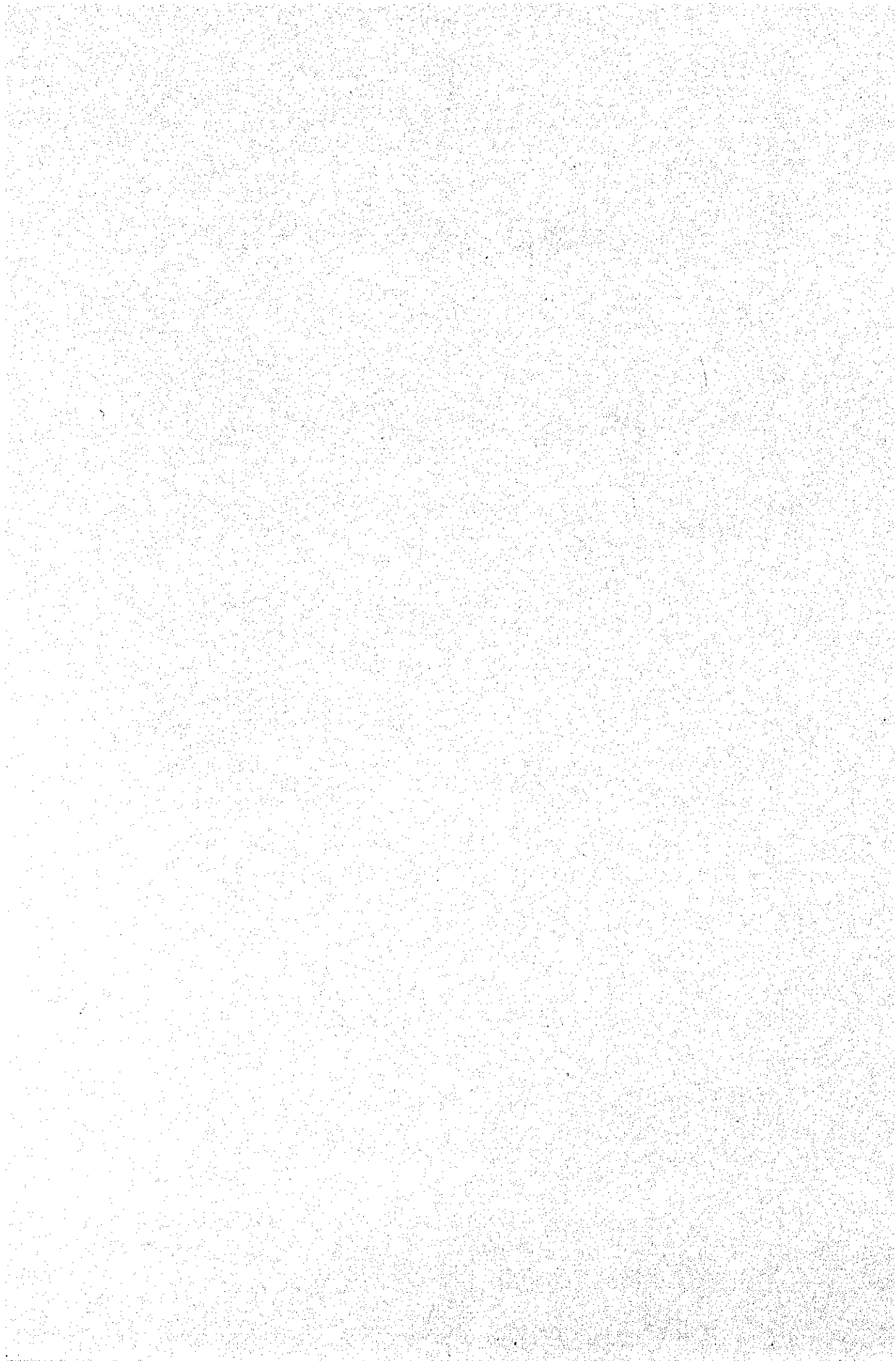


社会開発調査部報告書



JAPAN INTERNATIONAL COOPERATION AGENCY

**HANOI PEOPLE'S COMMITTEE
SOCIALIST REPUBLIC OF VIET NAM**

**THE STUDY ON
URBAN DRAINAGE AND WASTEWATER
DISPOSAL SYSTEM
IN
HANOI CITY**

FINAL REPORT

DATA BOOK

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FEBRUARY 1995

**NIPPON KOEI CO., LTD.
CTI ENGINEERING CO., LTD.**

ESTIMATE OF PROJECT COST

Estimate of Base Cost : At 1994 Price Level

Currency Exchange Rate : US\$ 1 = Dong 10,800 = Yen 100

**THE STUDY ON
URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM
IN
HANOI CITY**

**DATA BOOK
(TOPOGRAPHIC SURVEY DATA)**

1. Longitudinal and Cross Sections of To Lich River
2. Longitudinal and Cross Sections of Lu River
3. Longitudinal and Cross Sections of Set River
4. Longitudinal and Cross Sections of Kim Nguu River
5. Longitudinal and Cross Sections of Old To Lich River
6. Topography of Thanh Liet Weir & Yen So Pumping Station
7. Topography of 7 Lakes
8. Topography of Yen So Regulating Reservoir
9. Cross Section of Linh Dam Lake
10. Cross Sections and Bridge Dimensions of Drainage Channels

国際協力事業団

28092

LIST OF REPORTS

1. Executive Summary
2. Main Report
 - Part I : Master Plan for Urban Drainage and Wastewater Disposal System in Hanoi City
 - Part II : Feasibility Study on the To Lich River Basin Drainage Project
3. Appendix Vol. I
 - A. Socio-economy
 - B. City Development Plan
 - C. Hydrology
 - D. Drainage Plan
4. Appendix Vol. II
 - E. Wastewater Disposal Plan
 - F. Environment and Water Quality
 - G. Construction Plan and Cost Estimate
 - H. Economic Evaluation
 - J. Geotechnical Investigation
 - K. Topographic Survey
 - L. Urgent Project - Basic Design Report
5. Data Book (This Volume)

ABBREVIATIONS

(1) Domestic Organizations

DCWSS	Design Company for Water Supply and Sanitation System
GDOMH	General Department of Meteorology and Hydrogy
HEC	Hanoi Environment Committee
HPC	Hanoi People's Committee
HSDC (or SDC)	Hanoi Sewerage and Drainage Company
HUPI (or UPI)	Hanoi Urban Planning Institute
HWSC (or WSC)	Hanoi Water Supply Company
INVESSCo	Investment Company for the Development of Water Sector
IURP	Institute of Urban and Rural Planning of MOC
MOC	Ministry of Construction
MOSTE	Ministry of Science, Technology and Environment
MOWR	Ministry of Water Resources
SPC	State Planning Committee
TUPWS	Transport and Urban Public Works Service
URENCO	Hanoi Urban Environment Company
WASECO	Water and Sewerage Construction Organization

(2) International or Foreign Organizations

CIDA	Canadian International Development Agency
FINNIDA	Finnish International Development Agency
JICA	Japan International Cooperation Agency
SIDA	Swedish International Development Authority
OECD	Overseas Economic Cooperation Fund, Japan
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization

(3) Others

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DAWF	Daily Average Water Flow
DSF	Design Stormwater Flow
EIRR	Economic Internal Rate of Return
EL	Elevation above Mean Sea Level
GDP	Gross Domestic Product
GF	Groundwater Infiltration
HMWF	Hourly Maximum Water Flow
OM	Operation and Maintenance
SS	Suspended Solids
TN	Total Nitrogen
TP	Total Phosphorus

ABBREVIATIONS OF MEASUREMENT

Length

mm = millimeter
 cm = centimeter
 m = meter

km = kilometer
 ft = foot
 yd = yard

Area

cm² = square centimeter
 m² = square meter
 ha = hectare
 km² = square kilometer

Volume

cm³ = cubic centimeter
 l = litre
 kl = kilolitre
 m³ = cubic meter
 gal. = gallon

Weight

mg = milligram
 g = gram
 kg = kilogram
 ton = metric ton
 lb. = pound

Time

s = second
 min = minute
 h = hour
 d = day
 y = year

Electrical Measurement

V = Volt
 A = Ampere
 hz = Hertz (cycle)
 Ghz = Gigahertz
 W = Watt
 kW = kilowatt
 MW = Megawatt
 GW = Gigawatt
 pr = pair

Other Measures

% = percent
 PS = horsepower
 ° = degree
 ' = minute
 " = second
 10³ = thousand
 10⁶ = million
 10⁹ = billion

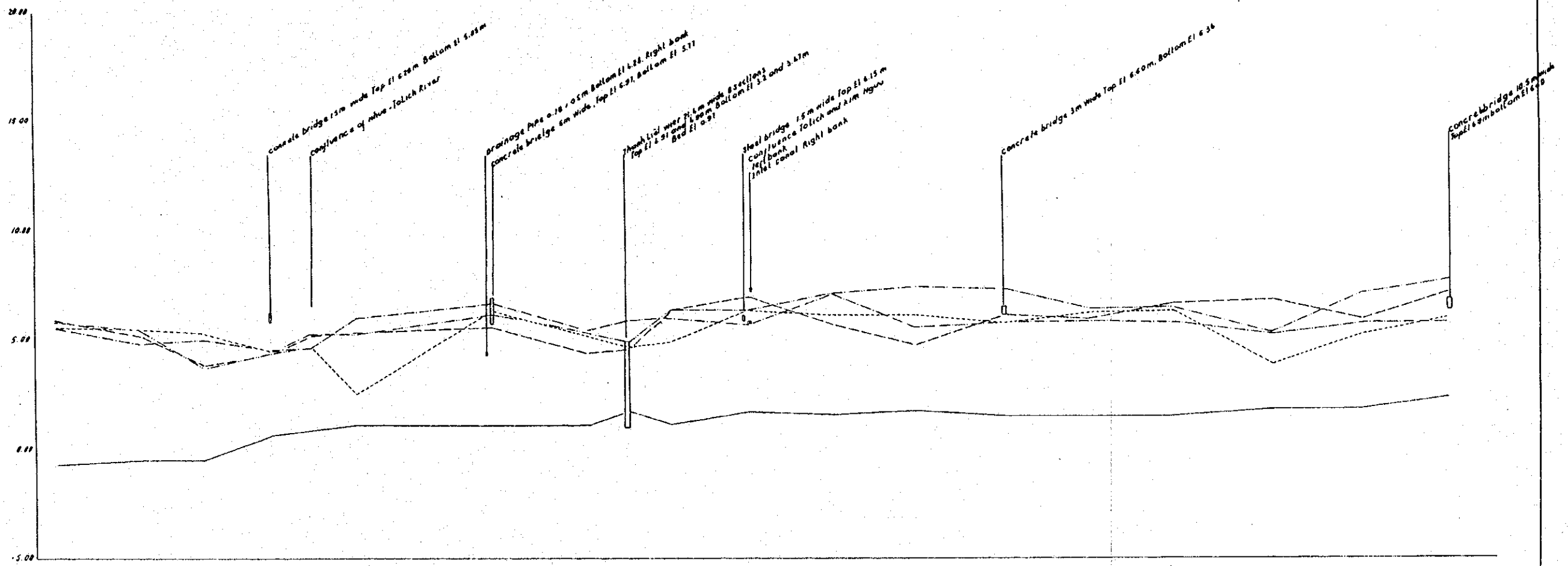
Derived Measures

m³/s = cubic meter per second
 mg/l = milligram per litre
 kWh = Kilowatthour
 MWh = Megawatthour
 GWh = Gigawatthour
 kWh/y = kilowatthour per year
 kVA = kilovolt ampere
 lcd = litre per capita per day

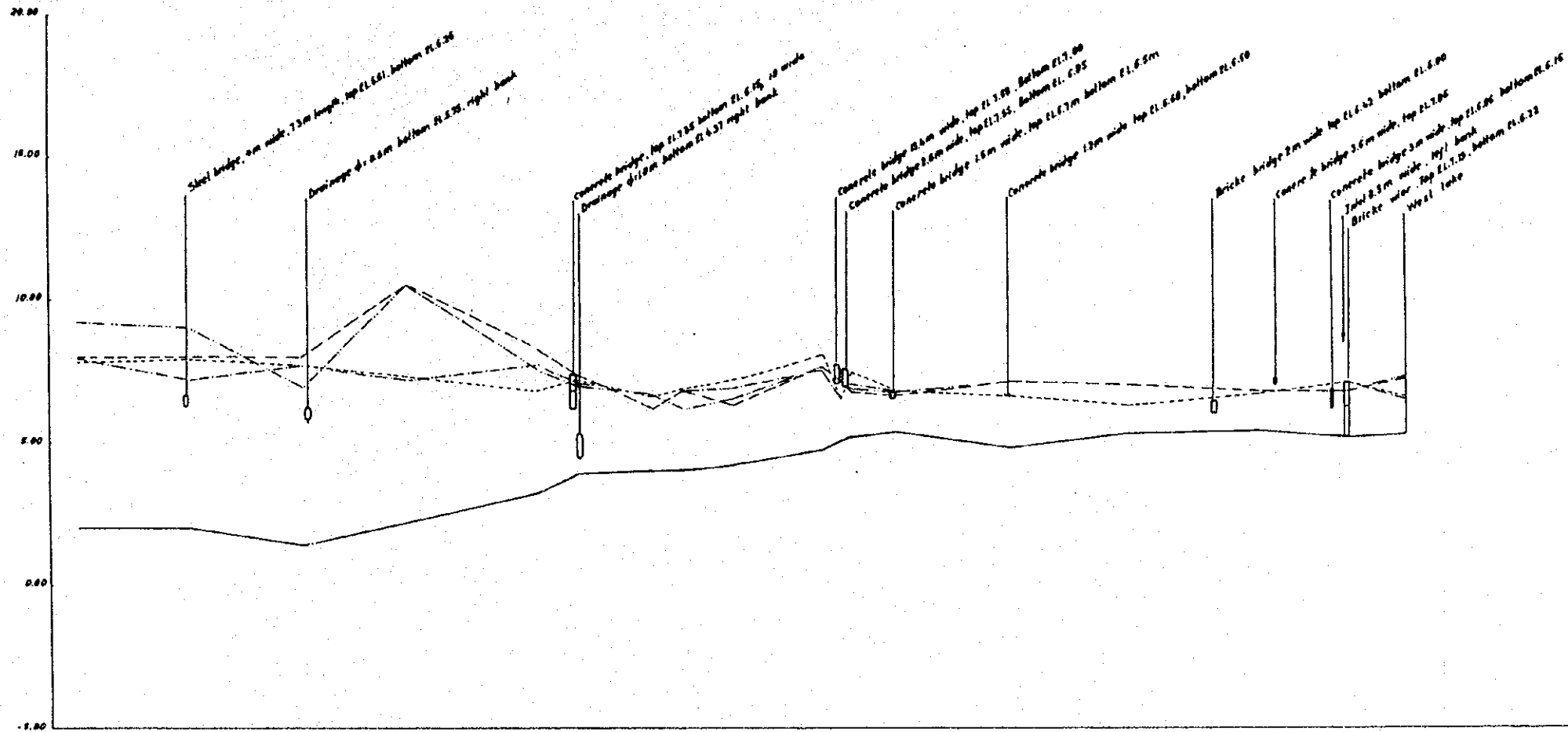
Currency

US\$ = US Dollar
 VND = Vietnamese Dong

1. Longitudinal and Cross Sections of To-Lich River



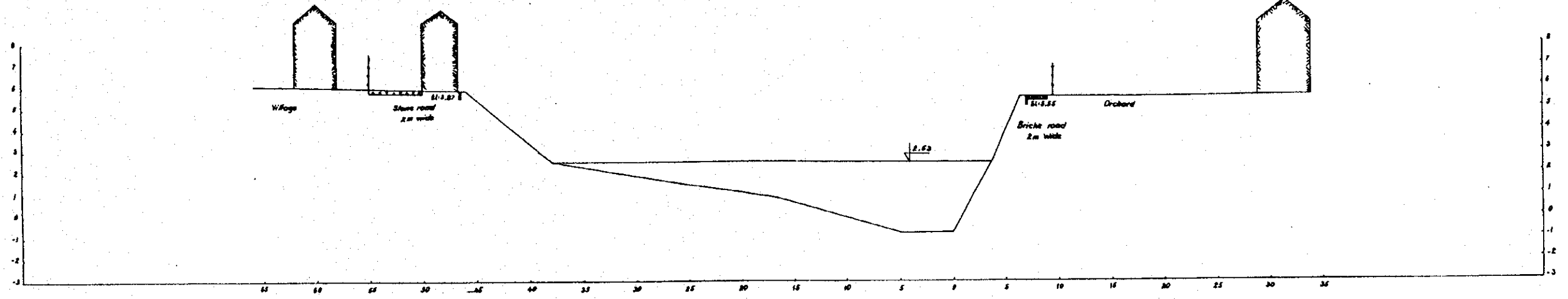
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DESIGN HIGH WATER		
DESIGN RIVER BED		
EXISTING DIKE CROWN	RIGHT	5.57 6.82 5.00 4.55 4.68 5.82 6.78 5.44 5.22 6.03 5.73 6.15 5.57 5.86 5.90 5.30 5.79 5.84
	LEFT	5.87 5.44 3.70 4.40 5.86 5.33 6.78 5.42 4.82 6.43 6.44 7.20 7.49 7.42 6.53 6.55 5.39 7.20 7.77
EXISTING LAND SIDE GROUND	RIGHT	5.00 5.49 5.30 4.50 4.68 2.52 6.40 5.20 4.42 4.96 6.41 6.23 6.20 5.84 6.30 6.39 3.90 5.30 6.10
	LEFT	5.80 5.18 3.80 4.40 5.20 5.37 5.58 4.42 4.53 6.40 7.00 5.78 4.88 6.20 4.80 6.70 6.92 6.00 7.20
EXISTING RIVER BED		0.76 -0.56 -0.04 -0.05 -0.85 -1.08 -1.13 -1.07 -1.70 -1.18 -1.71 -1.58 -1.72 -1.52 -1.53 -1.77 -1.83 -2.41
ACCUMULATIVE DISTANCE		532.34 357.82 348.84 291.12 200.00 103.23 423.87 641.69 743.33 840.02 1016.84 1228.26 1462.52 1623.30 1815.87 2076.53 2246.72 2459.55 2659.30
DISTANCE		185.52 144.94 157.74 39.12 80.00 103.53 119.54 218.42 101.64 96.76 176.71 201.40 210.78 192.26 210.78 230.26 212.74 199.77
SECTION NO.		N.K.04 N.K.06 N.K.08 N.K.09 N.K.10 T.K.04 T.K.06 T.K.07 T.K.08 T.K.10 T.K.12 T.K.14 T.K.16 T.K.18 T.K.20 T.K.22 T.K.24 T.K.26



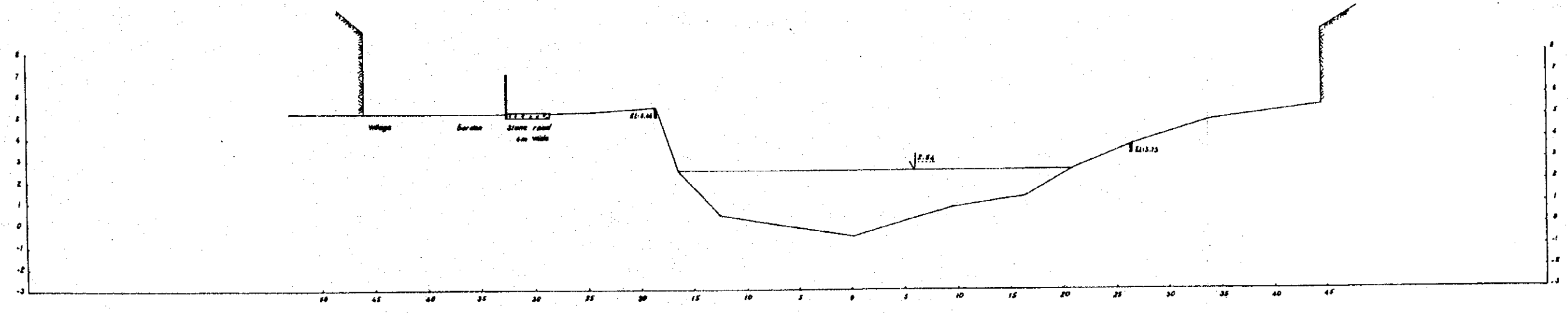
DESIGN DIKE CROWN		
DESIGN HIGH WATER		
DESIGN RIVER BED		
EXISTING DIKE CROWN	RIGHT	7.15 7.20 7.17 7.20 6.73 7.10 6.60 6.76 6.80 7.80 6.55 6.70 6.40 6.30 6.70 7.00 6.87
	LEFT	5.20 6.80 6.80 6.55 7.60 7.03 6.70 6.72 6.50 7.60 7.10 6.90 6.70 6.07 6.80 6.80 7.33
EXISTING LAND SIDE GROUND	RIGHT	7.80 7.90 7.70 7.30 6.80 7.30 6.60 6.86 7.20 8.00 6.60 6.40 6.30 6.70 7.00 6.60
	LEFT	8.40 8.00 8.00 10.85 8.70 7.80 6.20 6.80 6.10 7.60 7.10 7.00 7.00 6.80 6.80 7.25
EXISTING RIVER BED		-2.85 -2.05 -1.40 -2.10 -1.20 -1.30 -4.05 -4.00 -6.25 -1.70 -5.00 -6.30 -5.40 -5.20 -5.20 -6.30
ACCUMULATIVE DISTANCE		0000.00 0226.40 0243.64 0260.35 0290.10 0307.76 0314.02 0370.84 0329.21 0346.17 0448.83 0497.70 0533.60 0564.44 0582.24 0630.90 0662.80
DISTANCE		012.24 026.24 028.64 036.77 037.76 041.86 042.26 049.84 043.21 047.64 052.84 056.10 060.70 064.44 067.24 073.50 076.80
SECTION NO		T K12.2 T K12.3 T K12.4 T K12.5 T K12.6 T K12.7 T K12.8 T K12.9 T K13.0 T K13.1 T K13.2 T K13.3 T K13.4 T K13.5 T K14.0 T K14.1 T K14.2

SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOS SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO	DATE	DESIGNED BY	DATE	TITLE LONGITUDINAL SECTION OF TOLICH RIVER FROM K12.2 TO WEST LAKE SCALE H=1:5000, V=1:100 DWG NO 7.L 5 / 5
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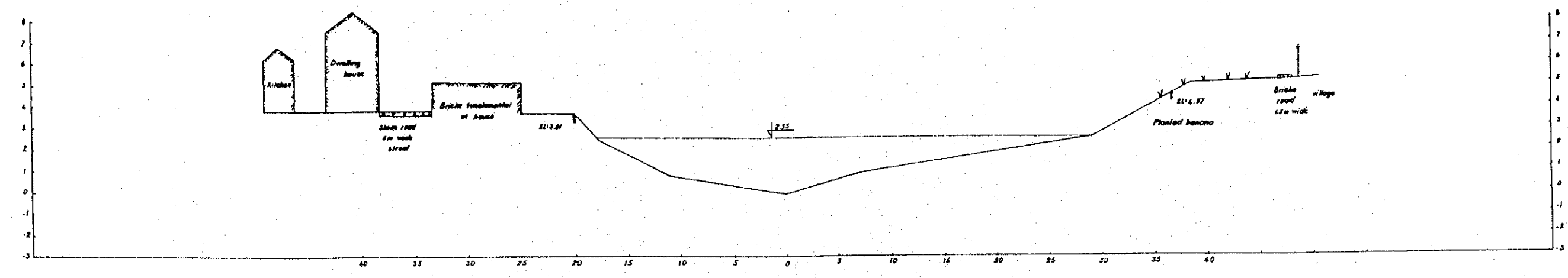
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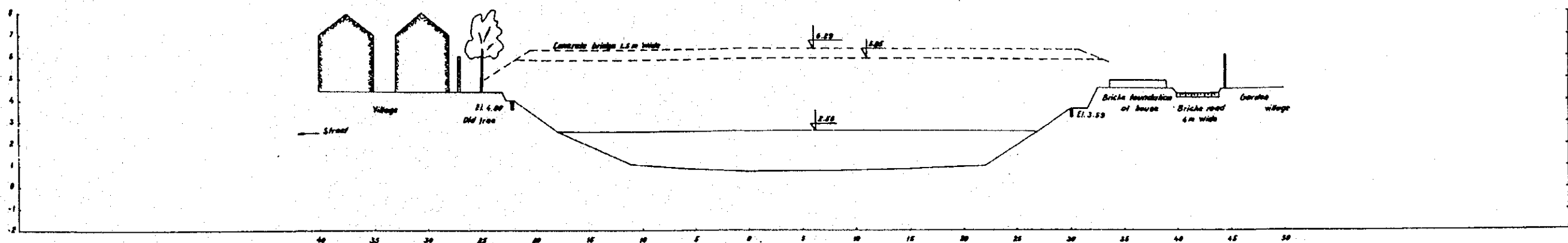


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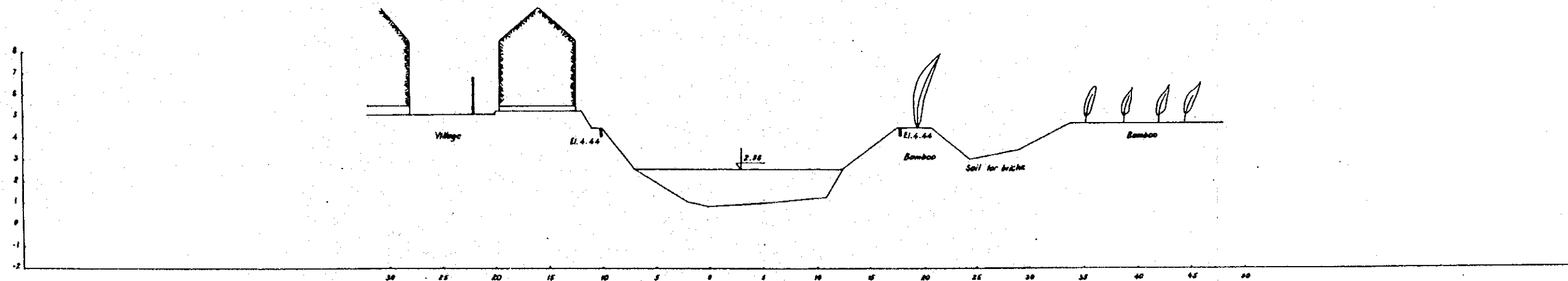


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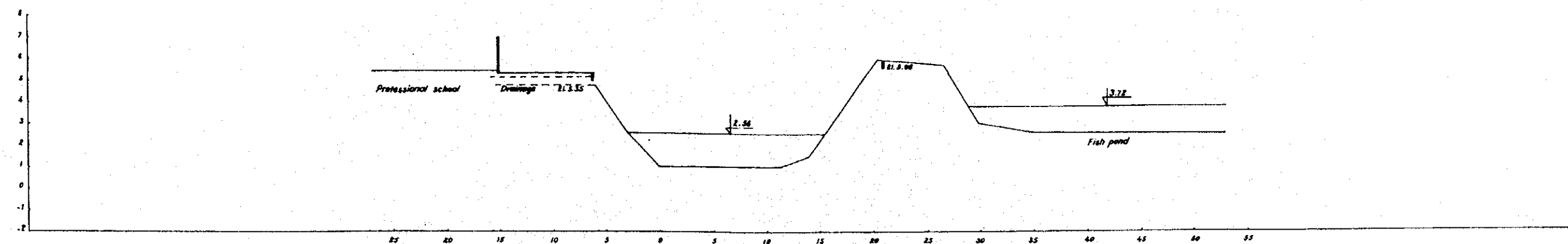
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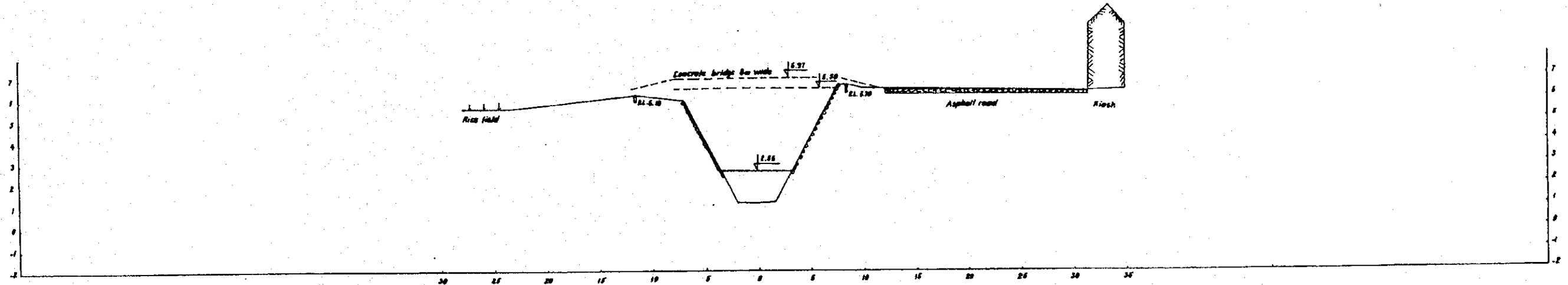


