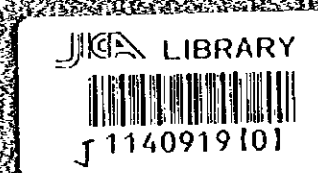


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN

FINAL REPORT
VOLUME IV-2
DATA BOOK II

DECEMBER 1997



CTI ENGINEERING CO., LTD.
IN ASSOCIATION WITH
SANYU CONSULTANTS INC.
PASCO INTERNATIONAL INC.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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PASCO INTERNATIONAL INC.**

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- B. Climate and Hydrology
- C. Flood Damage Analysis
- D. Watershed and Flood Plain Conditions
- E. River Conditions
- F. Sediment Control Plan
- G. River Improvement Plan
- H. Non-structural Measures and Institutional Aspects
- I. Multipurpose Development of the Project
- J. Economic and Financial Evaluation
- K. Environmental Aspects
- L. Aerophotogrammetric and Topographic Survey

VOLUME III-2 SUPPORTING REPORT (FEASIBILITY STUDY)

Sabo and Flood Control

- A. Sediment Analysis
- B. Sabo Dam Plan
- C. River Improvement Plan
- D. Construction Plan and Cost Estimate
- E. Project Evaluation
- F. Environmental Impact Assessment
- G. Aerophotogrammetric and Topographic Survey
- H. River Monitoring

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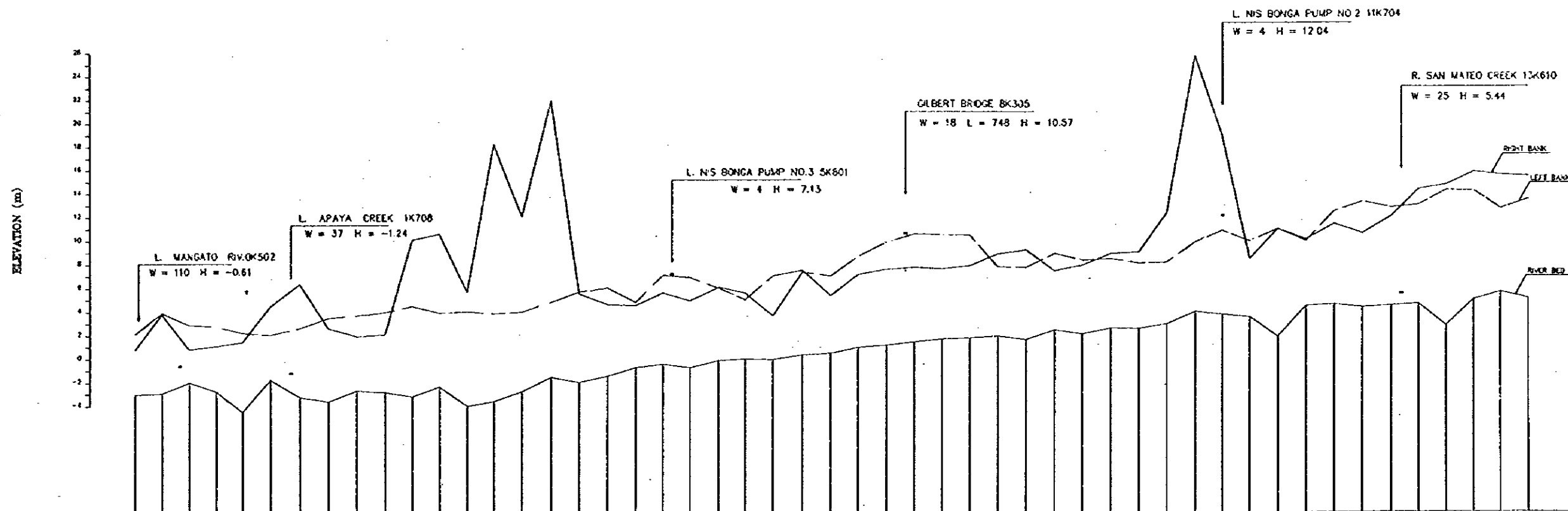
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MASTER PLAN STUDY

STA. 0+000 TO STA. 15+000



RIGHT BANK ELEVATION	0.82	3.80	0.79	1.08	1.43	4.13	6.32	2.35	1.80	2.07	14.08	10.08	0.91	16.13	12.08	21.84	5.49	4.58	4.46	8.44	8.44	10.54	10.47	10.44	7.74	7.74	8.48	8.33	8.44	8.05	8.14	9.49	10.79	8.83	10.07	11.38	10.58	14.33	14.08	15.74	15.64	15.38									
LEFT BANK ELEVATION	2.12	3.00	2.88	2.75	3.20	2.03	2.81	3.44	3.65	3.92	4.42	3.80	3.08	3.83	3.84	4.78	5.48	5.57	4.78	7.02	6.88	7.73	7.28	7.02	7.11	7.04	7.73	7.28	7.40	7.87	8.08	9.01	12.33	20.38	18.04	8.44	10.87	9.90	12.44	13.27	12.78	13.00	14.33	14.20	14.18	12.70	13.43				
RIVER BED ELEVATION	-3.01	-2.91	-1.95	-2.78	-4.58	-1.58	-3.28	-2.83	-2.72	-2.98	-3.72	-2.37	-4.04	-3.83	-2.77	-1.58	-1.88	-1.58	-4.74	-0.83	-0.75	1.40	1.44	0.48	6.34	1.16	1.40	1.44	1.78	1.88	1.81	2.28	2.09	2.58	2.52	2.65	3.18	3.73	3.01	1.64	4.45	4.58	4.37	4.45	4.62	2.78	4.97	5.80	5.08		
ACCUMULATIVE DISTANCE	0.00	300.00	600.00	900.00	1200.00	1500.00	1800.00	2100.00	2400.00	2700.00	3000.00	3300.00	3600.00	3900.00	4200.00	4500.00	4800.00	5100.00	5400.00	5700.00	6000.00	6300.00	6600.00	6900.00	7200.00	7500.00	7800.00	8100.00	8400.00	8700.00	9000.00	9300.00	9600.00	9900.00	10200.00	10500.00	10800.00	11100.00	11400.00	11700.00	12000.00	12300.00	12600.00	12900.00	13200.00	13500.00	13800.00	14100.00	14400.00	14700.00	15000.00
UNIT DISTANCE	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00		
STATION NUMBER	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	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	46	47	48	49	50

THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE

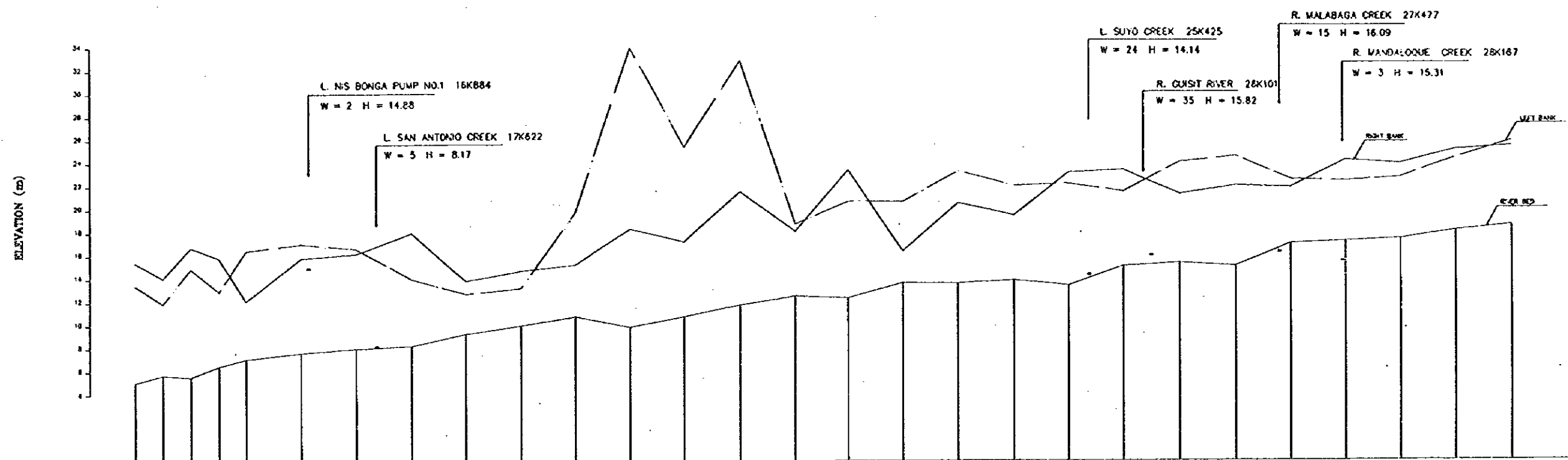
APPROVED BY: _____ CHECKED BY: _____

SITE (LOCATION): LAOAG-BONGO RIVER

SCALE: H = 1 : 50000 V = 1 : 400

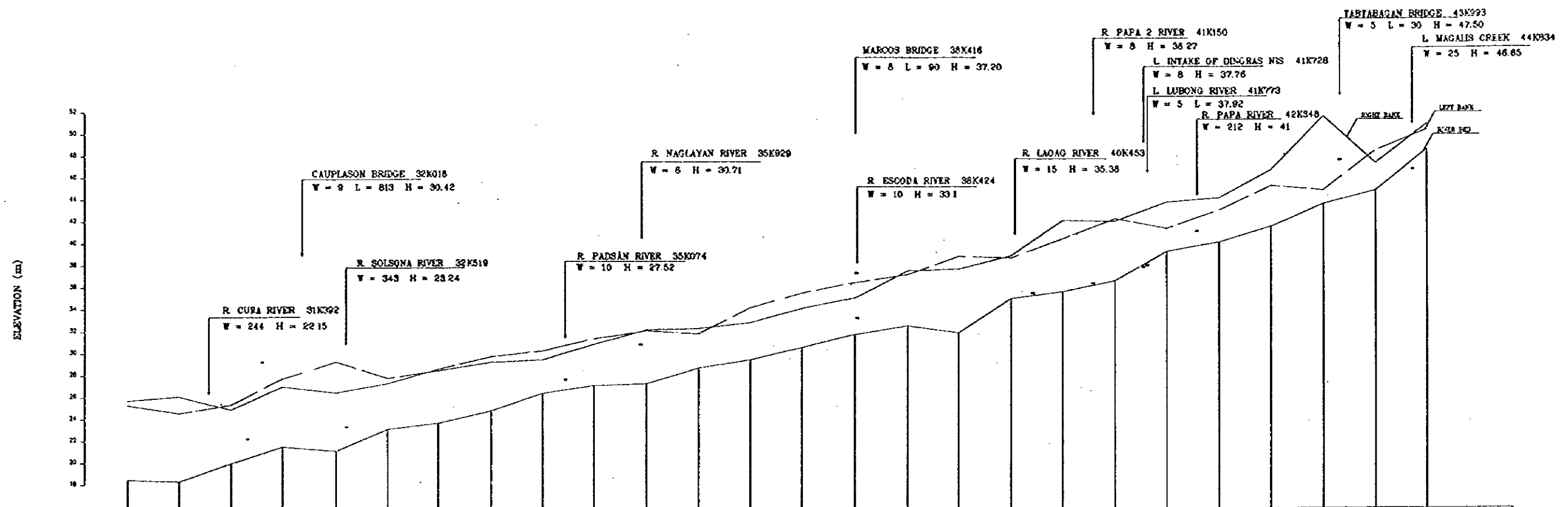
SHEET NO. 1/5

STA. 15+000 TO STA. 30+000



RIGHT BANK ELEVATION	15.28	14.08	16.72	15.78	13.10	13.86	16.14	17.32	13.88	14.68	15.14	13.28	17.07	21.49	17.63	23.5	16.24	20.34	18.28	22.84	23.18	21.12	21.84	21.70	24.02	23.77	24.83	20.24	
LEFT BANK ELEVATION	13.43	11.86	14.87	12.83	14.45	17.00	16.82	13.87	12.87	13.17	18.44	33.28	25.21	32.88	18.58	20.52	20.46	23.08	21.28	23.28	24.38	22.28	22.23	22.52	24.23	24.23	25.87		
RIVER BED ELEVATION	5.08	5.70	5.55	6.48	7.08	7.63	8.00	6.22	8.32	8.85	10.88	9.78	10.88	11.84	12.37	12.18	13.48	13.47	13.71	13.25	14.83	15.17	14.49	16.83	17.04	17.24	17.96	18.43	
ACCUMULATIVE DISTANCE	10000.00	13000.00	15900.00	19000.00	23000.00	28900.00	37900.00	51700.00	60000.00	73800.00	84600.00	100800.00	111600.00	123900.00	136200.00	148500.00	160800.00	173100.00	185400.00	197700.00	210000.00	222300.00	234600.00	246900.00	259200.00	271500.00	283800.00	296100.00	308400.00
UNIT DISTANCE	3000.00	3000.00	3000.00	3000.00	4000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	6000.00	
STATION NUMBER	L-08	L-09	L-10	L-11	L-12	L-13	L-14	L-15	L-16	L-17	L-18	L-19	L-20	L-21	L-22	L-23	L-24	L-25	L-26	L-27	L-28	L-29	L-30	L-31	L-32	L-33	L-34	L-35	

<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	LONGITUDINAL PROFILE		SITE (LOCATION): LAOAG-BONGO RIVER	
	APPROVED BY:	CHECKED BY:	SCALE: H = 1 : 50000 V = 1 : 400	SHEET NO. 3/5



RIGHT BANK ELEVATION	28.24	28.30	28.38	27.84	28.17	27.88	28.25	28.13	28.34	28.78	32.09	32.18	32.73	34.09	34.88	37.44	37.58	38.80	42.02	41.83	42.68	44.07	48.85	51.37	47.28	50.83
LEFT BANK ELEVATION	25.87	26.00	26.85	28.81	28.37	27.72	28.48	29.80	30.14	31.27	31.87	31.73	34.10	35.38	36.34	37.11	38.71	38.84	40.34	42.18	41.31	42.88	45.18	44.78	46.42	50.30
RIVER BED ELEVATION	18.43	18.28	19.84	21.41	21.03	23.03	23.88	24.70	26.30	26.89	27.18	28.40	28.38	30.48	31.88	32.43	31.79	34.81	35.53	36.32	38.19	40.00	41.45	43.02	44.76	46.31
ACCUMULATIVE DISTANCE	000.00	600.00	1200.00	1800.00	2400.00	3000.00	3600.00	4200.00	4800.00	5400.00	6000.00	6600.00	7200.00	7800.00	8400.00	9000.00	9600.00	10200.00	10800.00	11400.00	12000.00	12600.00	13200.00	13800.00	14400.00	15000.00
UNIT DISTANCE	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00
STATION NUMBER	L-77	L-78	L-79	L-80	L-81	L-82	L-83	L-84	L-85	L-86	L-87	L-88	L-89	L-90	L-91	L-92	L-93	L-94	L-95	L-96	L-97	L-98	L-99	L-100	L-101	L-102

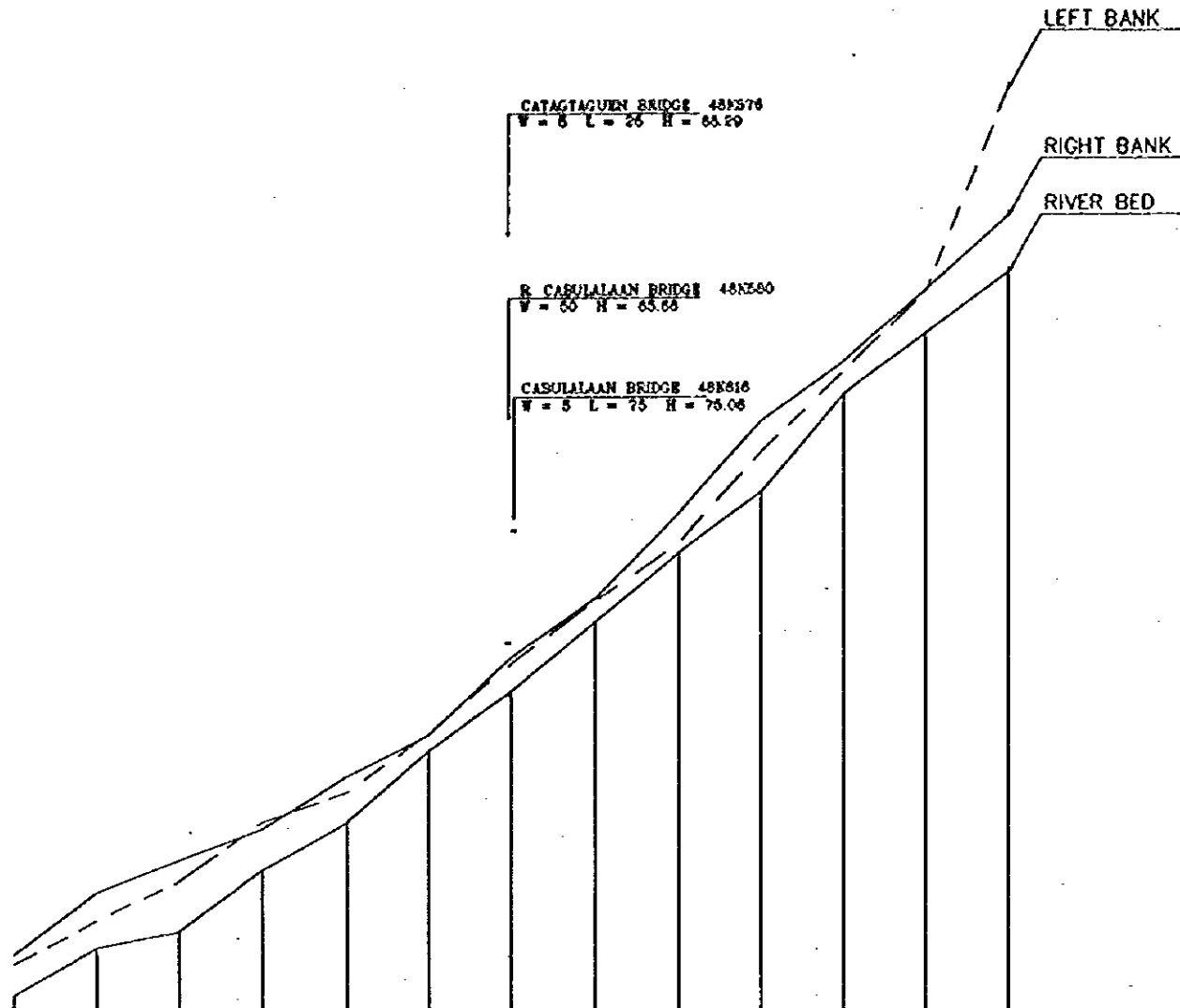
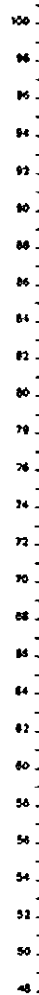
THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE
APPROVED BY: _____
CHECKED BY: _____

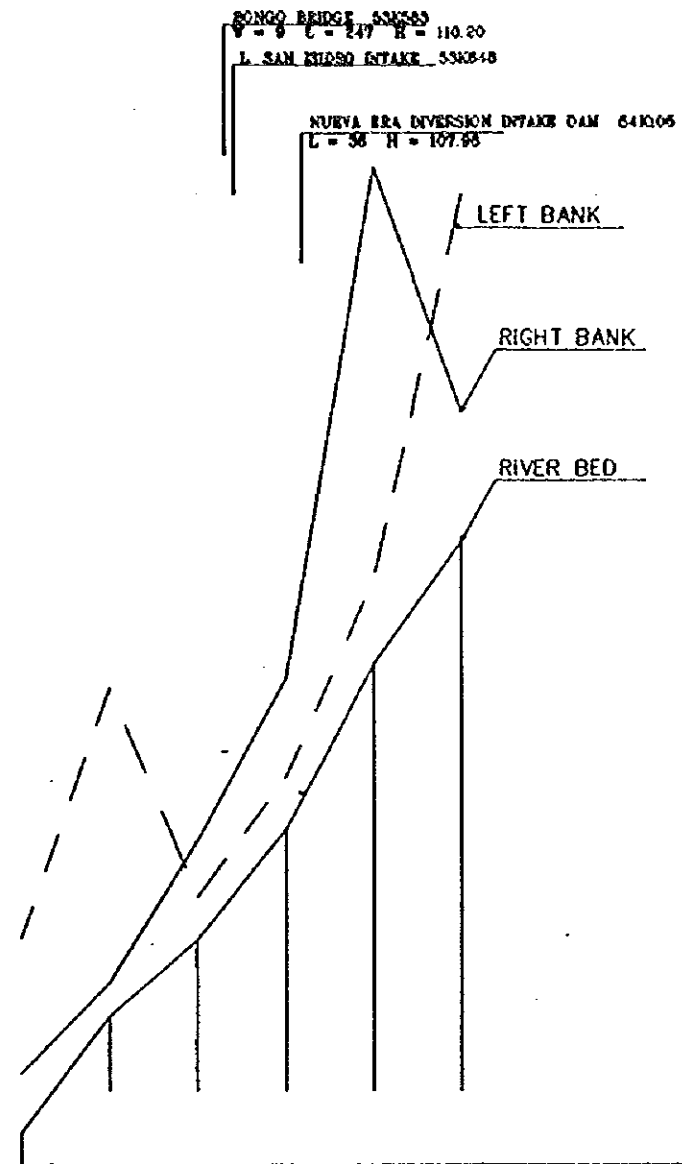
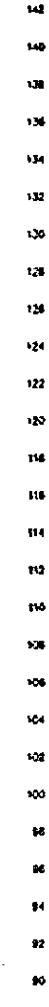
SITE (LOCATION):
LAOAG-BONGO RIVER
SCALE:
H = 1 : 50000
V = 1 : 500
SHEET NO. 3/5

STA. 45+000 TO STA. 55+200

ELEVATION (m)



ELEVATION (m)



RIGHT BANK ELEVATION	86.83	84.40	84.38	86.02	81.08	83.40	87.88	71.27	76.07	81.29	84.87	86.70	82.80	88.83	87.88	108.44	114.14	141.88	128.82
LEFT BANK ELEVATION	84.38	82.84	85.03	85.42	88.13	83.48	87.82	71.04	74.37	76.55	84.13	86.84	100.22	100.22	113.87	108.38	108.84	118.44	140.11
RIVER BED ELEVATION	48.84	51.24	52.18	55.88	61.28	62.48	65.80	68.85	73.88	77.27	82.28	84.24	86.73	88.73	98.03	100.08	108.03	114.87	121.00
ACCUMULATIVE DISTANCE	0.00	48000.00	96000.00	144000.00	192000.00	240000.00	288000.00	336000.00	384000.00	432000.00	480000.00	528000.00	576000.00	624000.00	672000.00	720000.00	768000.00	816000.00	864000.00
UNIT DISTANCE	0.00	4800.00	9600.00	14400.00	19200.00	24000.00	28800.00	33600.00	38400.00	43200.00	48000.00	52800.00	57600.00	62400.00	67200.00	72000.00	76800.00	81600.00	86400.00
STATION NUMBER	L-100	L-101	L-102	L-103	L-104	L-105	L-106	L-107	L-108	L-109	L-110	L-111	L-112	L-113	L-114	L-115	L-116	L-117	L-118

