	Point geodesique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Mule track	Route muletiere
Trail	Sentier
Railway	Chemin de fer
Perennial river	Riviere
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Région sablonneuse
Swamp, marsh	Marécage marais
Steep slope	Talus escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte terre herbe

E Dwch

Ea Krong Ana

Ea Blong Krieng

Ea Blong Pak

C. Pling

E Plate

Eq. Krong Ana

Ea Krong Diet

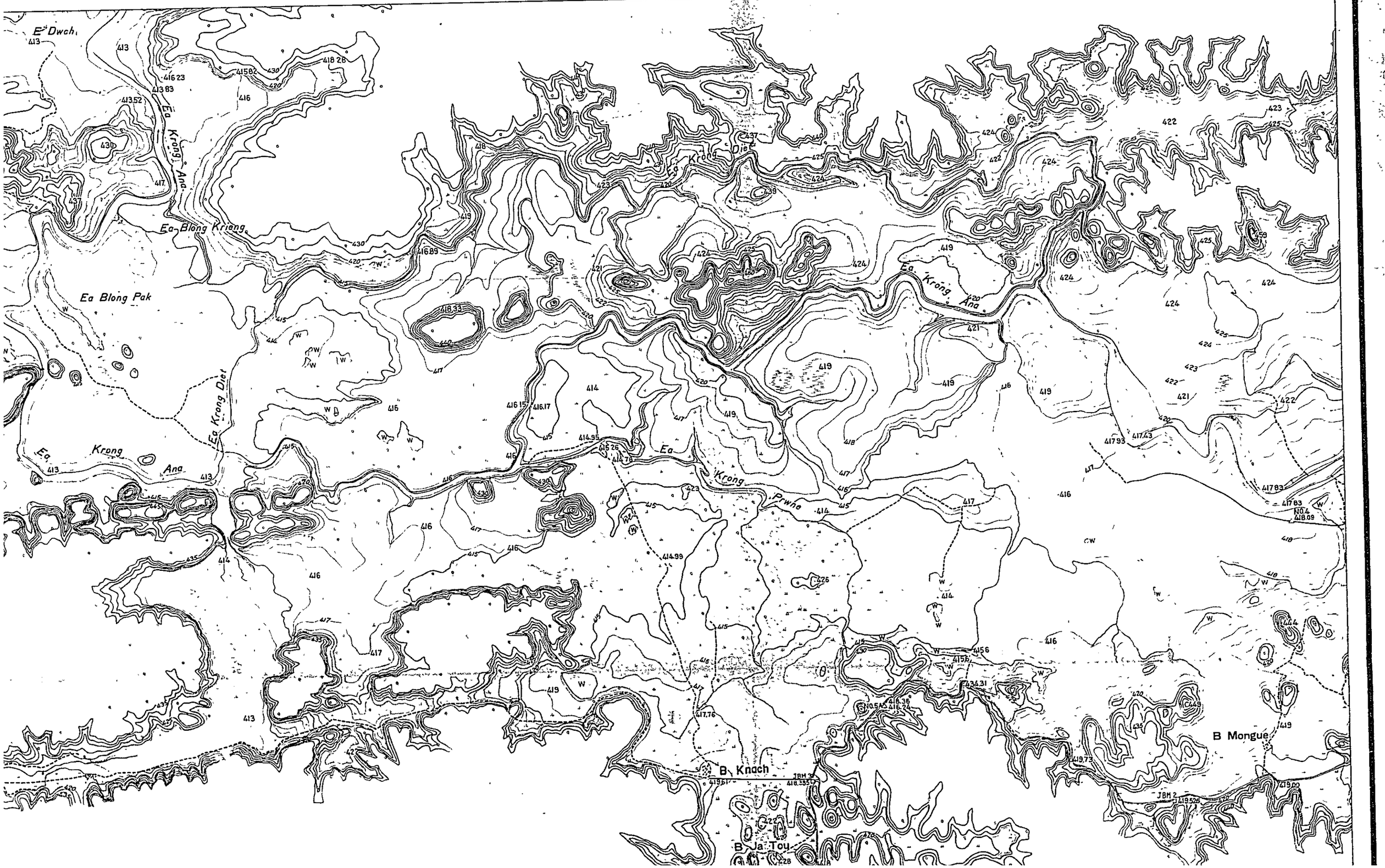
Ea Krong Prwho

B. Knach

B. Ja Tou

DAR LAC

D


E Dwch
Ea Krong Ana
Ea Blong Krieng
Ea Blong Pak
Ea Krong Diet
Ea Krong Ana
Ea Krong Diet
Ea Krong Prwho
Ea Krong Ana
B Knach
B Ja Tou
B Mongue
JBM 3
JBM 2