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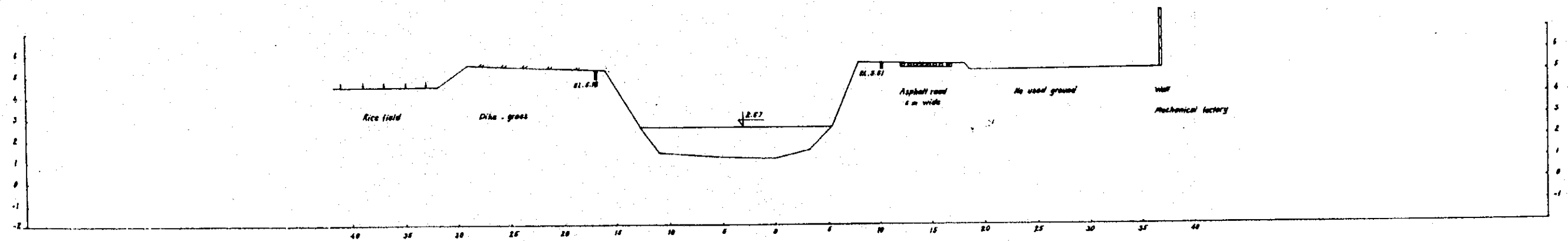


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO. & DATE	DESIGNED BY & DATE	TITLE
		DRAWN BY & DATE	CROSS SECTION OF TOLICH RIVER
		CHECKED BY & DATE	FROM K-0.2 TO K 0.2
		APPROVED BY & DATE	SCALE: H=1:200 V=1:100
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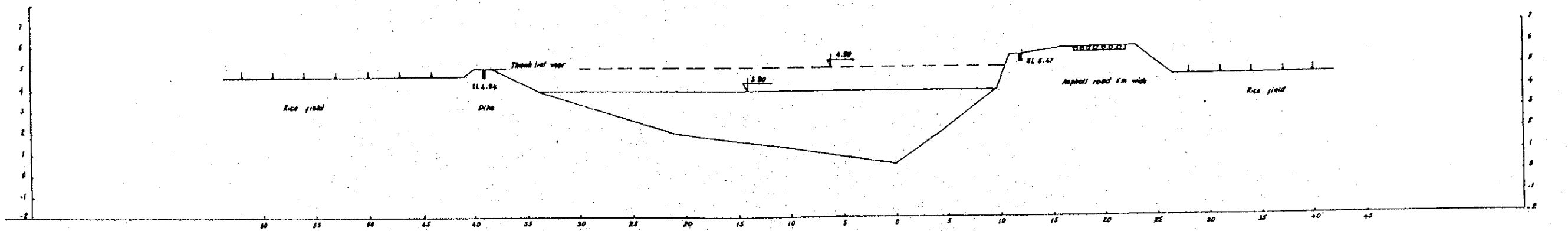
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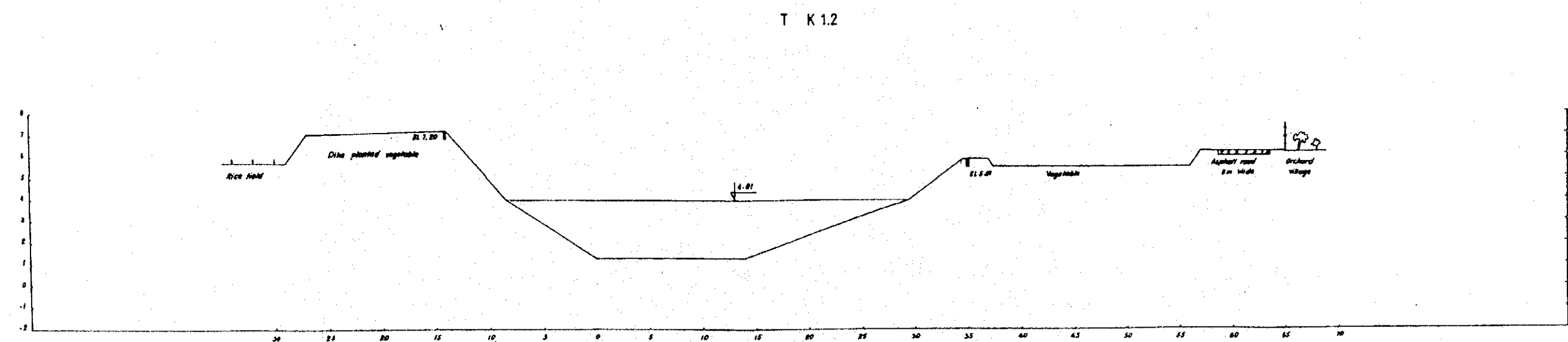
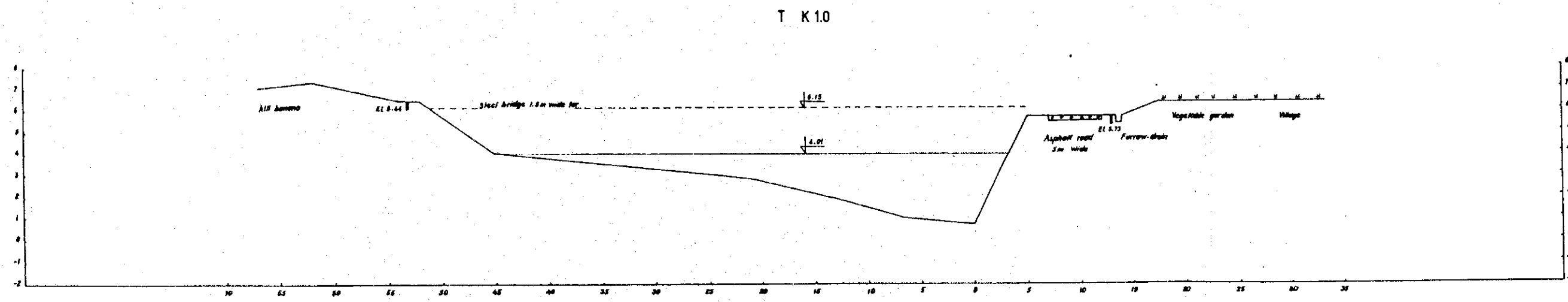
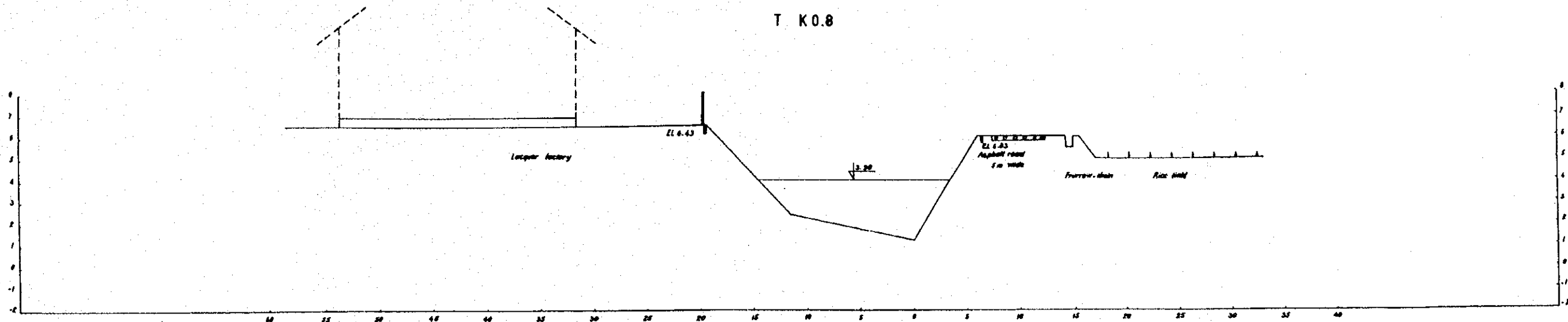
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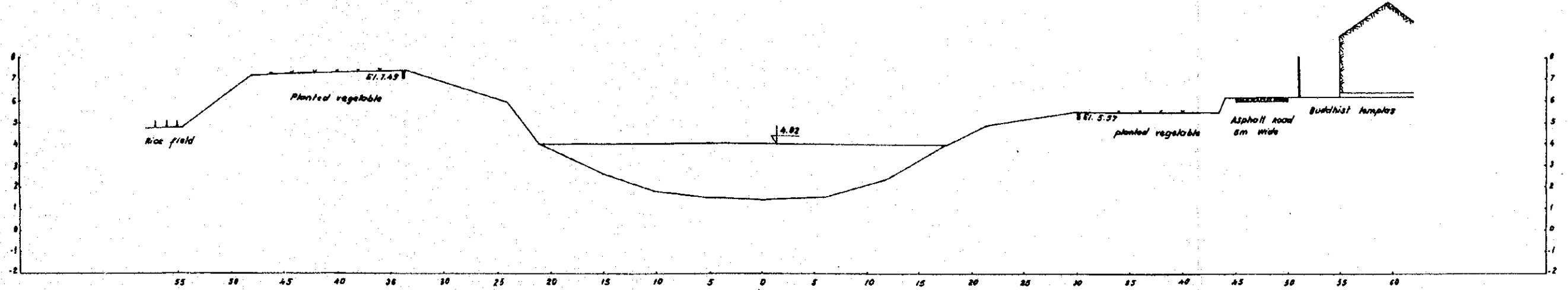


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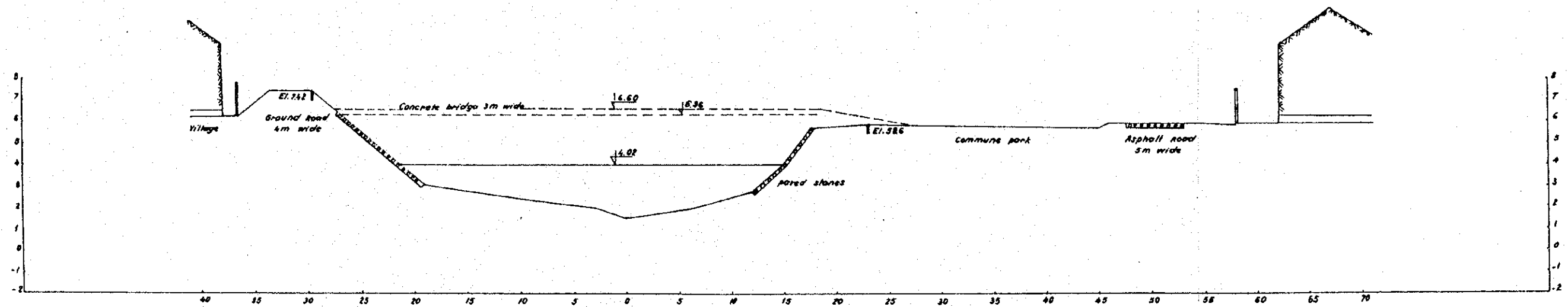


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLUH RIVER FROM K-0.8 TO K-1.2 SCALE H=1:200 V=1:100
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DWG NO. TC 4 / 27			

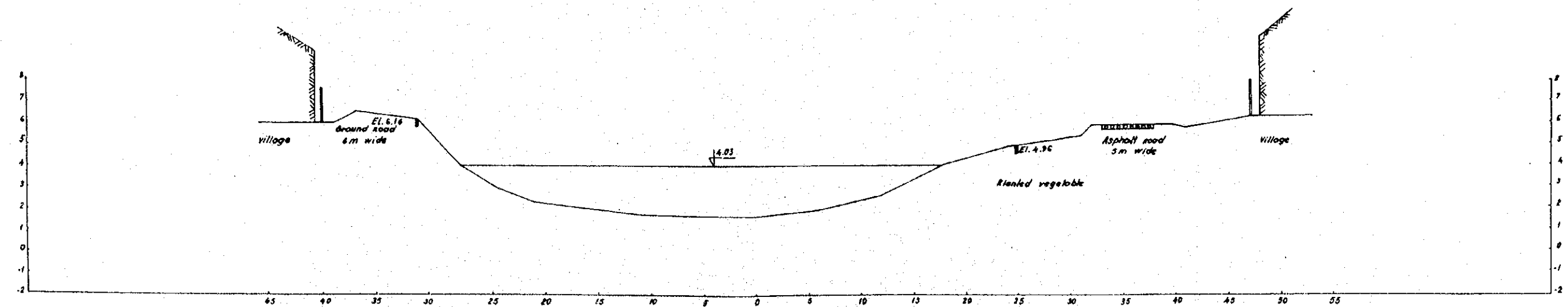
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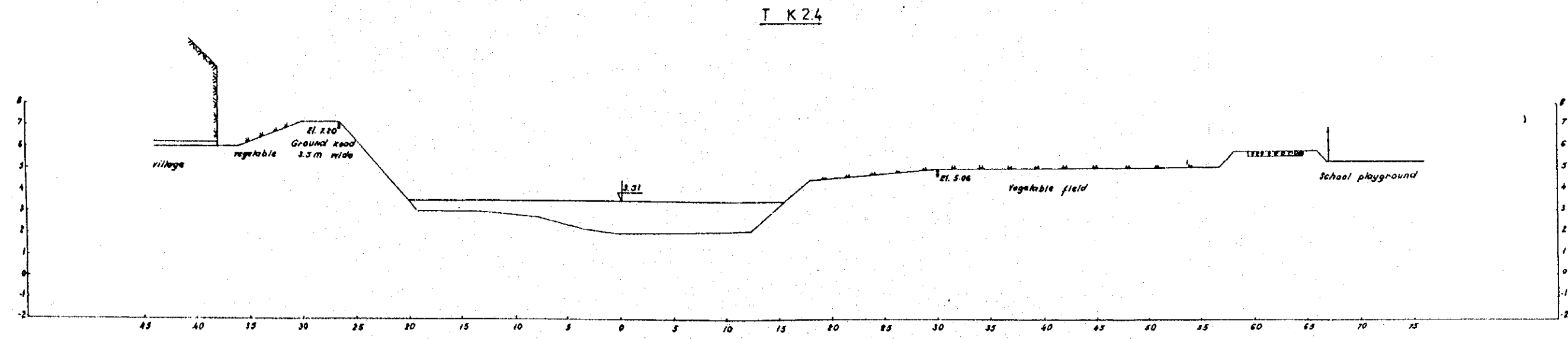
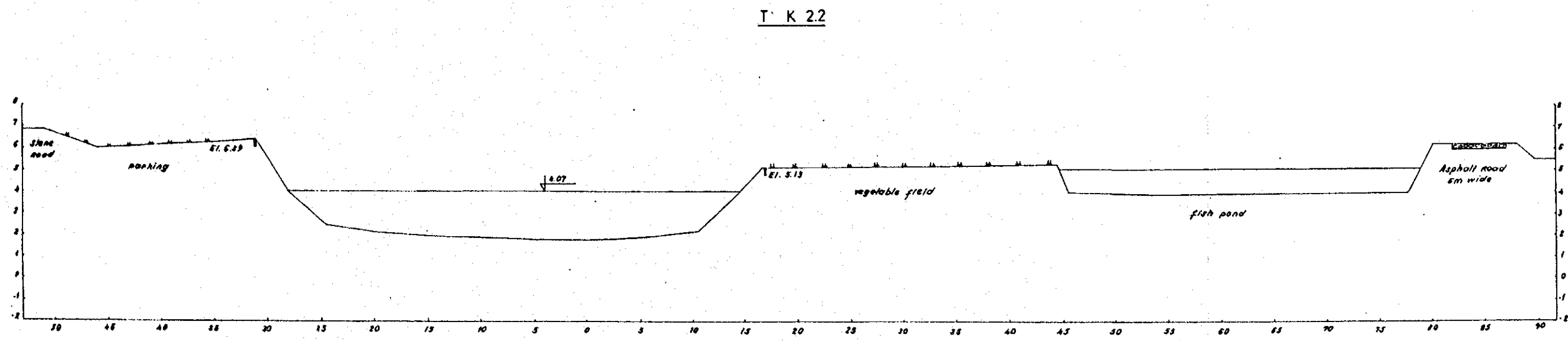
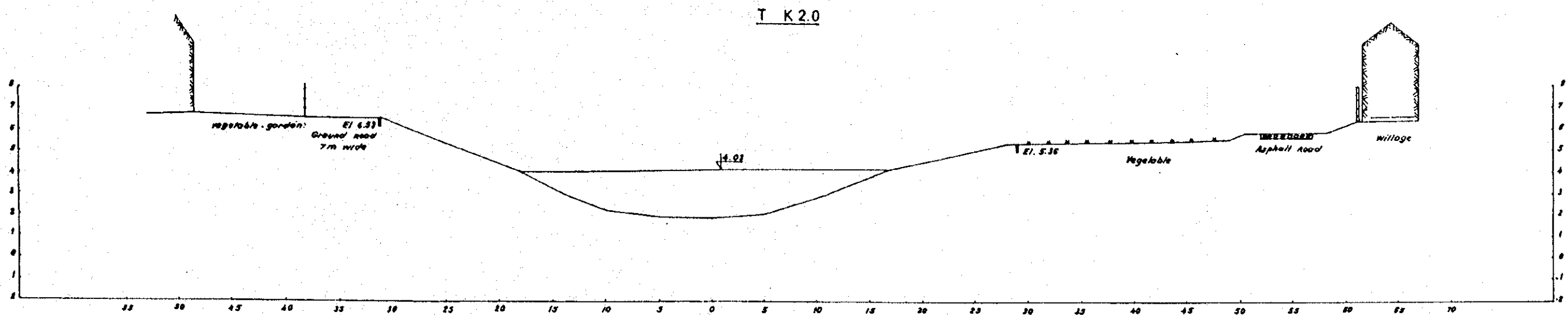
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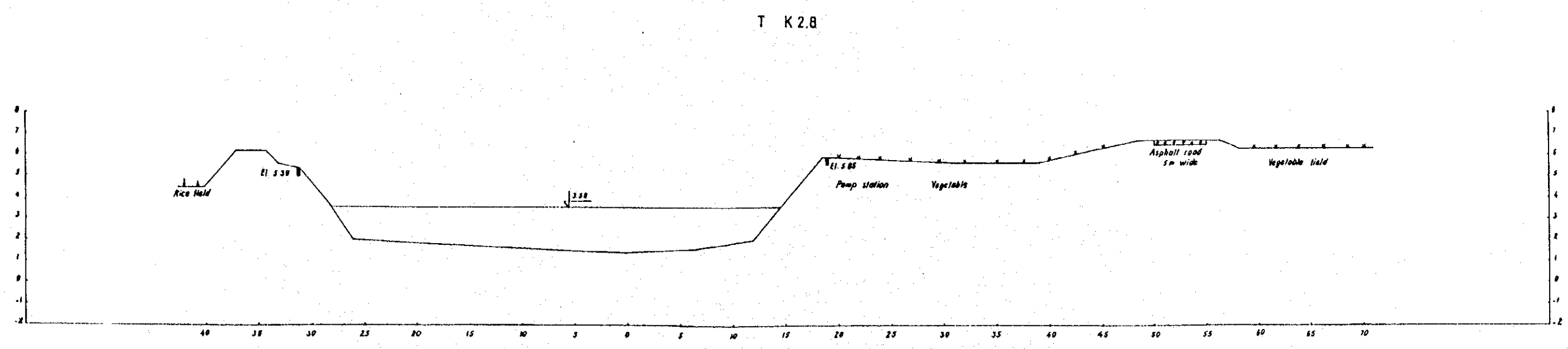
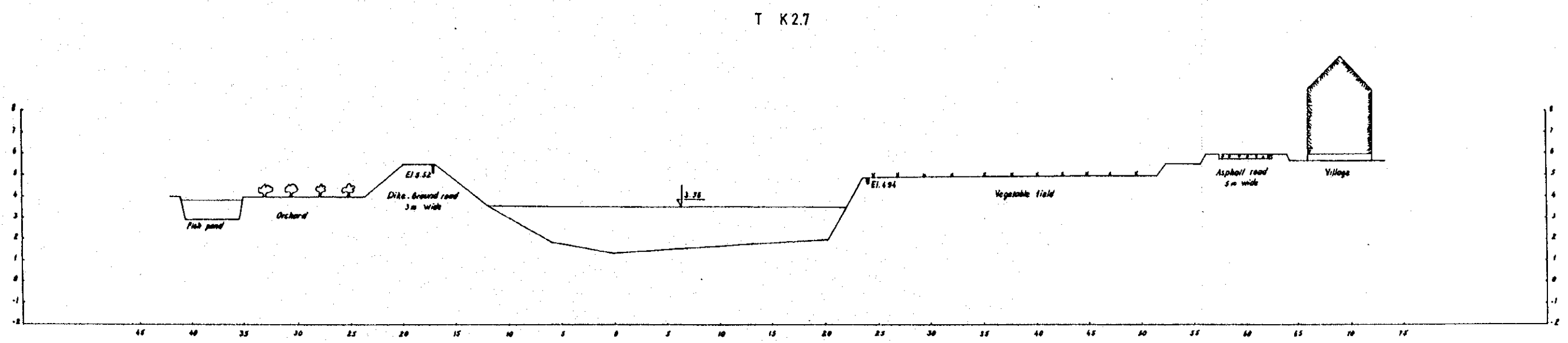
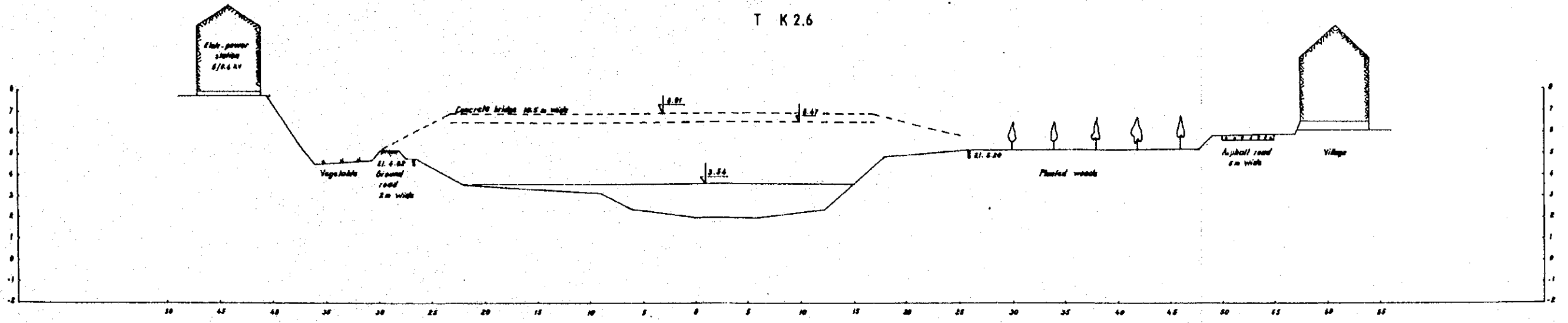
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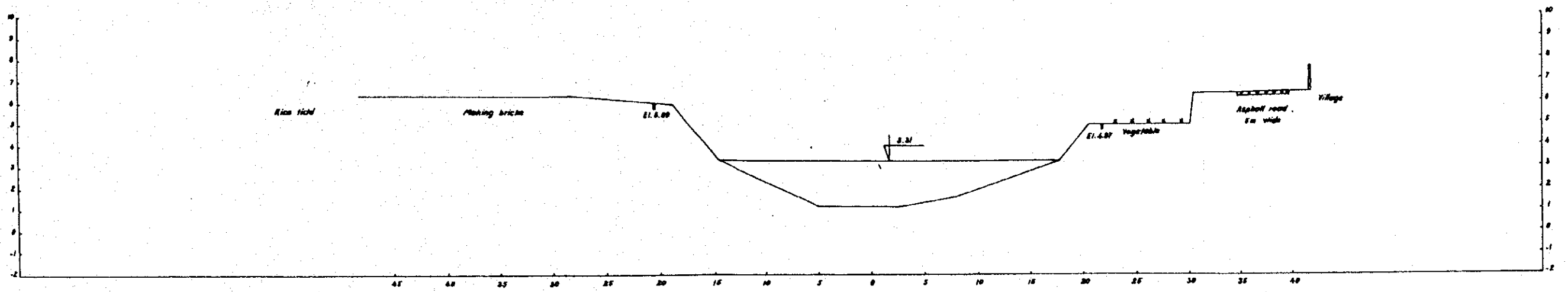


SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTION OF TOLICH RIVER FROM K2.0 TO K2.4 SCALE H:1:200 V:1:100 DWGNO TC 6/21
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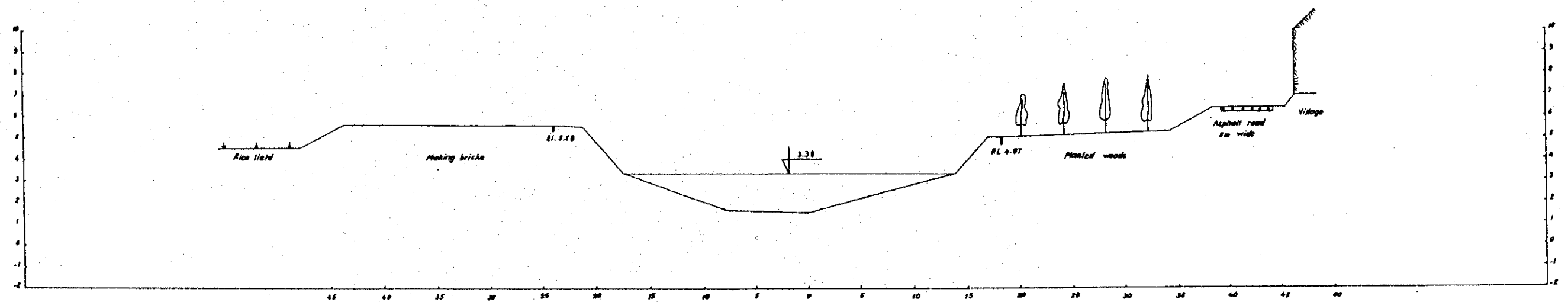


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO	DATE	DESIGNED BY	DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K 2.6 TO K 2.8 SCALE H=1:200 V=1:100 DWG NO TC 7 / 27