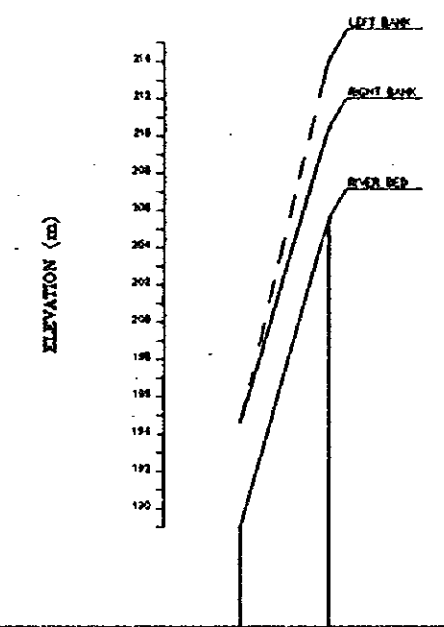
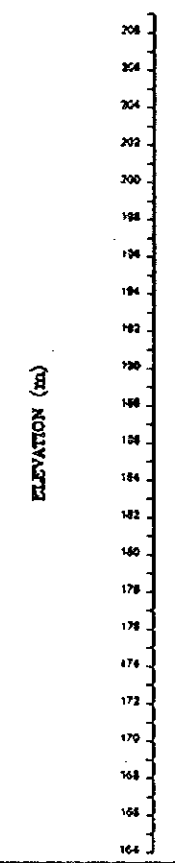
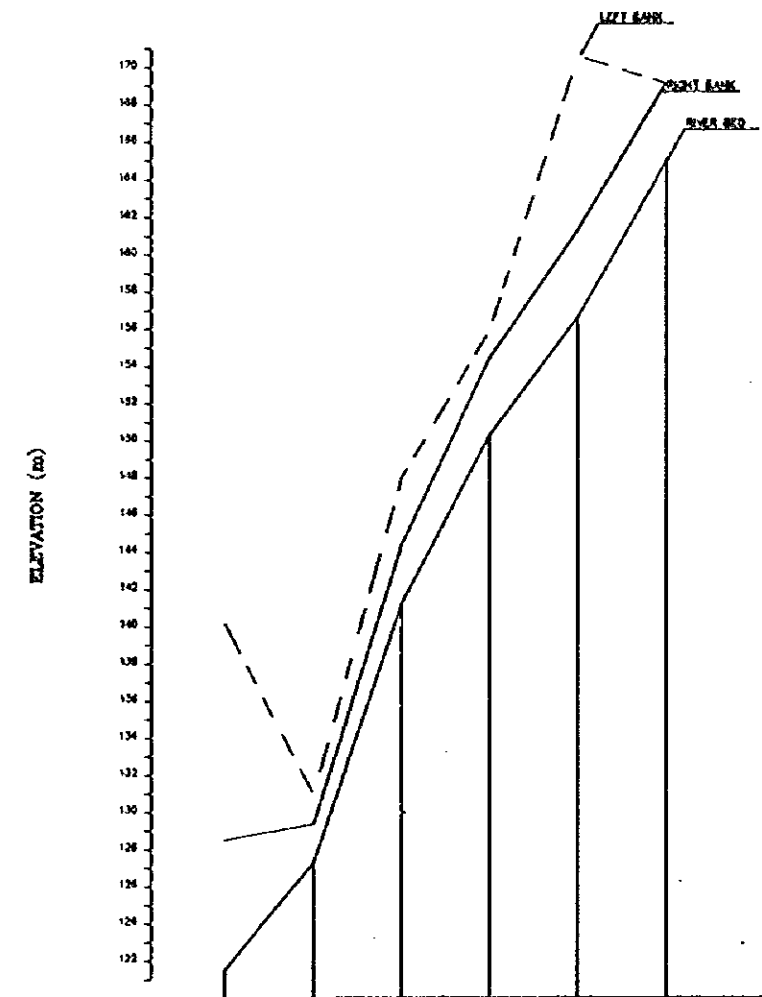
THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE
APPROVED BY: _____
CHECKED BY: _____

SITE (LOCATION):
LAOAG-BONGO RIVER
SCALE:
H = 1 : 50000
V = 1 : 1000
SHEET NO. 1/5

STA. 55+200 TO STA. 60+000

BRIDGE 521304
W = 4 L = 40 H = 191.08

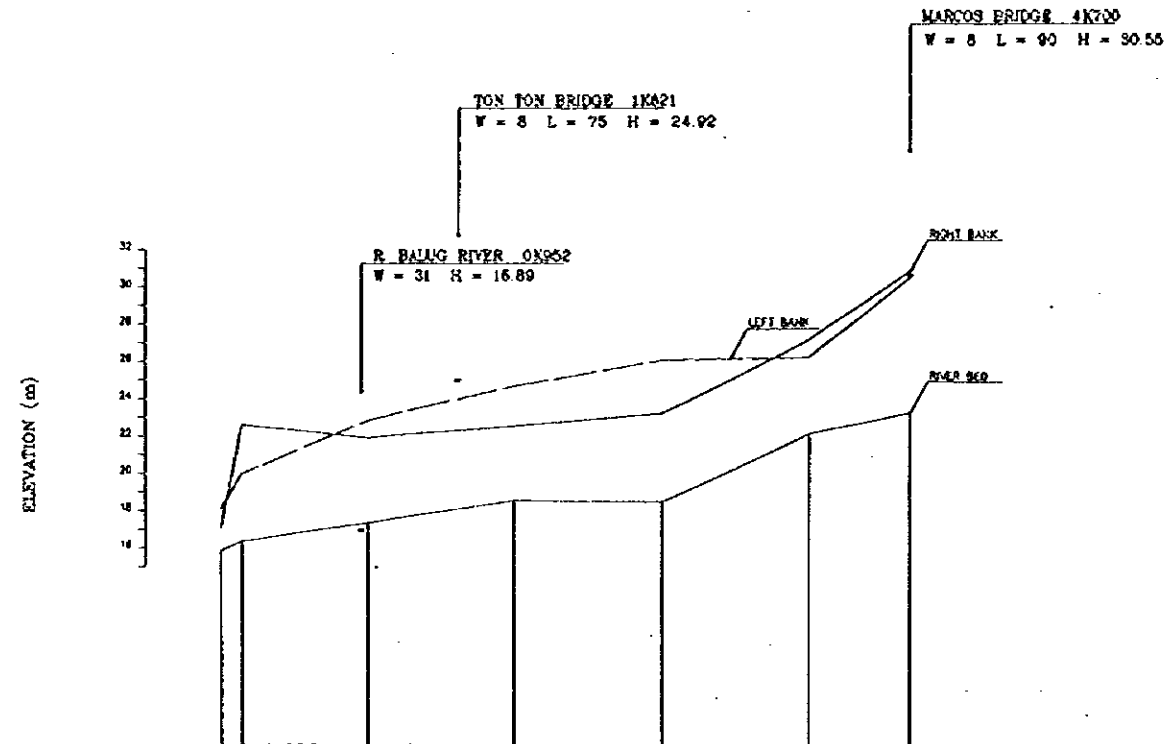


RIGHT BANK ELEVATION	138.82	138.35	144.37	154.33	161.28	168.10	188.40	178.17	194.88	203.28	194.88	214.13	
LEFT BANK ELEVATION	148.11	153.95	147.87	155.78	170.80	188.03	198.03	188.40	194.88	208.84	194.88	210.40	
RIVER BED ELEVATION	131.80	137.26	141.22	150.23	158.00	164.84	168.84	175.33	188.01	200.37	188.01	205.53	
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	2500.00	3000.00	3500.00	4000.00	4500.00	5000.00	5500.00	
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	
STATION NUMBER	L-119	L-120	L-121	L-122	L-123	L-124	L-124	L-125	L-126	L-127	L-128	L-128	

<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	<p>LONGITUDINAL PROFILE</p>		<p>SITE (LOCATION): LAOAG-BONGO RIVER</p>	
	<p>APPROVED BY:</p>	<p>CHECKED BY:</p>	<p>SCALE: H = 1 : 50000 V = 1 : 400</p>	<p>SHEET NO. 5/5</p>

STA. 0+000 TO STA. 4+700

1/1



RIGHT BANK ELEVATION	17.04	22.94	21.88	22.51	23.14	27.14	30.85
LEFT BANK ELEVATION	18.06	18.97	22.80	24.64	26.01	28.18	30.14
RIVER BED ELEVATION	15.82	16.33	17.32	18.51	19.49	22.23	23.51
ACCUMULATIVE DISTANCE	0.00	143.00	1000.00	2000.00	3000.00	4000.00	4700.00
UNIT DISTANCE	0.00	143.00	857.00	1000.00	1000.00	1000.00	700
STATION NUMBER	L-0 L-0+143		L-1	L-2	L-3	L-4	L-4+700

THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE

SITE (LOCATION):
GUISIT RIVER

APPROVED BY:

CHECKED BY:

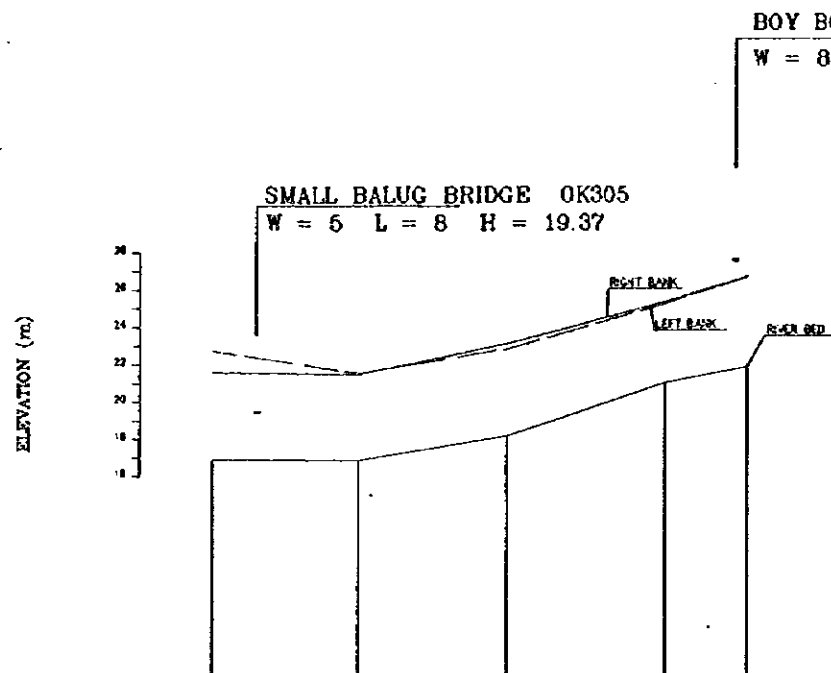
SCALE:
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V = 1 : 500

SHEET NO.

1/1

STA. 0+000 TO STA. 3+567

1/1



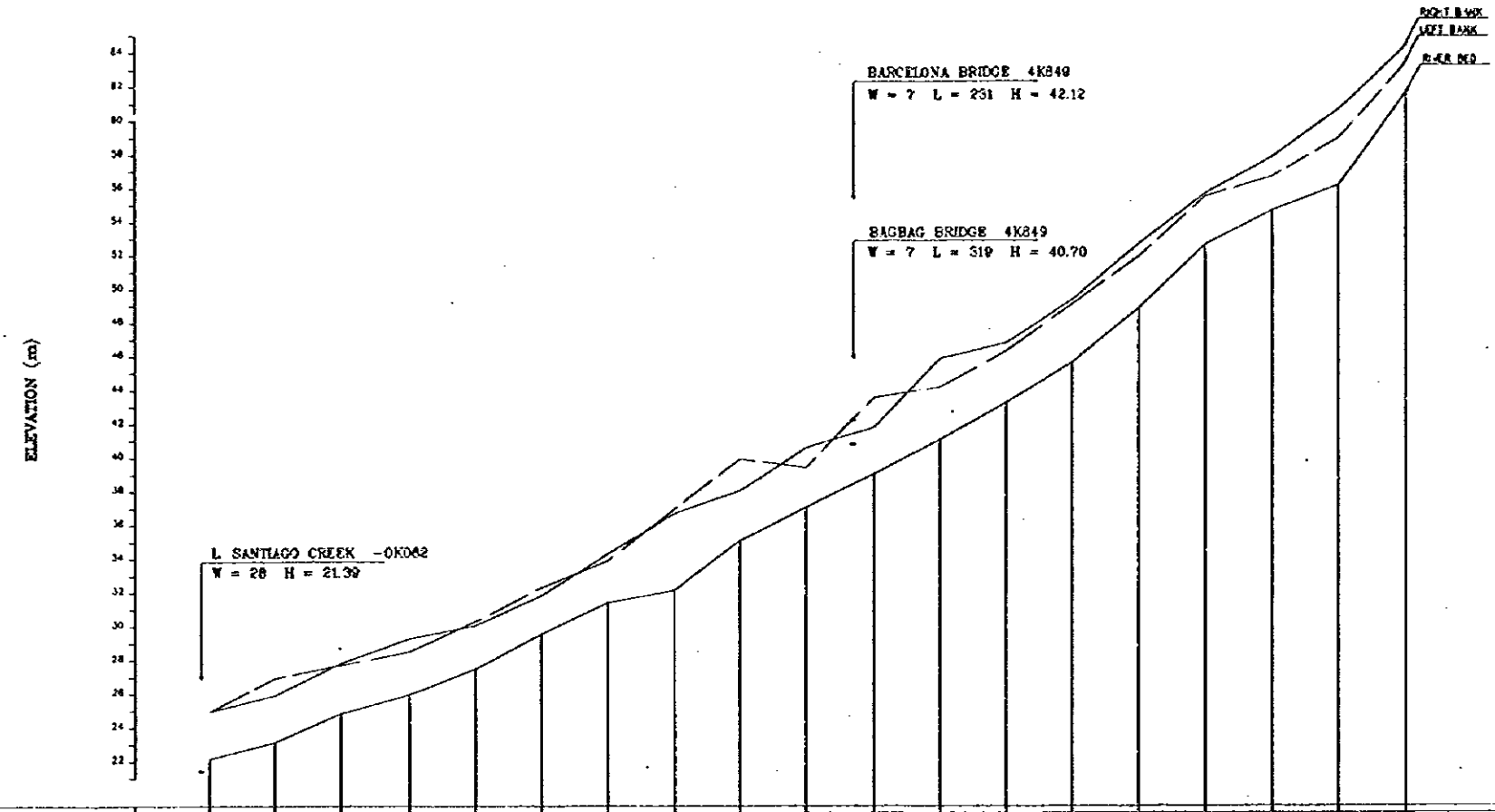
RIGHT BANK ELEVATION	21.00	21.42	23.00	26.33	26.88
LEFT BANK ELEVATION	22.71	21.40	22.80	26.21	26.63
RIVER BED ELEVATION	18.86	18.87	18.13	20.88	21.84
ACCUMULATIVE DISTANCE	0.00	1000.00	2000.00	3000.00	3567.00
UNIT DISTANCE	0.00	1000.00	1000.00	1000.00	567.00
STATION NUMBER	0	1	2	3	3+567

THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE
APPROVED BY: _____ CHECKED BY: _____

SITE (LOCATION):
BALUG RIVER
SCALE:
H = 1 : 50000
V = 1 : 400
SHEET NO. 1/1

STA. 0+000 TO STA. 9+000



RIGHT BANK ELEVATION	24.97	25.82	27.80	28.38	30.00	31.82	33.38	34.86	36.00	38.54	41.74	45.78	48.70	48.24	52.08	56.08	57.71	60.54	64.27	
LEFT BANK ELEVATION	24.95	26.83	27.70	28.48	30.27	32.29	33.98	36.83	38.87	38.34	43.48	44.10	44.38	46.00	51.84	56.38	56.35	58.82	63.78	
RIVER BED ELEVATION	22.15	23.12	24.82	25.84	27.67	28.88	31.48	32.10	34.05	37.02	38.00	41.03	43.31	45.00	48.80	52.00	54.58	56.08	61.48	
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	2500.00	3000.00	3500.00	4000.00	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00	8000.00	8500.00	9000.00	
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	
STATION NUMBER	L-0	L-1	L-2	L-3	L-4	L-5	L-6	L-7	L-8	L-9	L-10	L-11	L-12	L-13	L-14	L-15	L-16	L-17	L-18	

THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE

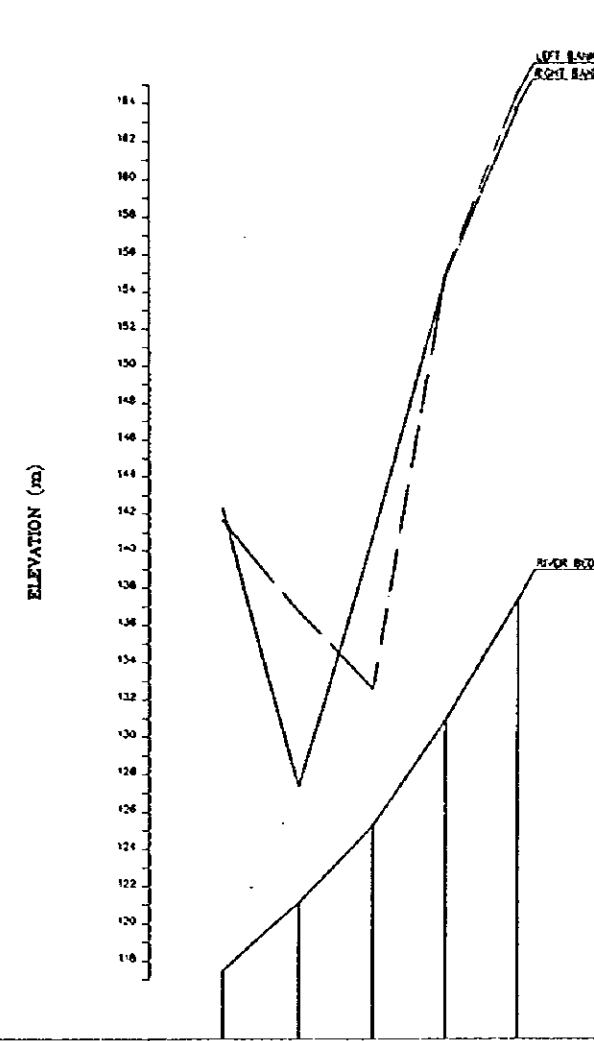
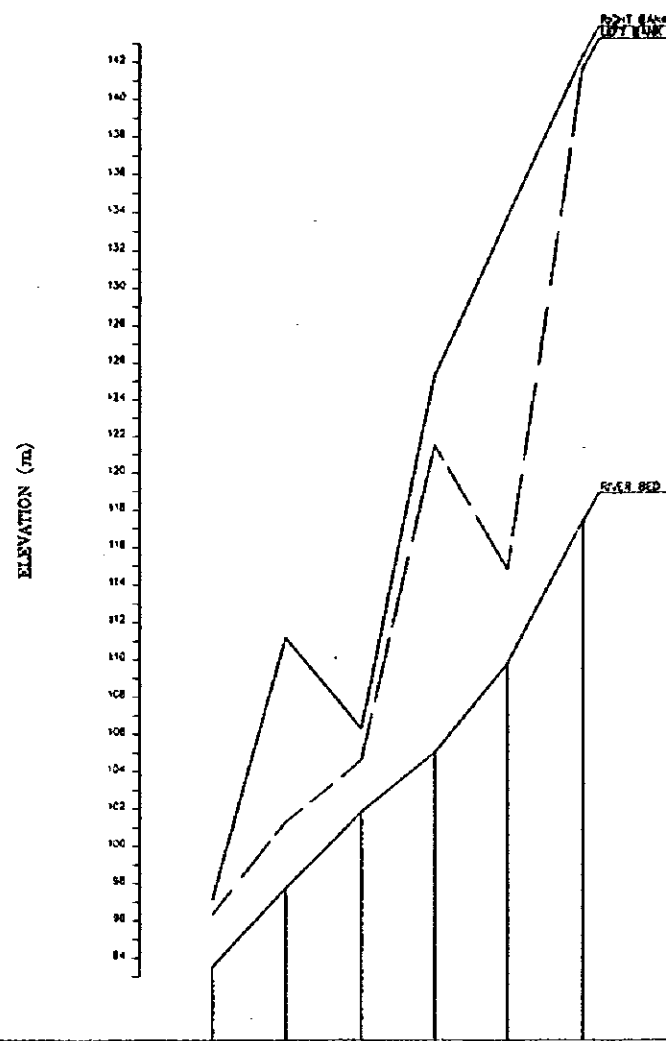
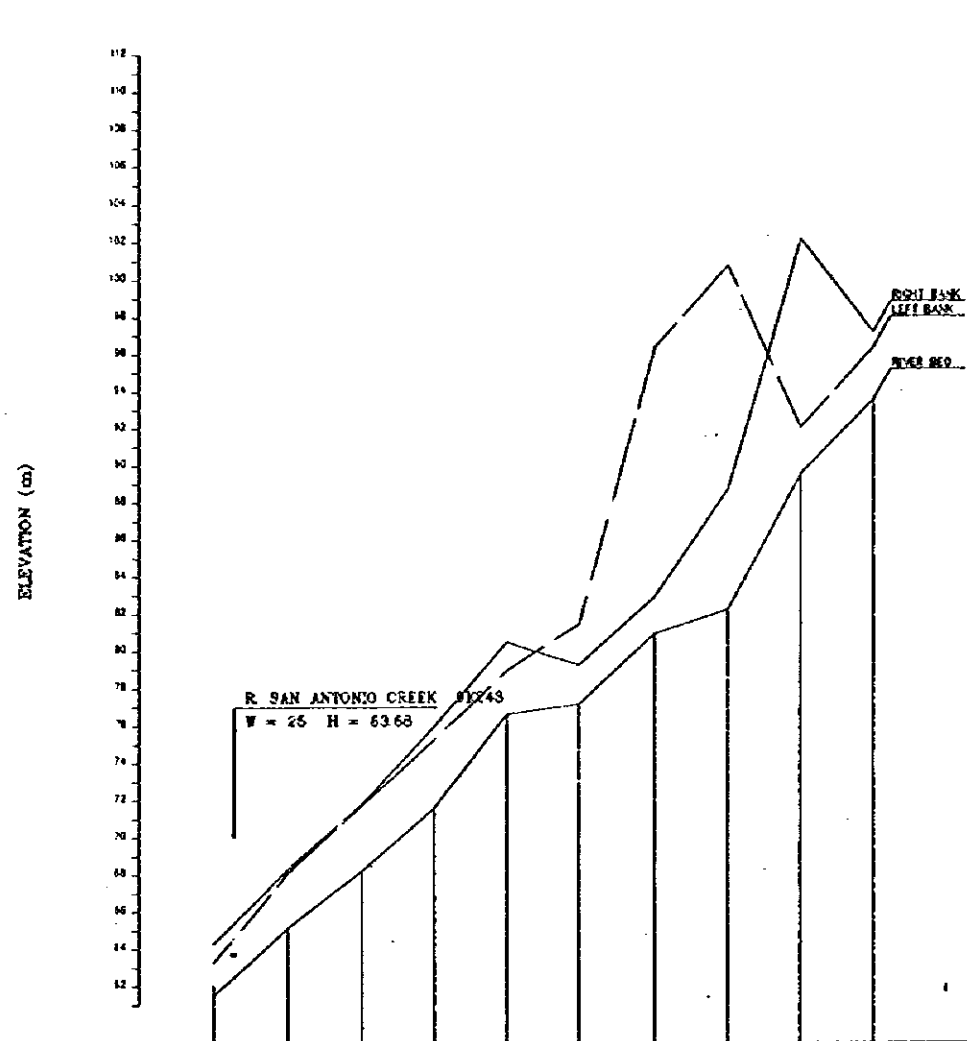
APPROVED BY: _____ CHECKED BY: _____

SITE (LOCATION): CURA RIVER

SCALE: H = 1: 50000 V = 1: 400

SHEET NO. 1/2

STA. 9+000 TO STA. 18+000

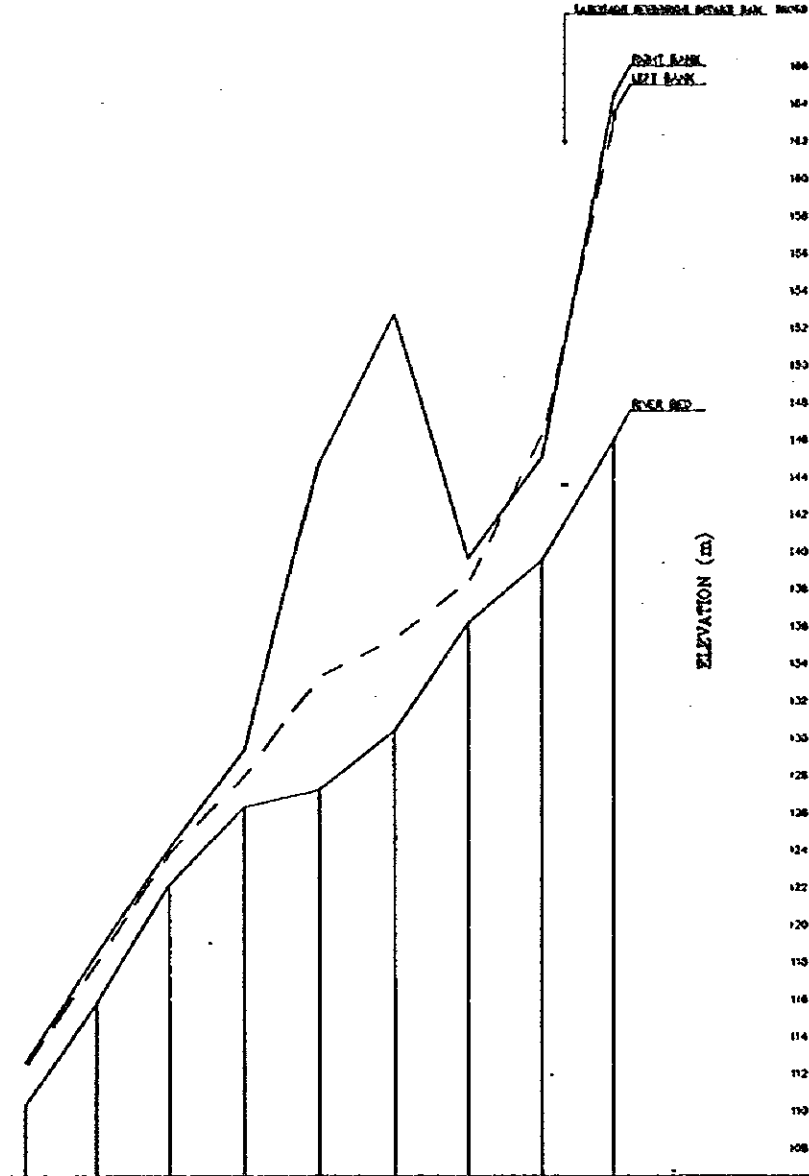
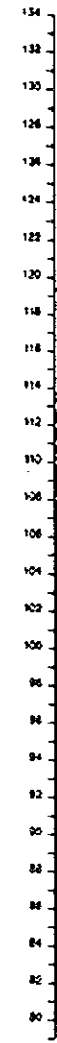