LEGEND – LEGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Mule track	Route muletière
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Région sablonneuse
Swamp, marsh	Marécage marais
Steep slope	Talus escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte terre herbe

Compiled by photogrammetric methods aerial photography dated February 1958 furnished by U.S Army

A Control points required for compilation established by control point survey at the sites Final results of aerial triangulation and control points were utilized for compilation Areas where control point survey could not be performed were compiled by utilizing rivers or topographic features around the vicinity

B It is recommended that the areas where no control surveys were performed be adjusted when better control is available

LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

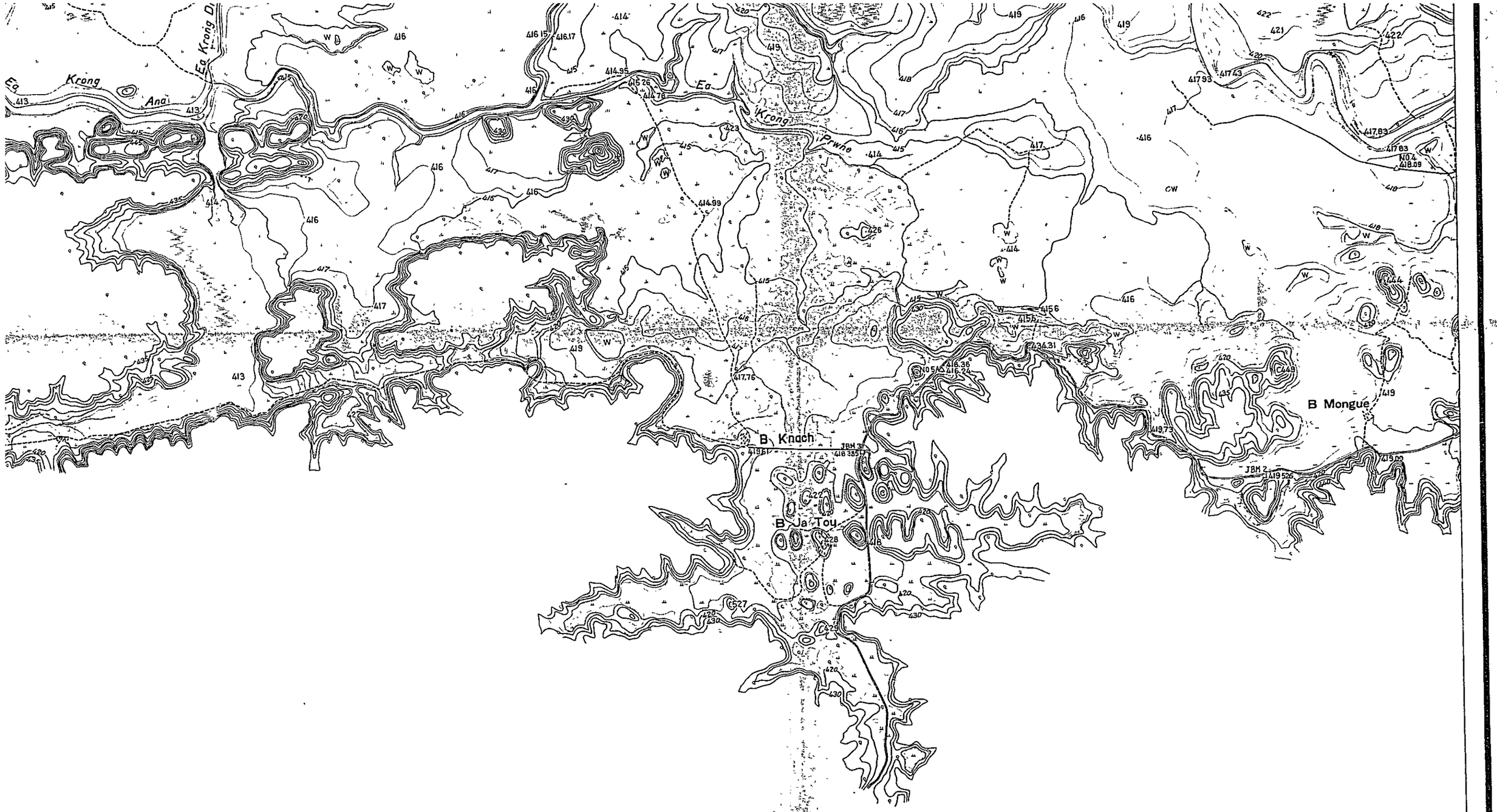
VIET NAM

SCALE 1 20,000

MILE 0 1

METERS 1000 0 1000 2000 3000 METERS

FORM LINE INTERVAL 5 METER



LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

SCALE 1:20,000

METERS 1000 0 1000 2000 3000 METERS

FORM LINE INTERVAL 5 METER

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD.
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SHEET NO