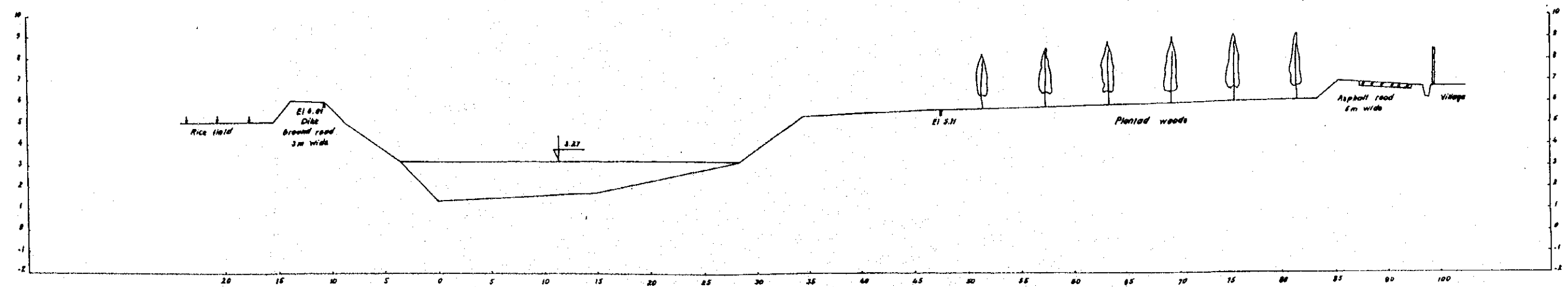
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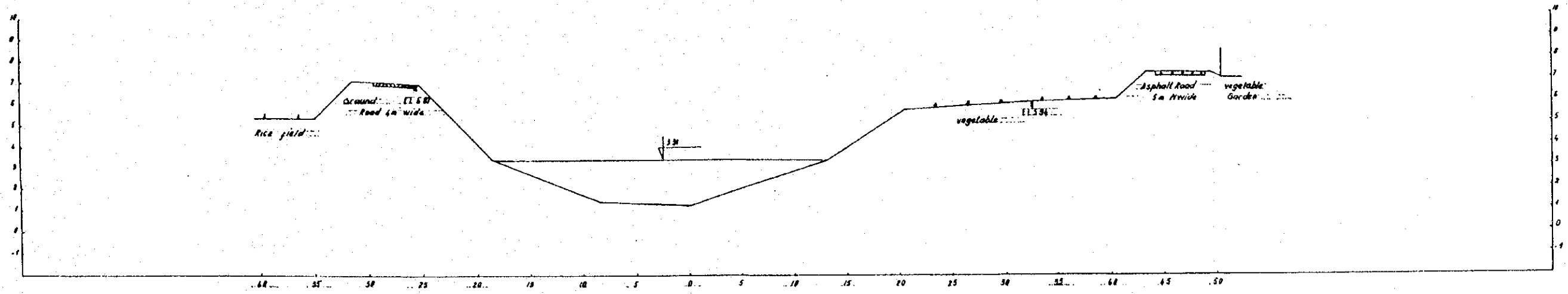


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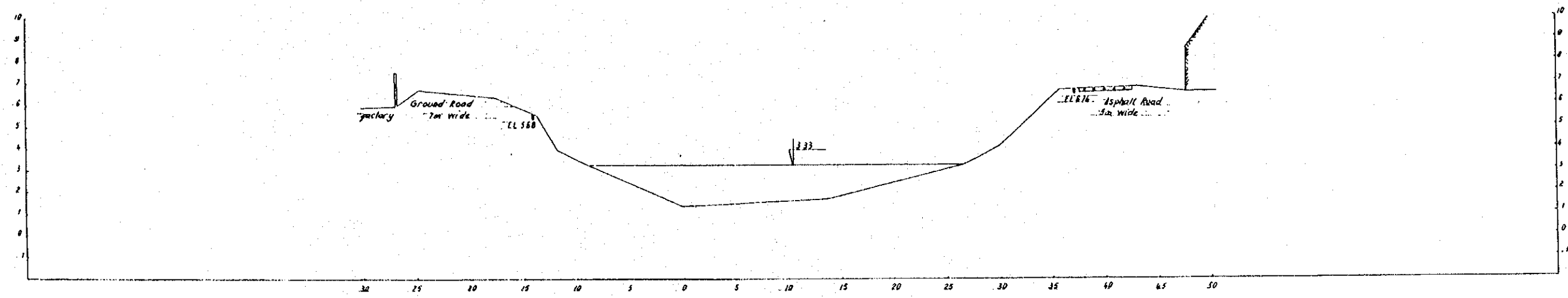


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO * DATE	DESIGNED BY * DATE	TITLE CROSS SECTION OF TOLICH RIVER FROM K 3.0 TO K 3.4 SCALE H = 1:200 V = 1:100
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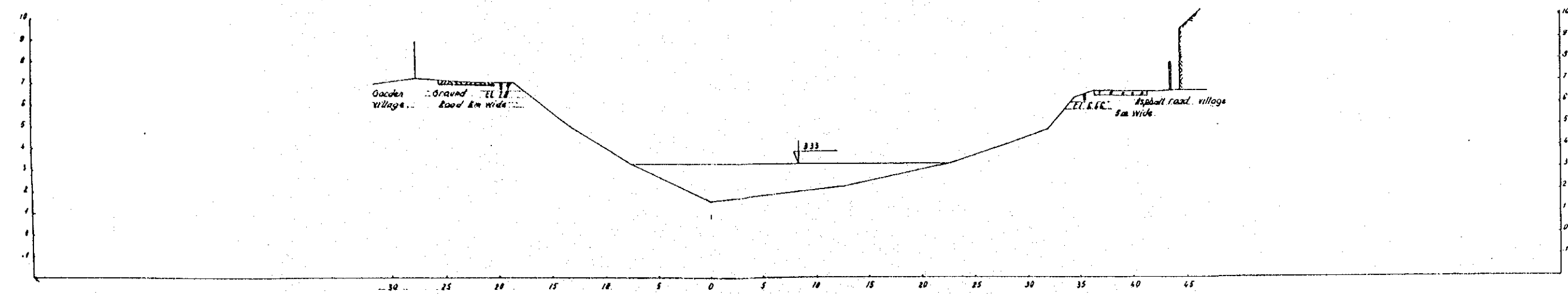
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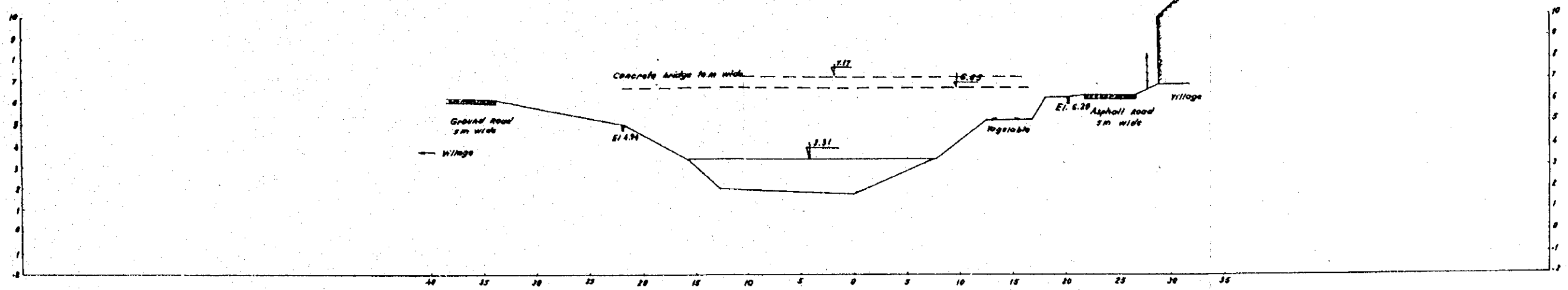


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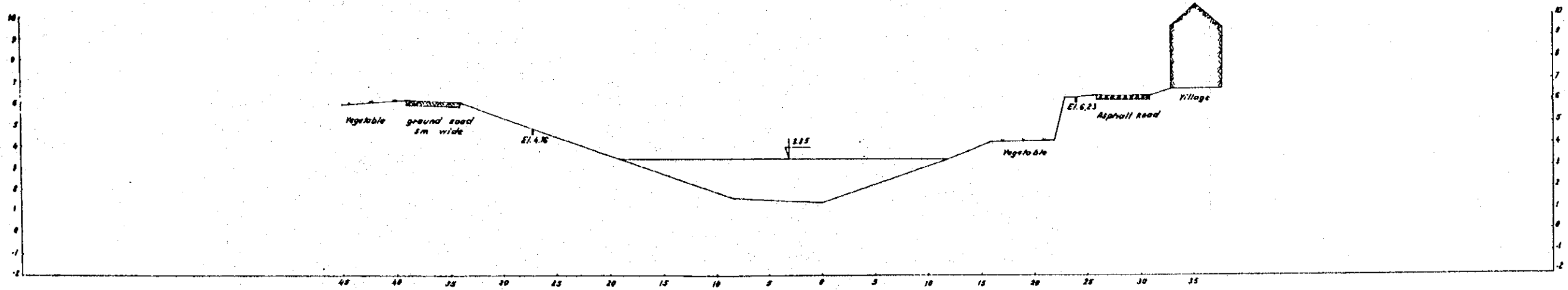


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO. & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K 3.6 TO K 4.0 SCALE H=1:200 V=1:100 DWG NO TC 9 / 21
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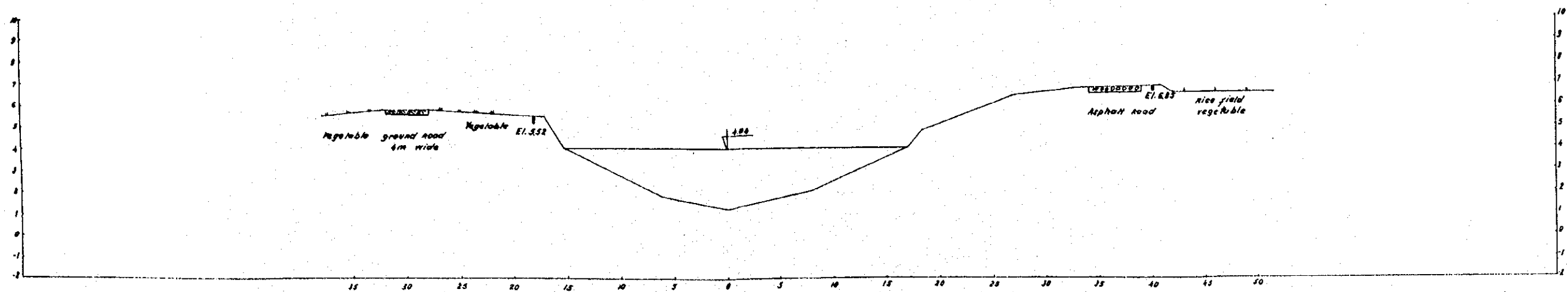
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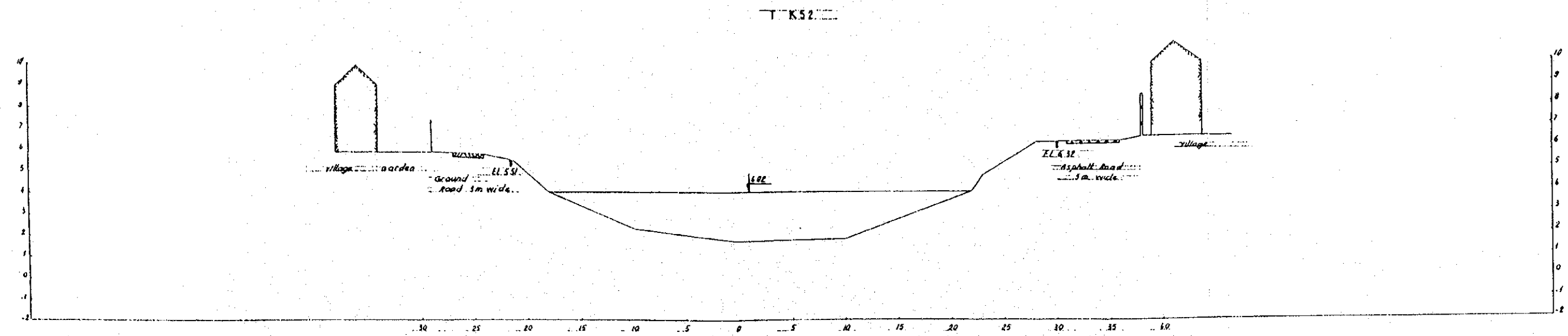
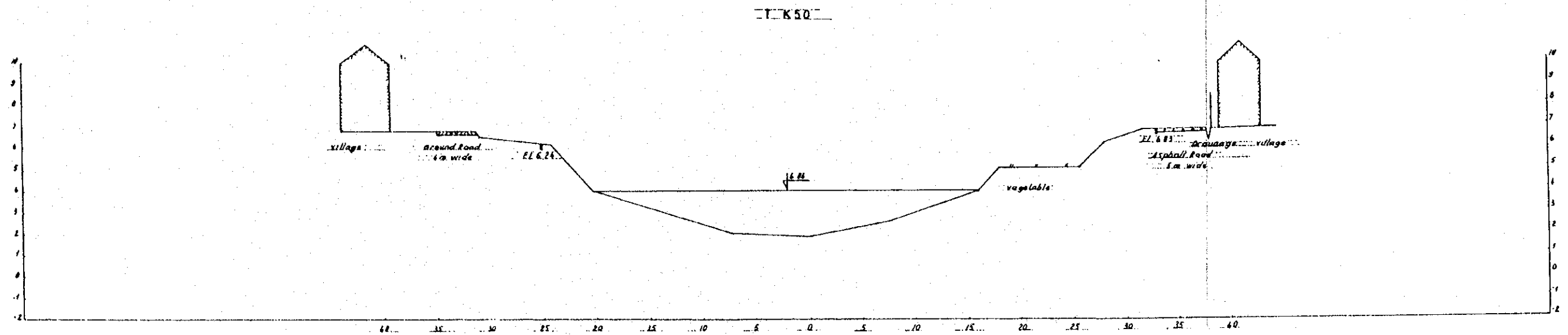
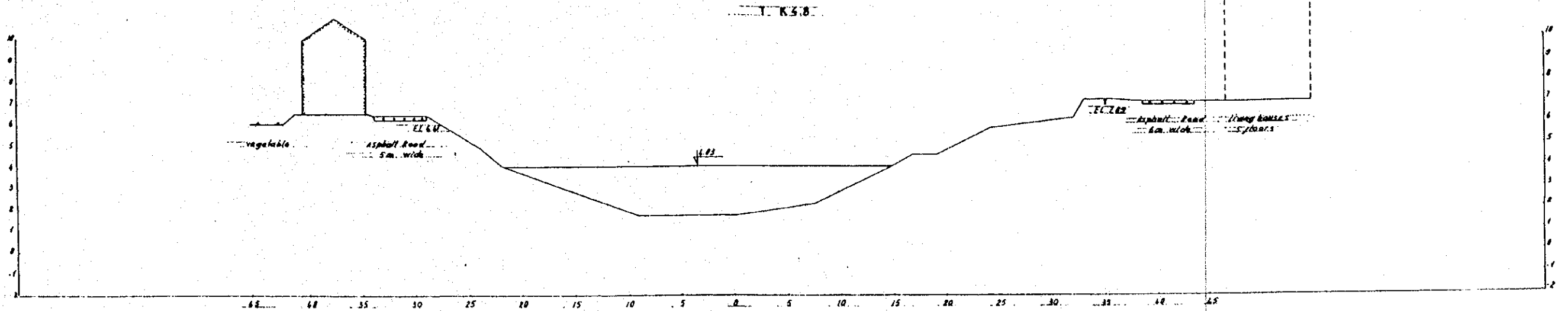
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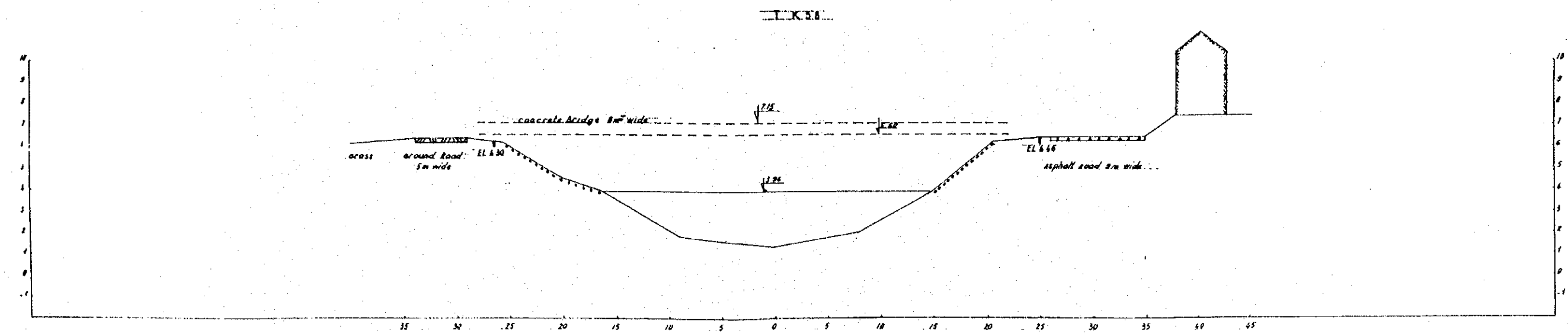
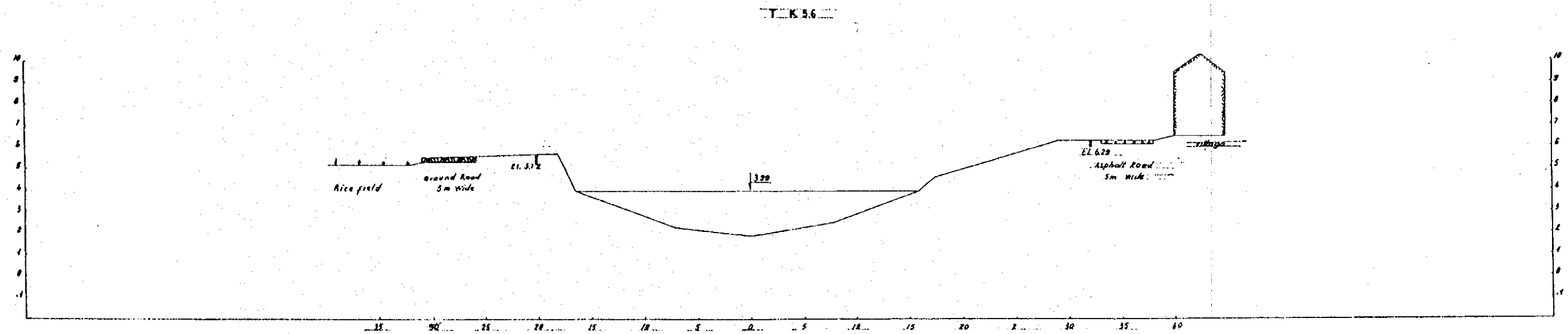
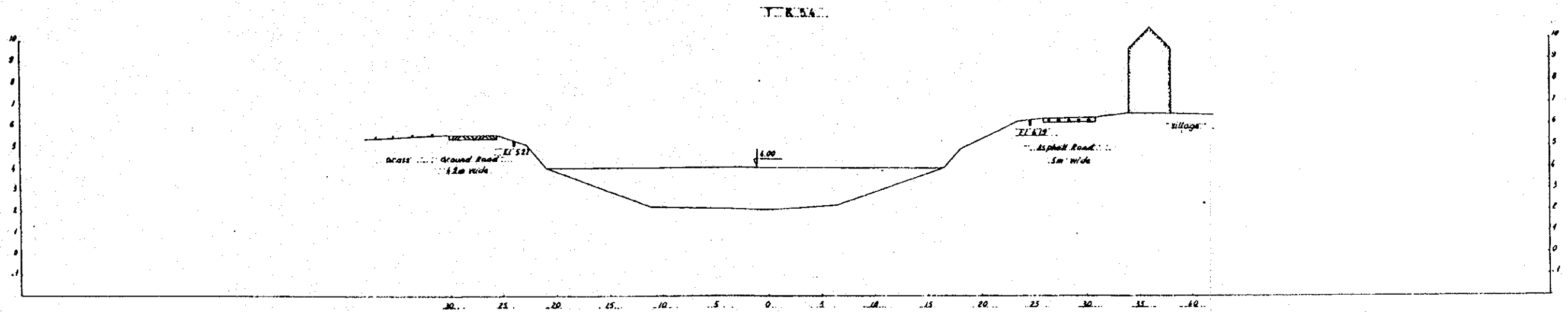
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SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTION OF TOLICH RIVER FROM K4.2 TO K4.6 SCALE H:1:200 V:1:100 DWGNO TC 10 / 27
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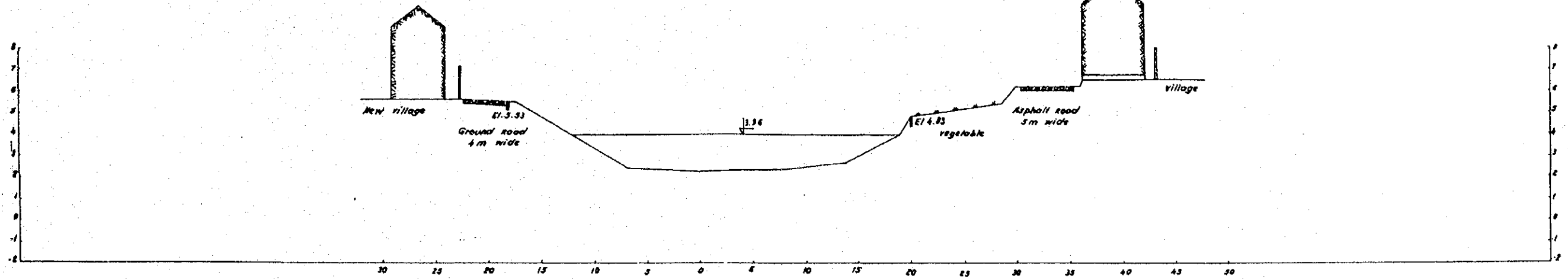


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE: CROSS SECTIONS OF TOLICH RIVER FROM K.4.8 TO K.5.2 SCALE: H=1:200 V=1:100 DWG. NO. TC 11/87
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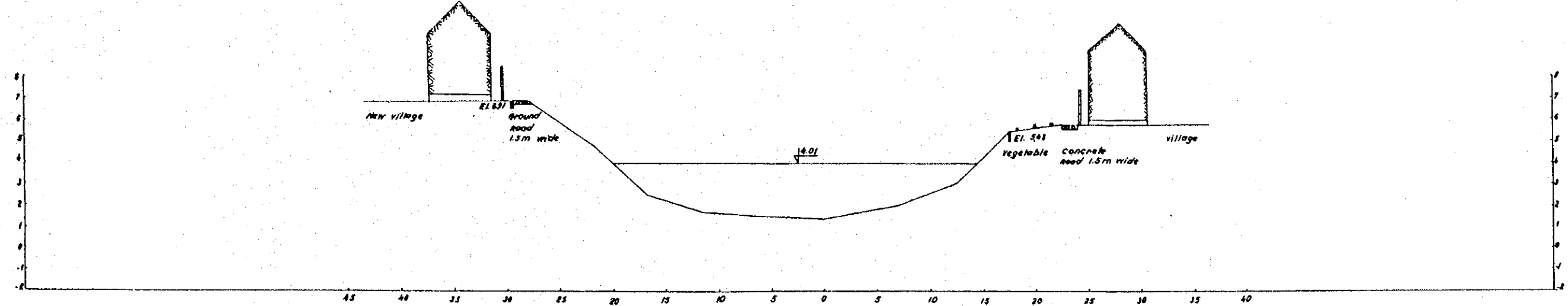


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL SYSTEM IN HANOI CITY	REVISION NO. & DATE	DESIGNED BY & DATE		TITLE CROSS SECTIONS OF TOLICH RIVER FROM K 54 TO K 58
JICA JAPAN INTERNATIONAL COOPERATION AGENCY				SCALE H = 1:200 V = 1:100 DWG NO TC 12 / 27

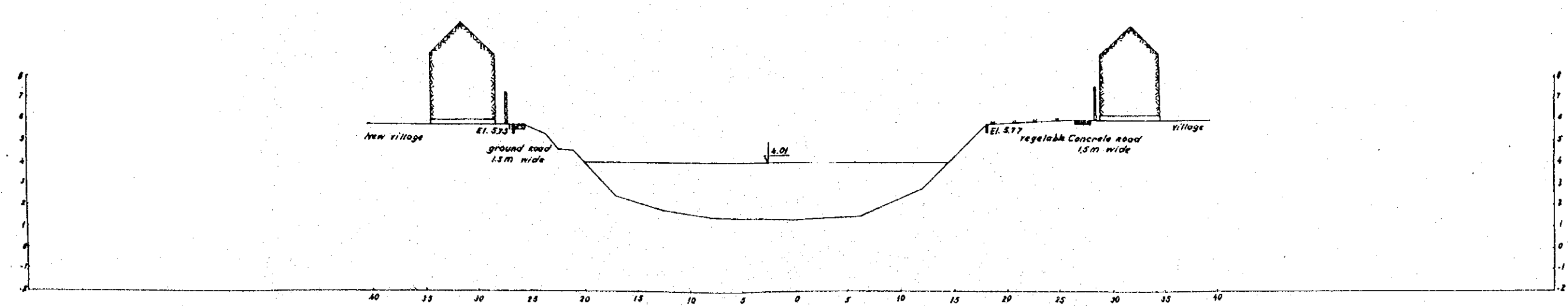
T K 60



T K 62

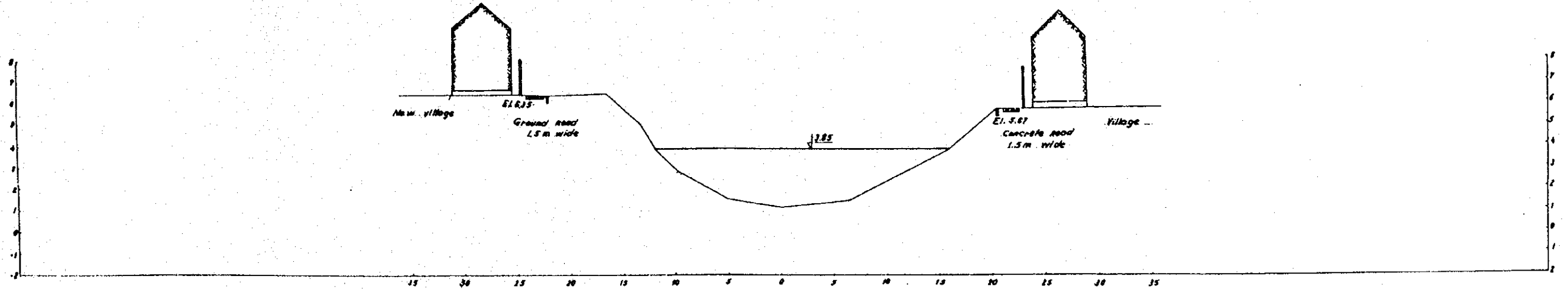


T K 64

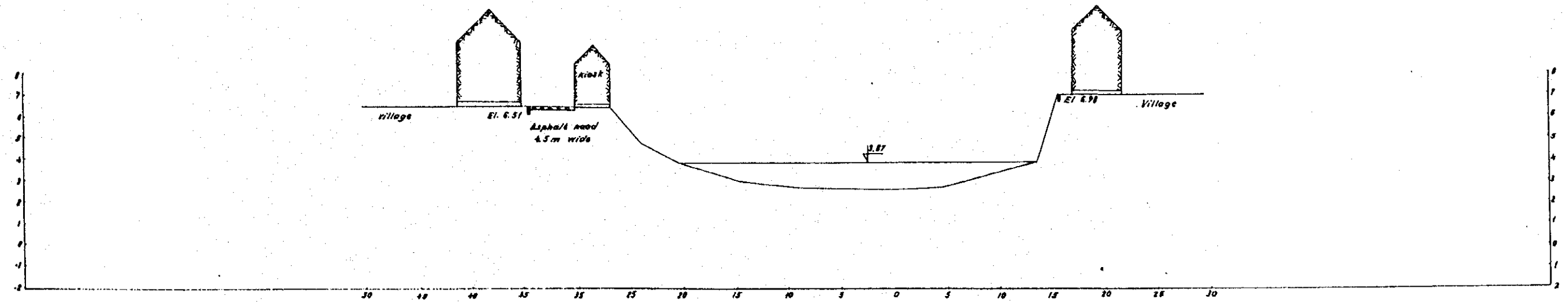


SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO	DESIGNED BY	TITLE CROSS SECTION OF TOLICH RIVER FROM K60 TO K64 SCALE H:1:200 V:1:100 DWGNO TC 13/41
	DATE	DATE	
		DATE	
		DATE	