RIGHT BANK ELEVATION	64.27	66.30	71.89	75.92	80.43	78.23	82.87	88.81	102.13	97.14	97.14	111.15	108.28	128.28	133.77	142.31	142.31	137.37	148.70	154.84	163.72
LEFT BANK ELEVATION	63.26	66.09	71.72	75.33	76.90	81.33	100.89	91.94	94.30	94.33	94.33	101.30	104.81	121.27	114.81	141.66	141.66	136.77	132.60	150.02	164.32
RIVER BED ELEVATION	61.48	65.13	68.21	71.88	74.69	77.13	82.97	82.17	86.45	83.30	83.30	87.74	101.83	108.02	106.79	117.44	117.44	121.10	125.26	130.92	137.32
ACCUMULATIVE DISTANCE	0000.00	5000.00	10000.00	15000.00	19000.00	11000.00	12000.00	12500.00	13000.00	13500.00	13500.00	14000.00	14000.00	15000.00	16000.00	16000.00	16000.00	16500.00	17000.00	17000.00	18000.00
UNIT DISTANCE	0.00	500.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
STATION NUMBER	L-18	L-19	L-20	L-21	L-22	L-23	L-24	L-25	L-26	L-27	L-27	L-28	L-28	L-29	L-30	L-31	L-32	L-33	L-34	L-35	L-36

<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	LONGITUDINAL PROFILE		SITE (LOCATION): CURA RIVER	
	APPROVED BY:	CHECKED BY:	SCALE: H = 1 : 50000 V = 1 : 500	SHEET NO. 2/2

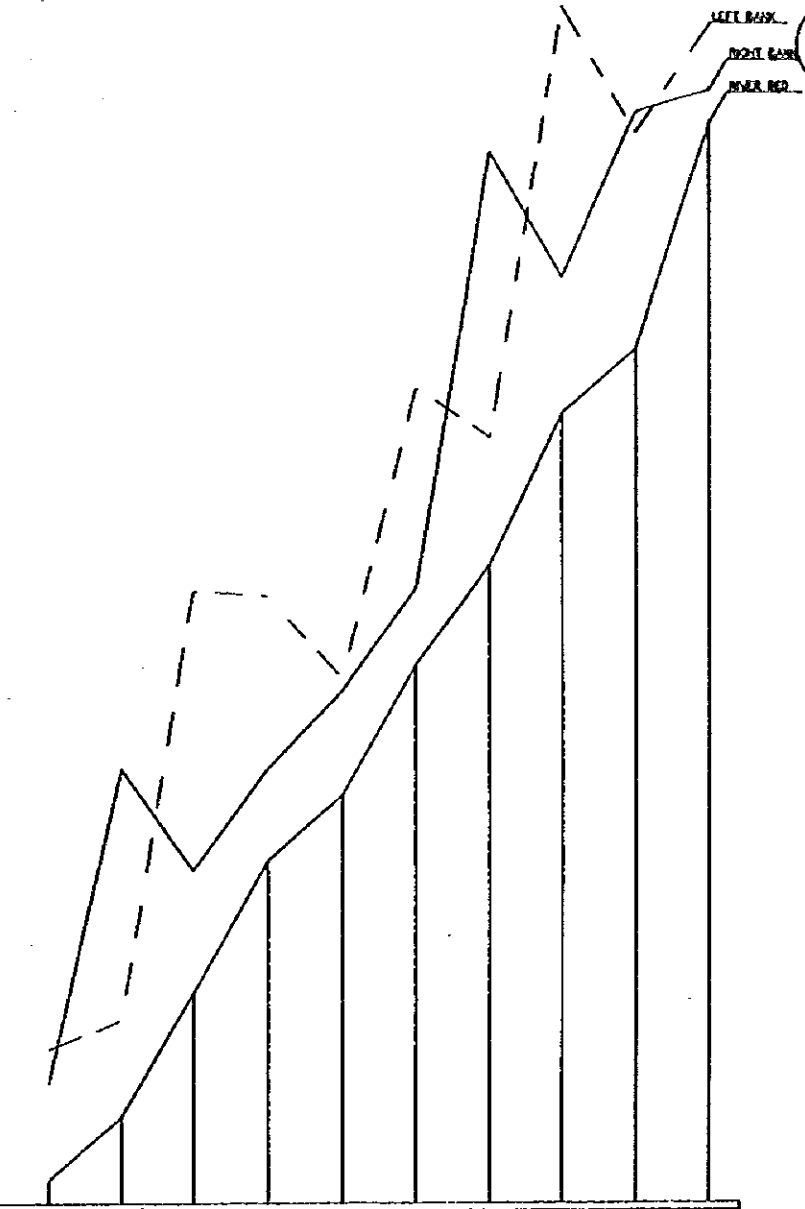
STA. 0+000 TO STA. 11+000

ELEVATION (m)



ELEVATION (m)

ELEVATION (m)



1/2

RIGHT BANK ELEVATION	87.5	87.0	83.4	88.8	114.0	122.0	108.0	114.3	133.6	114.7	133.6	127.87	143.86	137.75	144.08	148.60	184.53	188.85	188.53	181.13	184.80	170.66	176.23	180.83	182.66	207.74	202.8
LEFT BANK ELEVATION	81.7	87.3	83.23	87.29	102.58	94.53	107.64	110.48	125.85	115.8	132.85	141.77	148.79	138.41	150.76	154.48	183.01	181.48	183.01	178.10	175.82	171.40	187.01	184.41	207.41	200.83	206.3
RIVER BED ELEVATION	79.87	84.02	81.43	80.82	94.51	84.70	102.44	102.79	115.20	100.76	115.20	118.49	124.49	133.25	134.88	144.45	147.84	144.4	147.24	154.50	161.29	165.11	172.05	177.30	186.70	184.00	201.12
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	2500.00	3000.00	3500.00	4000.00	5000.00	6000.00	6500.00	8000.00	8500.00	9000.00	9500.00	10000.00	11000.00	12000.00	13000.00	14000.00	15000.00	16000.00	17000.00	18000.00	19000.00	20000.00
UNIT DISTANCE	500	500	500	500	500	500	500	500	500	1000	500	500	500	500	500	500	500	1000	500	500	500	500	500	500	500	500	500
STATION NUMBER	0+000	0+500	1+000	1+500	2+000	2+500	3+000	3+500	4+000	5+000	6+000	6+500	8+000	8+500	9+000	9+500	10+000	11+000	12+000	13+000	14+000	15+000	16+000	17+000	18+000	19+000	20+000

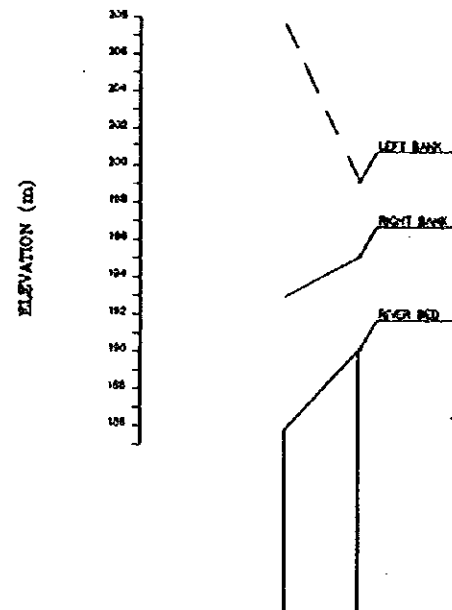
THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE
APPROVED BY:
CHECKED BY:

SITE (LOCATION): LABUGAON-1 RIVER
SCALE: H = 1 : 25000, V = 1 : 200
SHEET NO. 1/2

STA. 10+000 TO STA. 10+500

2/2

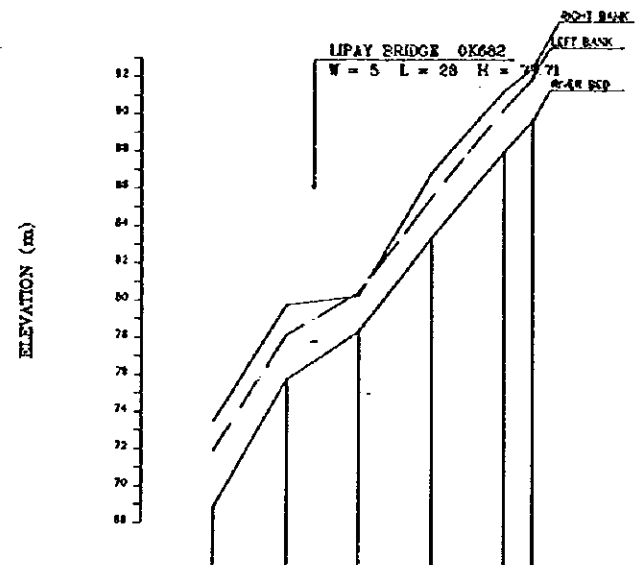


RIGHT BANK ELEVATION	192.28	194.28
LEFT BANK ELEVATION	207.44	198.89
RIVER BED ELEVATION	186.7	184.7
ACCUMULATIVE DISTANCE	10+000	10+500
UNIT DISTANCE	500.00	500.00
STATION NUMBER	L-29	L-30

THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	LONGITUDINAL PROFILE		SITE (LOCATION): LABUGAON-1 RIVER	
	APPROVED BY:	CHECKED BY:	SCALE: H = 1 : 50000 V = 1 : 100	SHEET NO. 2/2

STA. 0+000 TO STA. 2+193

1/1



RIGHT BANK ELEVATION	71.08	76.14	80.35	85.47	90.32	91.84
LEFT BANK ELEVATION	73.48	78.20	82.17	86.76	91.20	92.38
RIVER BED ELEVATION	68.68	73.72	78.28	83.32	87.84	88.08
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	2193.00
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	193.00
STATION NUMBER	0	1	2	3	4	2+193

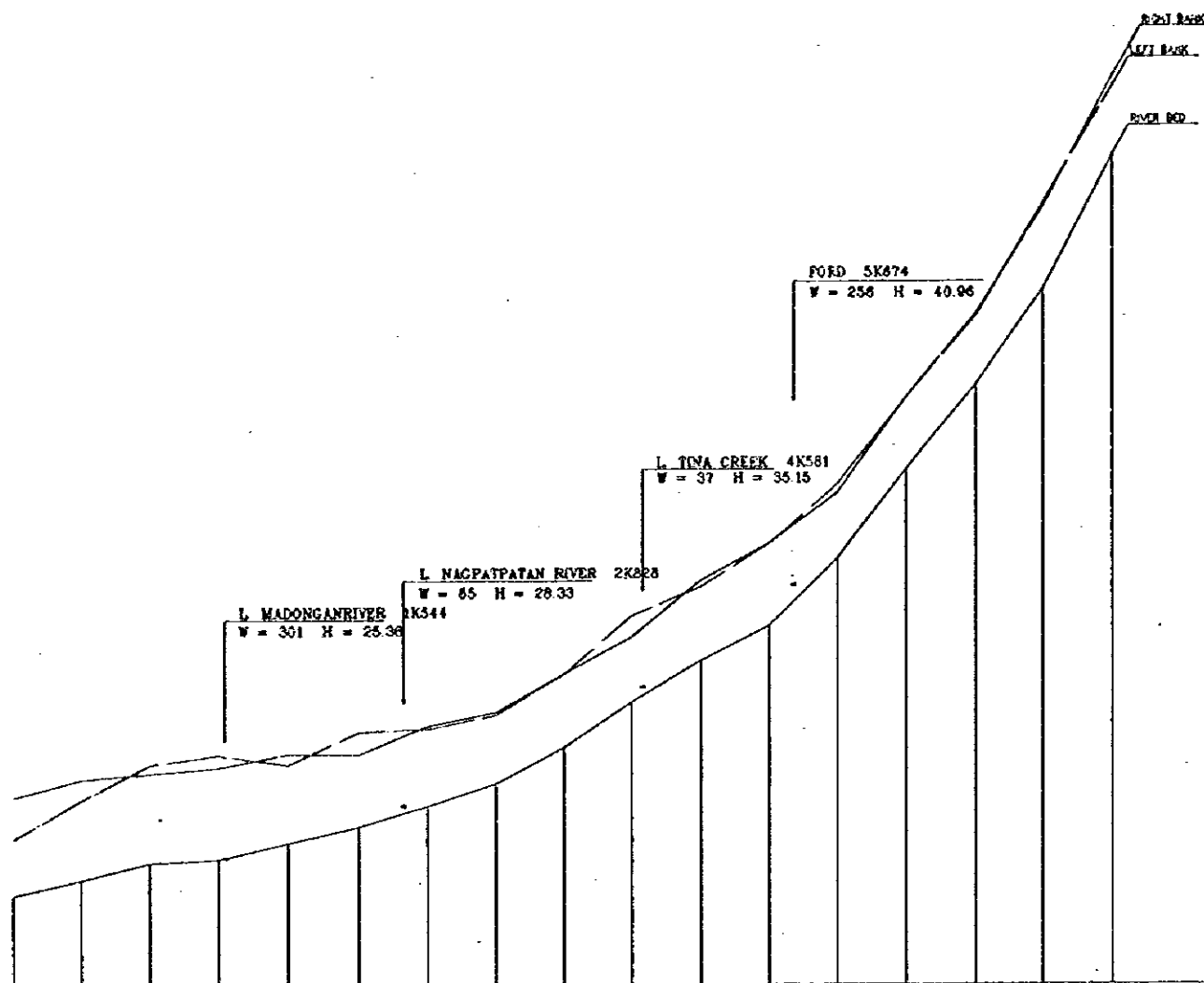
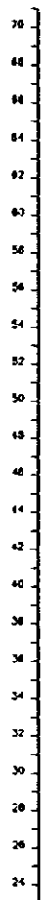
THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE
APPROVED BY: _____ CHECKED BY: _____

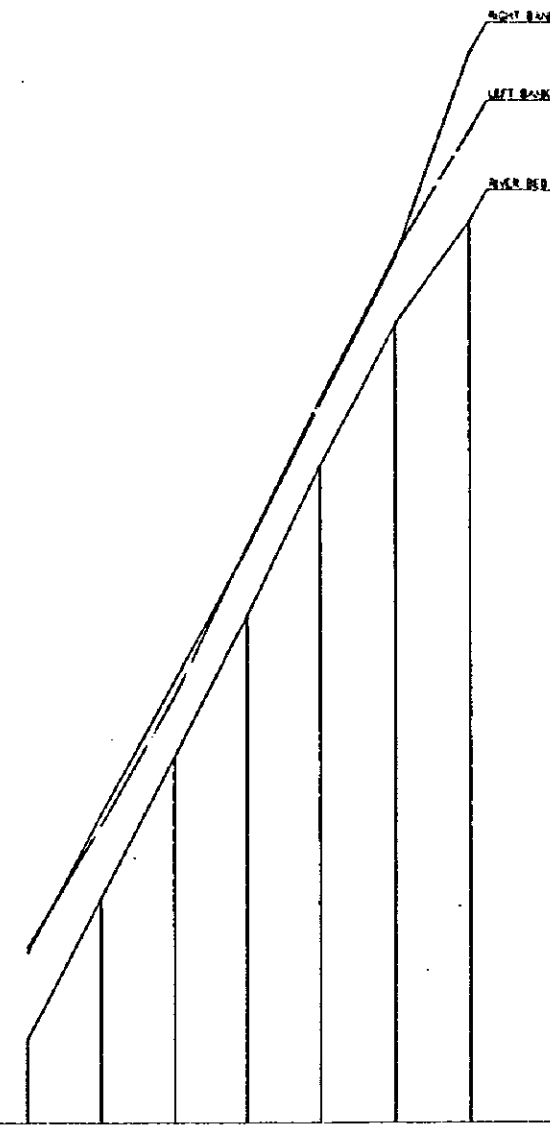
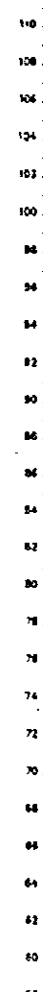
SITE (LOCATION):
LABUGAON-2 RIVER
SCALE:
H = 1 : 50000
V = 1 : 400
SHEET NO. 1/1

STA. 0+000 TO STA.10+500

ELEVATION (m)



ELEVATION (m)

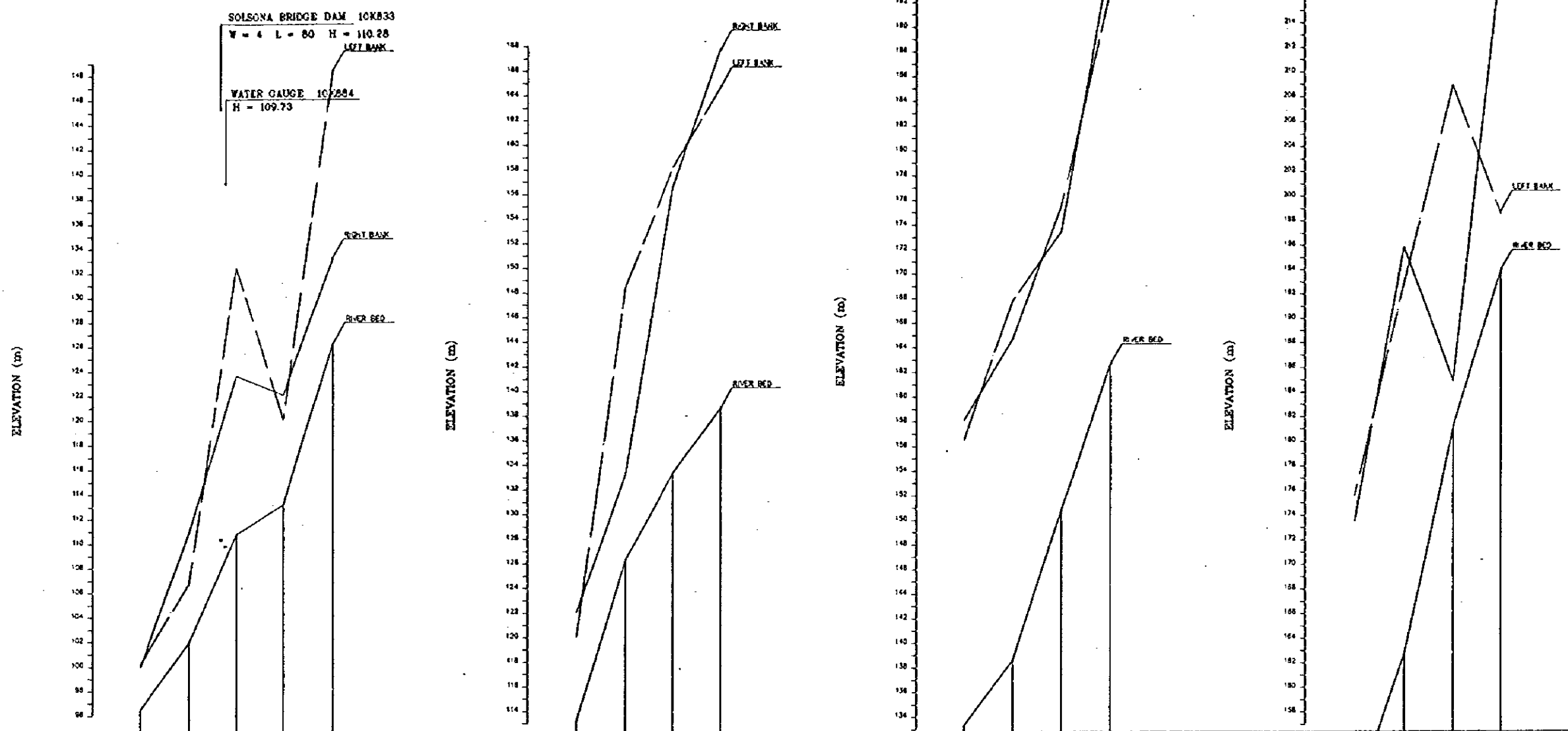


RIGHT BANK ELEVATION	28.90	29.83	30.25	30.88	31.37	31.24	32.87	33.74	35.99	36.05	41.28	43.43	46.32	51.74	56.65	62.75	70.14	62.75	70.14	77.28	84.41	92.24	99.85	108.48
LEFT BANK ELEVATION	26.46	26.72	26.79	27.32	26.78	28.62	29.75	31.54	32.91	34.25	41.82	43.38	44.77	51.74	56.57	62.98	68.59	62.28	68.28	76.44	84.24	92.21	100.15	108.72
RIVER BED ELEVATION	23.24	24.14	25.12	25.38	24.25	27.18	28.37	29.64	31.70	34.32	34.88	38.70	42.54	47.88	52.46	56.08	65.84	54.05	60.89	73.27	80.78	88.83	94.47	101.83
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	2500.00	3000.00	3500.00	4000.00	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00	8000.00	7500.00	8000.00	8500.00	9000.00	9500.00	10000.00	10500.00
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	0.00	500.00	500.00	500.00	500.00	500.00	500.00
STATION NUMBER	L-0	L-1	L-2	L-3	L-4	L-5	L-6	L-7	L-8	L-9	L-10	L-11	L-12	L-13	L-14	L-15	L-16	L-16	L-16	L-17	L-18	L-19	L-20	L-21

<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	LONGITUDINAL PROFILE		SITE (LOCATION): SOLSONA RIVER	
	APPROVED BY:	CHECKED BY:	SCALE: H = 1:50000 V = 1:100	SHEET NO. 1/3

STA. 10+000 TO STA. 15+000

2/3



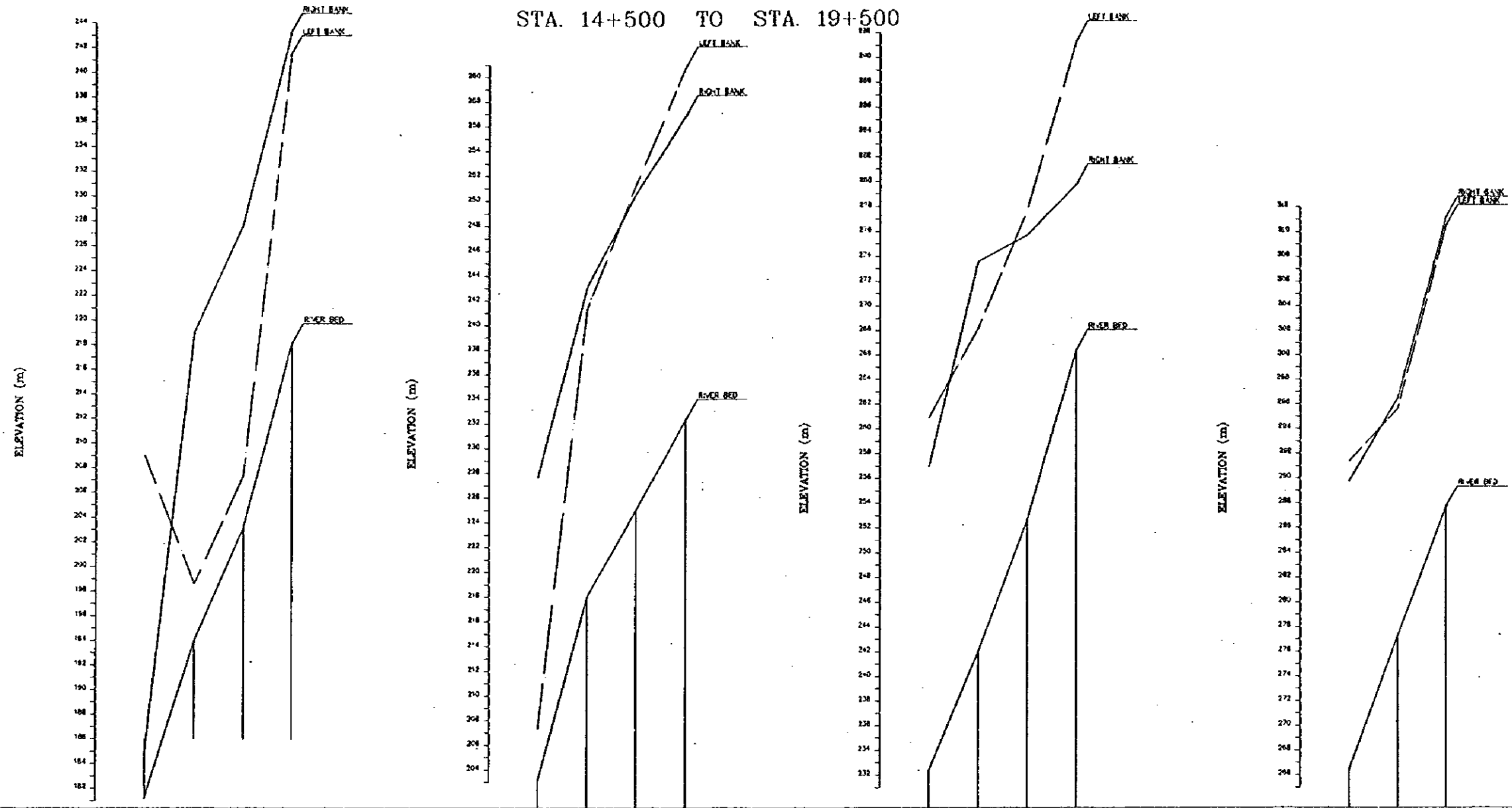
RIGHT BANK ELEVATION	96.82	110.28	113.81	122.08	133.25	158.82	173.49	186.87	173.49	186.87	218.85
LEFT BANK ELEVATION	100.15	108.72	133.44	138.08	148.47	158.17	164.07	175.58	175.58	192.84	198.87
RIVER BED ELEVATION	96.47	101.03	110.75	113.17	128.31	133.34	138.02	152.88	150.82	162.08	184.01
ACCUMULATIVE DISTANCE	0.00	1000.00	1100.00	11500.00	12000.00	12500.00	13000.00	14000.00	13000.00	14000.00	15000.00
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
STATION NUMBER	L-20	L-21	L-22	L-23	L-24	L-25	L-26	L-27	L-28	L-29	L-30

THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE
APPROVED BY: _____
CHECKED BY: _____

SITE (LOCATION): SOLSONA RIVER
SCALE: H = 1 : 50000, V = 1 : 400
SHEET NO. 2/3

STA. 14+500 TO STA. 19+500



RIGHT BANK ELEVATION	186.85	216.95	277.82	243.11	277.82	243.11	250.83	256.94	256.94	277.39	275.73	289.75	289.75	298.45	311.2
LEFT BANK ELEVATION	206.01	198.37	207.32	241.32	207.32	241.32	251.37	280.89	280.89	288.79	277.73	291.35	291.35	298.36	300.3
RIVER BED ELEVATION	186.15	194.01	203.07	217.89	203.07	217.89	225.01	232.33	232.33	246.88	252.88	266.44	266.44	277.2	287.7
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	1500.00	2000.00	2500.00	3000.00	3000.00	3500.00	4000.00	4500.00	4500.00	5000.00	5500.00
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
STATION NUMBER	L-2	L-3	L-4	L-5	L-6	L-7	L-8	L-9	L-10	L-11	L-12	L-13	L-14	L-15	L-16

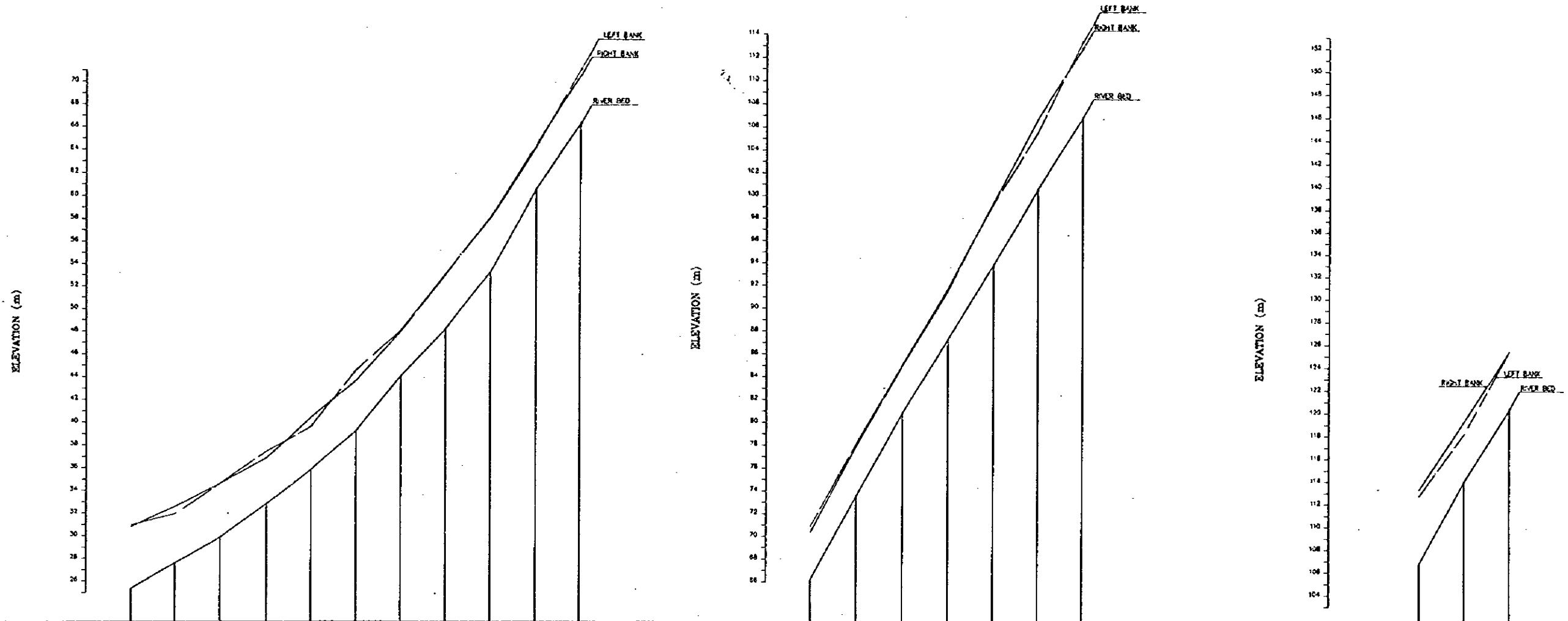
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE
 APPROVED BY: _____ CHECKED BY: _____

SITE (LOCATION): **SOLSONA RIVER**
 SCALE: H = 1 : 50000 V = 1 : 400
 SHEET NO. **3/3**

STA. 0+000 TO STA. 9+500

1/2

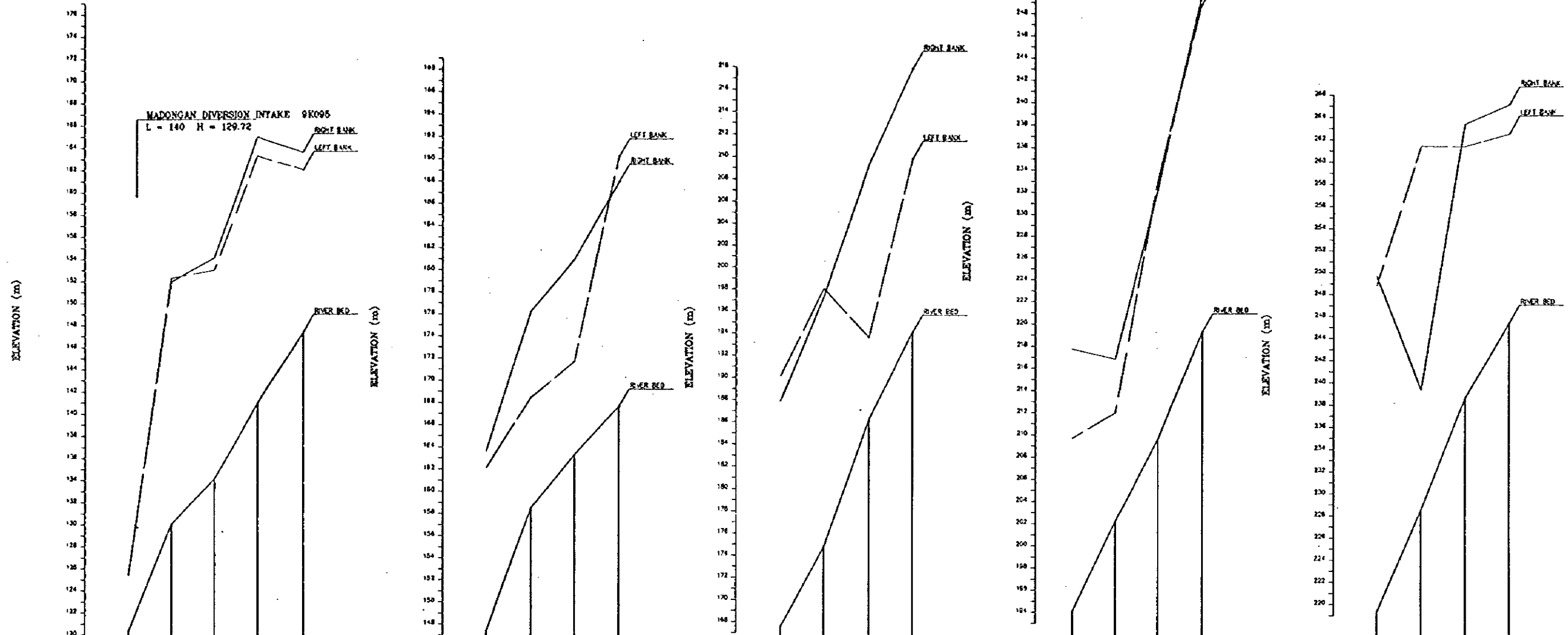


RIGHT BANK ELEVATION	30.63	32.08	34.62	36.80	40.99	43.62	47.88	52.80	58.04	64.43	70.37	70.37	77.48	85.00	91.59	98.29	106.87	112.74	112.74	118.26	125.47	
LEFT BANK ELEVATION	30.05	31.63	34.81	37.44	39.59	44.54	47.88	52.80	58.01	64.22	70.46	70.88	78.12	85.04	91.74	98.20	105.02	112.29	113.29	119.30	125.43	
RIVER BED ELEVATION	25.35	27.60	29.89	32.80	34.84	36.23	44.00	48.13	53.14	60.54	64.34	64.24	73.51	80.81	87.27	93.72	100.88	106.74	106.74	108.78	114.00	120.27
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	2800.00	3000.00	3500.00	4000.00	4500.00	5000.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00	8000.00	8000.00	8500.00	9000.00	
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	800.00	200.00	500.00	500.00	500.00	500.00	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	
STATION NUMBER	L-0	L-1	L-2	L-3	L-4	L-5	L-6	L-7	L-8	L-9	L-10	L-10	L-11	L-12	L-13	L-14	L-15	L-16	L-16	L-17	L-18	

LONGITUDINAL PROFILE
 APPROVED BY: _____ CHECKED BY: _____
 SITE (LOCATION): MADONGAN RIVER
 SCALE: H = 1 : 50000 V = 1 : 500
 SHEET NO. 1/2

STA. 9+000 TO STA. 17+000

2/2

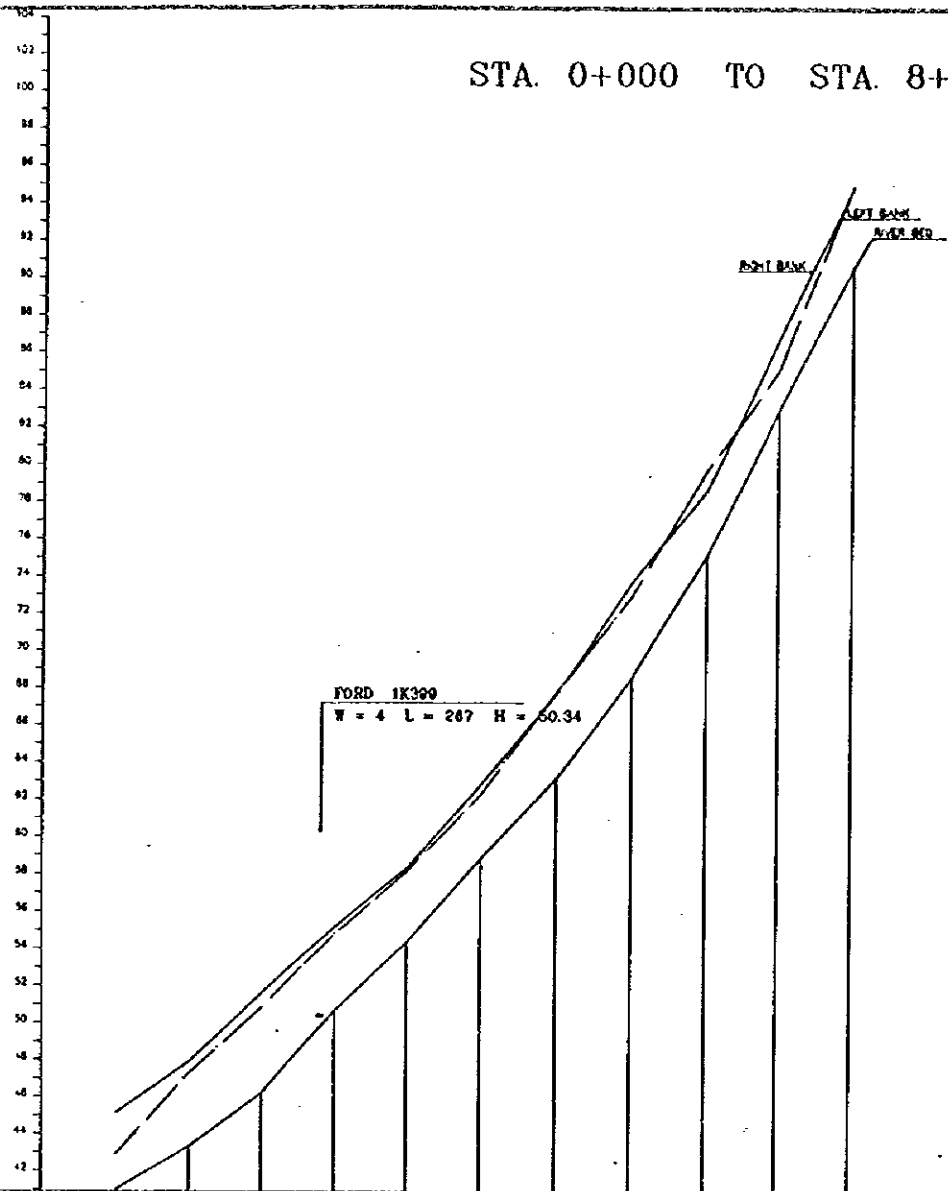


RIGHT BANK ELEVATION	125.47	131.44	134.10	143.00	143.84	143.84	174.37	180.80	187.88	187.88	187.88	187.28	208.28	217.75	217.75	216.78	232.15	246.70	246.70	238.33	243.40	246.11
LEFT BANK ELEVATION	125.40	132.35	132.98	143.31	143.08	142.08	168.48	171.68	180.14	180.14	180.14	180.00	193.38	208.70	211.92	233.00	246.87	246.07	246.07	261.40	261.40	262.50
RIVER BED ELEVATION	126.32	126.48	131.14	140.84	147.36	147.36	158.52	163.30	167.54	167.54	167.54	174.78	188.18	184.00	202.18	209.57	218.37	218.27	218.27	228.50	238.60	246.41
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	3000.00	4000.00	5000.00	6000.00	7000.00	8000.00	9000.00	10000.00	11000.00	12000.00	13000.00	14000.00	15000.00	16000.00	17000.00	18000.00	19000.00
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
STATION NUMBER	L-18	L-19	L-20	L-21	L-22	L-23	L-24	L-25	L-26	L-27	L-28	L-29	L-30	L-31	L-32	L-33	L-34	L-35	L-36	L-37	L-38	

LONGITUDINAL PROFILE
 APPROVED BY: _____ CHECKED BY: _____
 SITE (LOCATION): MADONGAN RIVER
 SCALE: H = 1 : 50000 V = 1 : 400
 SHEET NO. 2/2

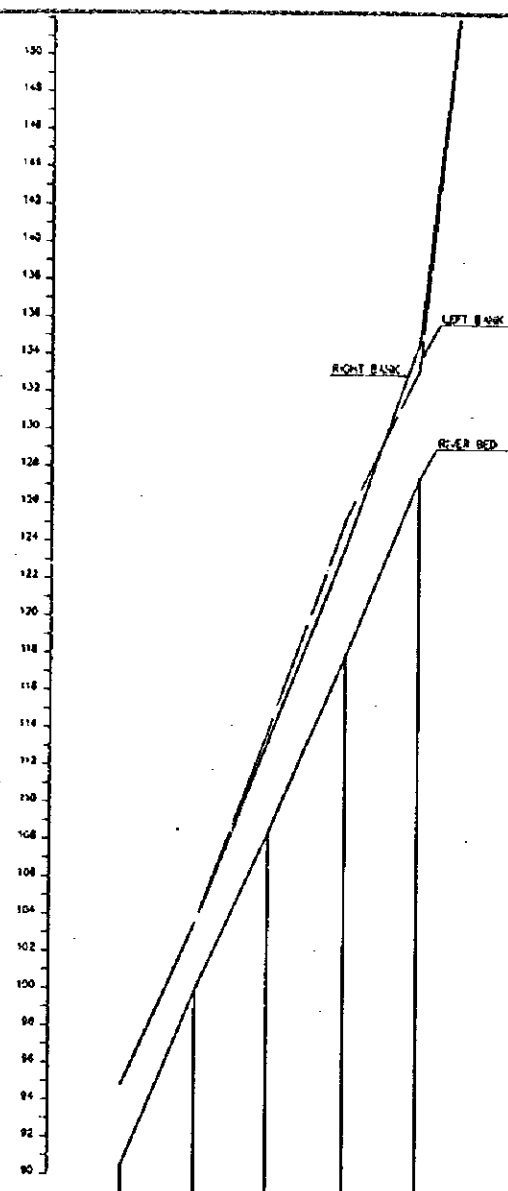
STA. 0+000 TO STA. 8+500

ELEVATION (m)

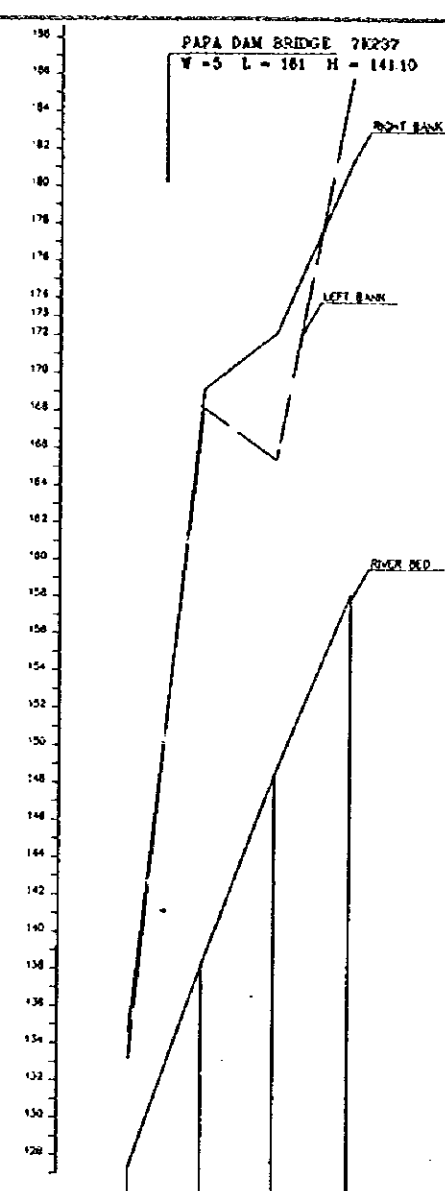


FORD 1K399
W = 4 L = 287 H = 50.34

ELEVATION (m)



ELEVATION (m)



PAPA DAM BRIDGE 71237
W = 5 L = 161 H = 141.10

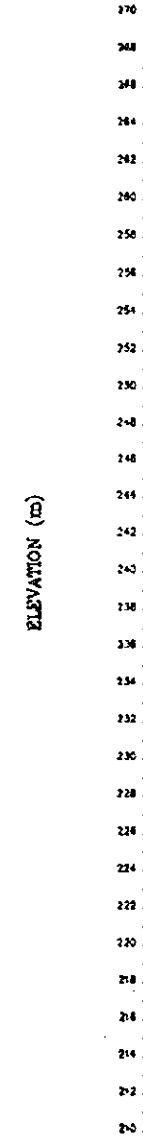
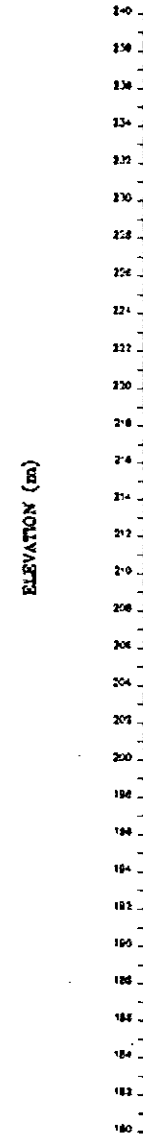
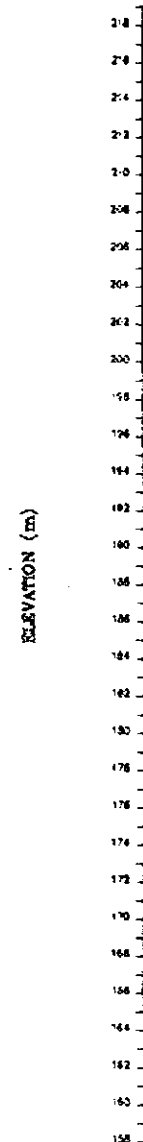
1/2

RIGHT BANK ELEVATION	45.12	47.26	51.56	54.14	56.53	62.77	67.64	73.66	78.54	84.44	89.29	94.08	94.08	103.08	113.77	123.85	134.58	134.58	146.13	146.39	146.74	
LEFT BANK ELEVATION	42.88	47.26	50.82	54.76	58.08	62.27	67.75	72.94	78.85	84.08	89.82	94.08	94.08	103.85	113.77	123.11	133.18	133.18	143.16	148.14	152.10	151.74
RIVER BED ELEVATION	41.00	43.31	46.27	50.65	54.30	58.70	63.10	68.49	73.08	82.87	86.30	86.30	86.30	96.94	108.23	117.76	127.30	127.30	137.30	138.10	148.43	158.17
ACCUMULATIVE DISTANCE	0.00	500.00	1000.00	1500.00	2000.00	2500.00	3000.00	3500.00	4000.00	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00	8000.00	8500.00	9000.00	9500.00	10000.00	10500.00
UNIT DISTANCE	0.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
STATION NUMBER	L-0	L-1	L-2	L-3	L-4	L-5	L-6	L-7	L-8	L-9	L-10	L-11	L-12	L-13	L-14	L-15	L-16	L-17	L-18	L-19	L-20	

THE STUDY ON SABO AND FLOOD CONTROL
IN THE LAOAG RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

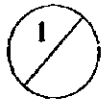
LONGITUDINAL PROFILE
APPROVED BY: _____
CREATED BY: _____
SCALE: H = 1 : 50000
V = 1 : 400
SHEET NO. 1/2

STA. 8+500 TO STA. 12+000

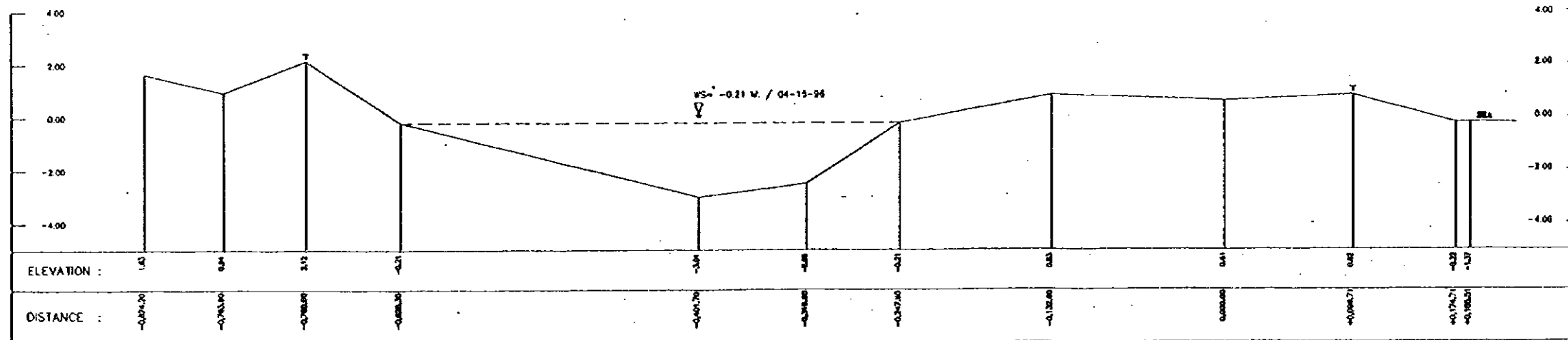


RIGHT BANK ELEVATION	185.74	193.78	204.88	246.88	271.80
LEFT BANK ELEVATION	191.34	198.07	203.63	233.63	265.34
RIVER BED ELEVATION	168.12	180.08	180.15	200.27	218.27
ACCUMULATIVE DISTANCE	0000.00	5000.00	8000.00	8500.00	10500.00
UNIT DISTANCE	0.00	500.00	3000.00	500.00	500.00
STATION NUMBER	L-17	L-18	L-19	L-20	L-21