MEKONG

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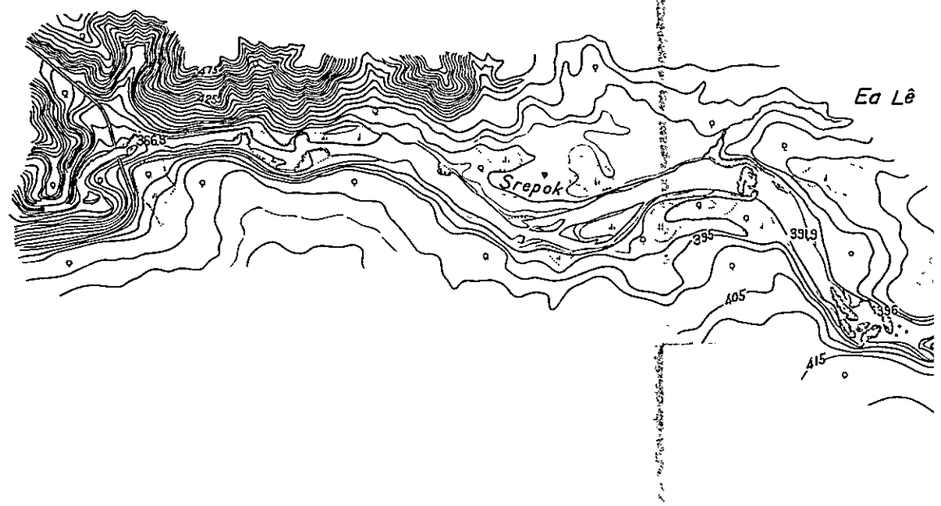


LEGEND — LEGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Mule track	Route muletiere
Trail	Sentier
Railway	Chemin de fer
Perennial river	Riviere
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une riviere
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Region sablonneuse
Swamp, marsh	Marecage, marais
Steep slope	Talus escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte, terre herbe


Ea Lê
Srepok
B Dray
Srepok
424
425
428
414

LEGEND — LEGENDE

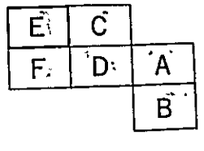
Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Mule track	Route muletiere
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes: rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Région sablonneuse
Swamp, marsh	Marécage marais
Steep slope	Talus escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte terre herbe

Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by U S Army.

A Control points required for compilation established by control point survey at the sites Final results of aerial triangulation and control points were utilized for compilation Areas where control point survey could not be performed were compiled by utilizing rivers or topographic features around the vicinity

B It is recommended that the areas where no control surveys were performed be adjusted when better control is available