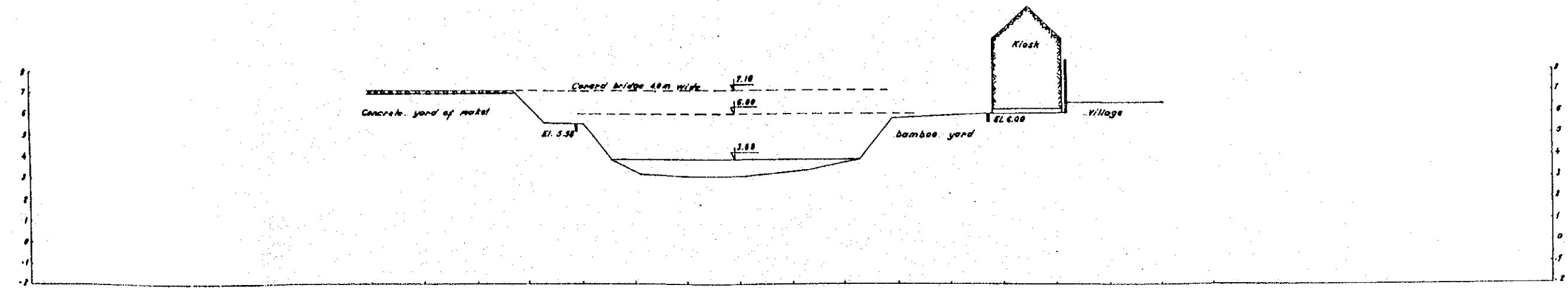
T...K66



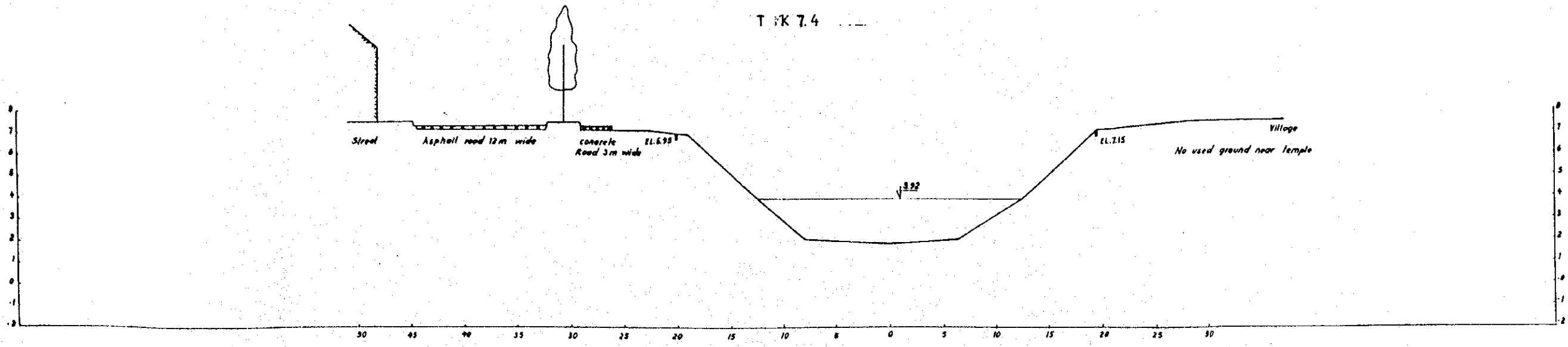
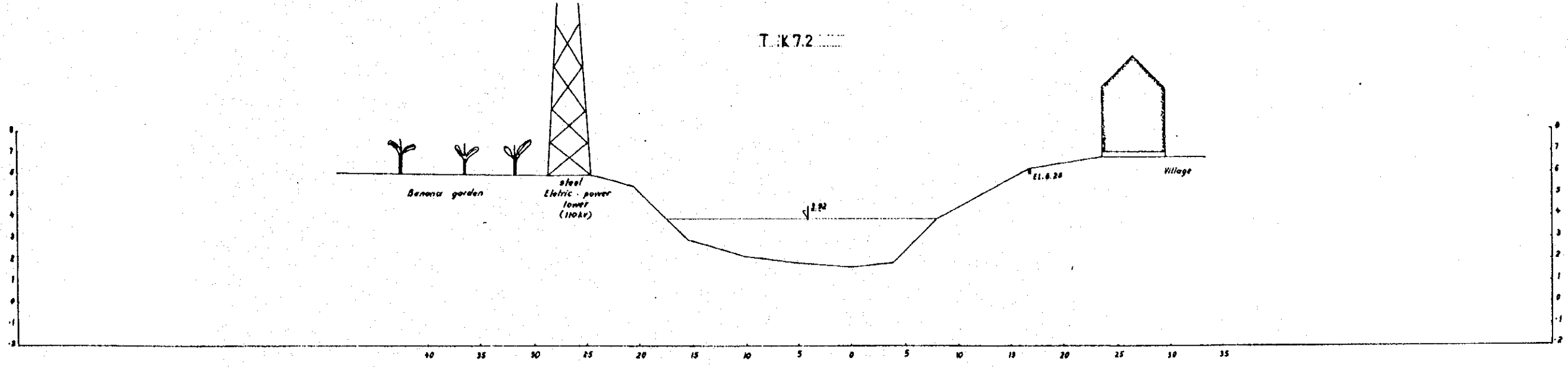
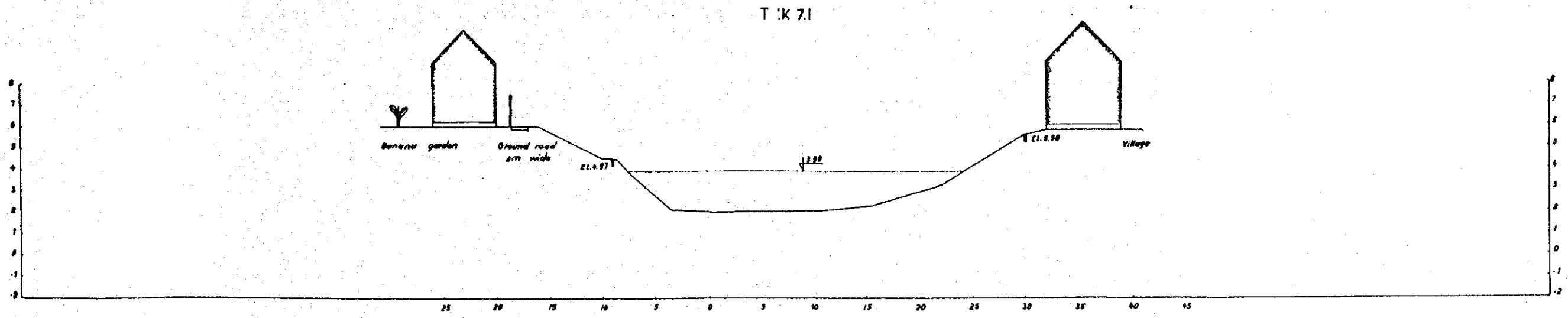
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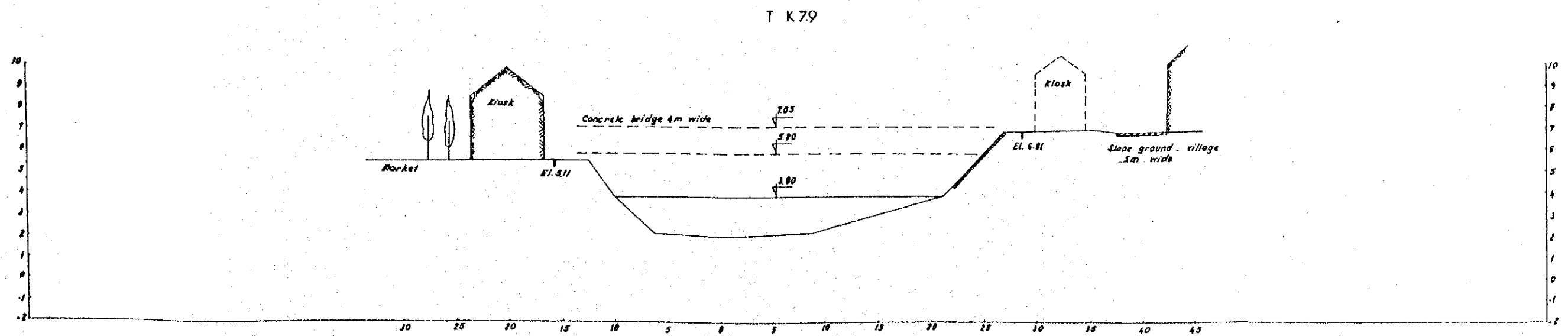
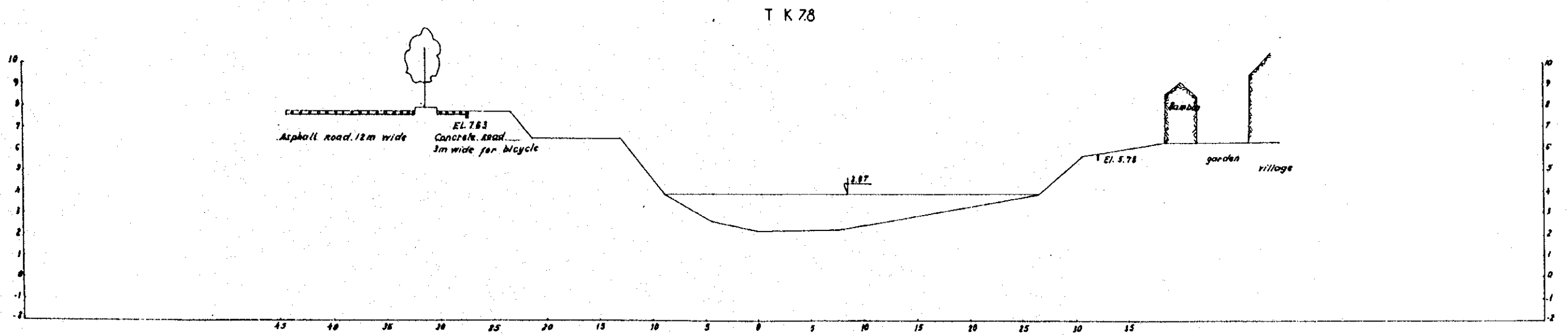
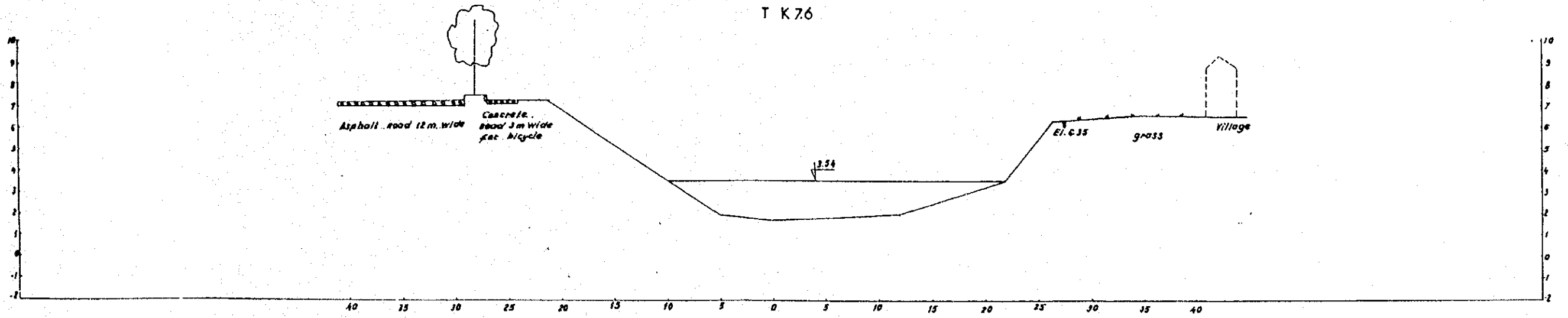
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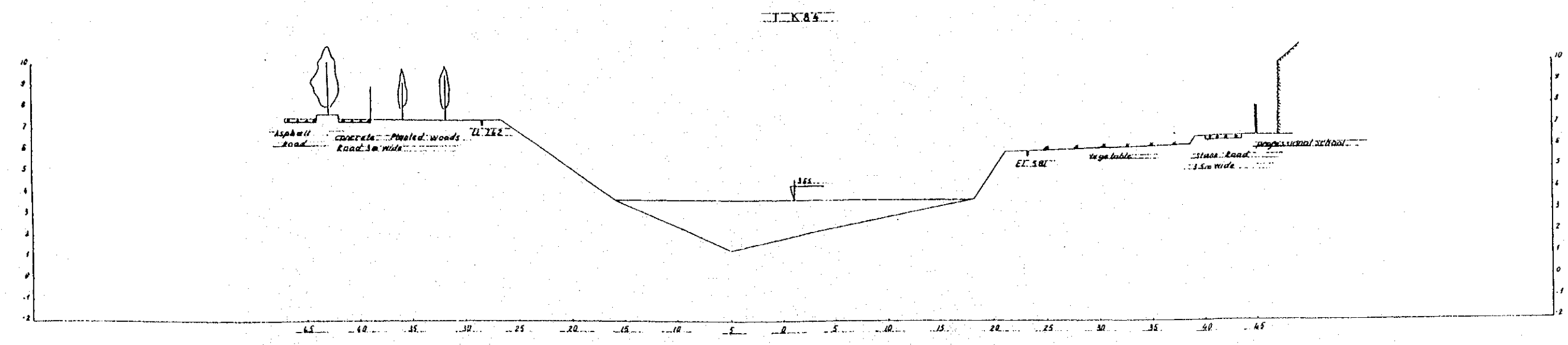
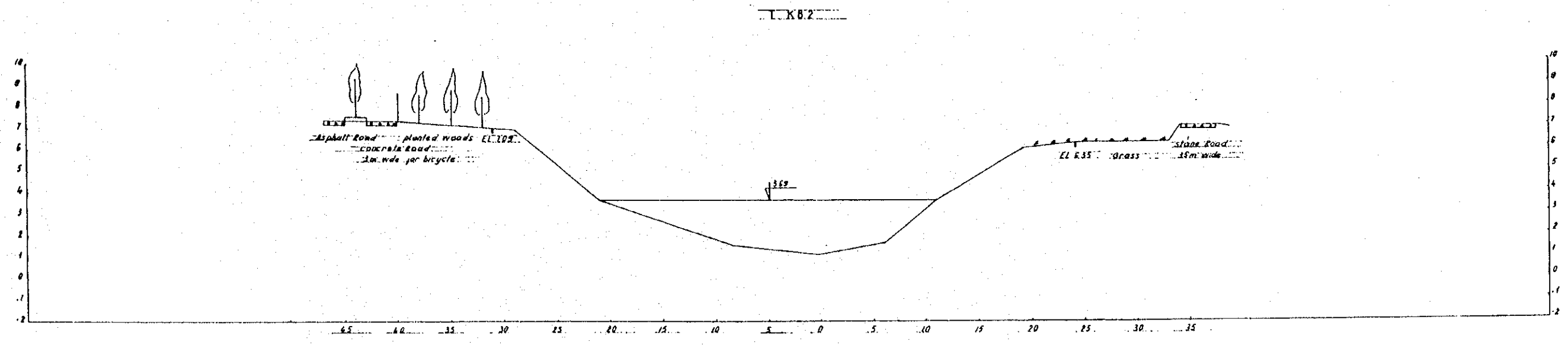
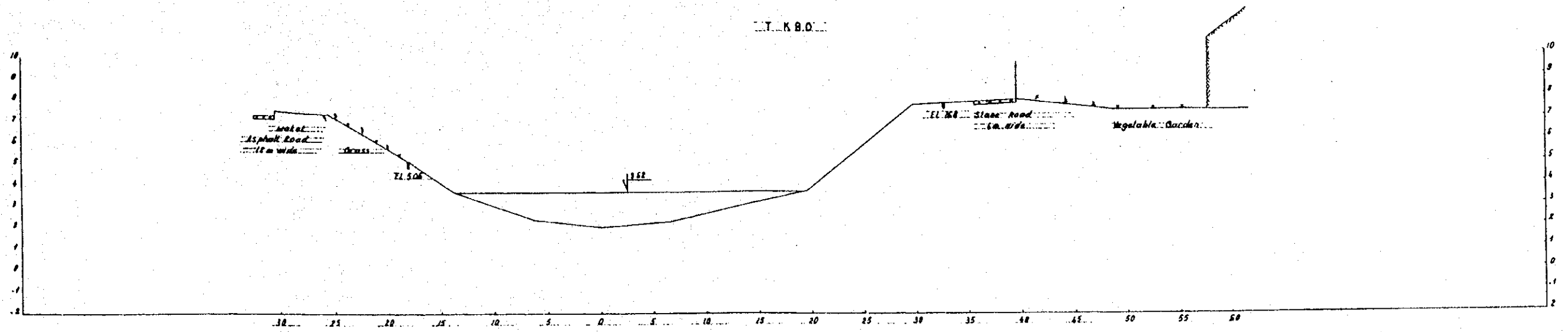
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE		TITLE CROSS SECTIONS OF TOLICH RIVER FROM K 66 TO K 70 SCALE H:1:200 V:1:100 DWG NO TC 14 / 27
		DRAWN BY & DATE		
		CHECKED BY & DATE		
		APPROVED BY & DATE		



SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K.7.1 TO K.7.4 SCALE H = 1:200 V = 1:100 DWG NO TC 13 / 27
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

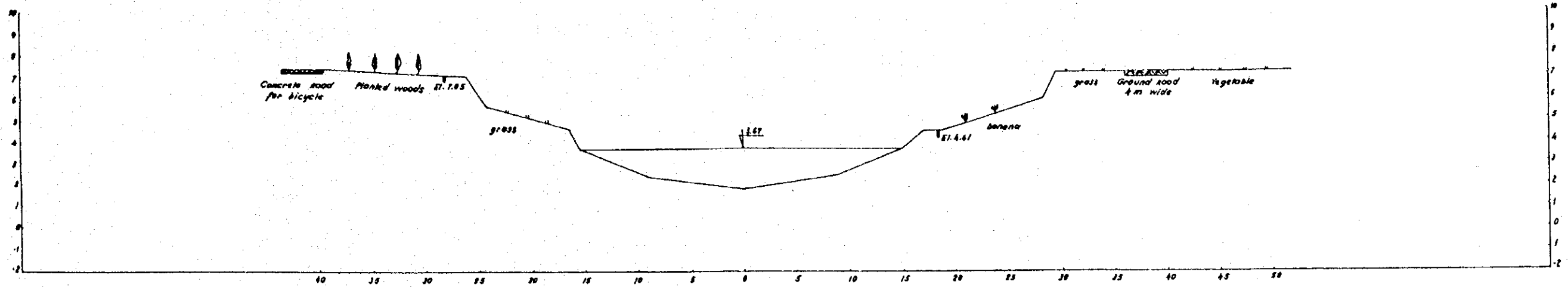


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO * DATE	DESIGNED BY * DATE	TITLE CROSS SECTION OF TOLICH RIVER FROM K 7.6 TO K 7.9 SCALE H • 1:200 V • 1:100 DWG NO TC 16 / 21
		DRAWN BY * DATE	
		CHECKED BY * DATE	
		APPROVED BY * DATE	

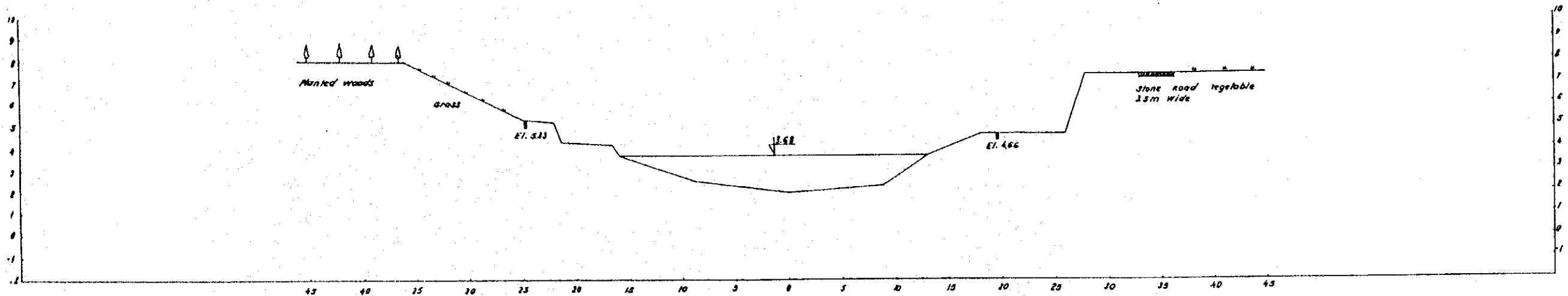


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K80 TO K84 SCALE H=1:200 V=1:100 DWG NO. TC 11/81
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

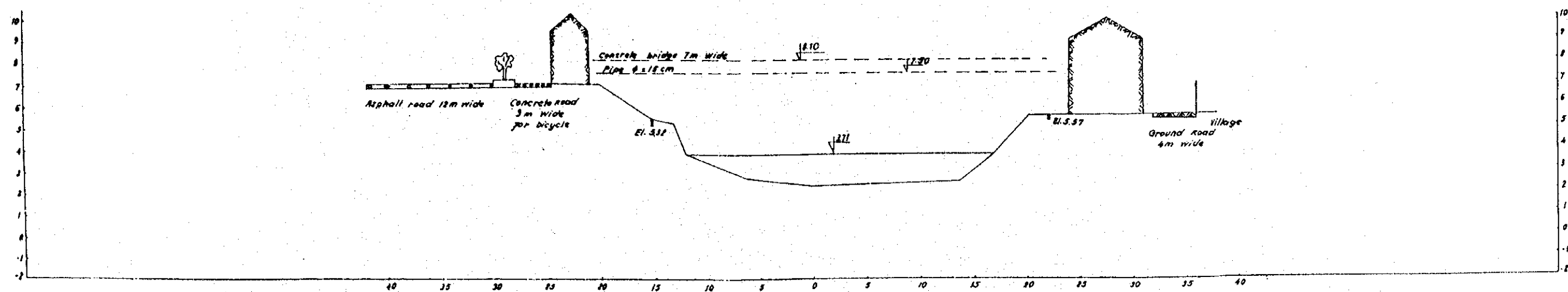
T K 86



T K 88

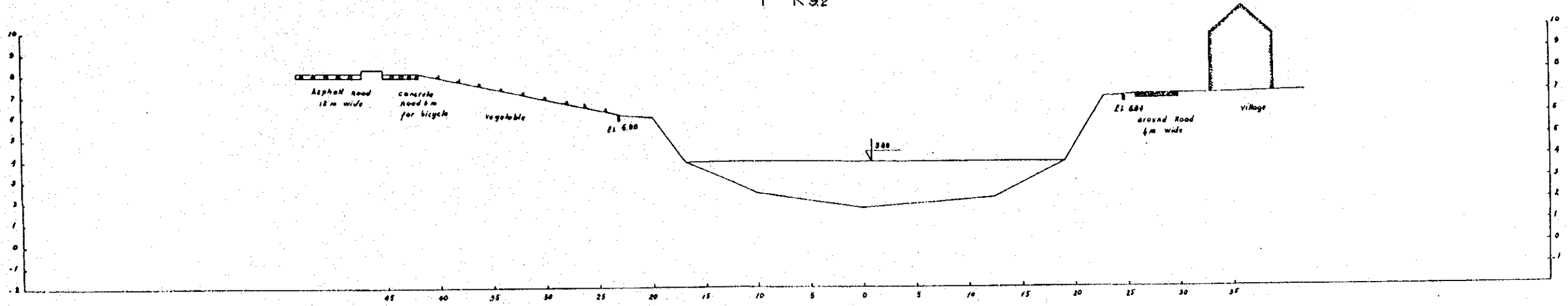


T K 90

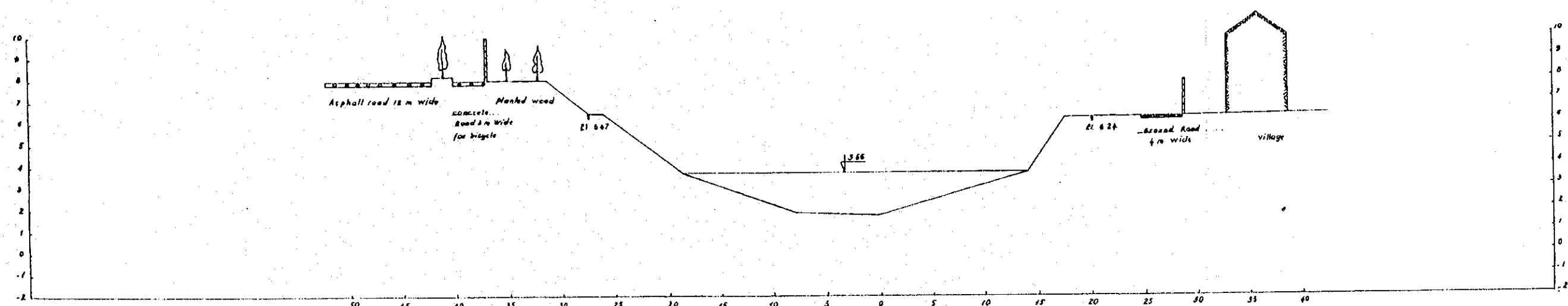


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K86 TO K90 SCALE: H:1:200 V:1:100 DWG NO TC 10 / 21
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