<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>		LONGITUDINAL PROFILE		SITE (LOCATION): PAPA RIVER	
		APPROVED BY:	CHECKED BY:	SCALE: H = 1 : 50000 V = 1 : 400	SHEET NO. 2/2

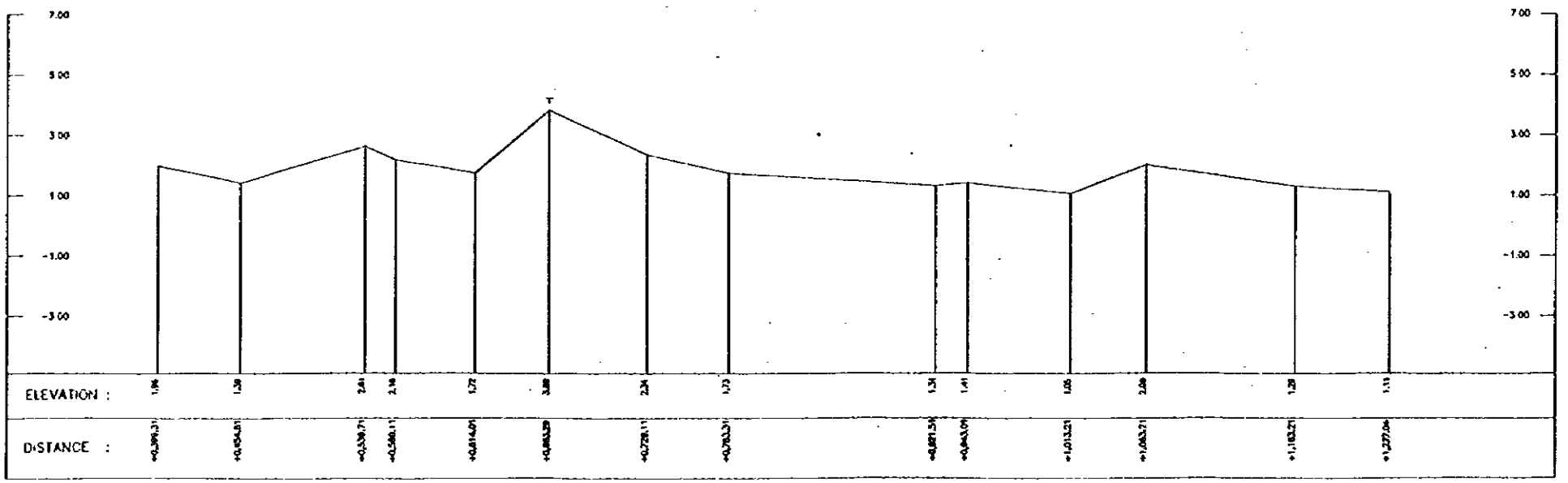
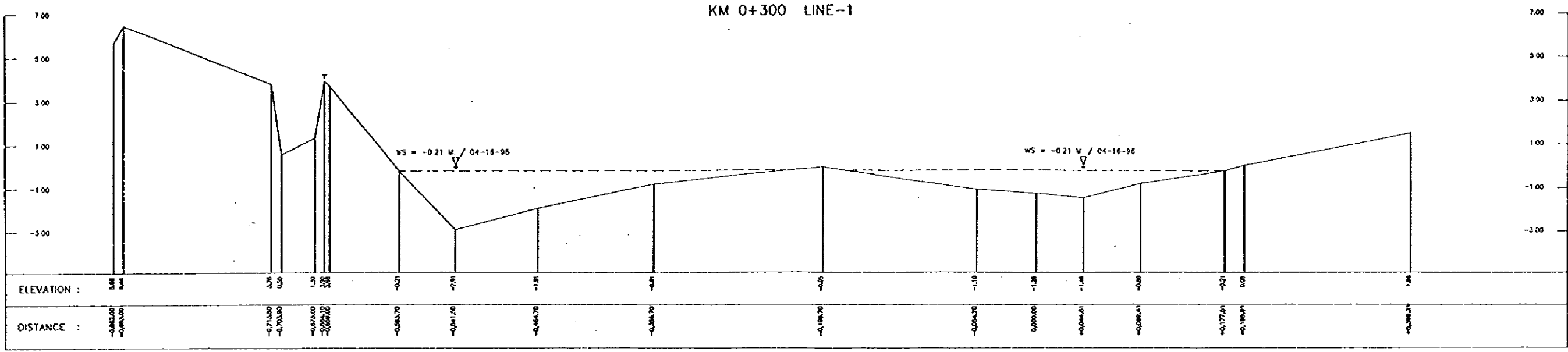


KM 0+000 LINE-0



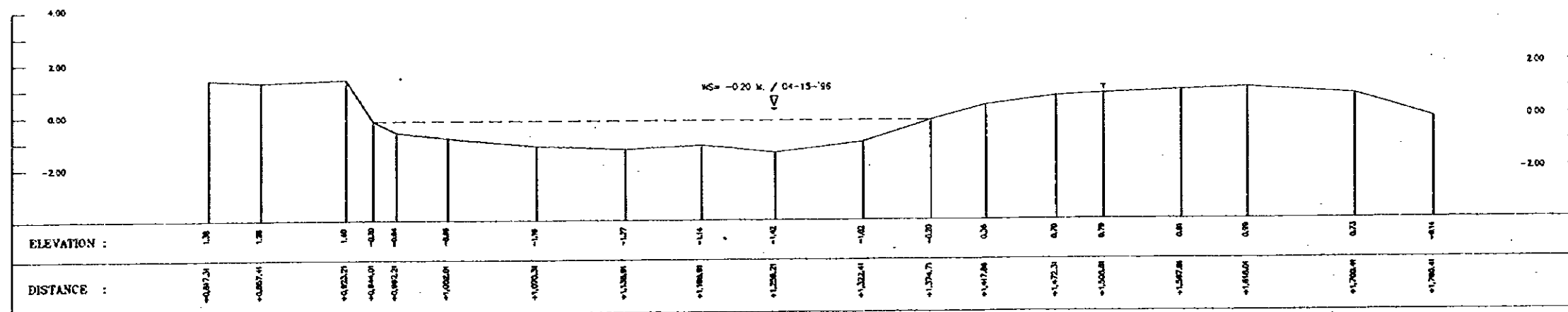
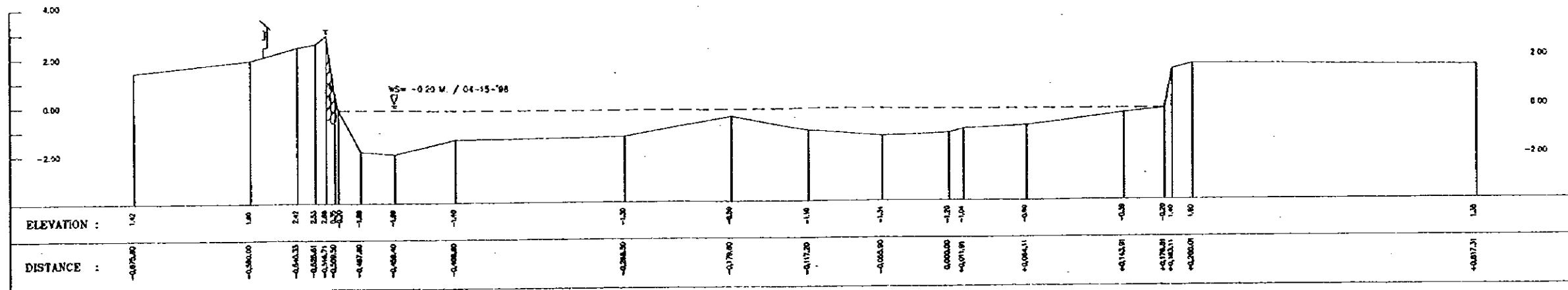
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	

KM 0+300 LINE-1



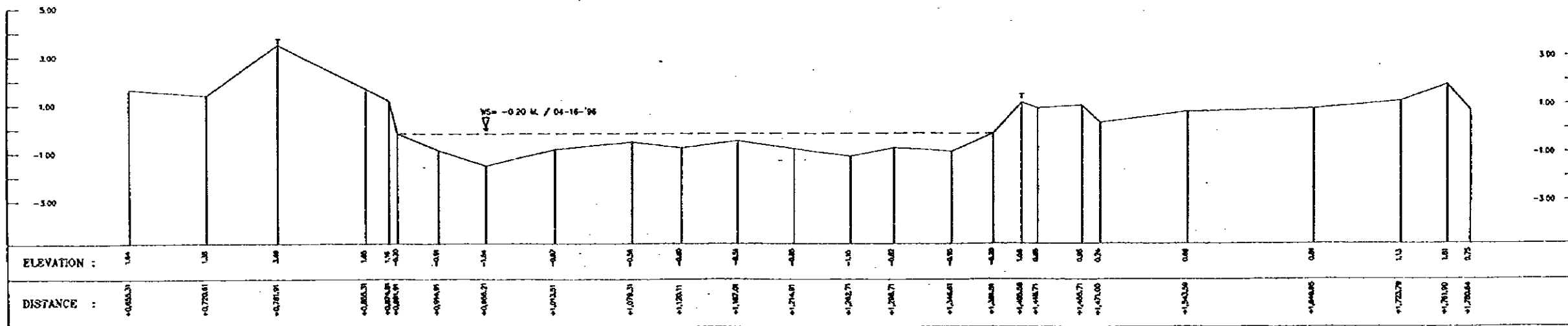
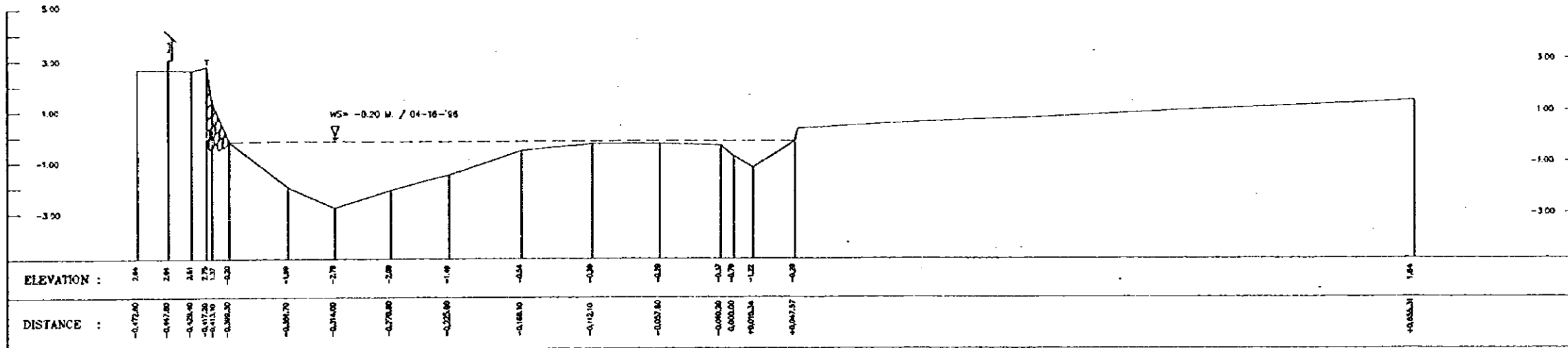
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	

KM 0+600 LINE-2



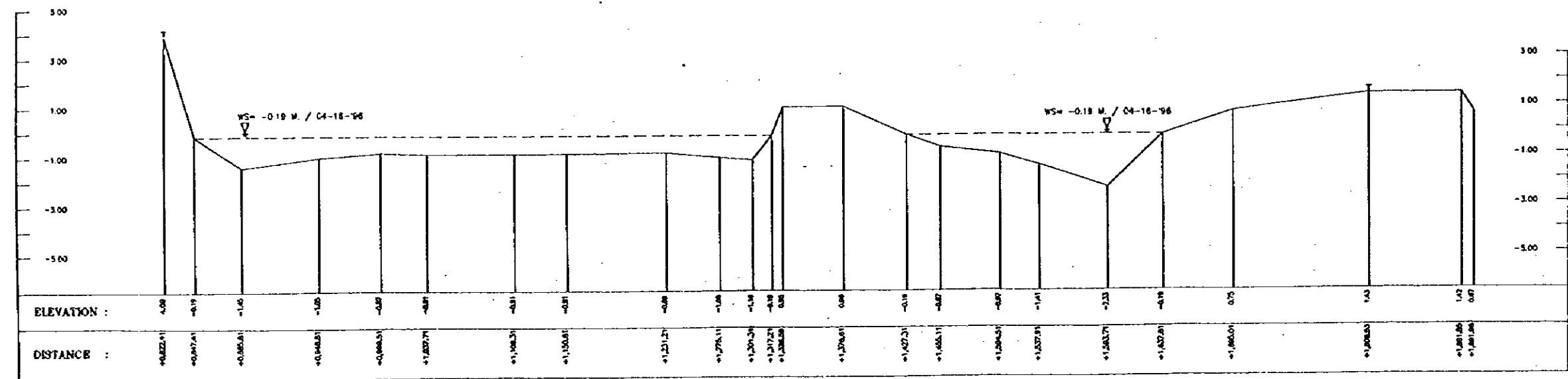
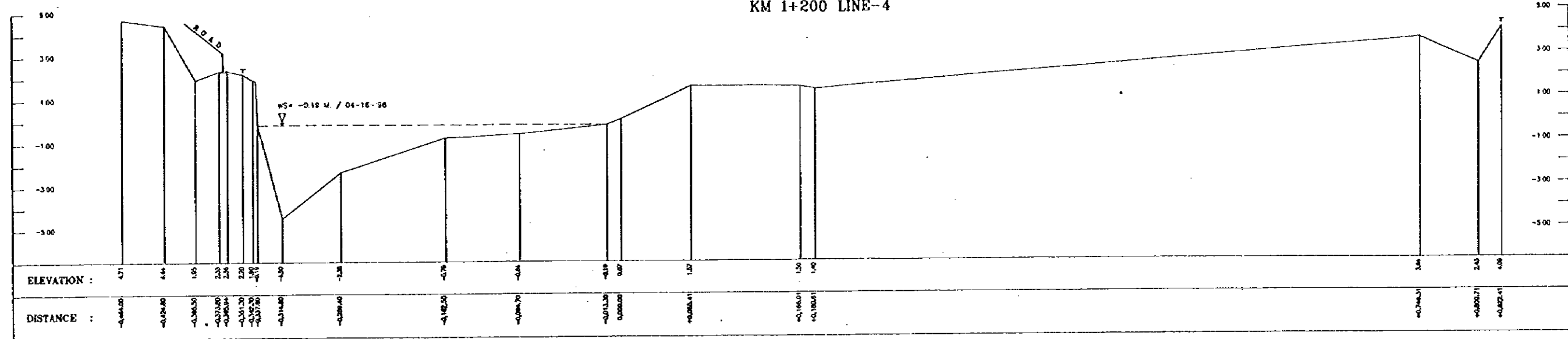
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER
			CROSS-SECTION NO.
			SCALE :
			H = 1 : 4000
			V = 1 : 200

KM 0+900 LINE-3



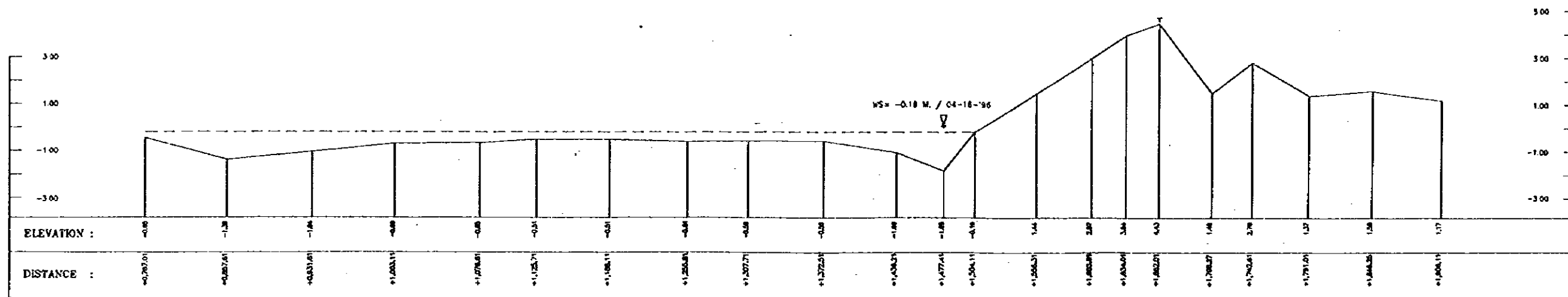
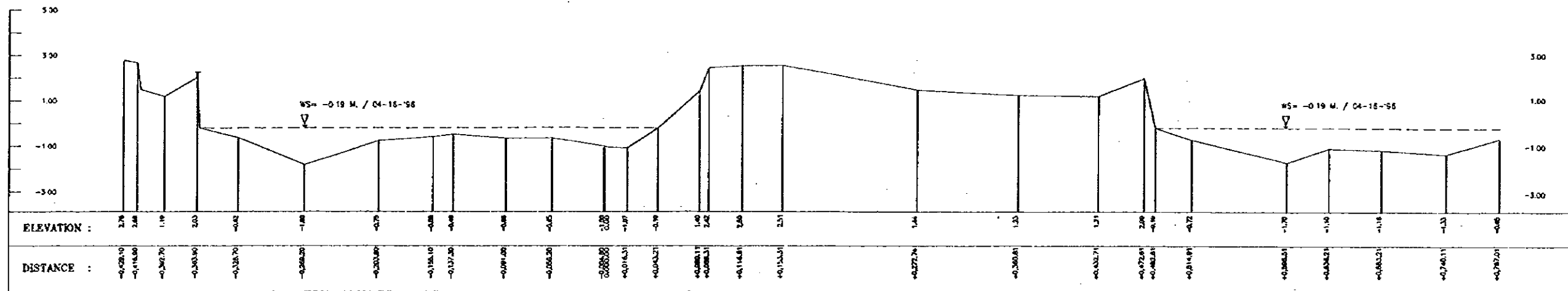
<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	<p>CROSS-SECTION</p>		<p>SITE (LOCATION) : LAOAG - BONGO RIVER</p>	
	<p>APPROVED BY :</p>	<p>CHECKED BY :</p>	<p>SCALE : H = 1 : 4000 V = 1 : 200</p>	<p>CROSS-SECTION NO.</p>

KM 1+200 LINE-4



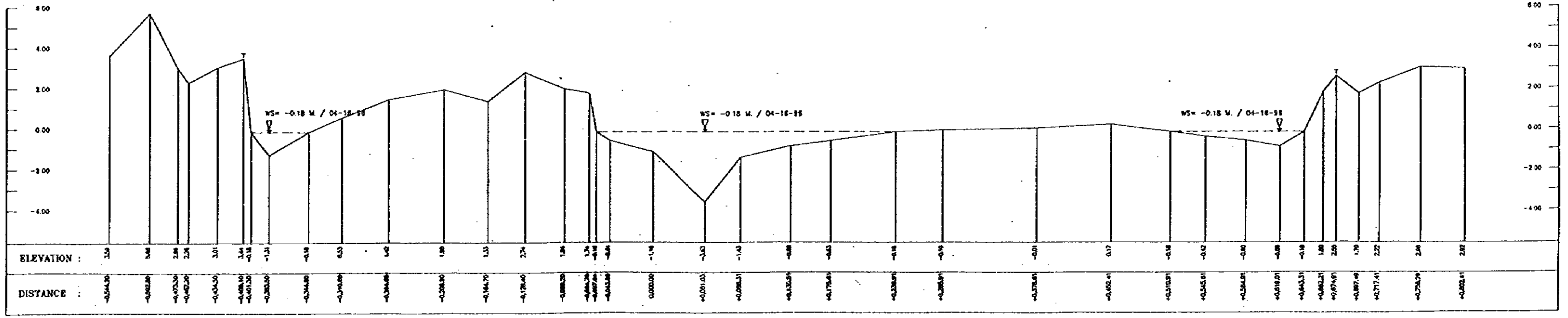
<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	CROSS-SECTION		SITE (LOCATION) : LAOAG - BONGO RIVER	
	APPROVED BY :	CHECKED BY :	SCALE : H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO.

KM 1+500 LINE-5



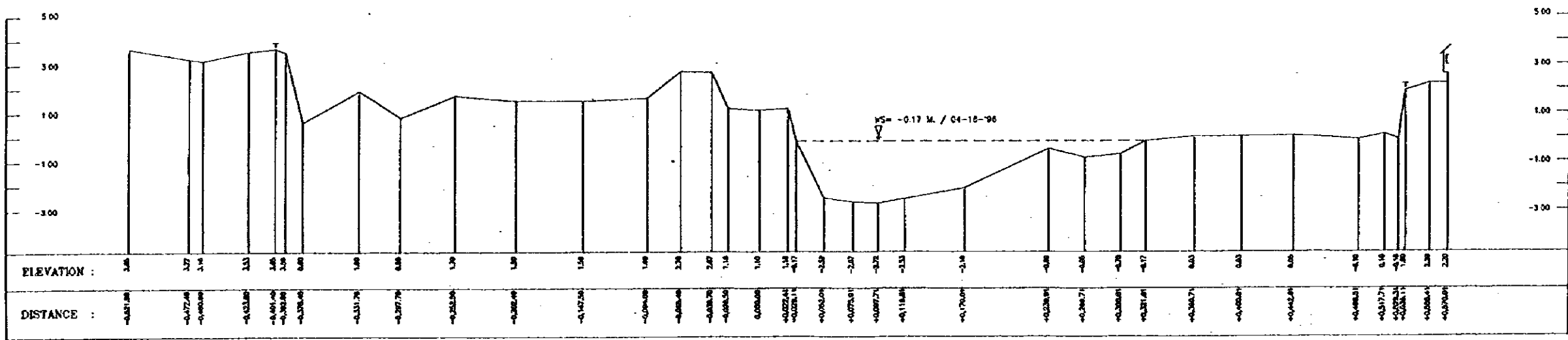
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) : LAOAG -- BONGO RIVER	
	APPROVED BY :	CHECKED BY :	SCALE : H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO.