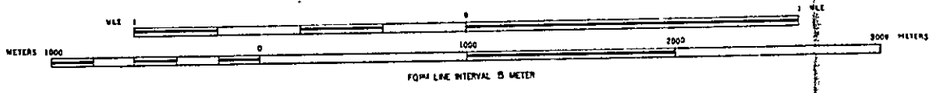
LOCATION DIAGRAM



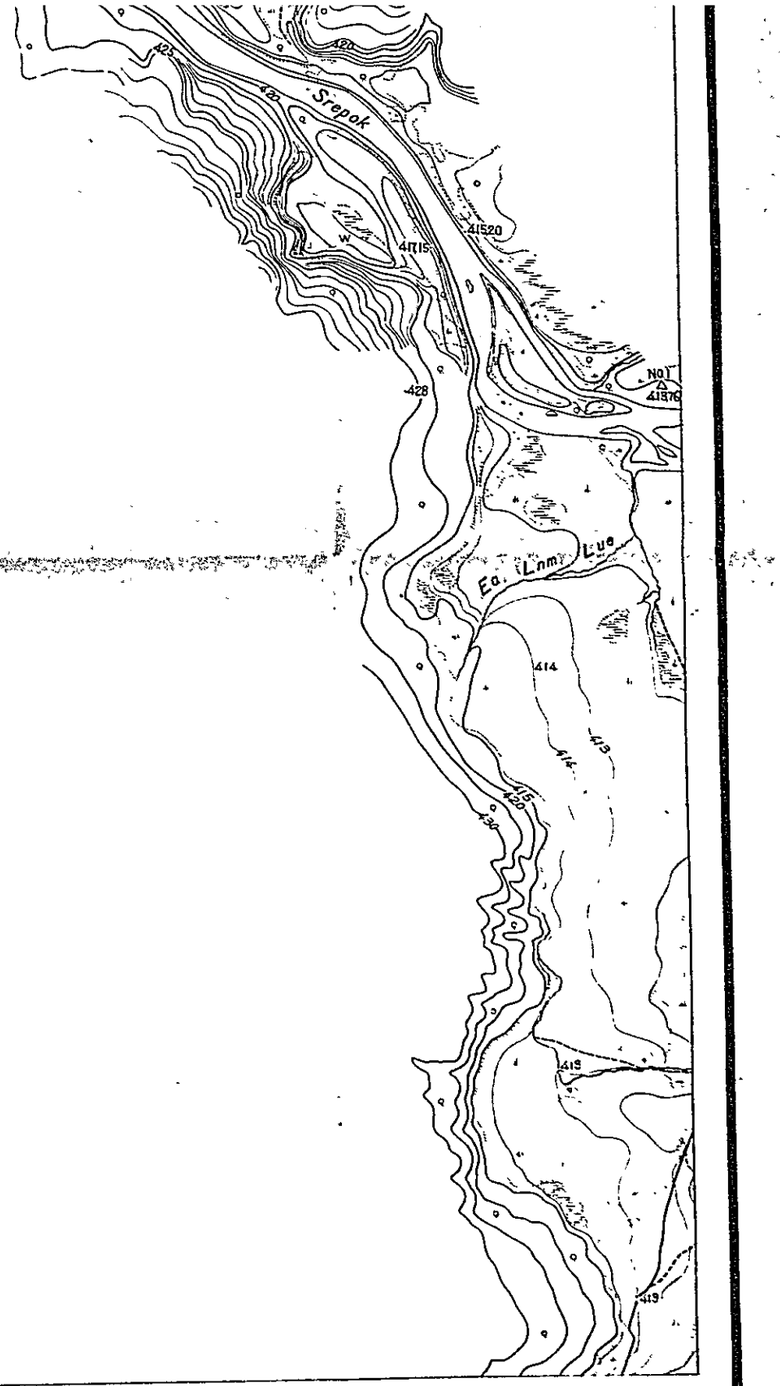
UPPER SREPOK

VIET NAM

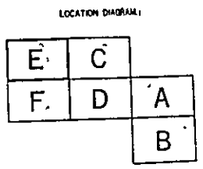
SCALE 1:20,000



CONTOUR INTERVAL 5 METERS



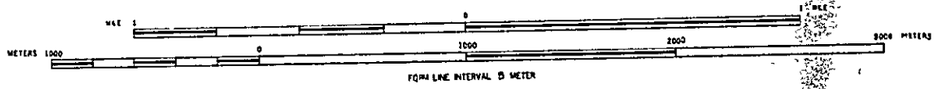
LOCATION DIAGRAM



UPPER SREPOK

VIET NAM

SCALE 1:20,000



FOR4 LINE INTERVAL 5 METER

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD.
(CONSULTING ENGINEERS)

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Approved

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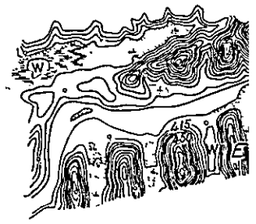
SHEET NO