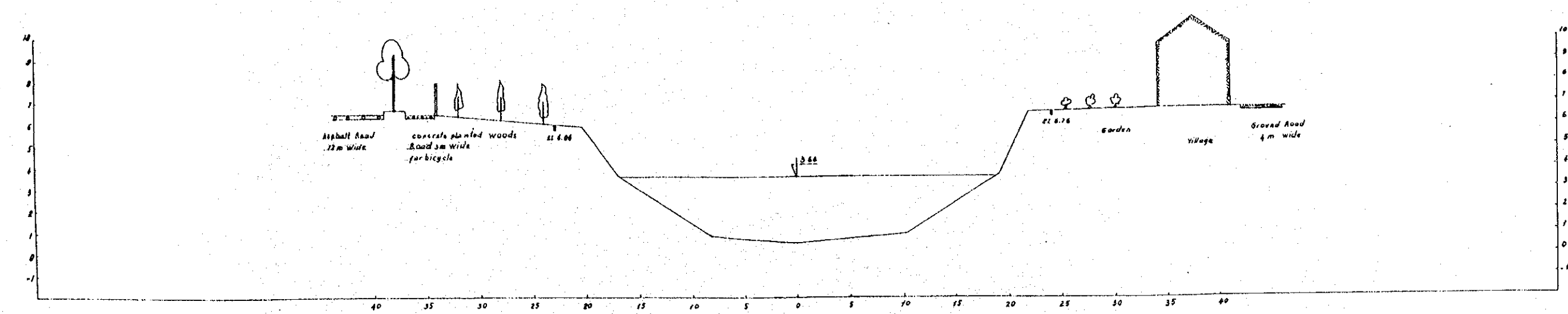
T K 92



T K 94

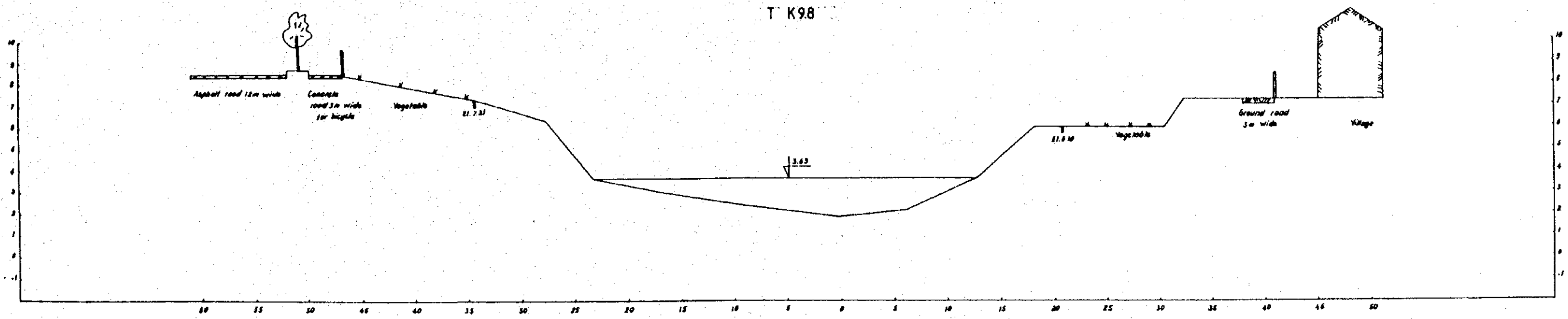


T K 96

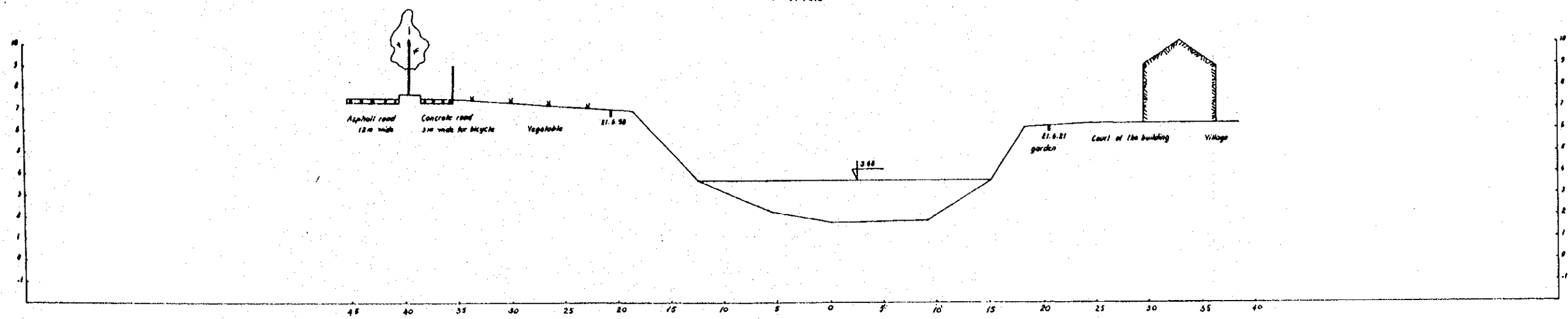


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM... K 9.2 TO K 9.6 SCALE H=1:200 V=1:100 DWGNO TC 19/21
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

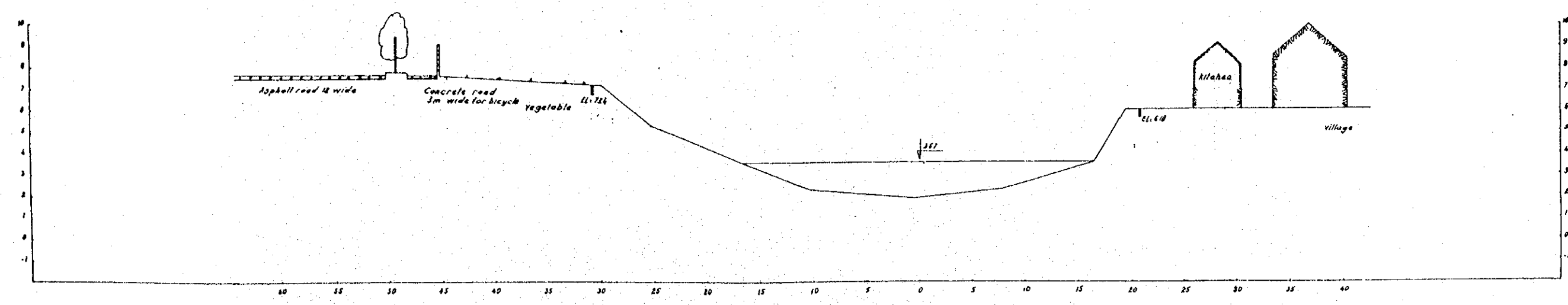
T K98



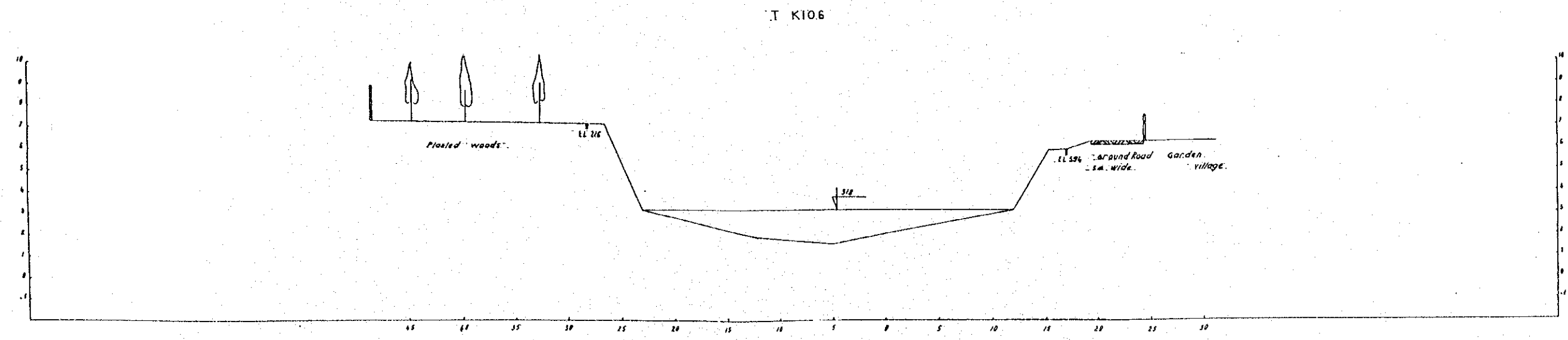
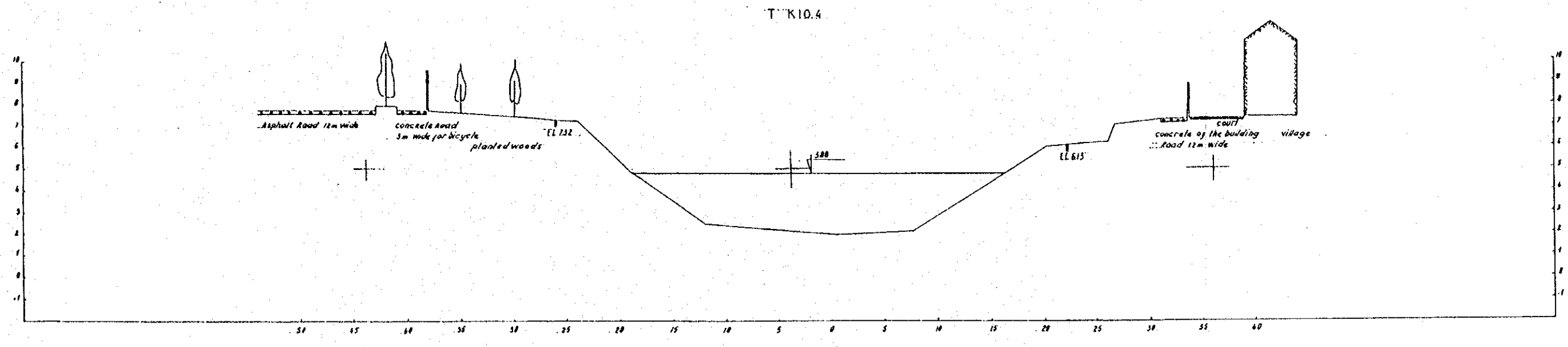
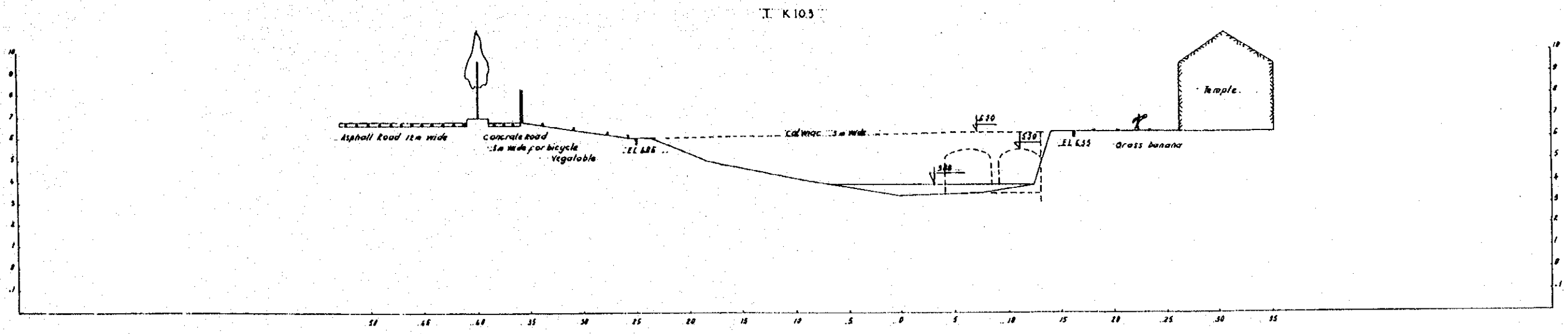
T K100



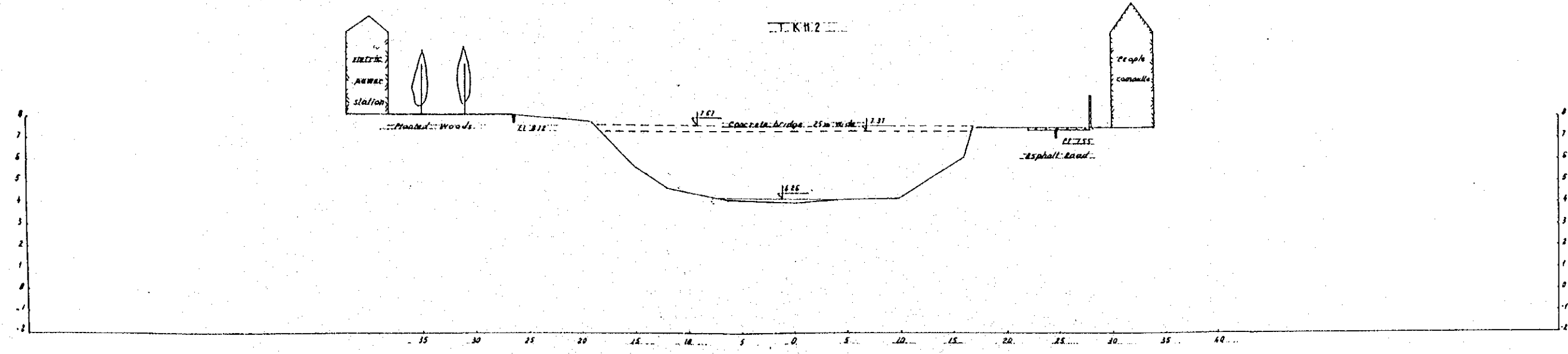
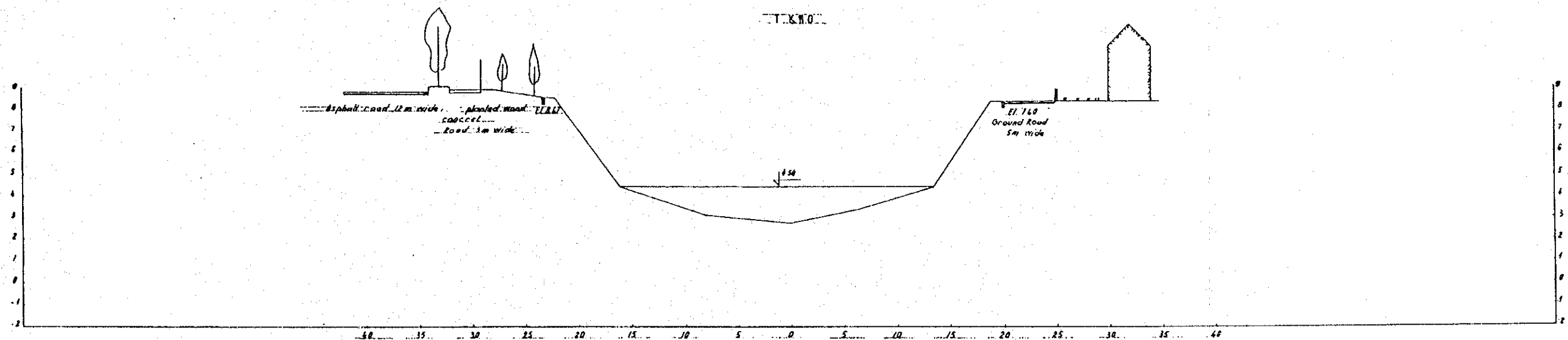
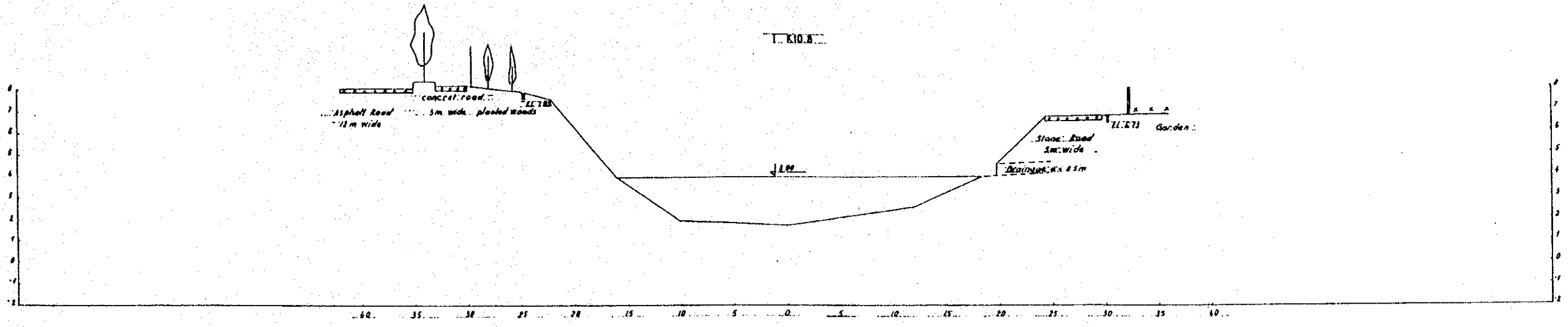
T K102



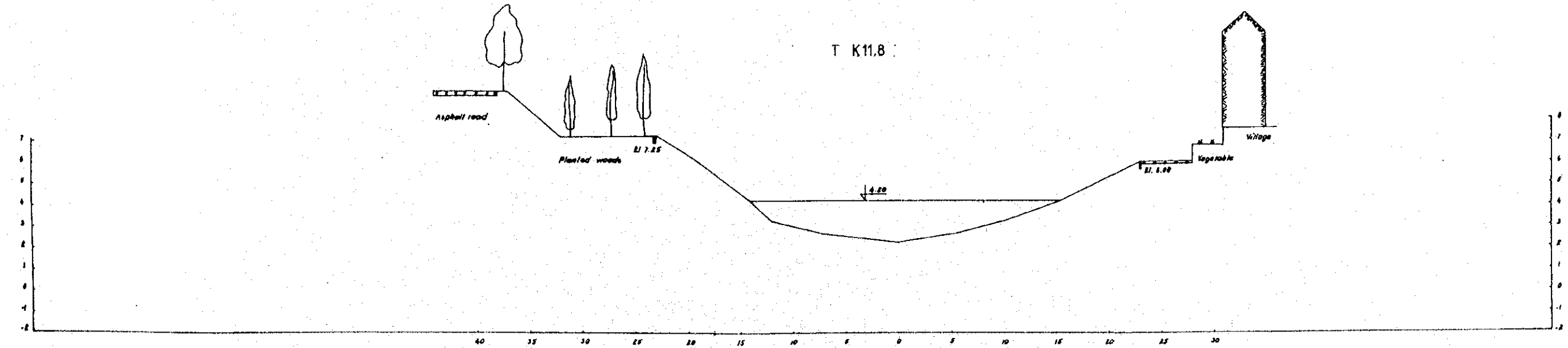
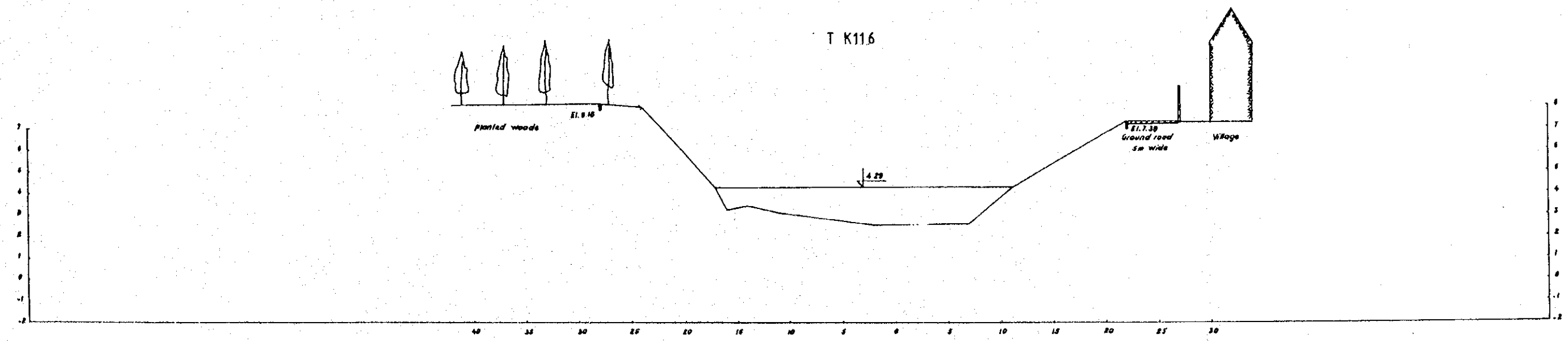
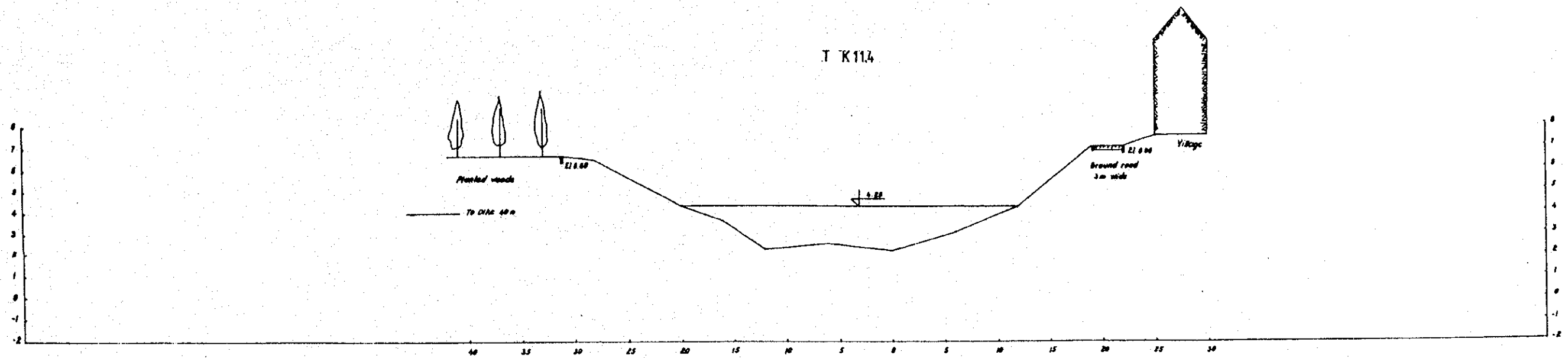
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO	DATE	DESIGNED BY	DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K 98 TO K 102 SCALE H=1:200 V=1:100
			DRAWN BY	DATE	
			CHECKED BY	DATE	
			APPROVED BY	DATE	
					DWG NO TC 20 / 21



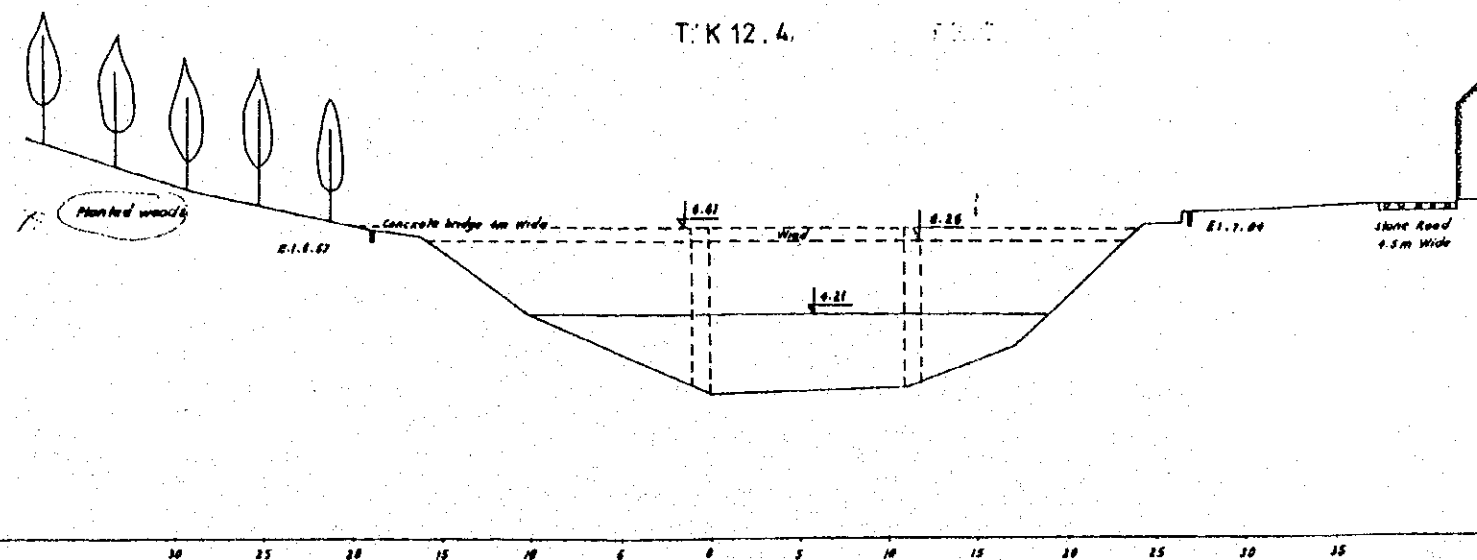
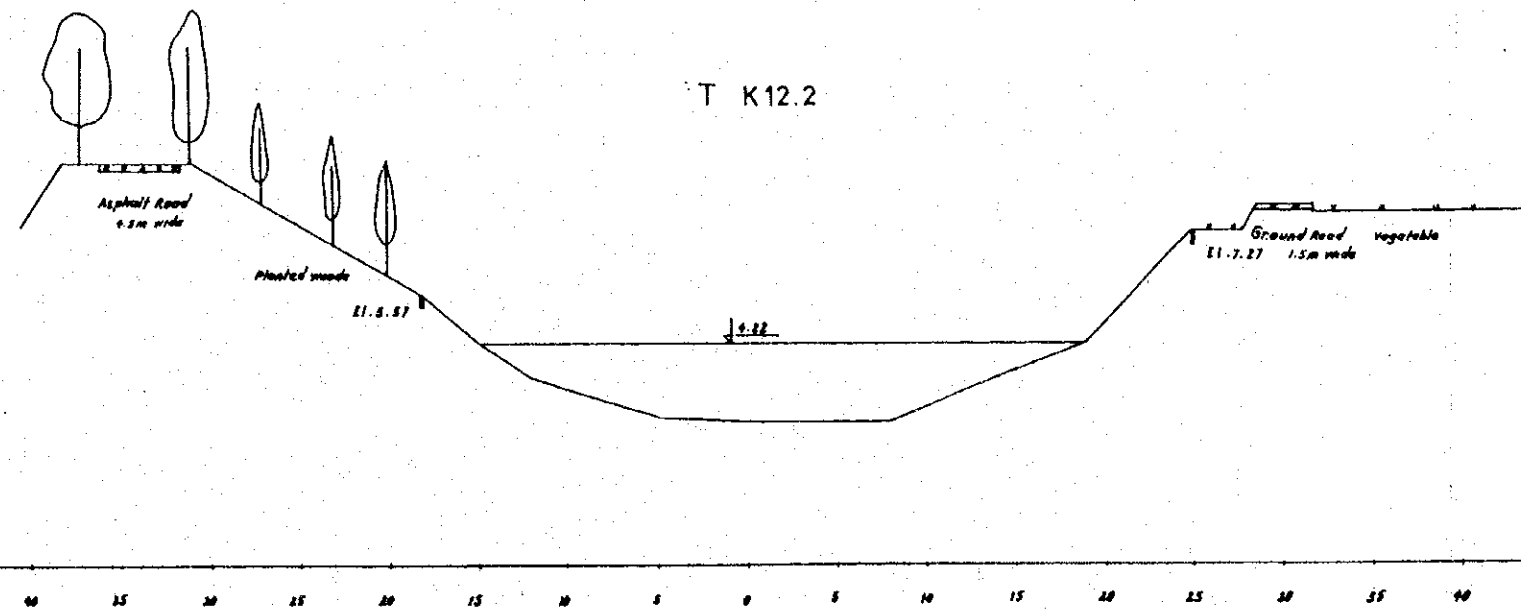
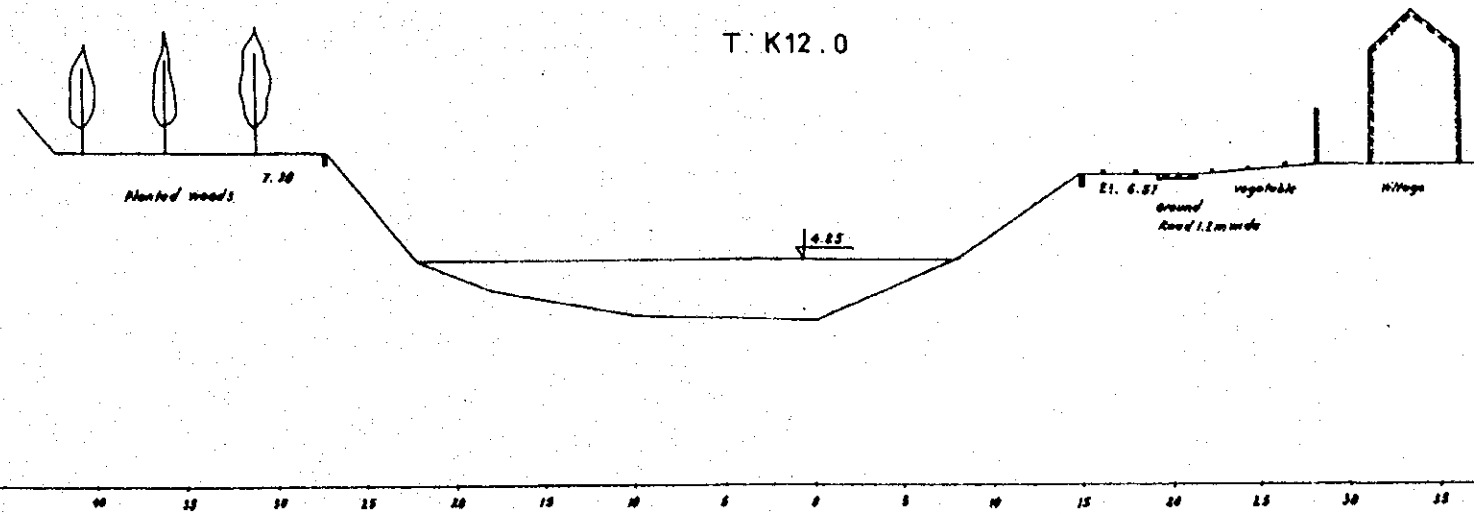
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY	REVISION NO & DATE	DESIGNED BY & DATE		TITLE CROSS SECTIONS OF TOLICH RIVER FROM K 103 TO K 106
JICA JAPAN INTERNATIONAL COOPERATION AGENCY				SCALE H=1:200 V=1:100
				DWG NO TC 21/27