KM 2+100 LINE-7



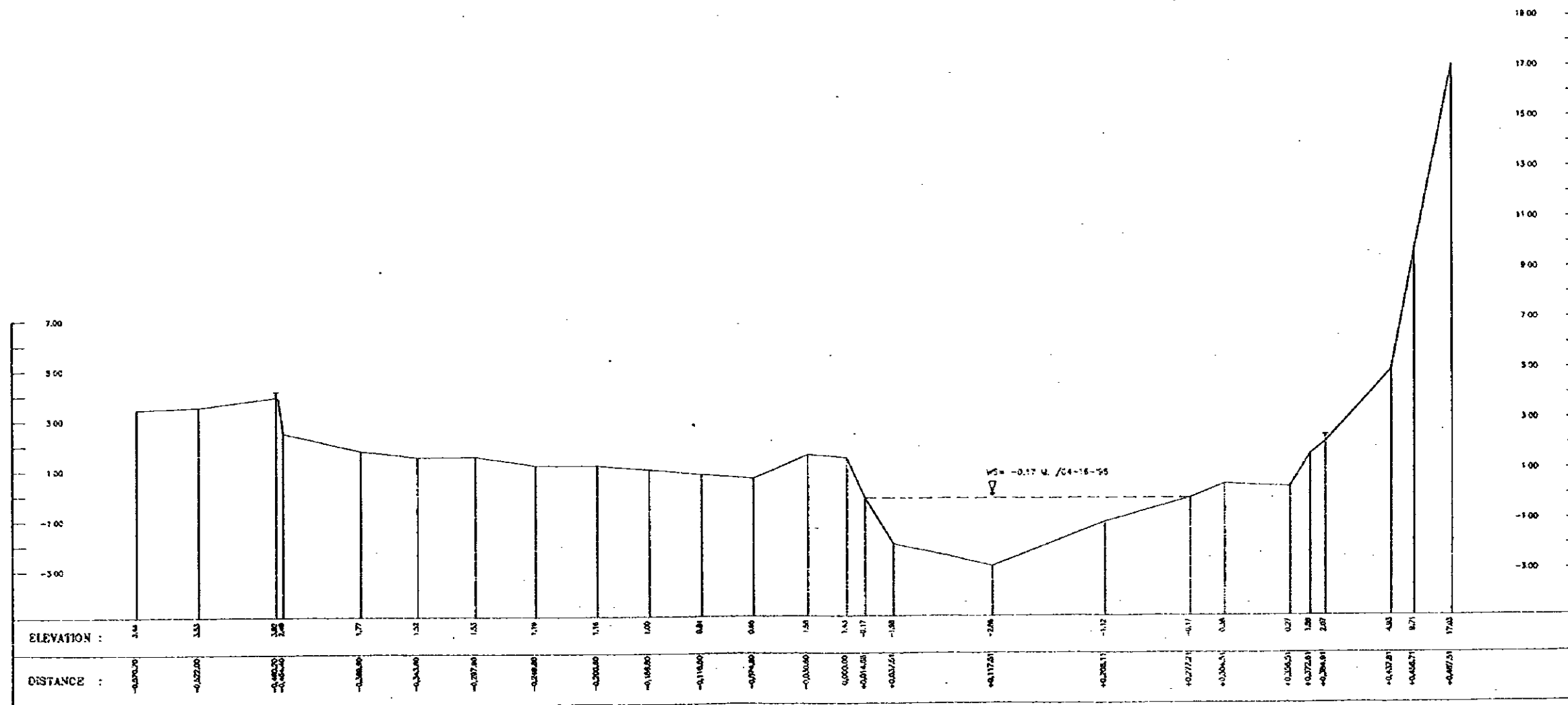
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	

KM 2+400 LINE-8



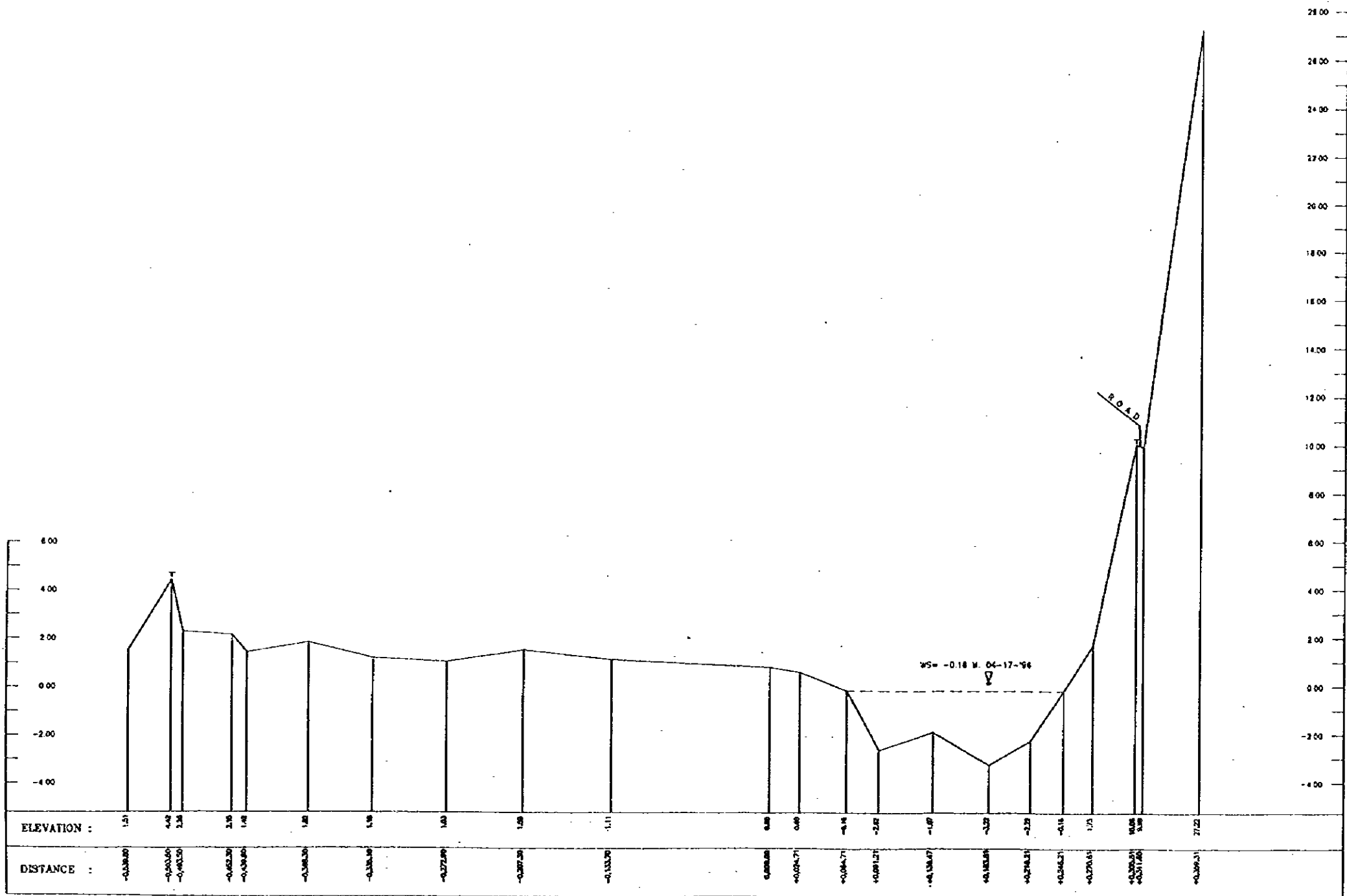
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) : LAOAG - BONGO RIVER	
	APPROVED BY :	CHECKED BY :	SCALE : H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO.

KM 2+700 LINE-9



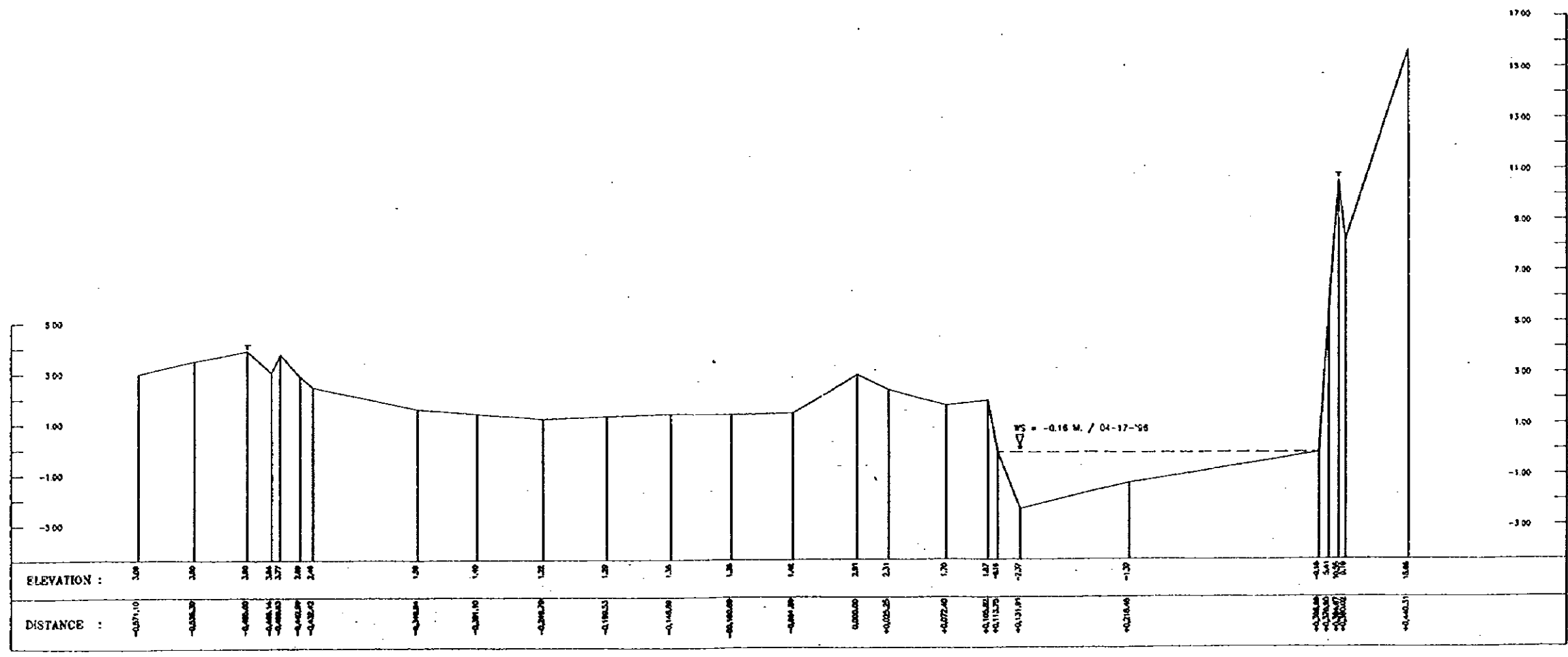
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	APPROVED BY:	CHECKED BY:	SCALE: H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO

KM 3+000 LINE-10



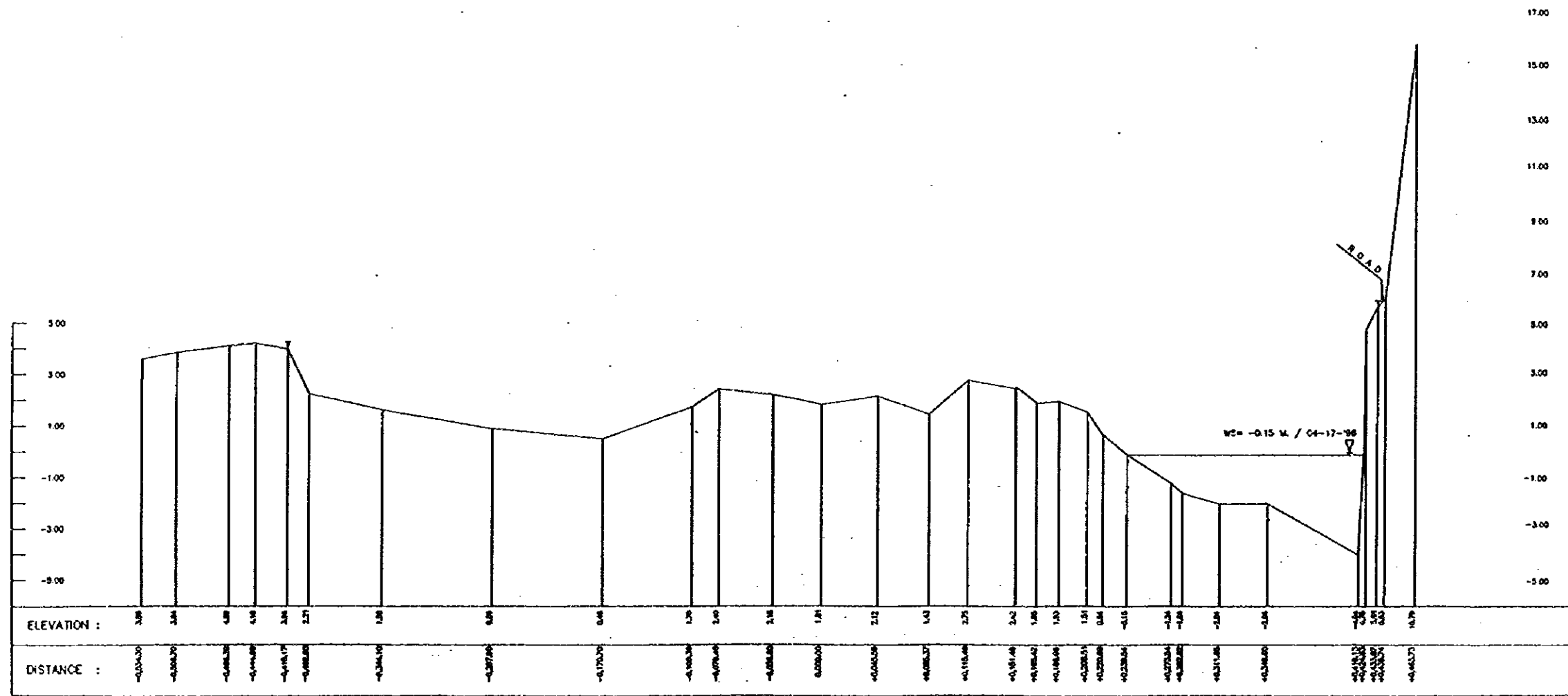
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	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	

KM 3+300 LINE-11



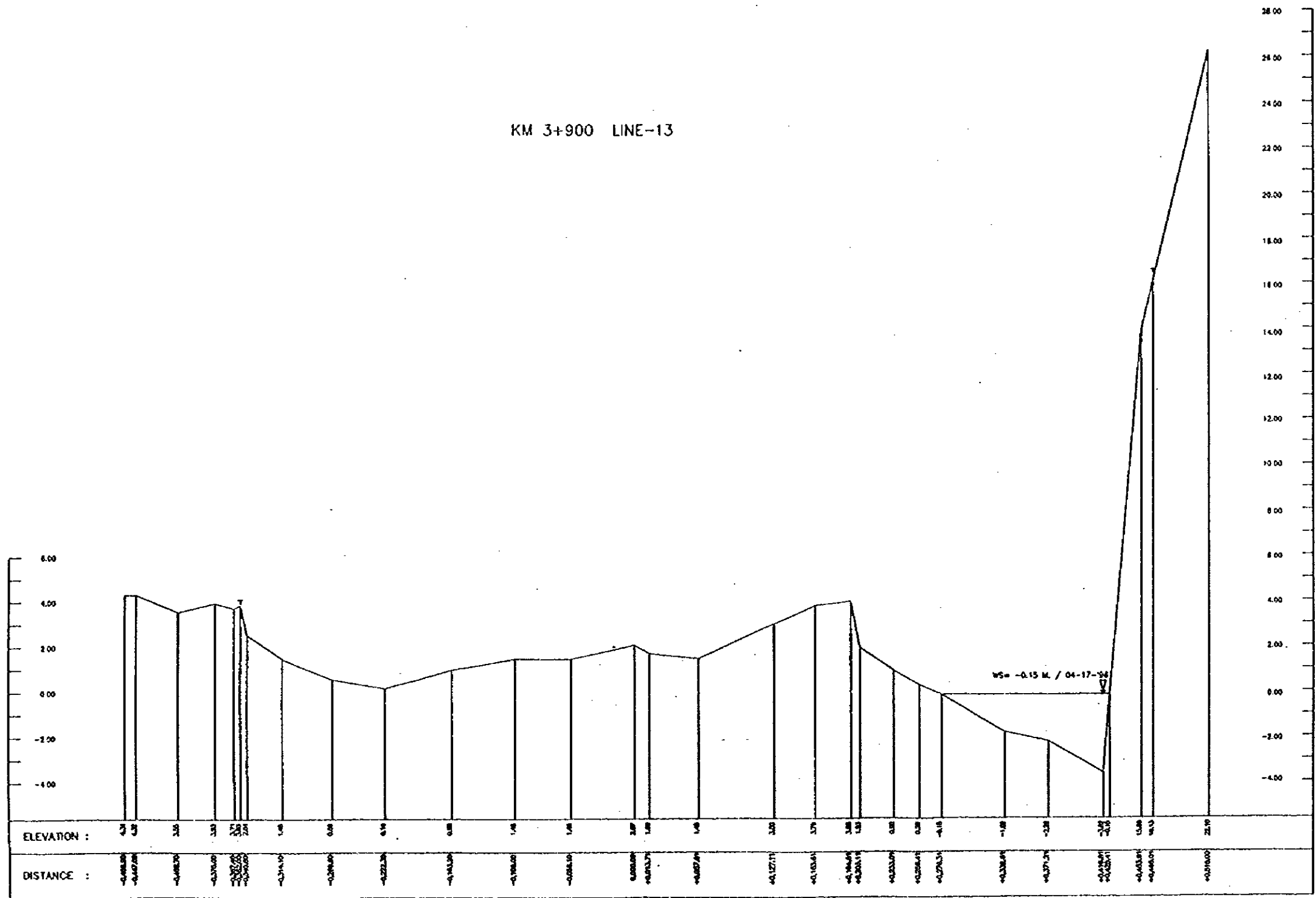
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) : LAOAG - BONGO RIVER	
	APPROVED BY :	CHECKED BY :	SCALE : H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO.

KM 3+600 LINE-12



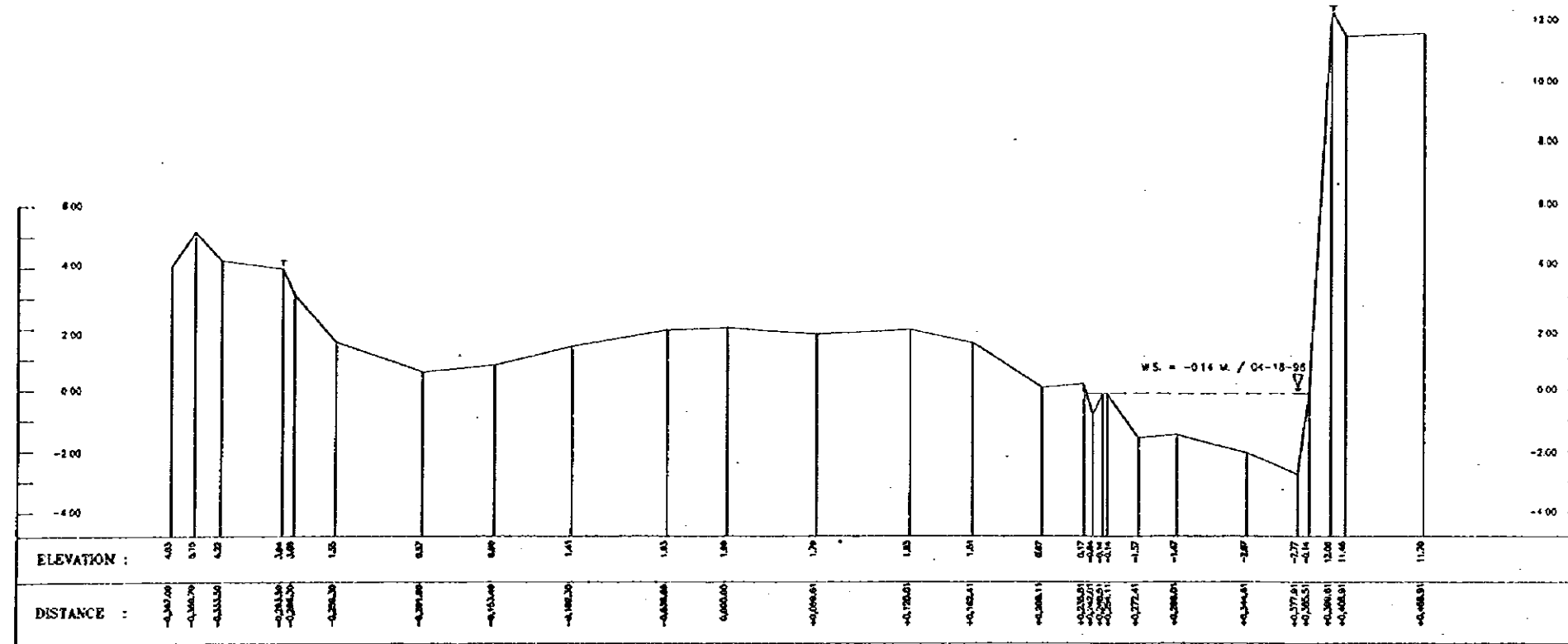
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			SCALE :	CROSS-SECTION NO. :
			H = 1 : 4000	
			V = 1 : 200	

KM 3+900 LINE-13



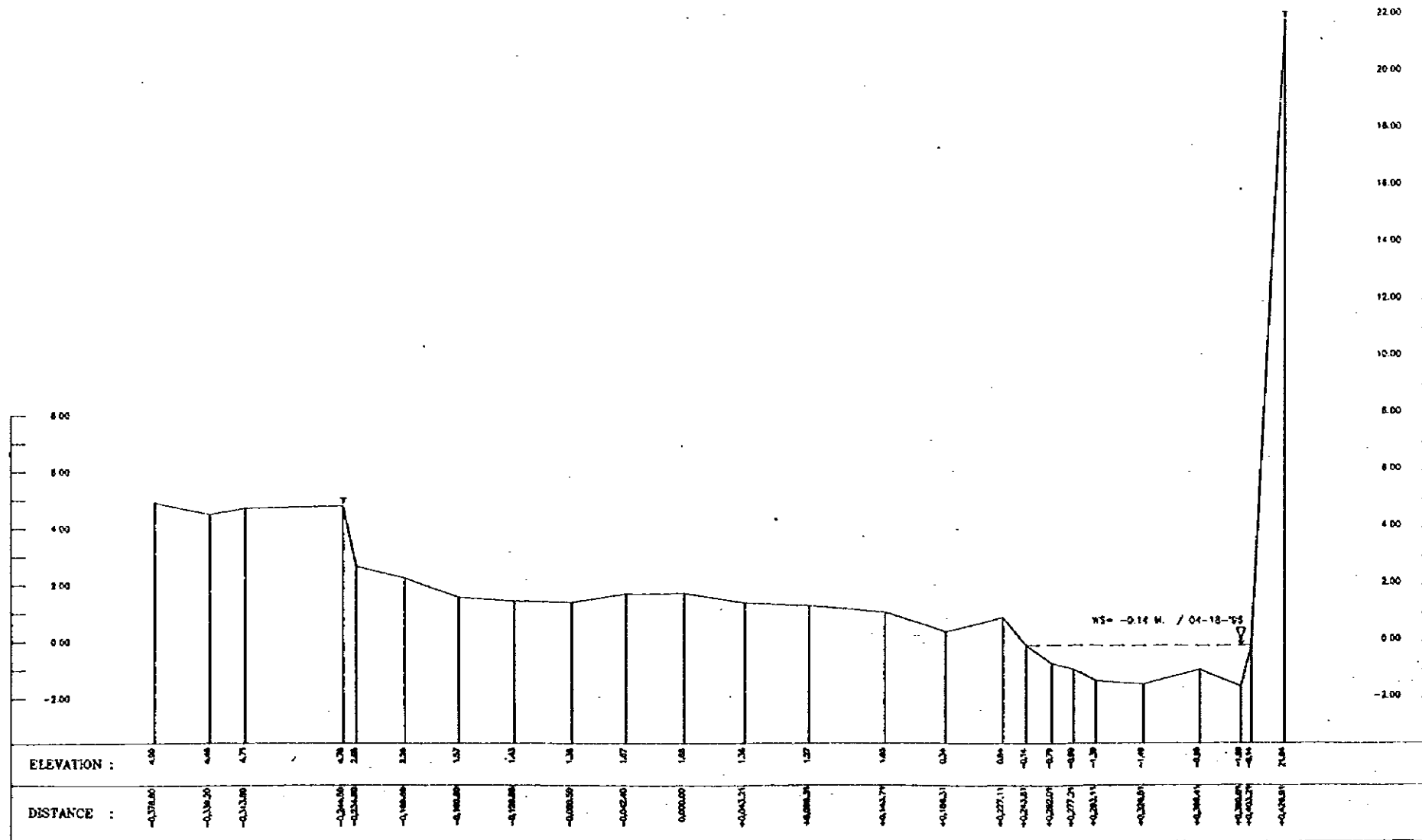
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		SCALE:	CROSS-SECTION NO.
		H = 1 : 4000	
		V = 1 : 200	

KM 4+200 LINE-14



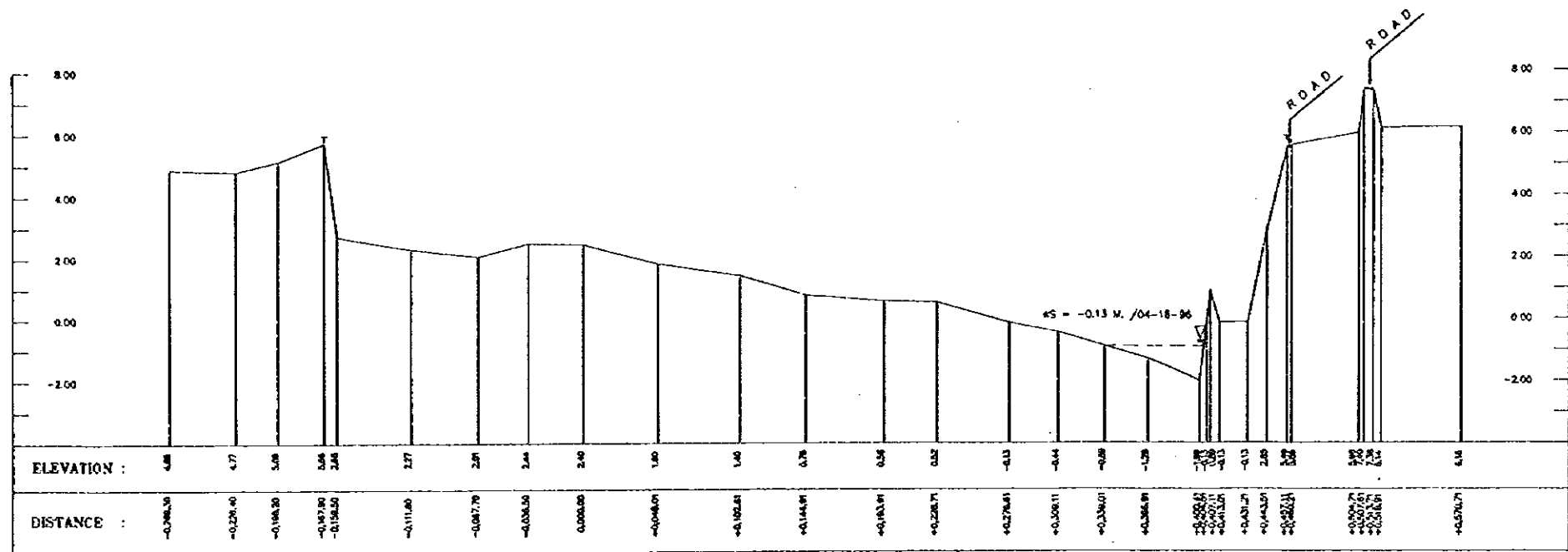
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			SCALE : H = 1 : 4000 V = 1 : 200 CROSS-SECTION NO.