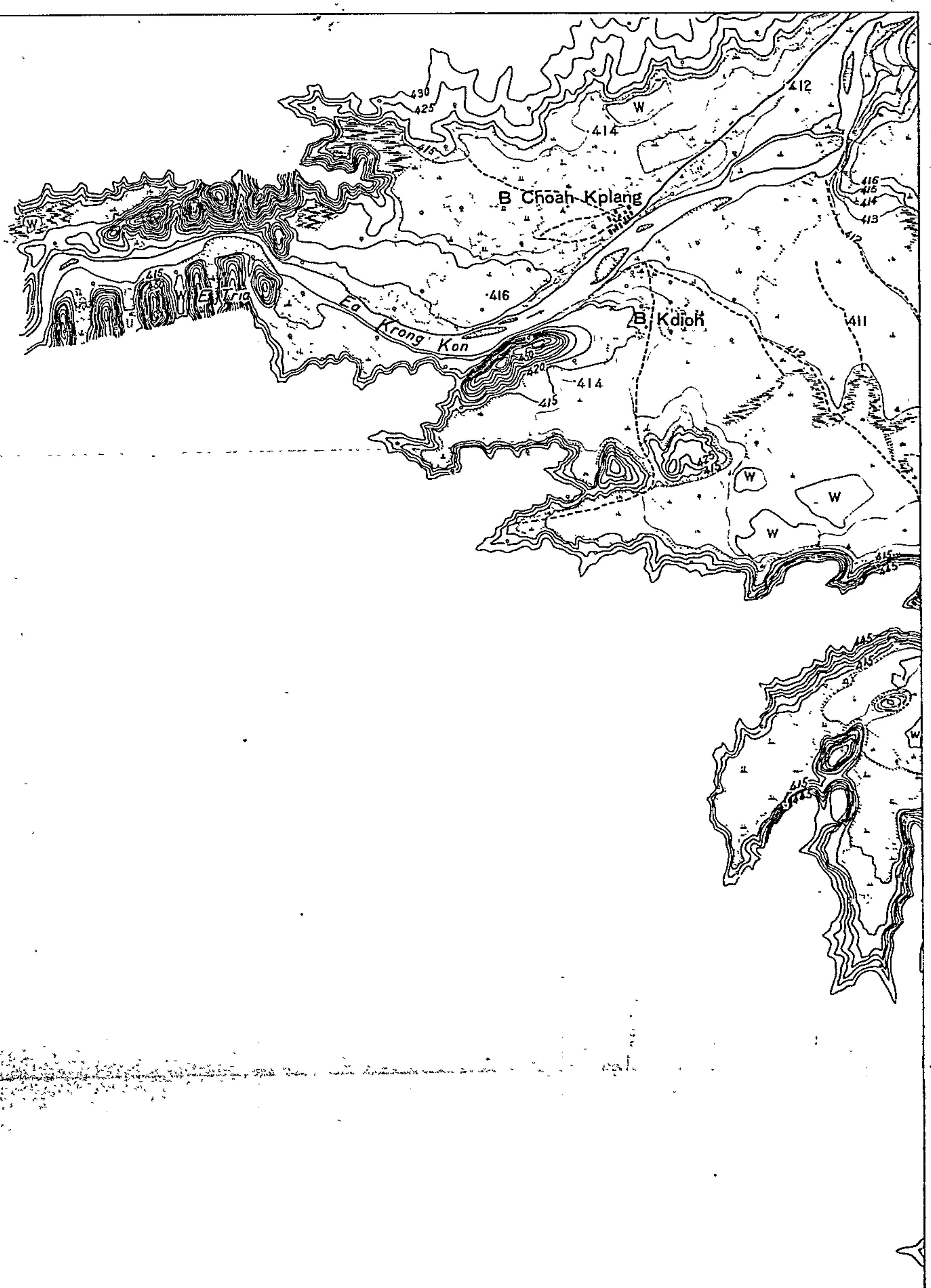
MEKONG

DAR LAC



LEGEND – LÉGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Motor track	Route matérisée
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Plage sablonneuse
Swamp, marsh	Marécage, marais
Steep slope	Talus escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte, terre herbe


B Choah Kplang
B Kdioh
Ea Krong Kon
430
425
415
414
412
416
411
414
420
413
W

LEGEND — LÉGENDE

Triangulation point	Point géodésique
Bench mark	Point de repère
Spot elevation	Point coté
National highway	Route nationale
Motor road	Autoroute
Motor track	Route empierrée
Trail	Sentier
Railway	Chemin de fer
Perennial river	Rivière
Non perennial river	Cours d'eau intermittent
Falls, rapids	Chutes, rapides
River course	Ecoulement d'une rivière
Non perennial lake	Lac intermittent
Pond	Etang
Sandy land	Region sablonneuse
Swamp, marsh	Marécage, marais
Steep slope	Talus, escarpé
Field	Champ
Paddy Field	Rizière
Orchard	Verger
Trees	Arbres
Waste land, Grass land	Terre inculte, terre herbe

Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by US Army

A Control points required for compilation established by control point survey at the sites. Final results of aerial triangulation and control points were utilized for compilation. Areas where control point survey could not be performed were compiled by utilizing rivers or topographic features around the vicinity

B It is recommended that the areas where no control surveys were performed be adjusted when better control is available

LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

SCALE 1:20,000

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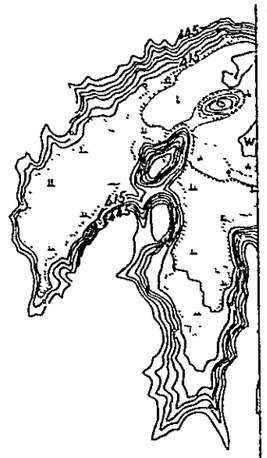
METERS 1000 0 1000 2000 3000 METERS

CONTOUR INTERVAL 5 METER



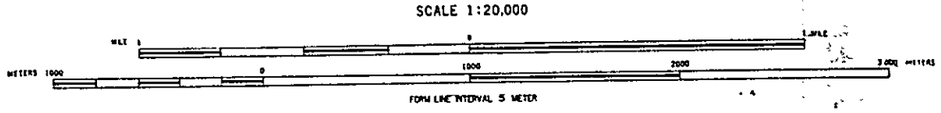
LOCATION DIAGRAM

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

SCALE 1:20,000



FORM LINE INTERVAL 5 METER

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD.
(CONSULTING ENGINEERS)