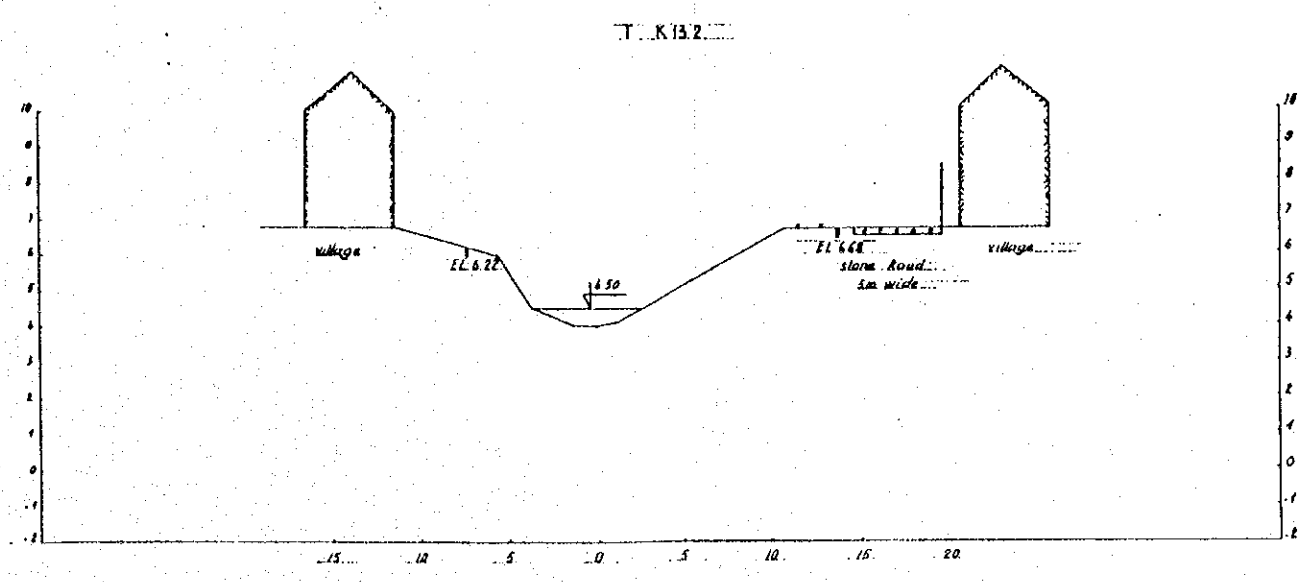
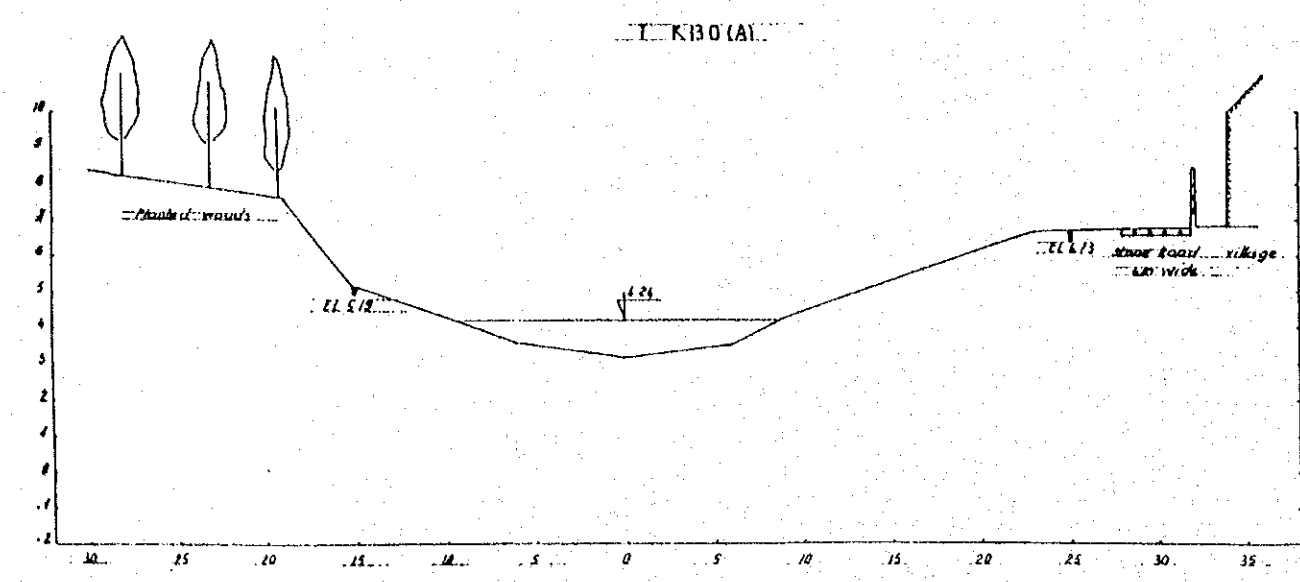
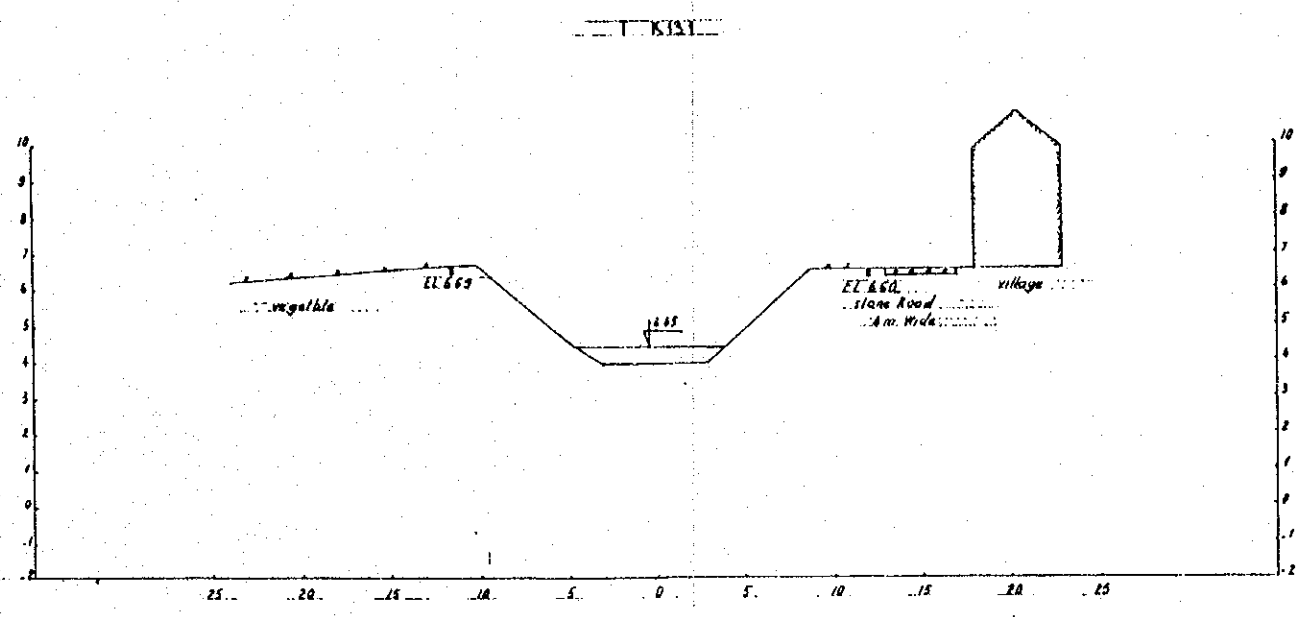
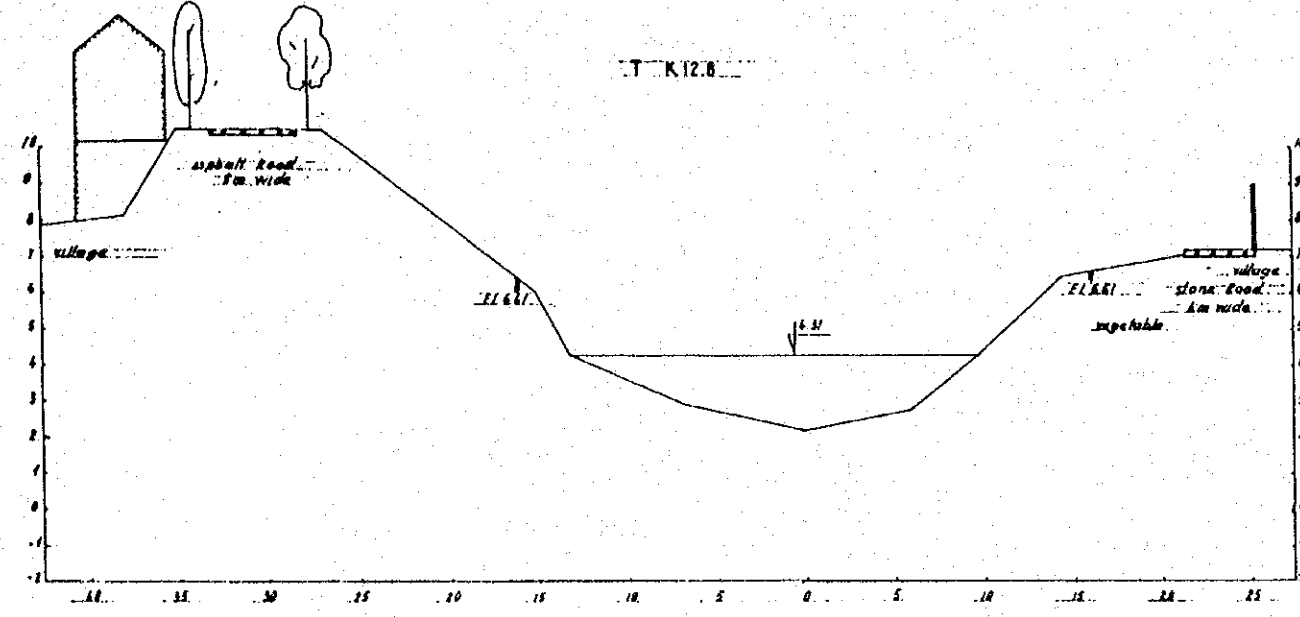
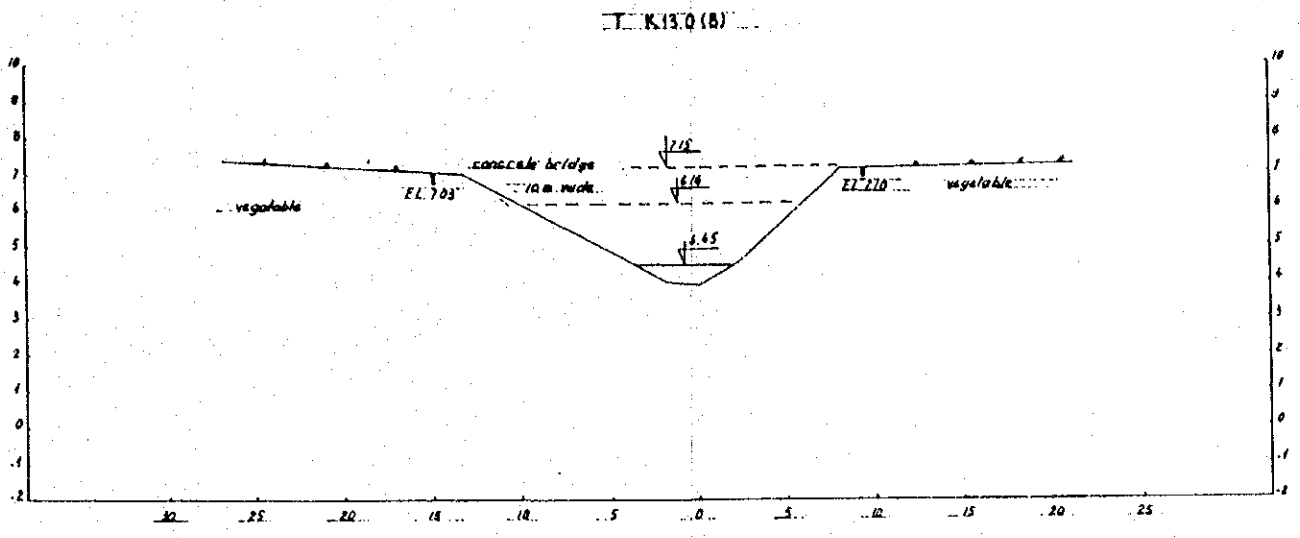
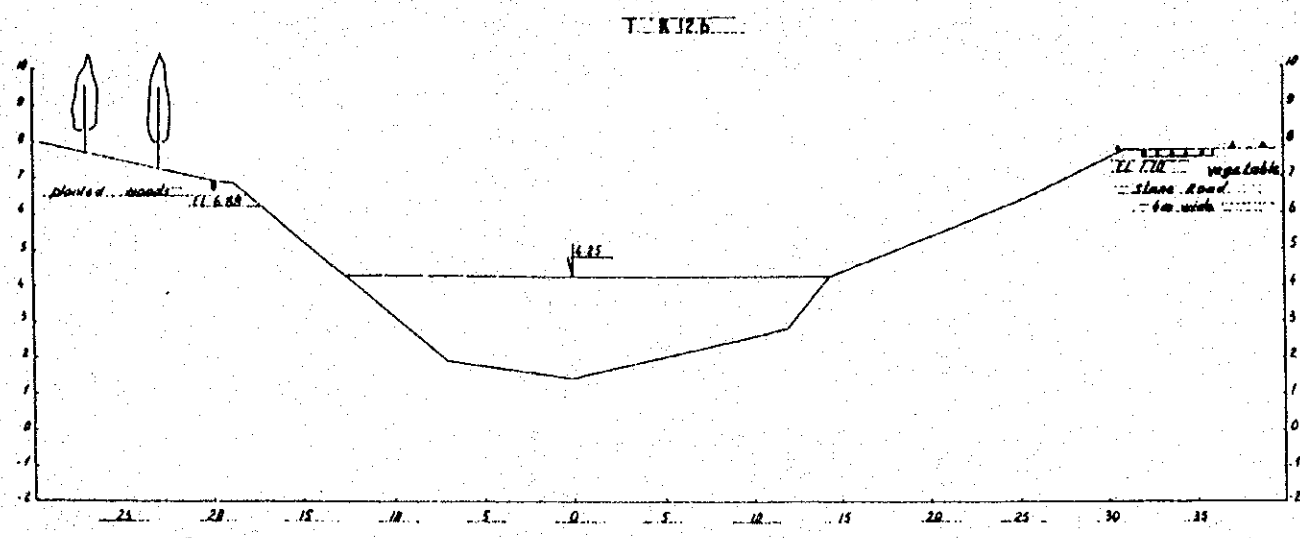
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO. & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K10.8 TO K11.2 SCALE HORIZ: 200 VERT: 100 DWG NO TC 22 / 21
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	



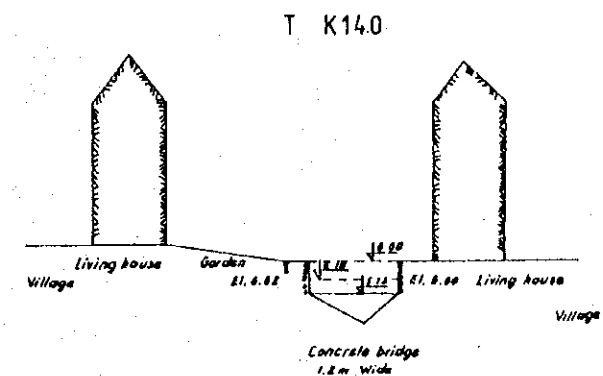
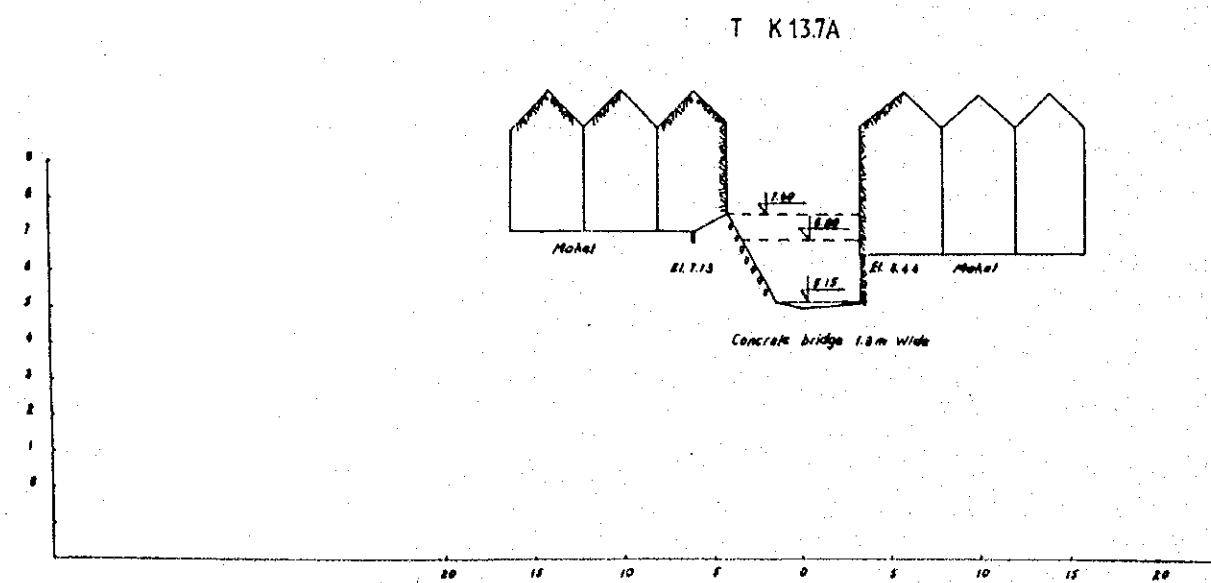
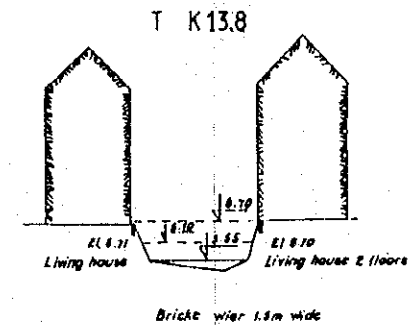
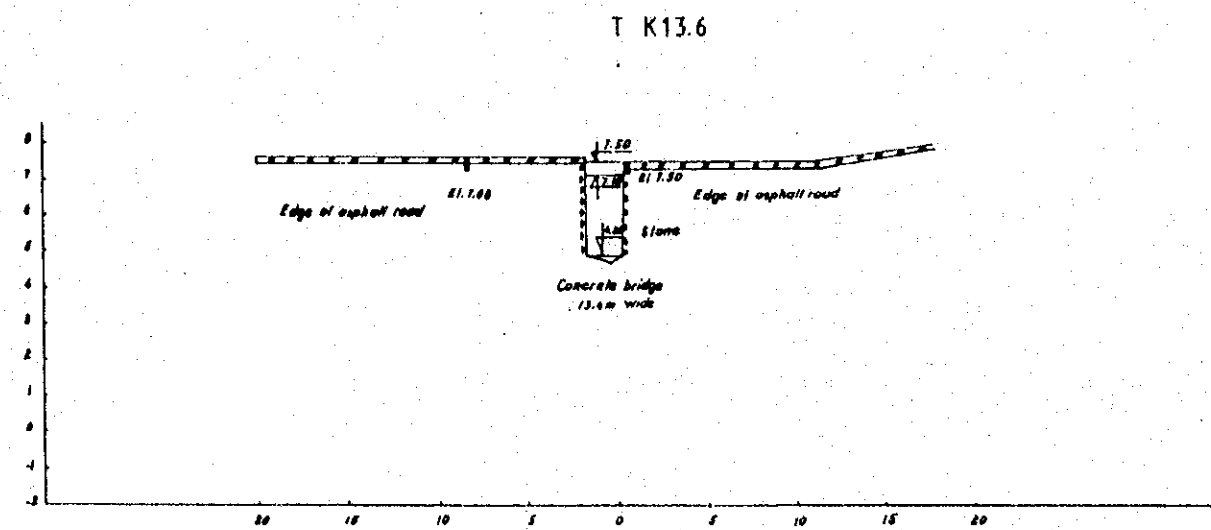
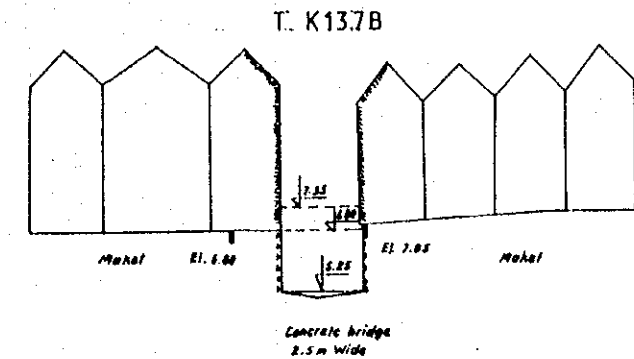
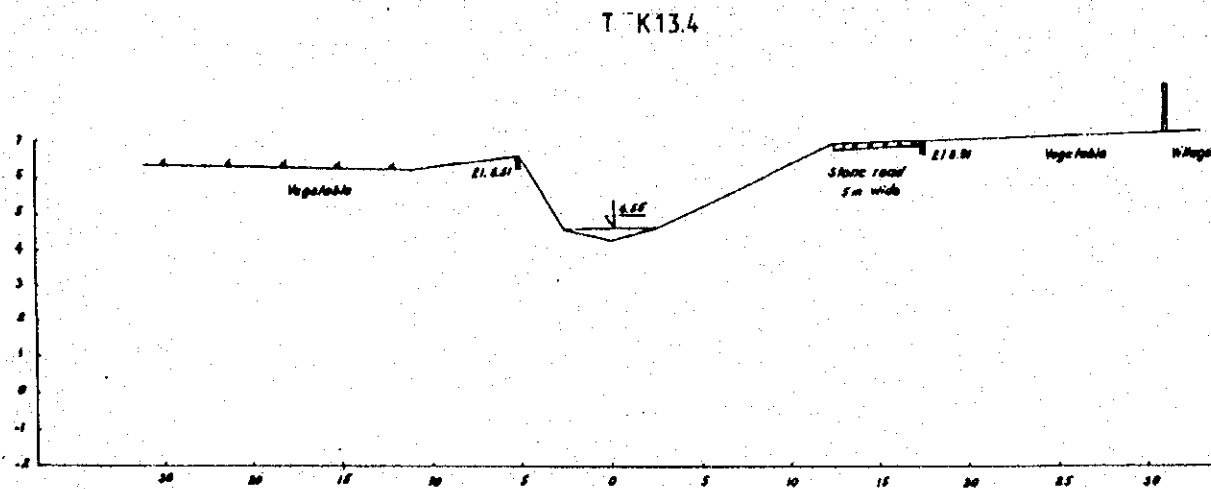
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO. & DATE	DESIGNED BY & DATE	TITLE CROSS SECTION OF TOLICH RIVER FROM K'11.4 TO K'11.8 SCALE H=1:200 V=1:100 DWG NO TC 23 / 27
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	