KM 4+500 LINE-15



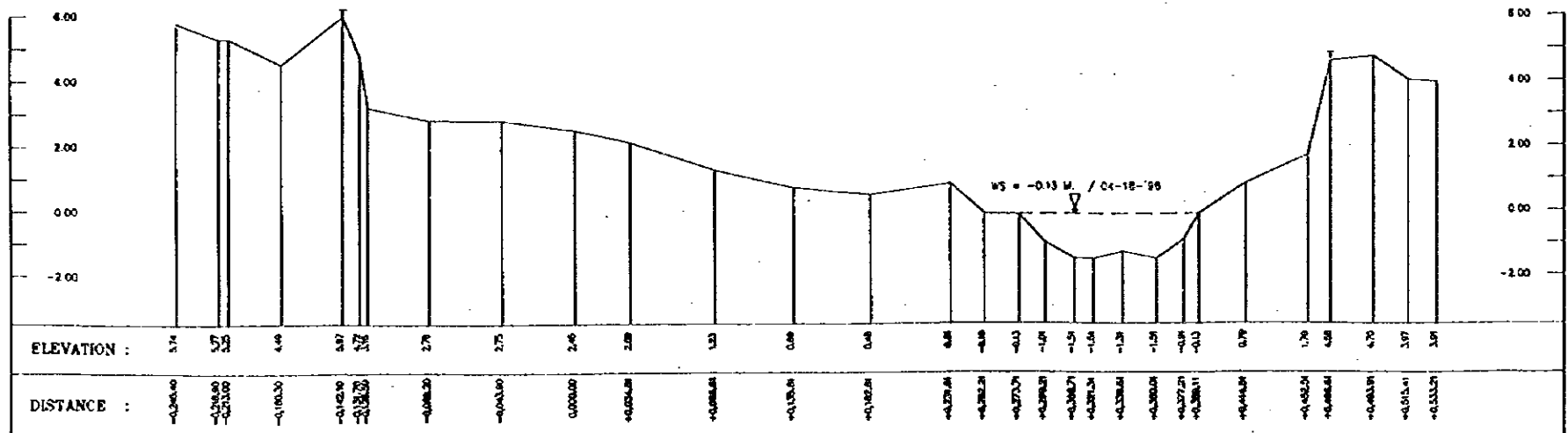
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	APPROVED BY :	CHECKED BY :	SCALE : H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO.

KM 4+800 LINE-16



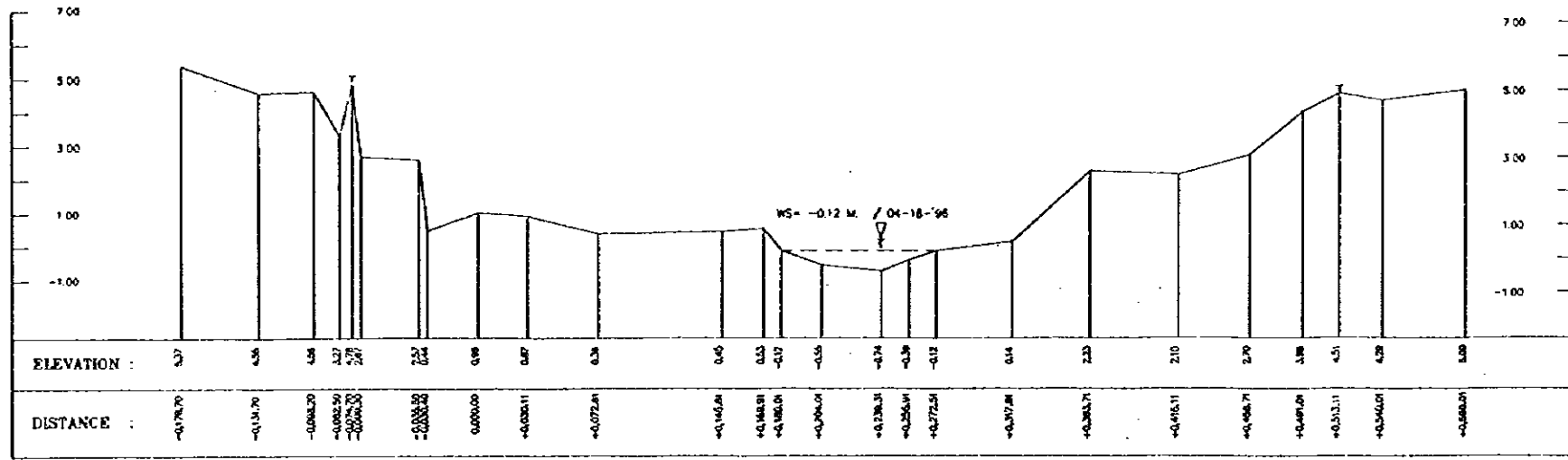
LINE-16

KM 5+100 LINE-17

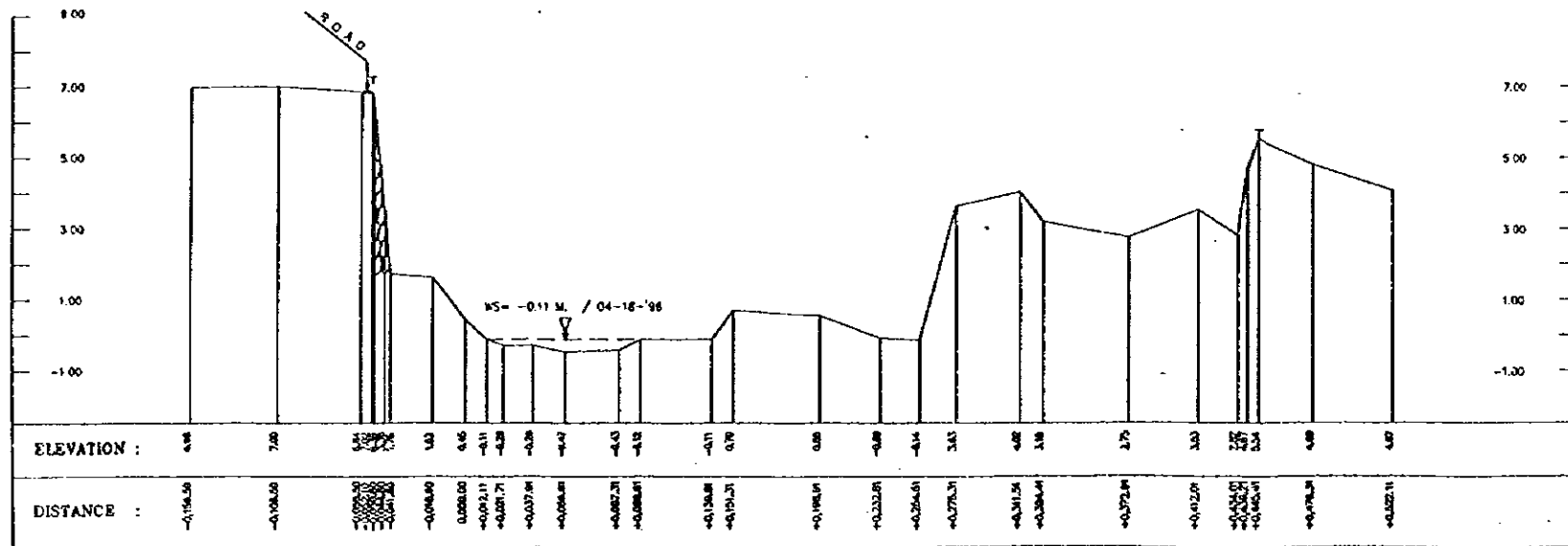


THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION): LAOAG - BONGO RIVER	
	APPROVED BY:	CHECKED BY:	SCALE: H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO

KM 5+400 LINE-18

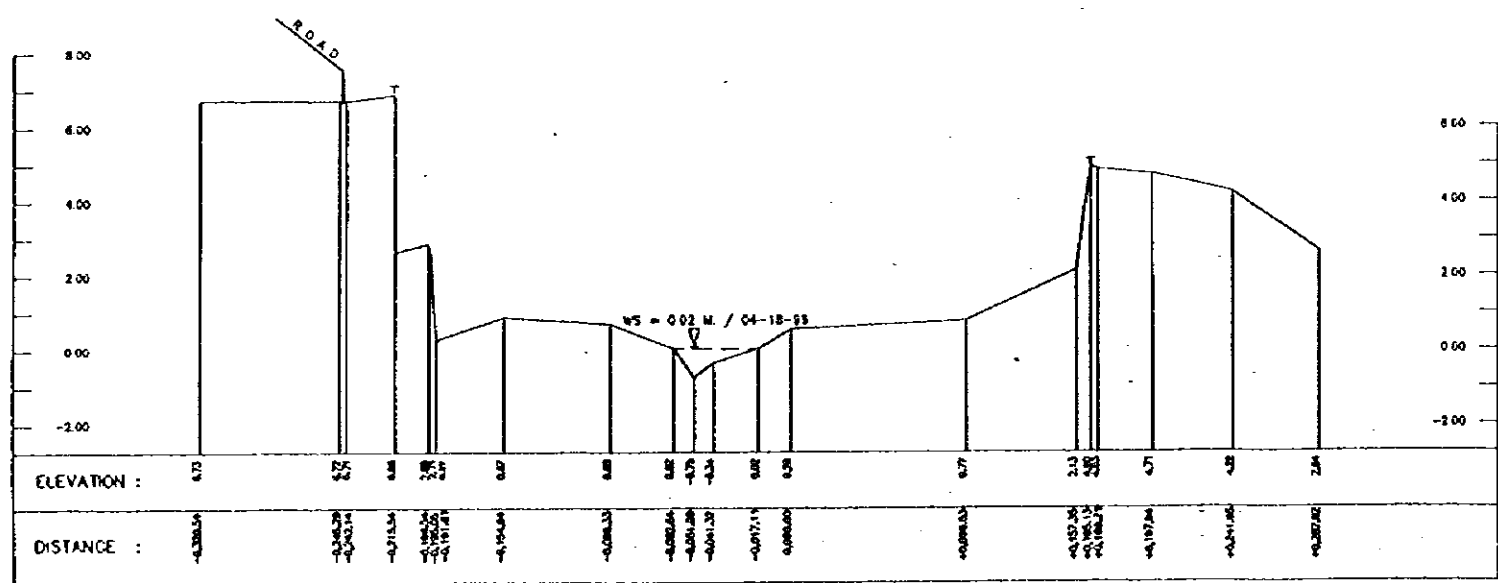


KM 5+700 LINE-19



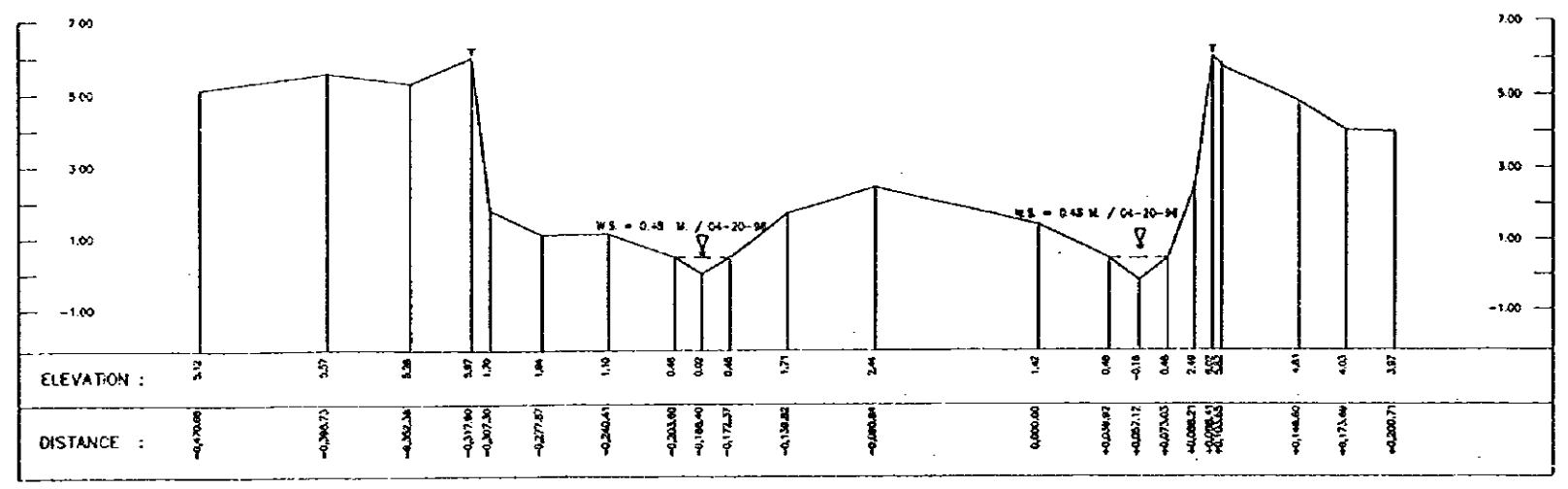
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		APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
				SCALE :	CROSS-SECTION NO.
				H = 1 : 4000	
				V = 1 : 200	

KM 6+000 LINE-20

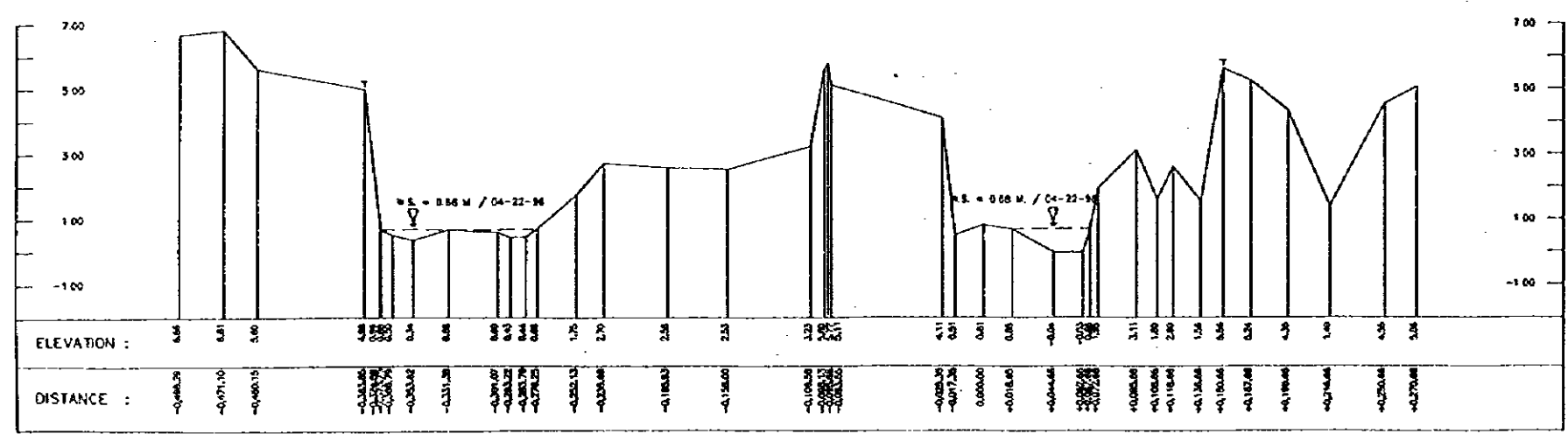


THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) : LAOAG - BONGO RIVER	
	APPROVED BY :	CHECKED BY :	SCALE : H = 1 : 4000 V = 1 : 200	CROSS-SECTION NO.

KM 6+300 LINE-21

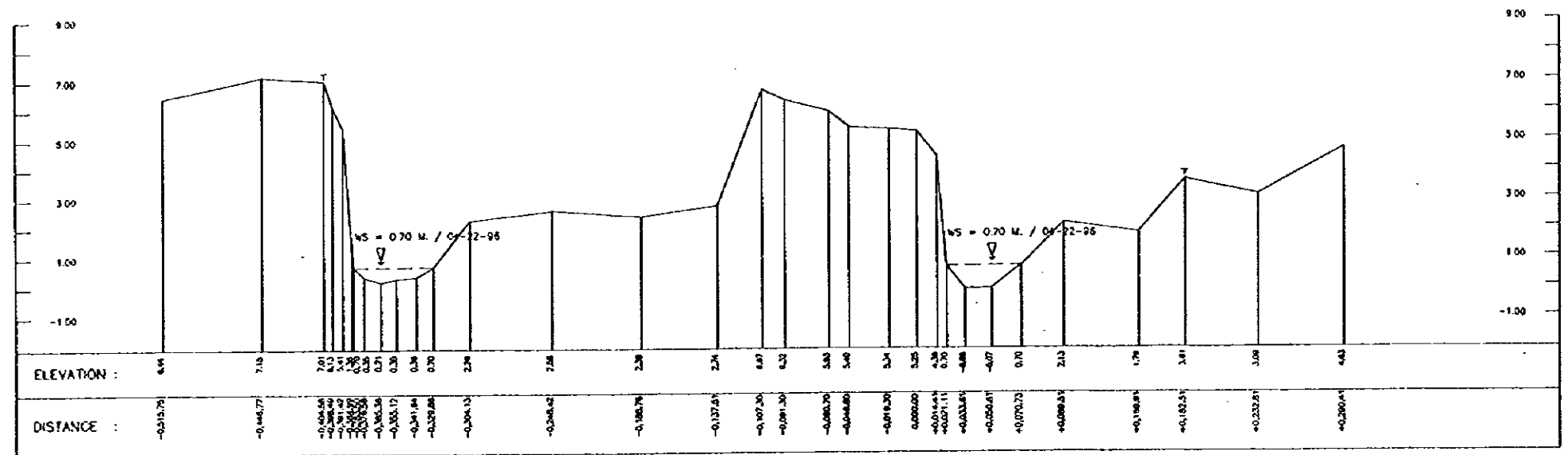


KM 6+600 LINE-22

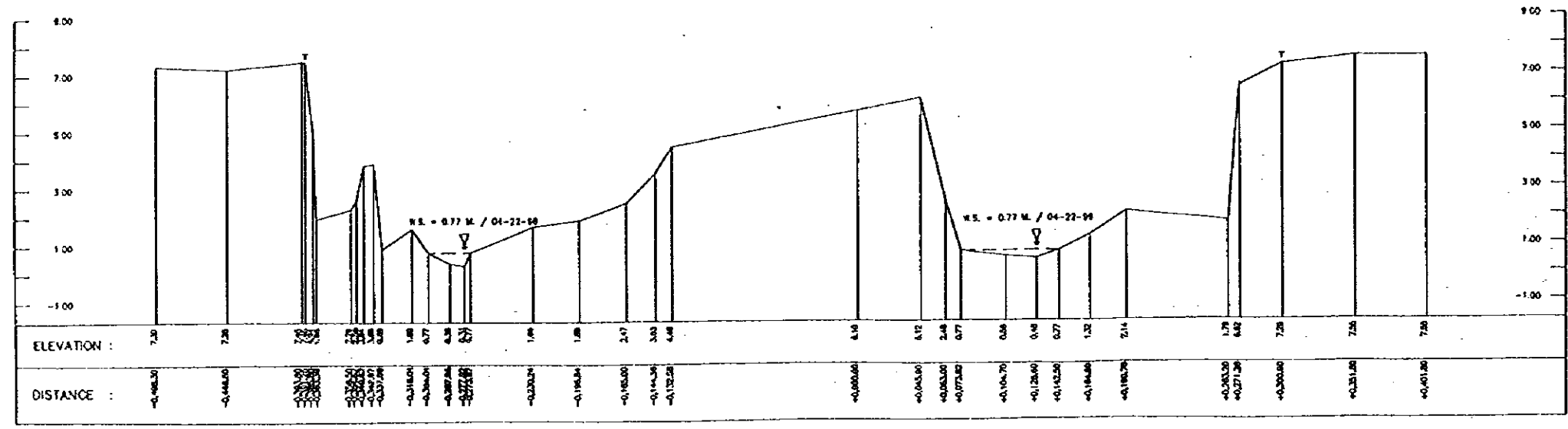


THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	

KM 6+900 LINE-23

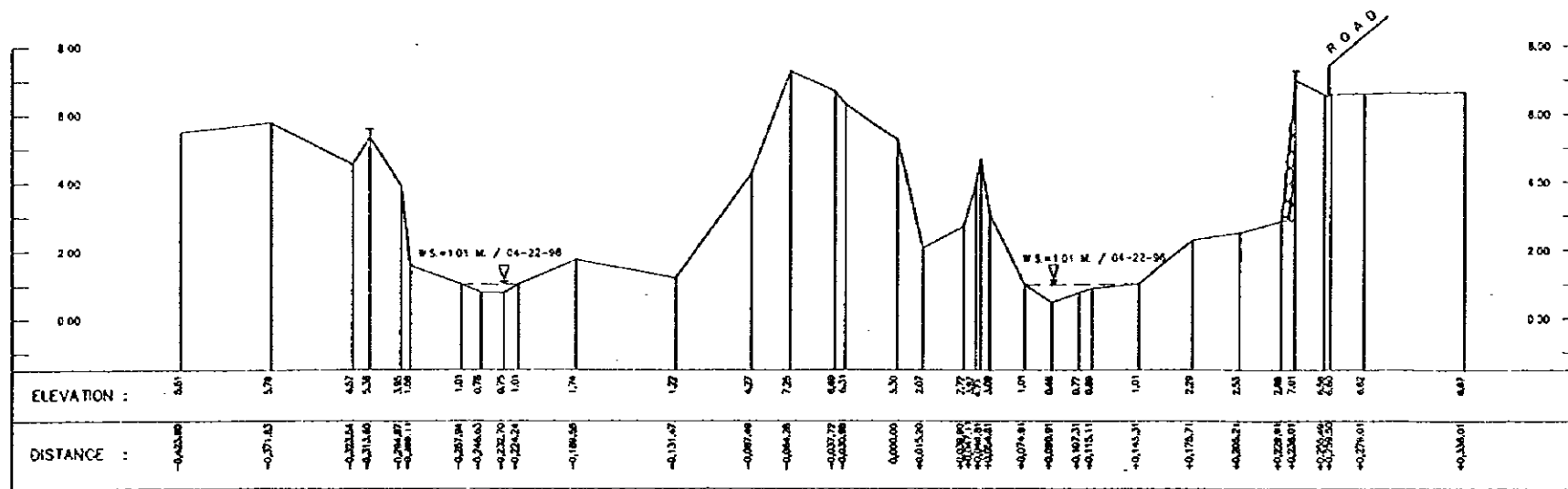


KM 7+200 LINE-24

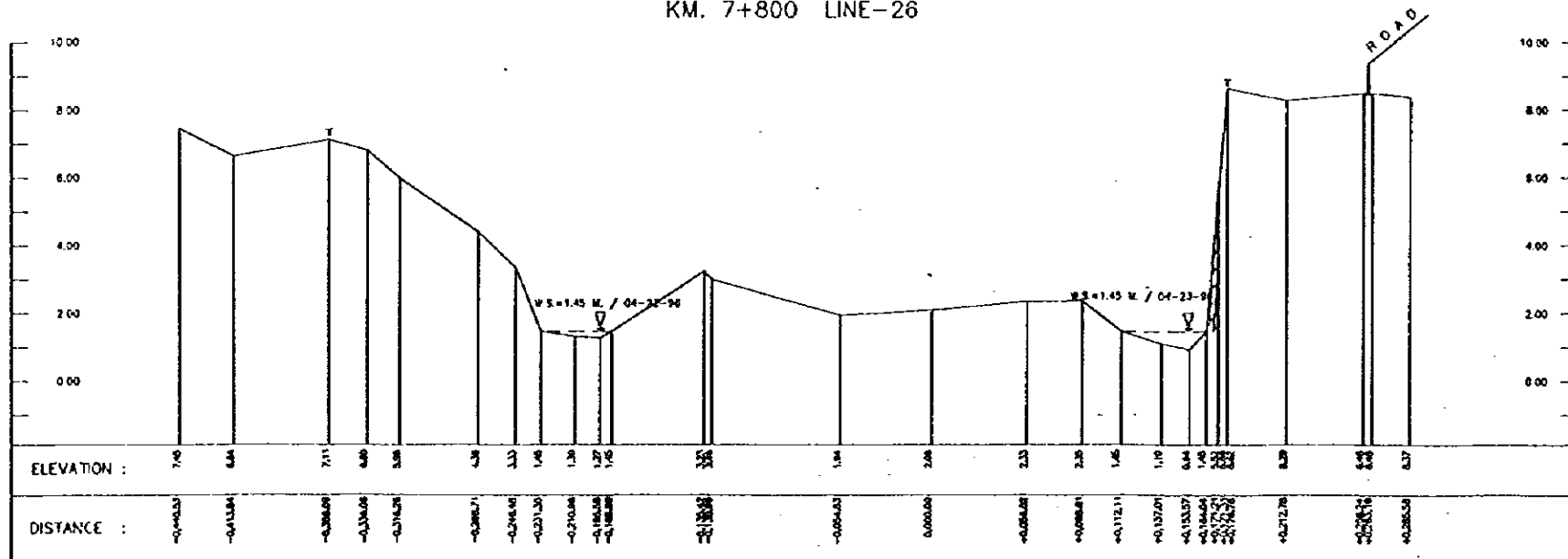


THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
		SCALE :		CROSS-SECTION NO.
		H = 1 : 4000		
		V = 1 : 200		