Compiled:
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MEKONG

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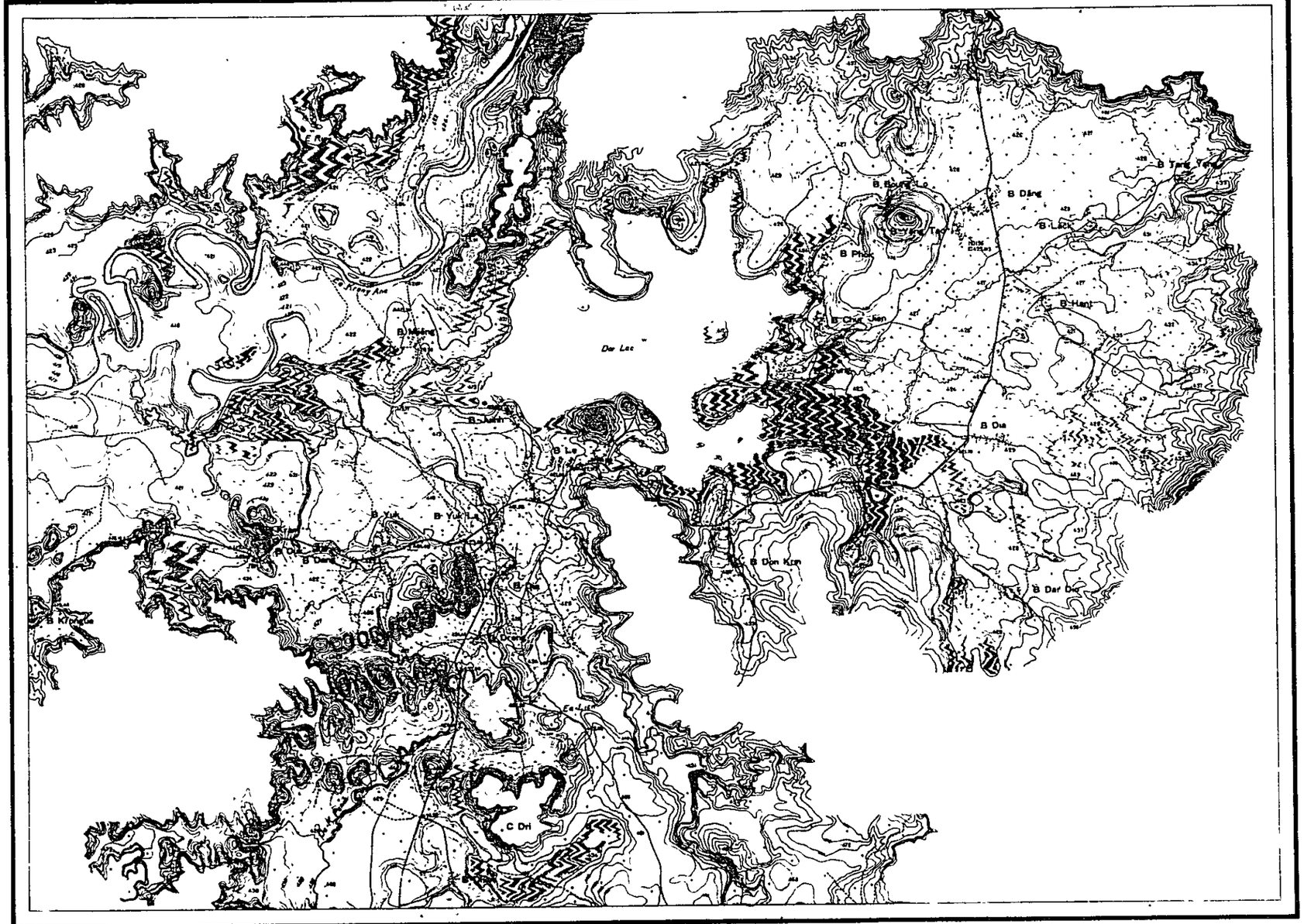


Compiled by photogrammetric methods, aerial photographs dated February 1958 furnished by U.S. Army

A. Control points required for completion established by control point survey of the others. Final results of aerial triangulation and control points were adjusted for completion. Areas where control points survey could not be performed were completed by utilizing rivers or topographic features around the vicinity.

B. It is recommended that the areas where no control surveys were performed be adjusted when better control is available.