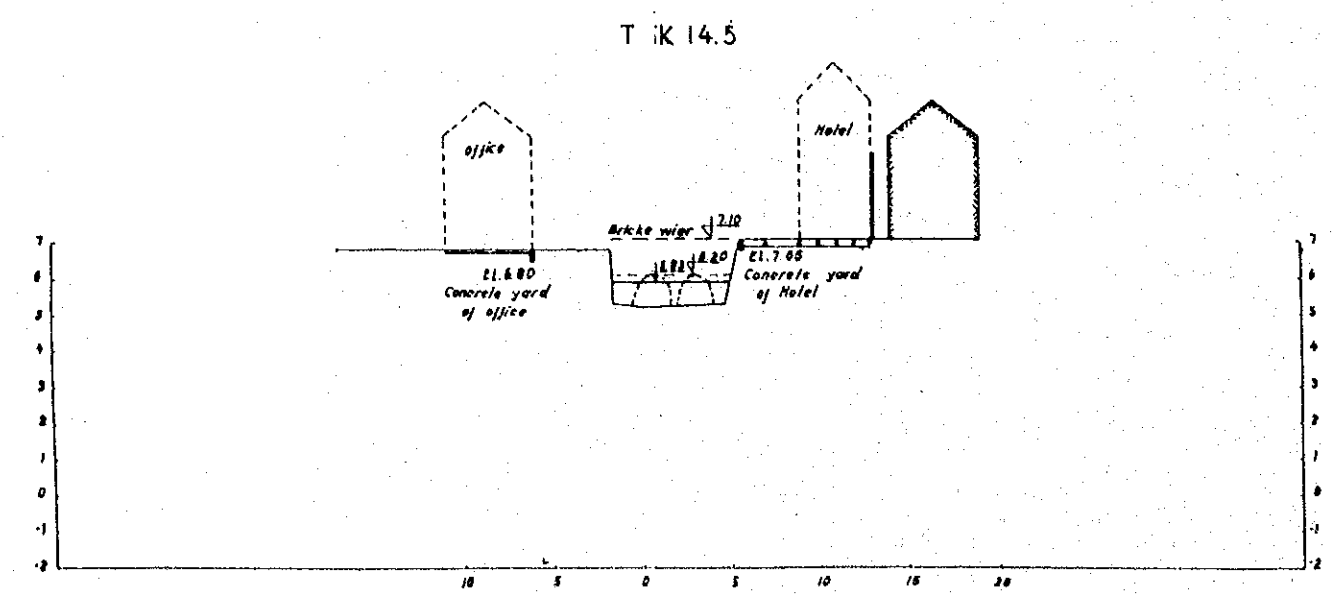
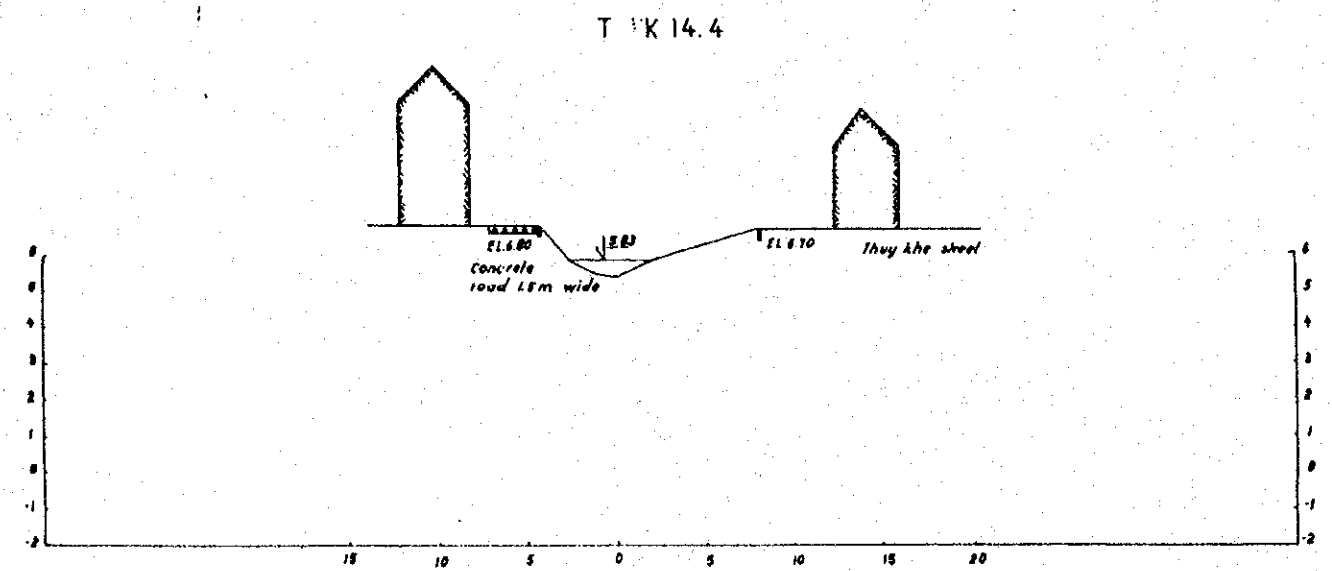
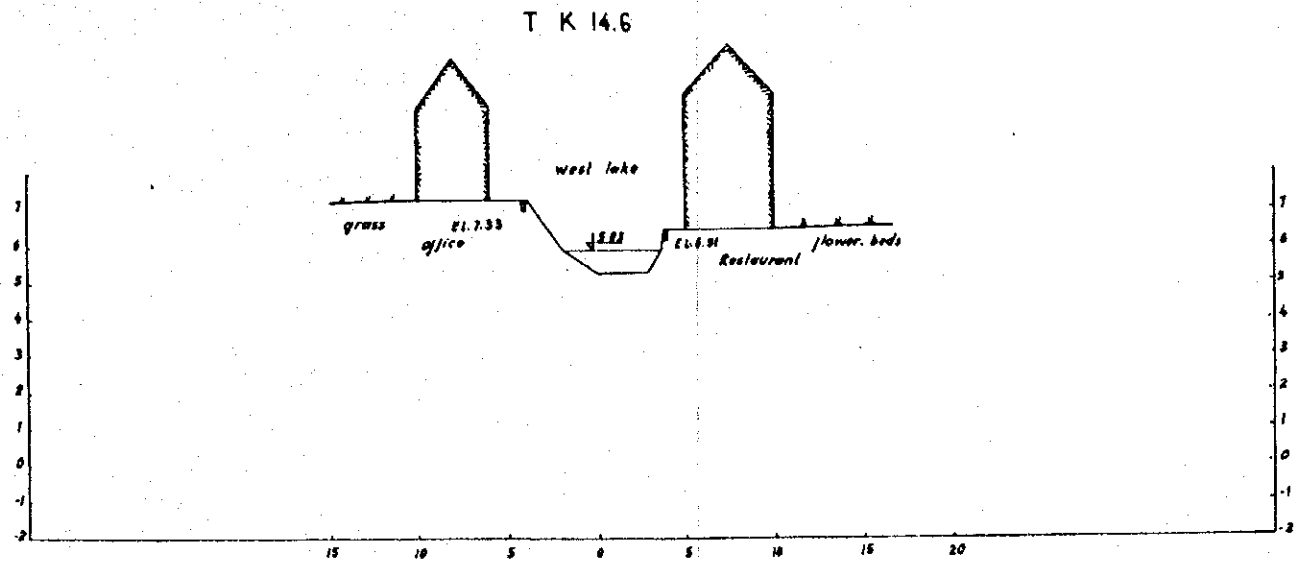
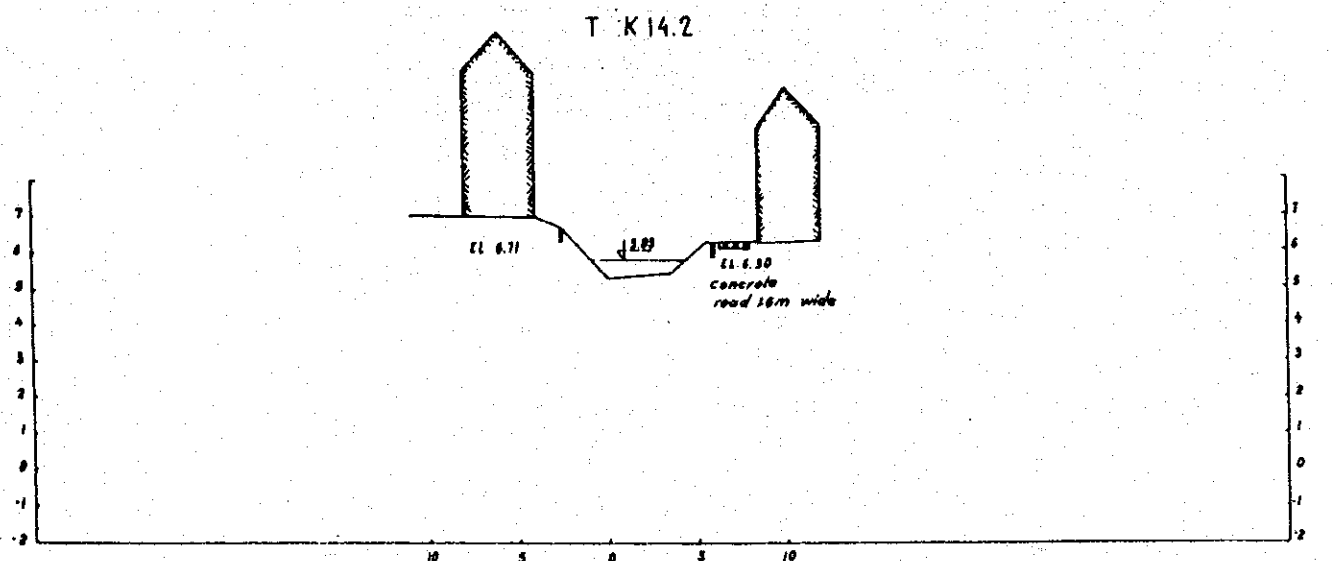
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE		TITLE CROSS SECTION OF TOLICH RIVER FROM K12.0 TO K12.4 SCALE H=1:200 V=1:100 DWG NO TC 24 / 27
		DRAWN BY & DATE		
		CHECKED BY & DATE		
		APPROVED BY & DATE		



SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO. & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K12.6 TO K13.2 SCALE H=1:200 V=1:100 DWG. NO. TC 25 / 21
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

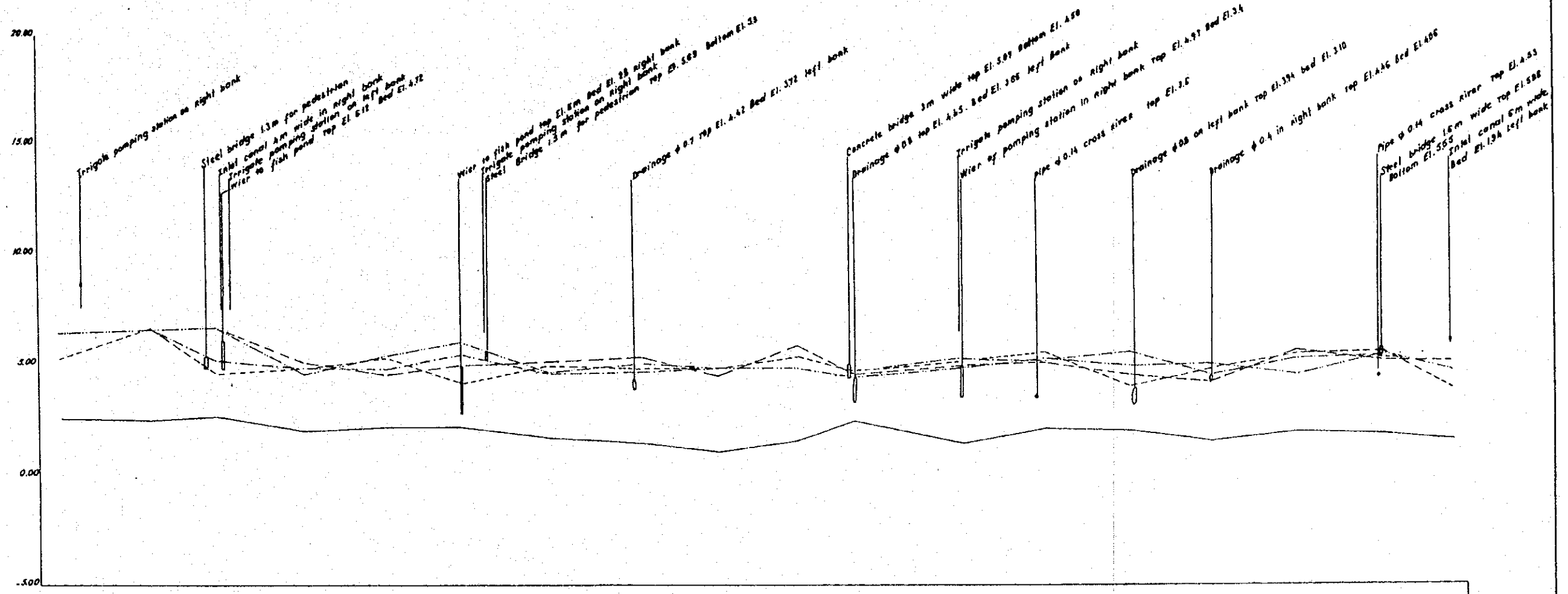


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO. & DATE	DESIGNED BY & DATE	TITLE CROSS SECTION OF TOLICH RIVER FROM K13.4 TO K14.0
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	
SCALE	H=1/200 V=1/100	DWG NO	TC 26/27



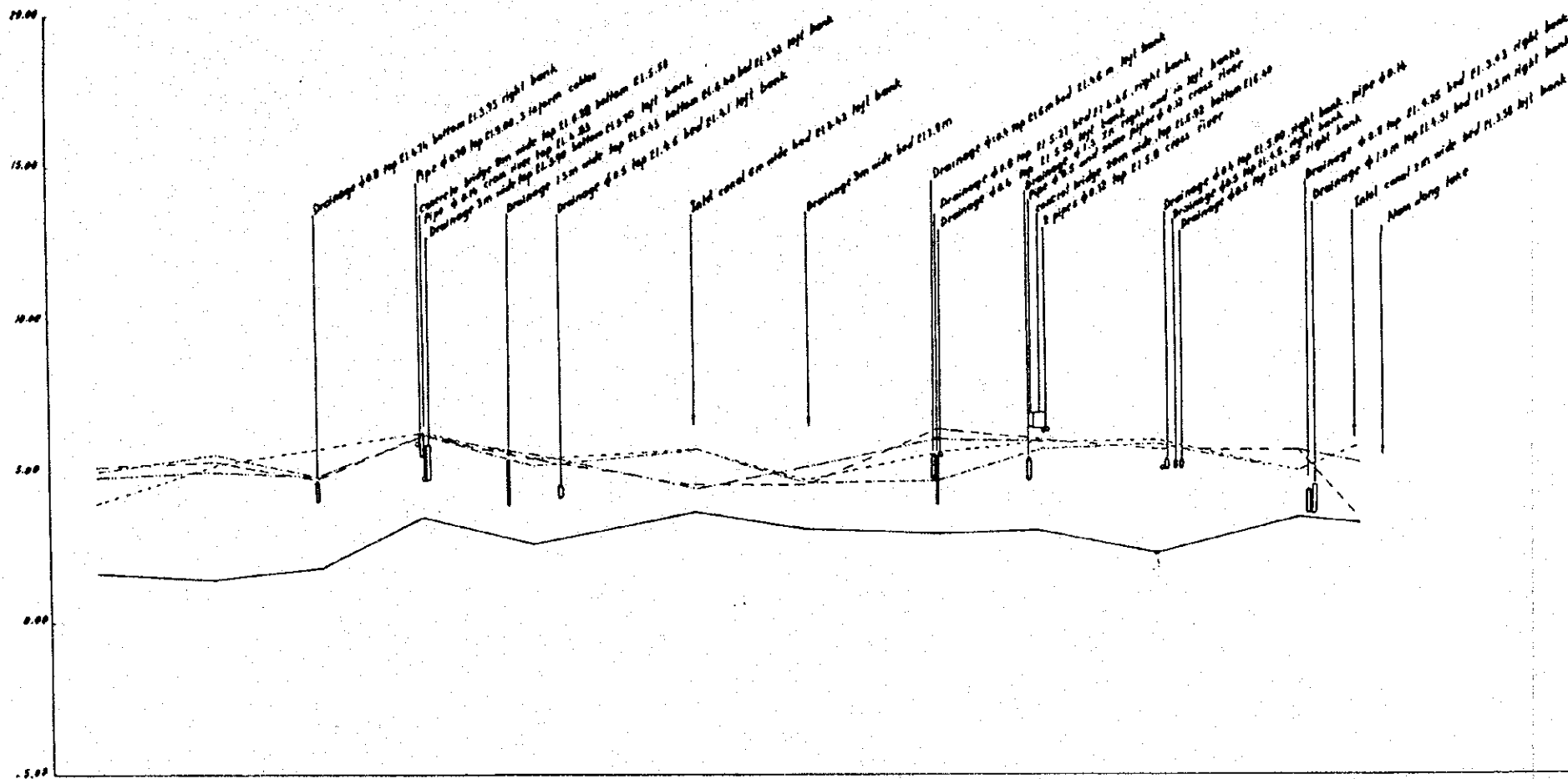
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO. & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF TOLICH RIVER FROM K 14.2 TO WEST LAKE SCALE H = 1:200 V = 1:100 DWG NO TC 21 / 21
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

2. Longitudinal and Cross Sections of Lu River



DESIGN DIKE CROWN		
DESIGN HIGH WATER		
DESIGN RIVER BED		
EXISTING DIKE CROWN	RIGHT	5.30 6.85 5.18 4.85 4.72 5.42 4.81 4.67 4.81 5.31 4.64 5.27 5.16 5.32 4.54 5.27 5.41 5.82
	LEFT	6.46 6.62 6.74 4.60 5.44 6.05 4.85 5.08 4.88 4.83 4.45 4.83 5.30 4.93 5.01 4.57 5.50 4.80
EXISTING LAND SIDE GROUND	RIGHT	5.30 6.45 4.62 4.88 5.32 4.20 4.96 4.87 4.88 5.33 4.79 5.17 5.54 4.02 4.80 5.50 5.60 5.90
	LEFT	6.46 6.62 6.74 5.11 4.08 5.00 5.14 5.35 4.80 5.85 4.58 4.95 5.11 4.50 4.22 5.70 5.19 5.15
EXISTING RIVER BED		-2.58 -2.52 -2.66 -1.99 -2.22 -2.70 -1.78 -1.47 -1.08 -1.53 -2.46 -1.44 -2.10 -2.00 -1.65 -1.91 -1.82 -1.60
ACCUMULATIVE DISTANCE		0.00 205.16 355.36 560.12 752.62 921.44 1125.91 1342.26 1521.37 1702.38 1838.47 2089.97 2285.65 2482.26 2660.46 2868.41 3072.49 3233.87
DISTANCE		00.00 205.16 355.36 560.12 752.62 921.44 1125.91 1342.26 1521.37 1702.38 1838.47 2089.97 2285.65 2482.26 2660.46 2868.41 3072.49 3233.87
SECTION NO		L K 00 L K 02 L K 04 L K 06 L K 08 L K 10 L K 12 L K 14 L K 16 L K 18 L K 20 L K 22 L K 24 L K 26 L K 28 L K 30 L K 32 L K 34

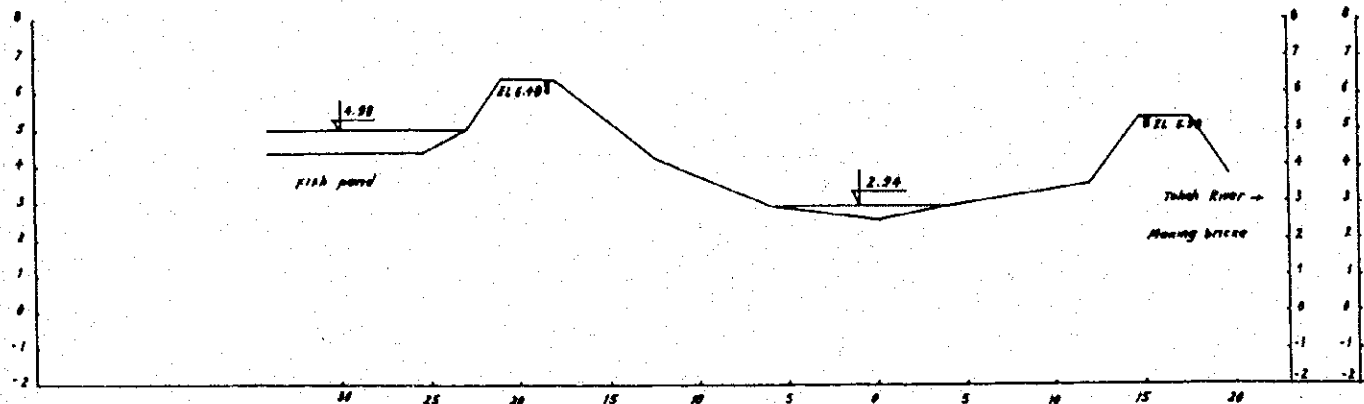
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE LONGITUDINAL SECTION OF LU RIVER FROM K00 TO K34 SCALE H = 1:5000 V = 1:100 DWG NO 44/1/2
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	



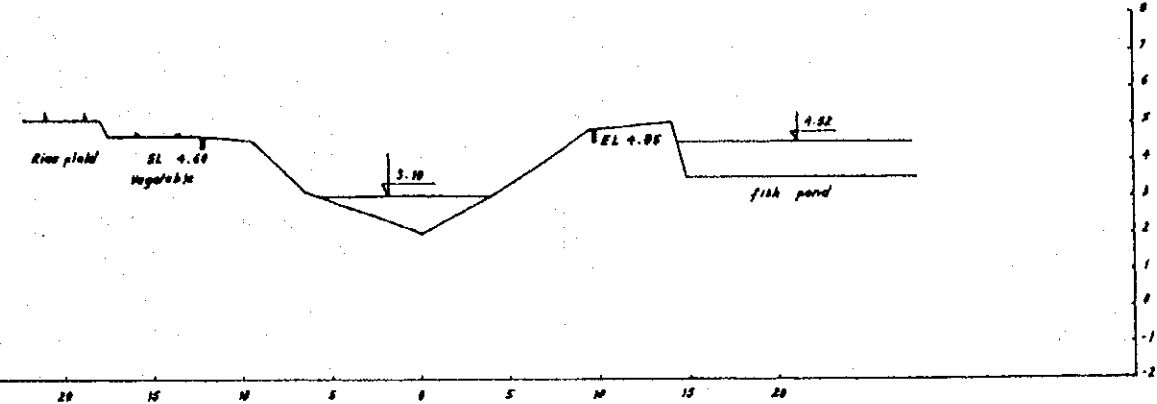
DESIGN DIKE CROWN														
DESIGN HIGH WATER														
DESIGN RIVER BED														
EXISTING DIKE CROWN	RIGHT	5.04	5.58	6.75	6.20	5.25	5.75	6.60	6.03	5.70	5.82	6.97	5.75	
	LEFT	4.00	5.00	4.87	6.20	5.00	4.42	5.13	5.95	6.82	5.18	6.42	5.28	
EXISTING LAND SIDE GROUND	RIGHT	6.00	6.20	6.76	6.79	6.43	5.75	6.69	6.60	5.82	6.98	6.97	5.75	
	LEFT	5.18	5.37	6.75	6.20	6.45	4.54	4.50	6.31	6.83	5.66	6.63	4.60	
EXISTING RIVER BED		-1.00	-1.58	-1.75	-3.48	-2.17	-3.68	-3.88	-2.90	-3.84	-2.24	-2.43	-4.88	
ACCUMULATIVE DISTANCE		320.97	342.86	355.27	377.25	395.27	424.02	440.97	464.02	489.24	499.46	579.56	607.16	
DISTANCE		161.89	194.02	197.22	176.54	188.02	272.74	182.34	225.10	187.22	188.22	298.10	94.00	
SECTION NO		K.3.4	K.3.6	K.3.8	K.4.0	K.4.2	K.4.4	K.4.6	K.4.8	K.5.0	K.5.2	K.5.4	K.5.6	

SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOS SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE LONGITUDINAL SECTION OF LU RIVER FROM K.3.4 TO NAMDONG LAKE SCALE H=1:5000 V=1:100 DWG NO 44/2/8
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