KM. 7+500 LINE-25

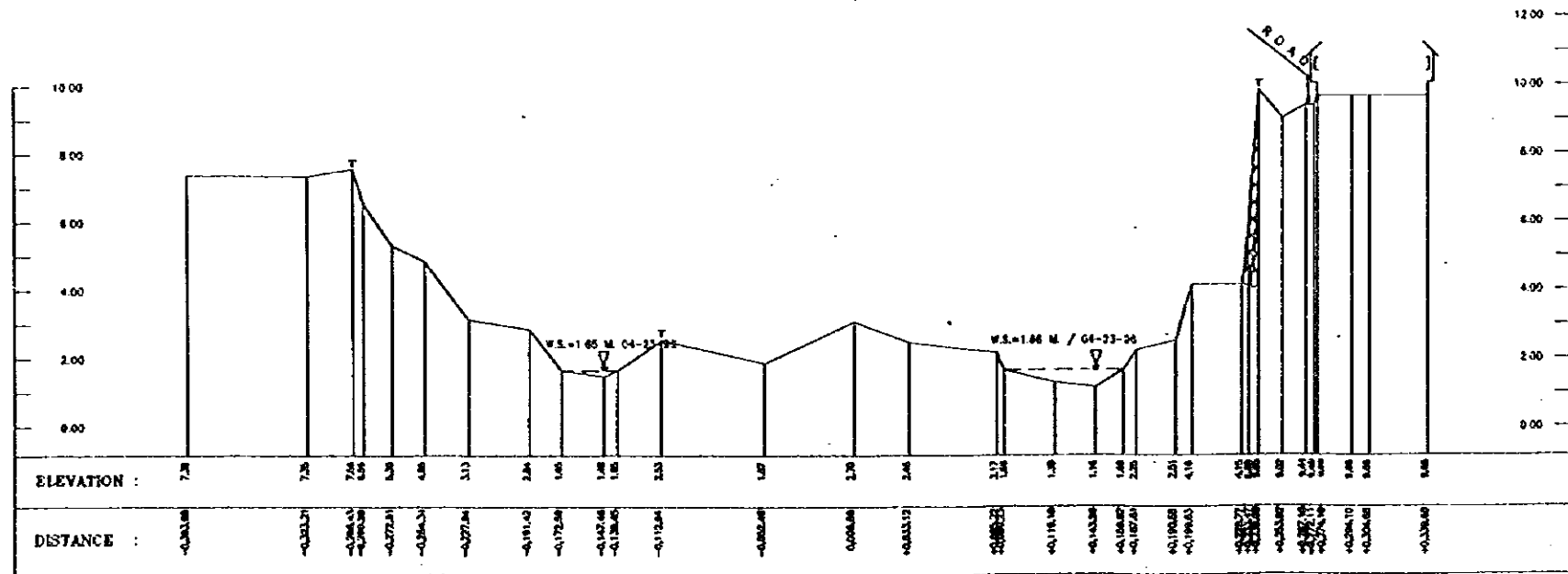


KM. 7+800 LINE-26



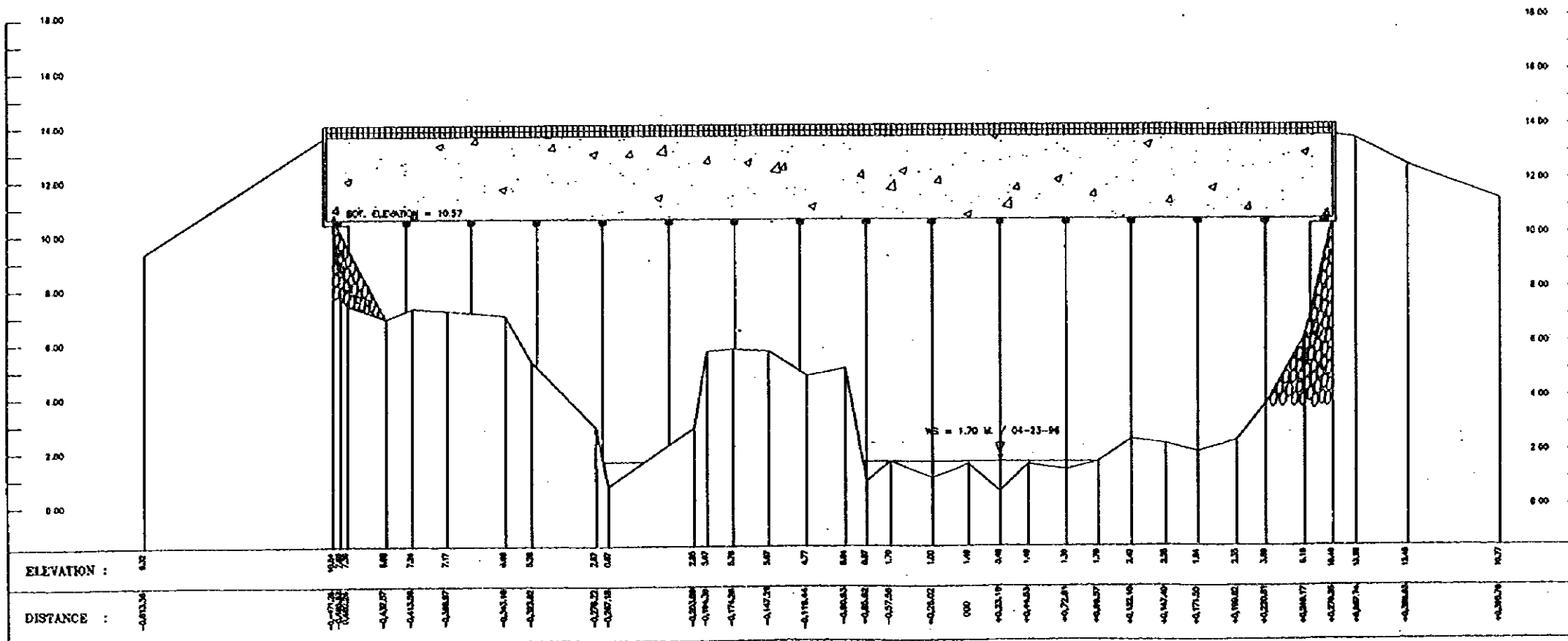
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
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			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	

KM. 8+100 LINE-27



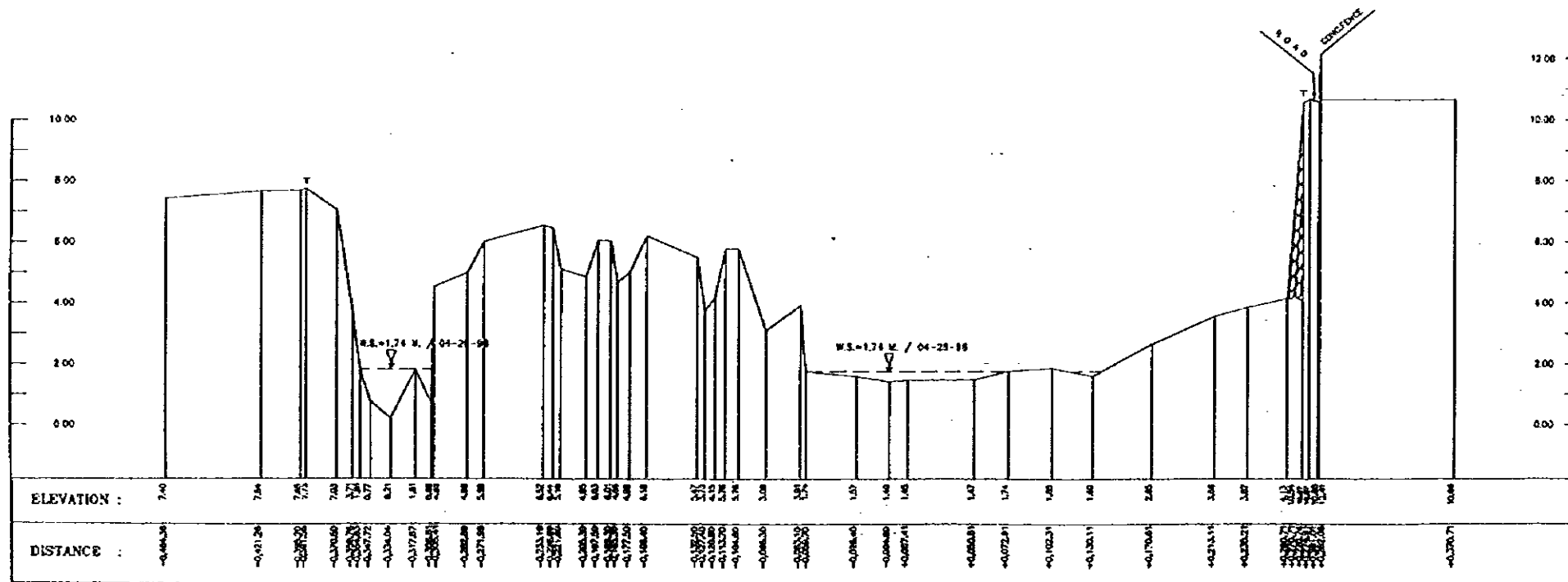
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	

KM 8+305 LINE-27+205 (GILBERT BRIDGE)



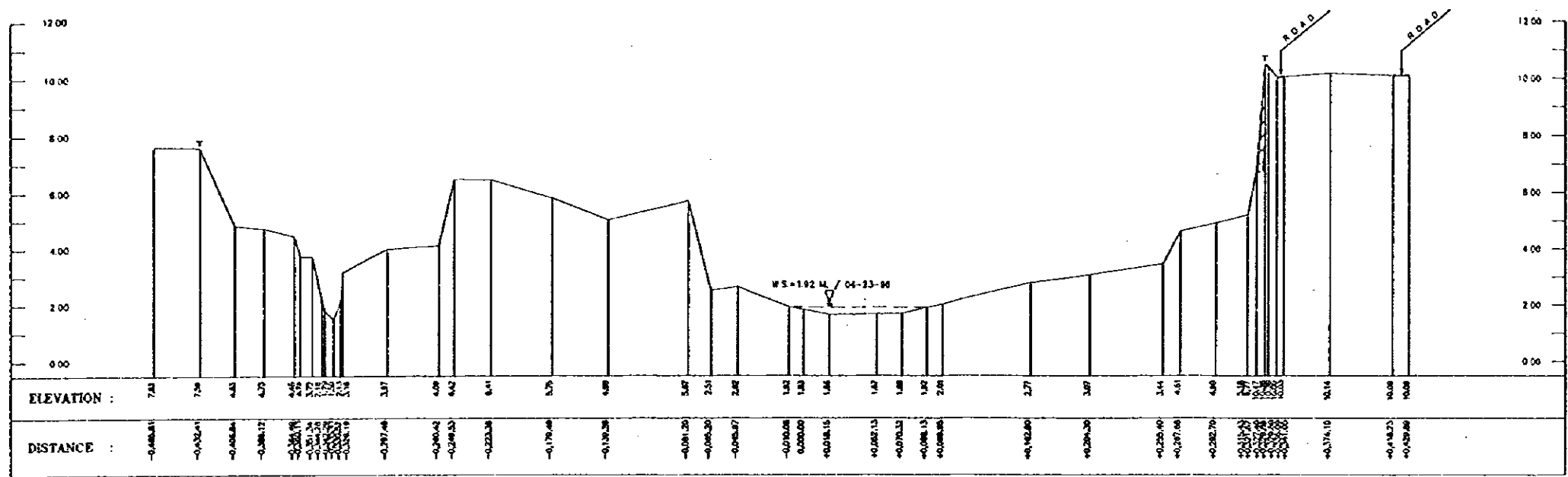
THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
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		SCALE :	CROSS-SECTION NO.	
		H = 1 : 4000		
		V = 1 : 200		

KM. 8+400 LINE-28

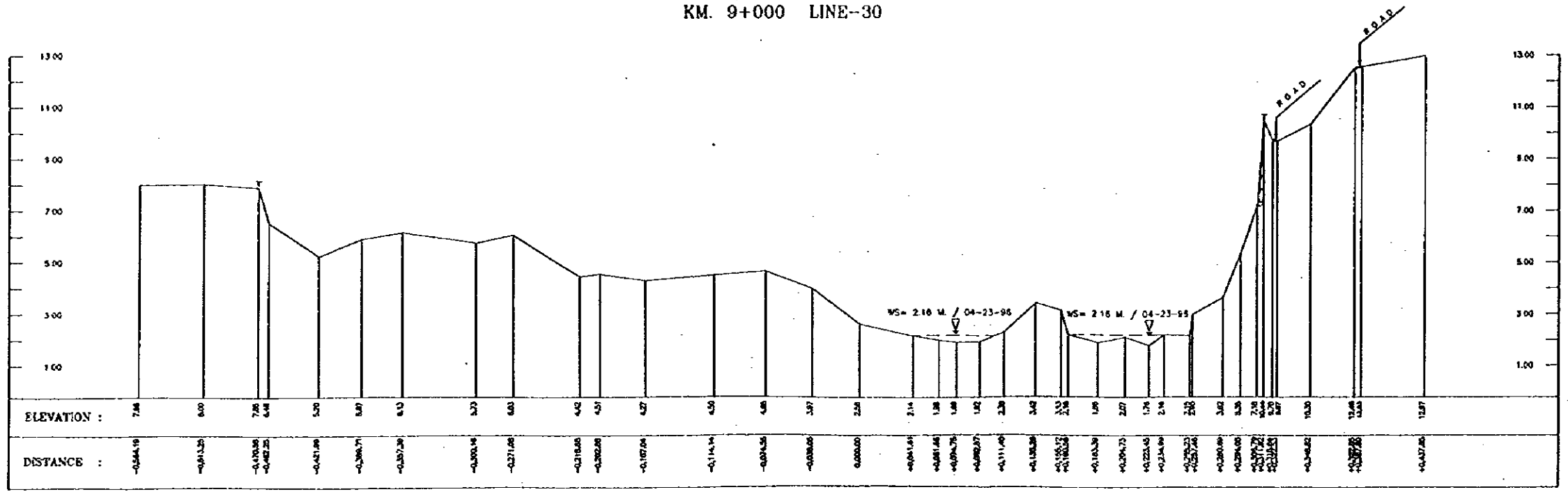


THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY		CROSS-SECTION		SITE (LOCATION) : LAOAG - BONGO RIVER	
APPROVED BY :	CHECKED BY :	SCALE :	CROSS-SECTION NO.		
		H = 1 : 4000 V = 1 : 200			

KM. 8+700 LINE-29

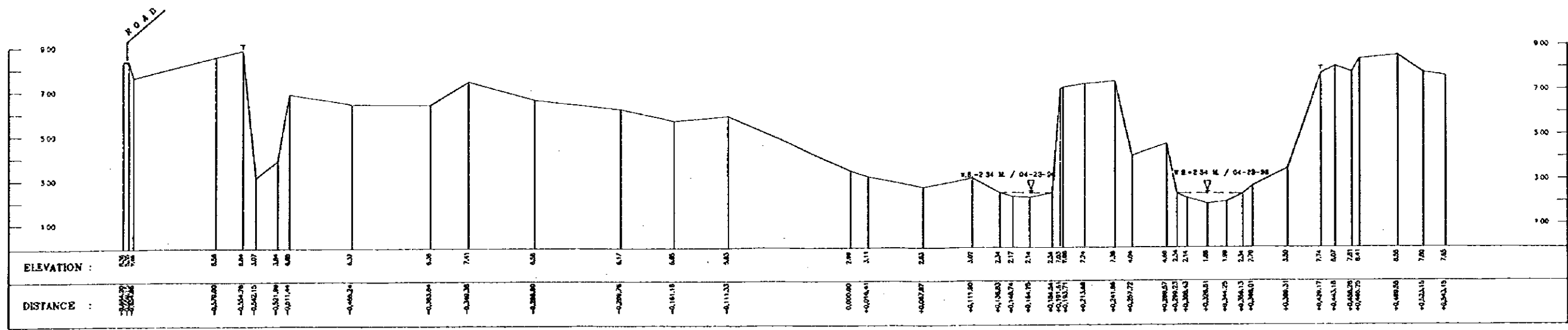


KM. 9+000 LINE-30

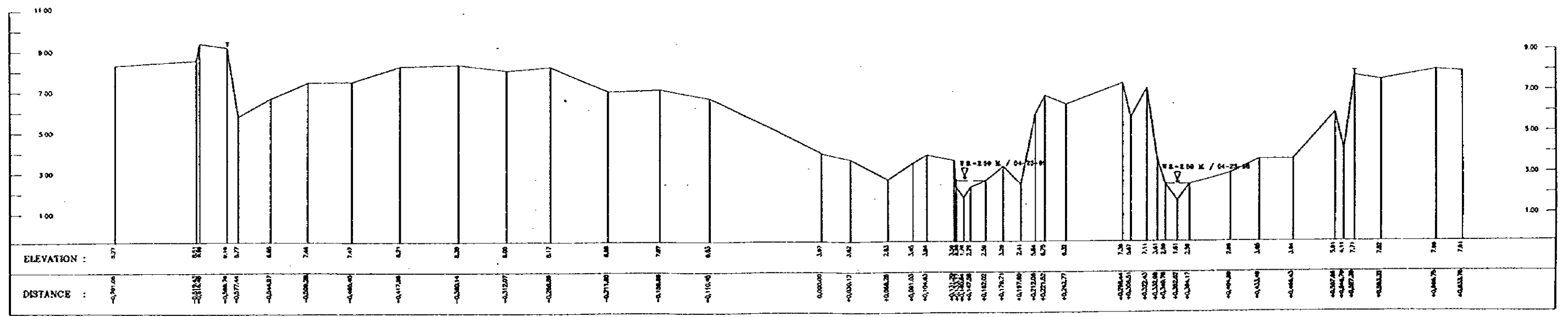


THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
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		SCALE :	CROSS-SECTION NO.	
		H = 1 : 4000		
		V = 1 : 200		

KM. 9+300 LINE-31

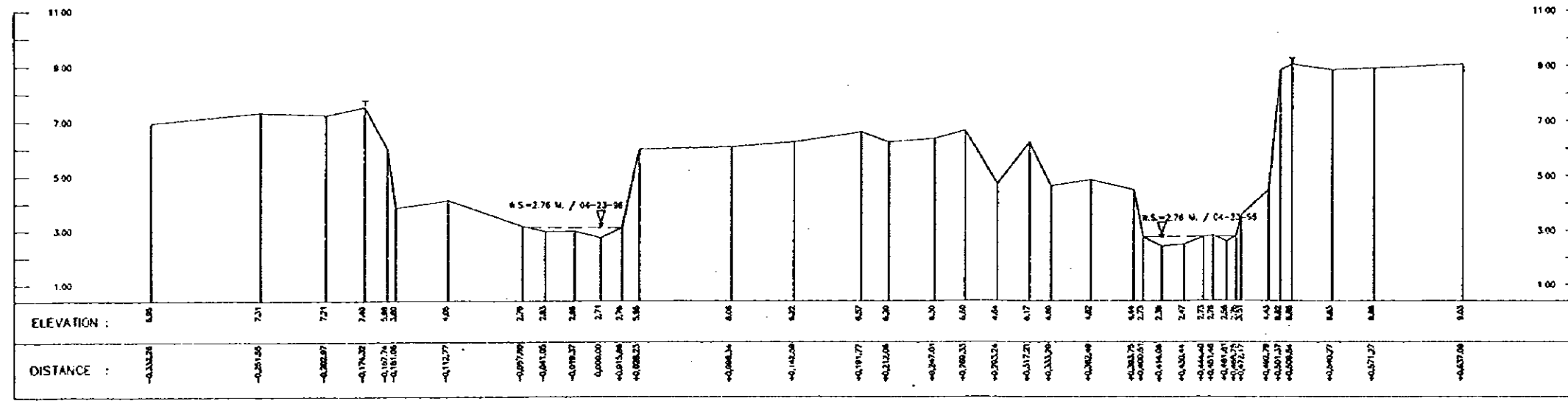


KM. 9+600 LINE-32

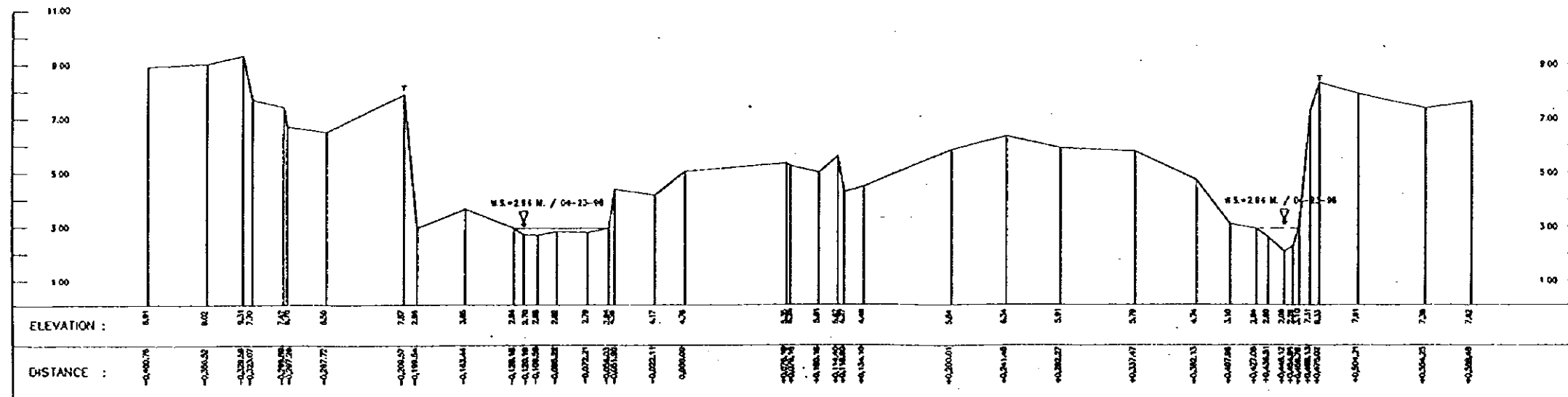


THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
		SCALE :	CROSS-SECTION NO.	
		H = 1 : 4000		
		V = 1 : 200		

KM. 9+900 LINE-33



KM. 10+200 LINE-34



<p>THE STUDY ON SABO AND FLOOD CONTROL IN THE LAOAG RIVER BASIN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	CROSS-SECTION		SITE (LOCATION) :	
	APPROVED BY :	CHECKED BY :	LAOAG - BONGO RIVER	
			SCALE :	CROSS-SECTION NO.
			H = 1 : 4000	
			V = 1 : 200	