E	C	
F	D	A
		B

UPPER SREPOK

VIET NAM

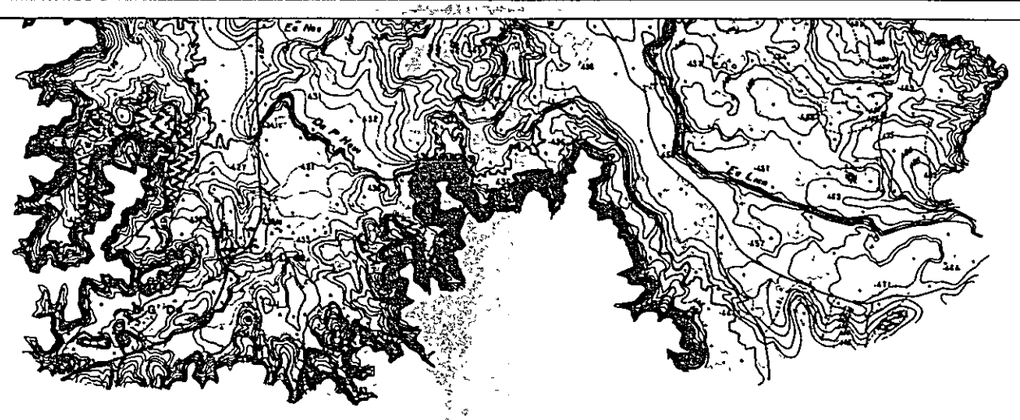
SCALE 1 : 50,000

OVERSEAS TECHNICAL COOPERATION AGENCY TOKYO JAPAN	
UPPER SREPOK PROJECT	
NIHON KOEI CO., LTD. (CONSULTING ENGINEERS)	
Compiled	No. 8
Checked	
Approved	SHEET NO.

MEKONG

DAR LAC

B



Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by U.S. Army

A. Control points required for compilation established by control point survey at the sites. Final results of aerial triangulation and control points were utilized for compilation. Areas, where control point survey could not be performed were compiled by utilizing points of topographic features around the vicinity.

B. It is recommended that the areas where no control surveys were performed be adjusted when better controls available.

E C
F D A
B

UPPER SREPOK

VIET NAM

SCALE 1 50,000

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD
(CONSULTING ENGINEERS)

Surveyed

Drawn

Approved

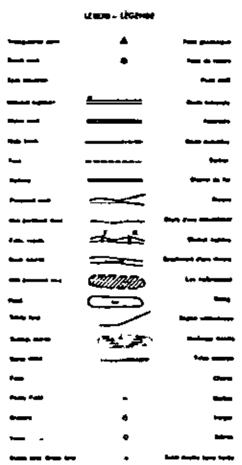
No. 9

SHEET NO.

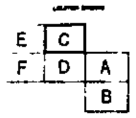
MEKONG

DAR LAC

C

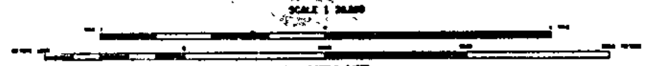


Compiled by photogrammetric methods, aerial photography dated February 1956 furnished by U.S. Army



UPPER SREPOK

SCALE 1:20,000



OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

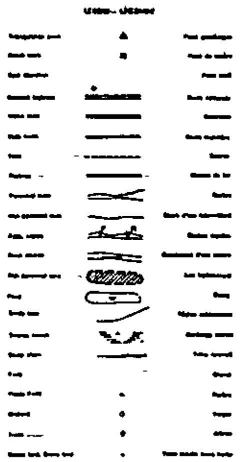
NIHON KOEI CO., LTD.
(CONSULTING ENGINEERS)

Compiled	No.
Checked	
Approved	SHEET NO

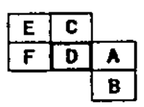
MEKONG

DAR LAC

D



Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by U.S. Army
A [illegible]
B It is recommended that the areas where no control surveys were performed be adjusted when better control is available



UPPER SREPOK

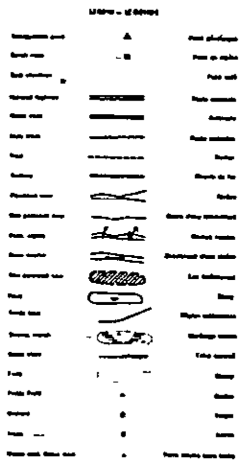
SCALE 1 : 25,000

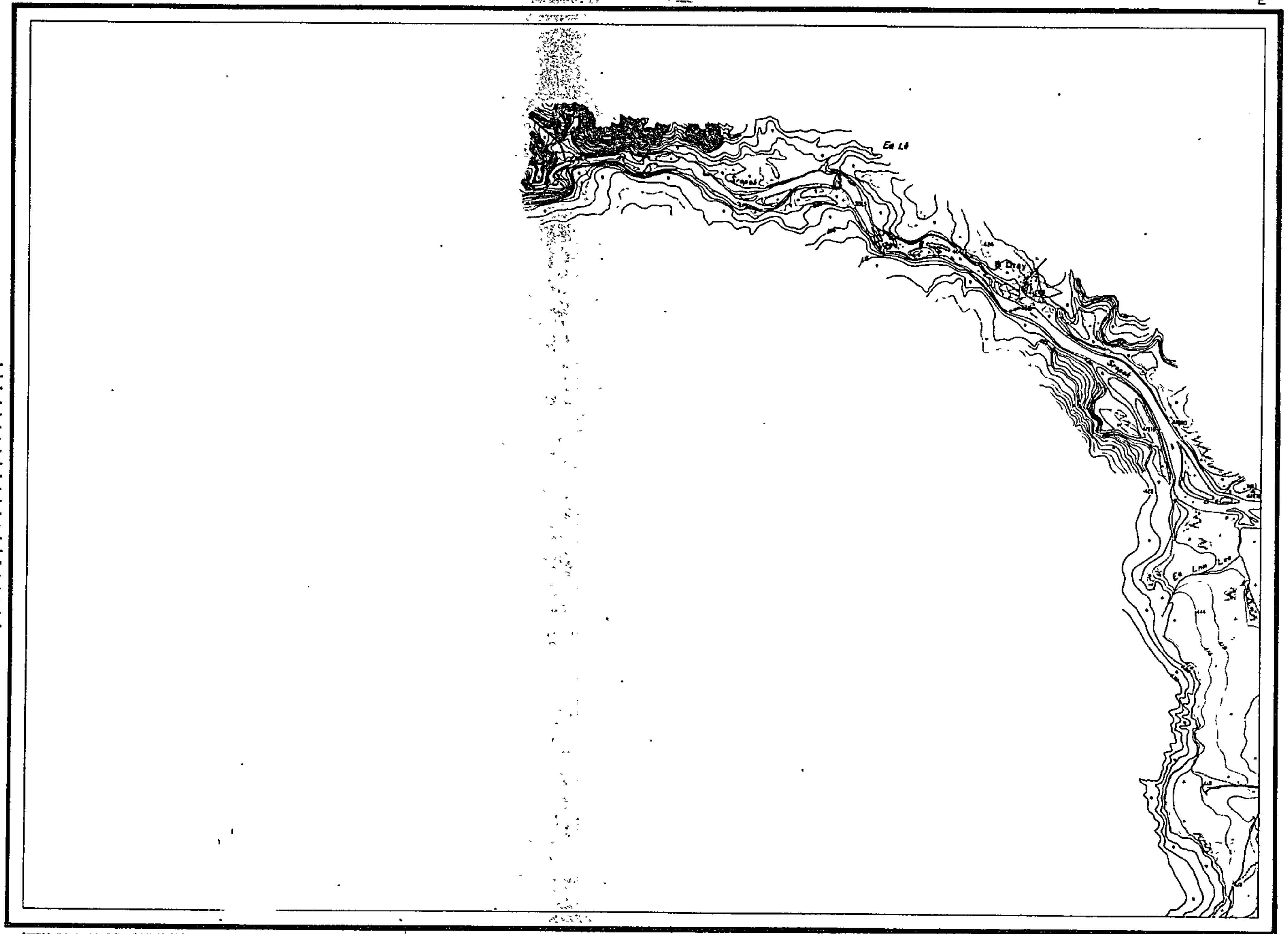
OVERSEAS TECHNICAL COOPERATION AGENCY TOKYO JAPAN
UPPER SREPOK PROJECT
NIHON KOEI CO., LTD (CONSULTING ENGINEERS)
SHEET No.

MEKONG

DAR LAC

E





Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by U.S. Army

A [illegible]

B [illegible]

E	C	
F	D	A
		B

UPPER SREPOK

SCALE 1 : 20,000

OVERSEAS TECHNICAL COOPERATION AGENCY TOKYO JAPAN
UPPER SREPOK PROJECT
NIHON KOEI CO., LTD (CONSULTING ENGINEERS)
SHEET No.

MEKONG

DAR LAC

F

Compiled by photogrammetric methods, aerial photography dated February 1958 furnished by U.S. Army.

A Control points required for compilation was obtained by control point survey of the latest field results of aerial triangulation and control points were utilized for completion. Areas, where control point surveys could not be performed were completed by utilizing rivers or topographic features around the vicinity.

B It is recommended that the areas where no control surveys were performed be adjusted when better control is available.

E C
F D A
B

UPPER SREPOK -

VIET NAM

SCALE 1 25,000

OVERSEAS TECHNICAL COOPERATION AGENCY
TOKYO JAPAN

UPPER SREPOK PROJECT

NIHON KOEI CO., LTD
(CONSULTING ENGINEERS)

Drawn
Checked
Approved

No. 1

SHEET NO.