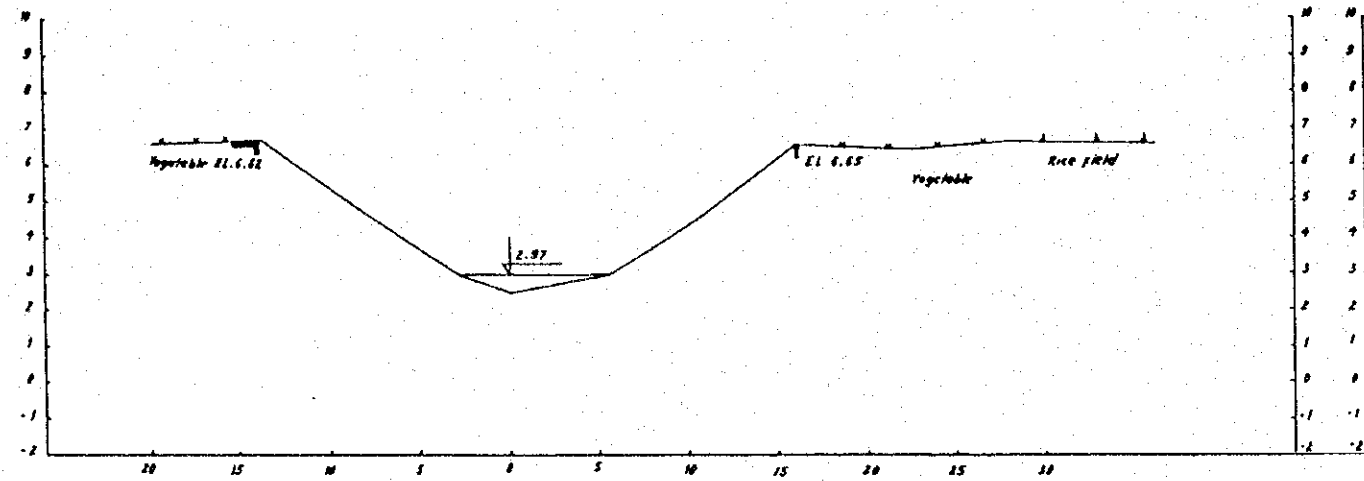
L K 0.0



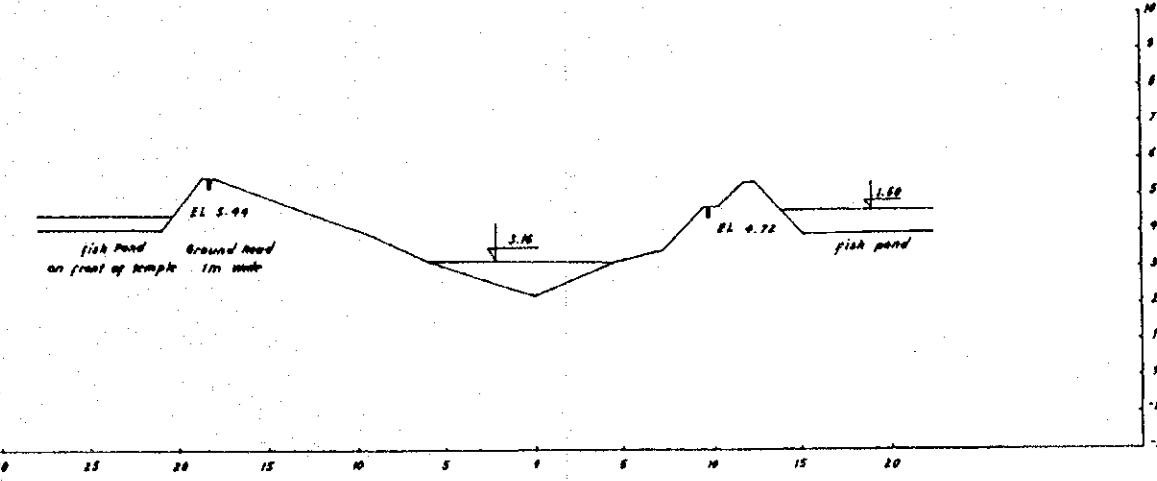
L K 0.6



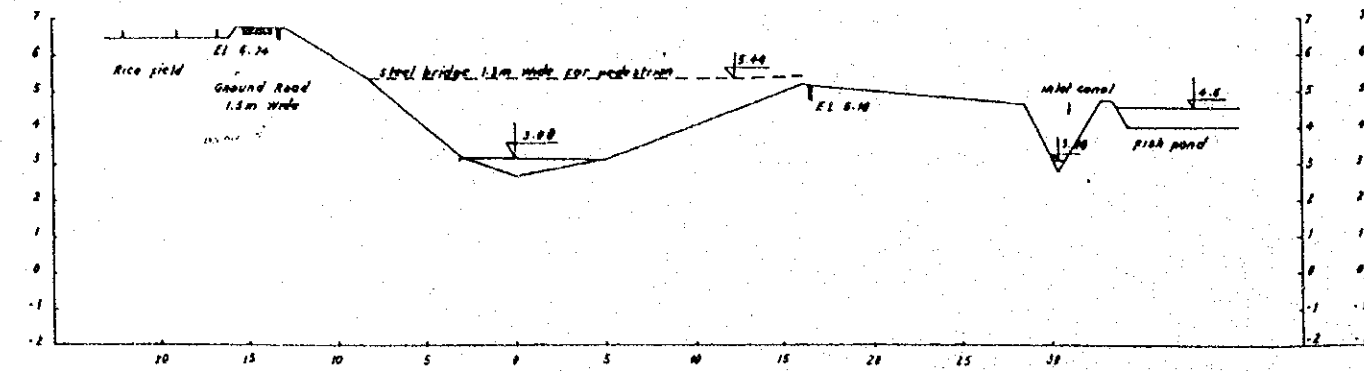
L K 0.2



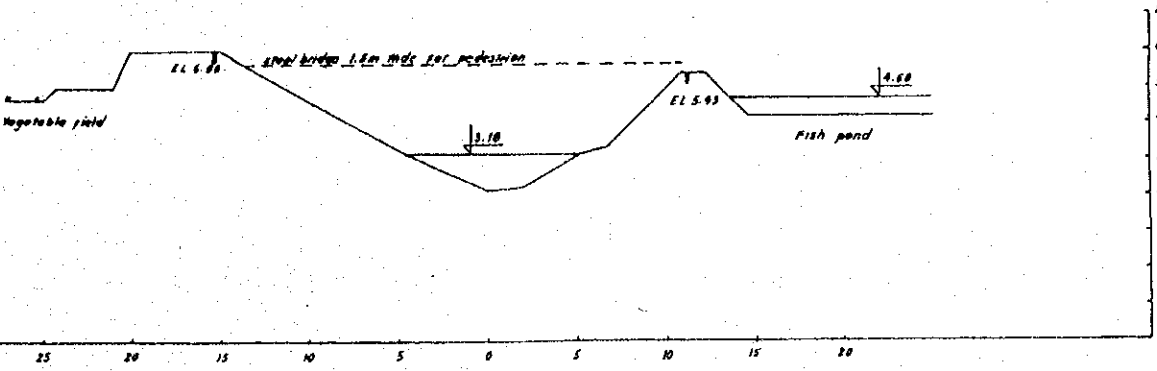
L K 0.8



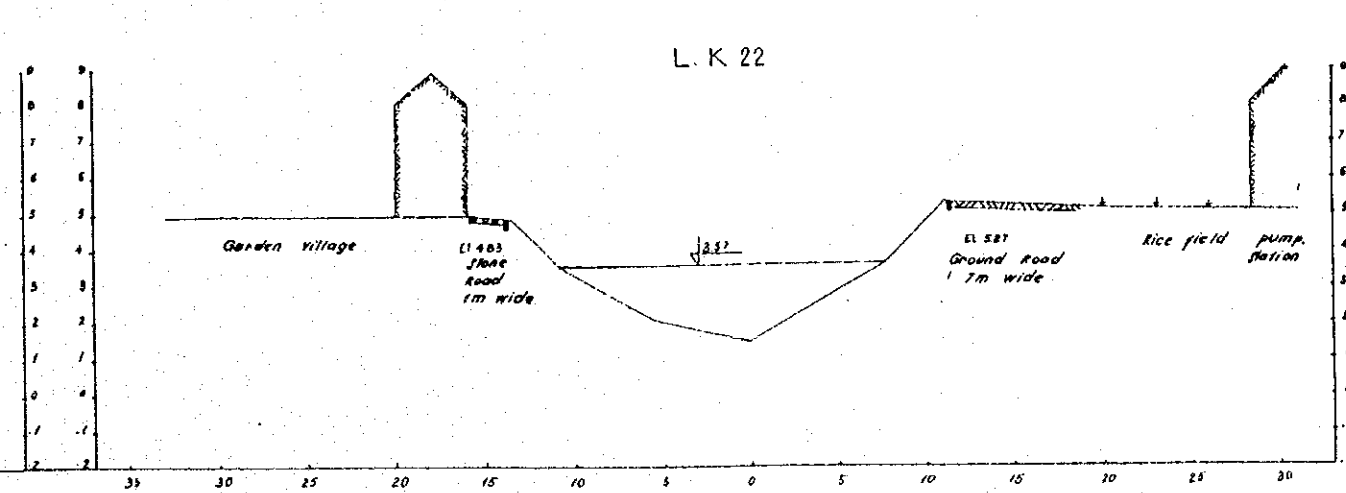
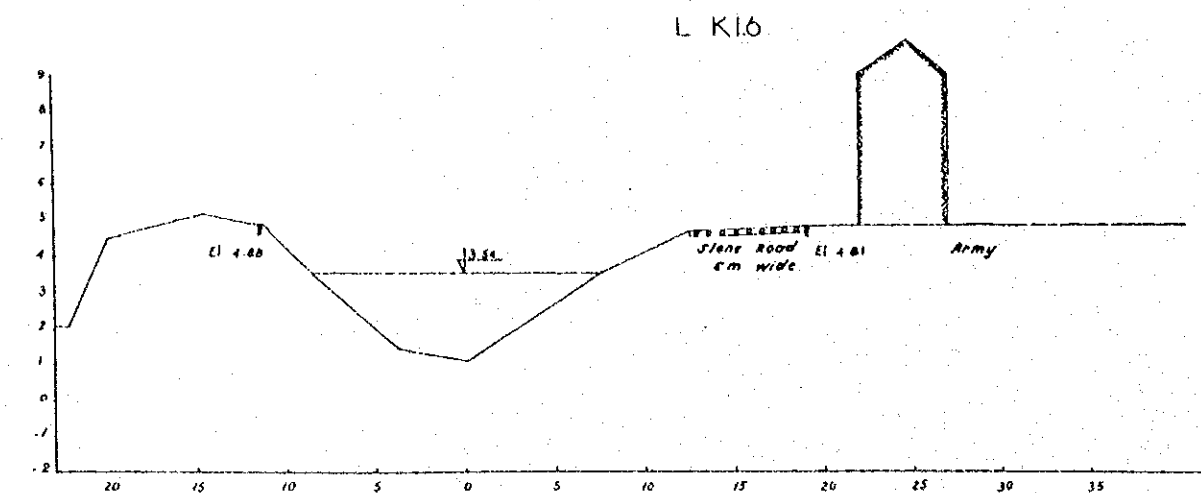
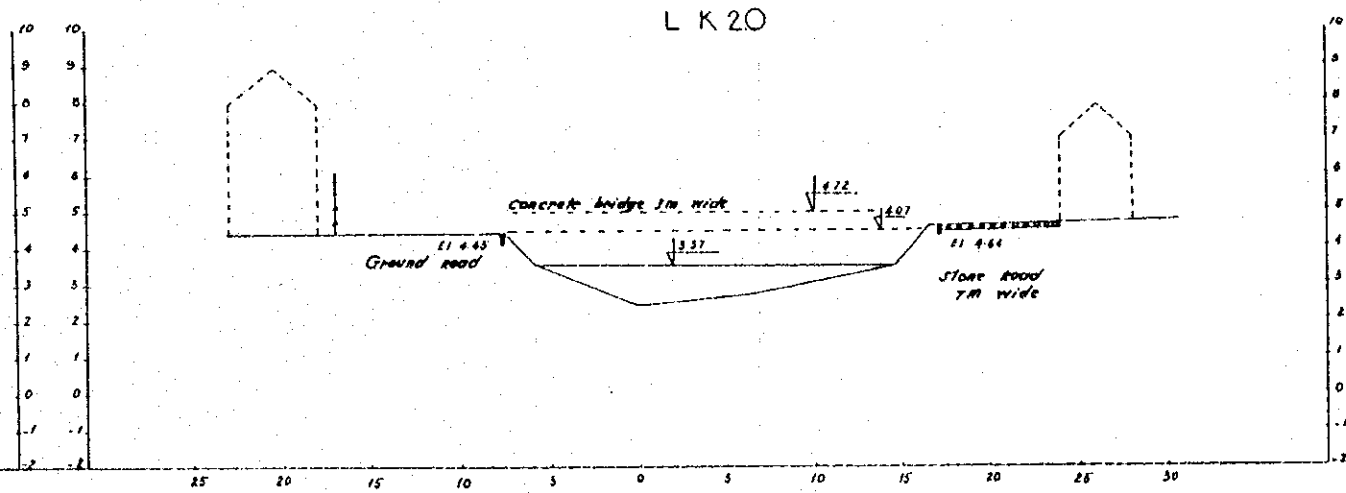
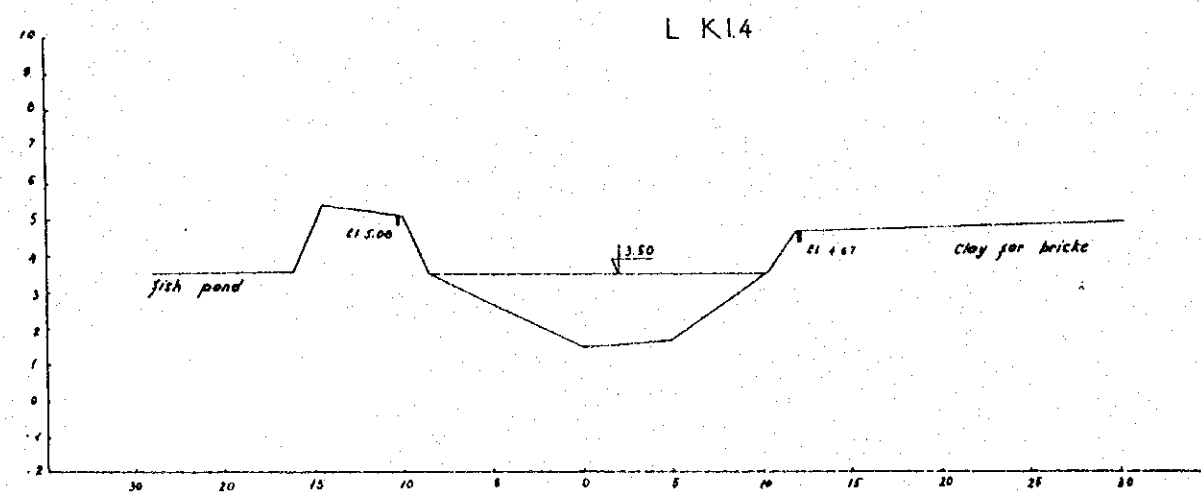
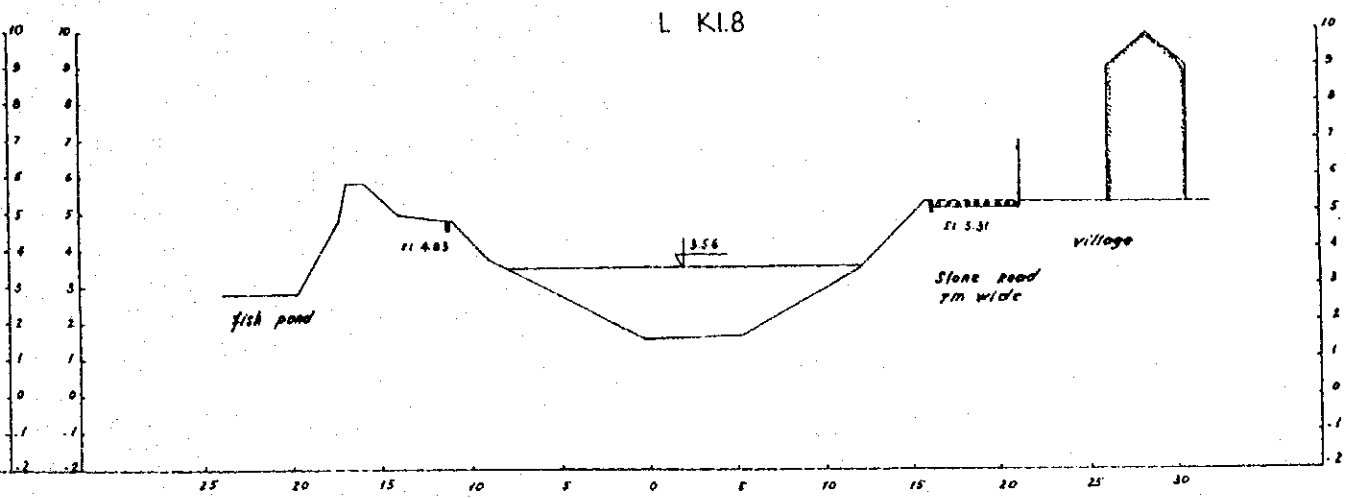
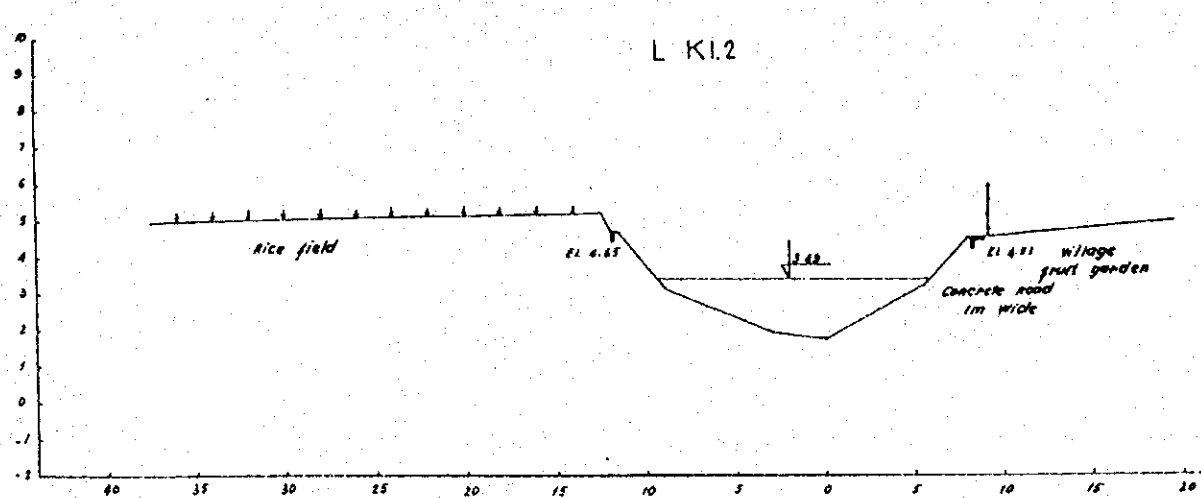
L K 0.4



L K 1.0

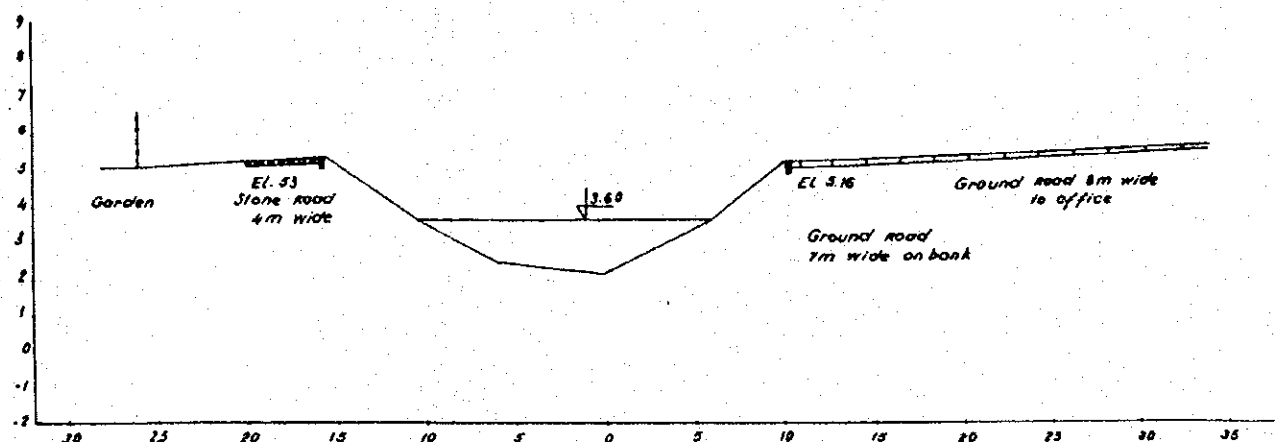


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO * DATE	DESIGNED BY * DATE	TITLE CROSS SECTION OF LU RIVER FROM K 0.0 TO K 1.0 SCALE H = 1:200 V = 1:100
		DRAWN BY * DATE	
		CHECKED BY * DATE	
		APPROVED BY * DATE	
			DWG NO LC 1/5

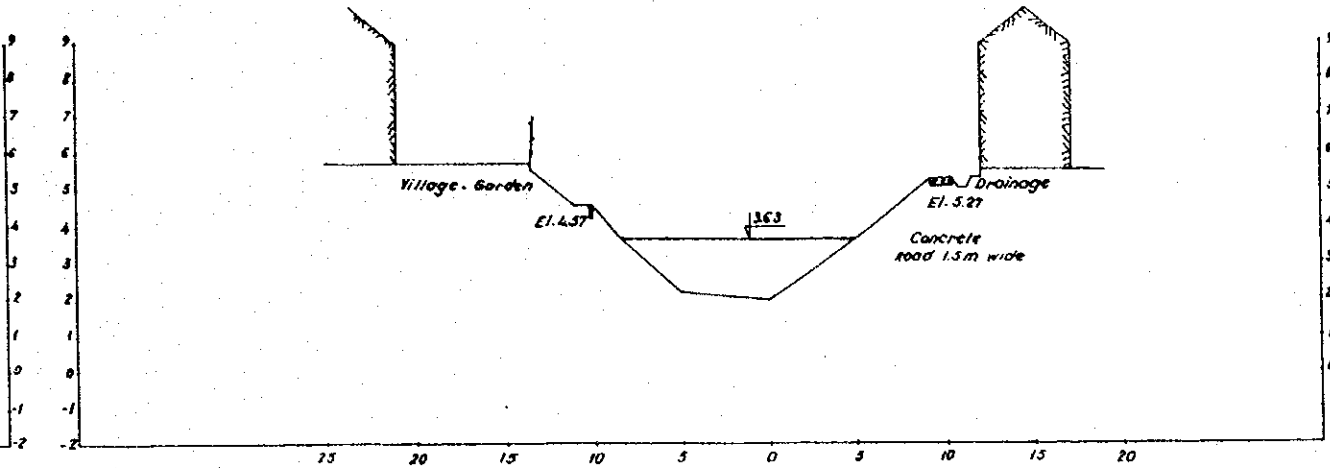


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE
		DRAWN BY & DATE	CROSS SECTIONS OF LU RIVER FROM K1.2 TO K2.2
		CHECKED BY & DATE	SCALE
		APPROVED BY & DATE	H:1:200 V:1:100
			DWG NO LC 215

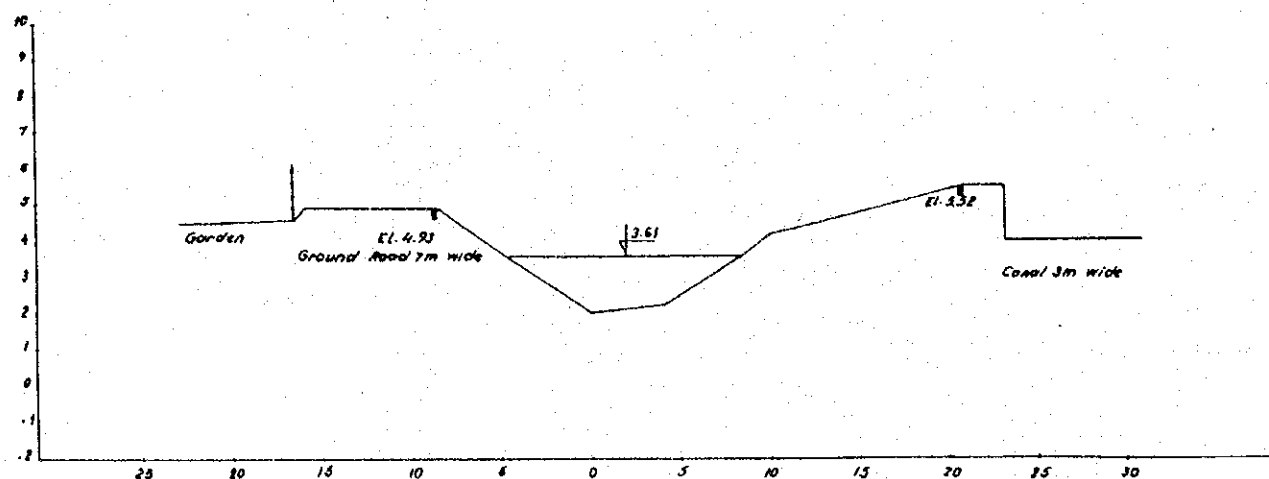
L K 24



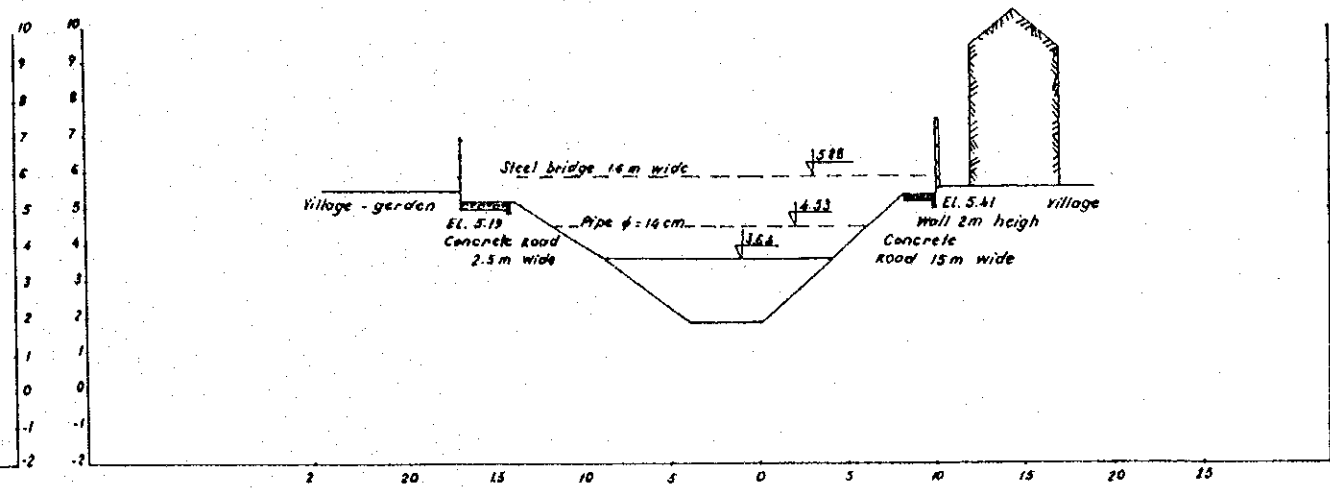
L K 30



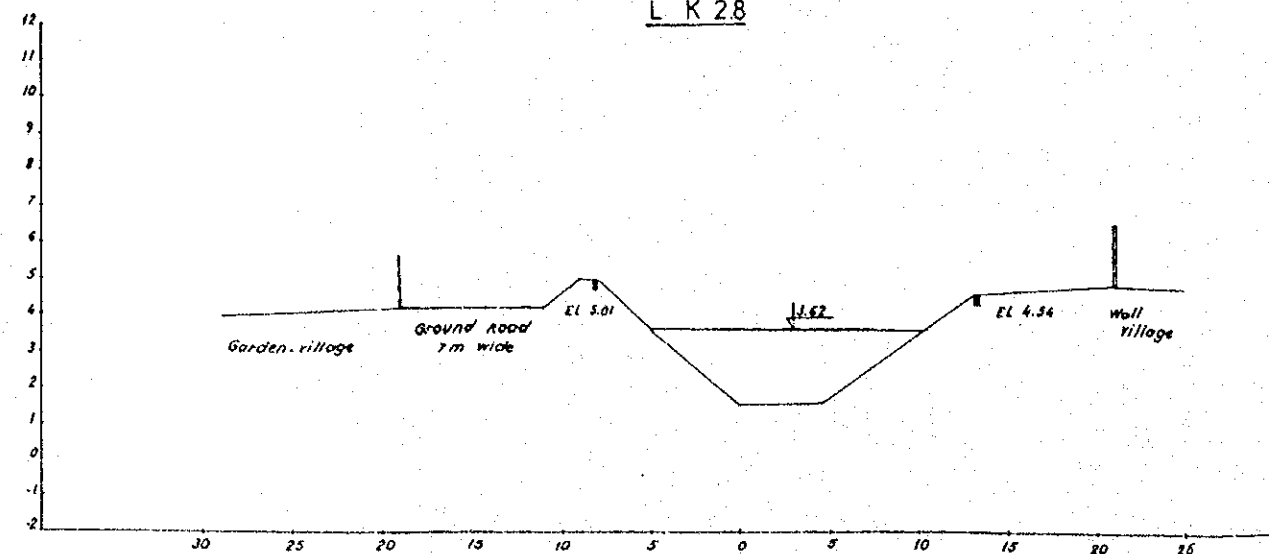
L K 26



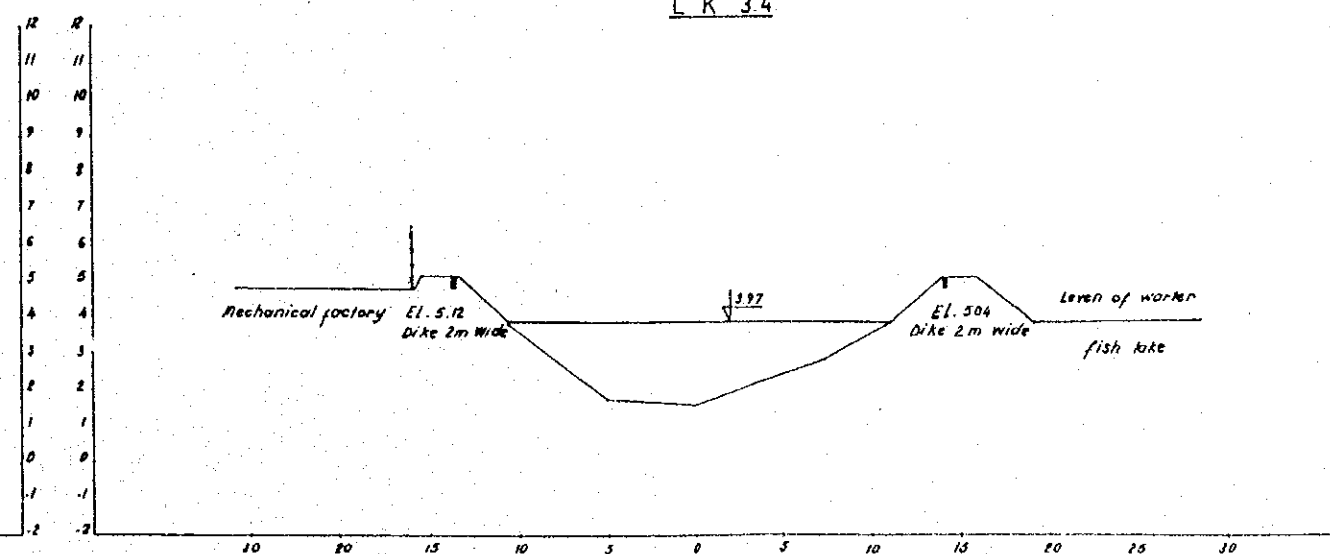
L K 32



L K 28

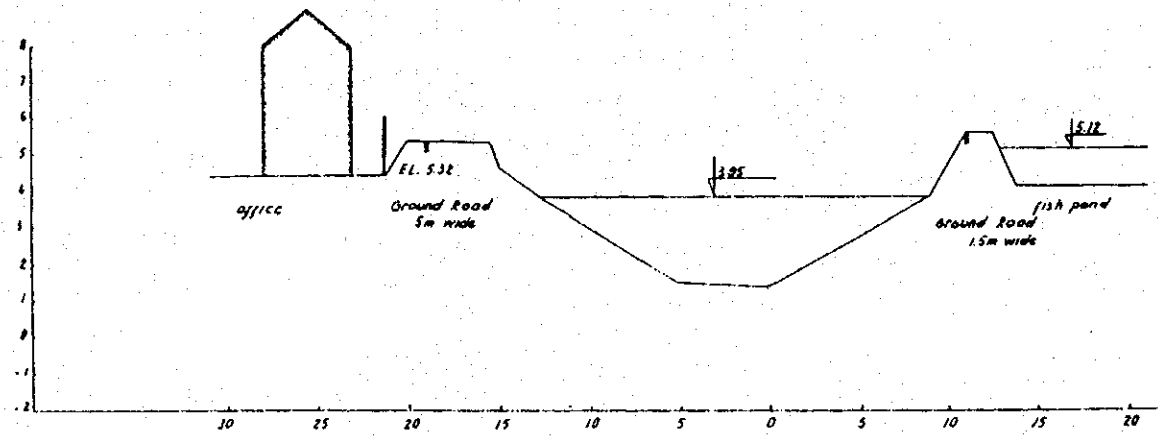


L K 34

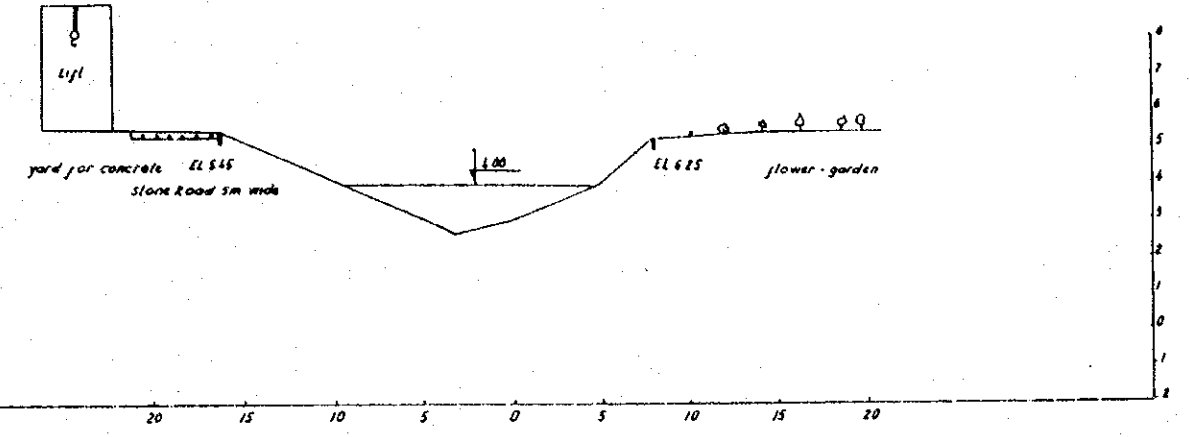


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF LU RIVER FROM K 24 TO K 34 SCALE H:1:200 V:1:100
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	
DWC NO		LC 3/8	

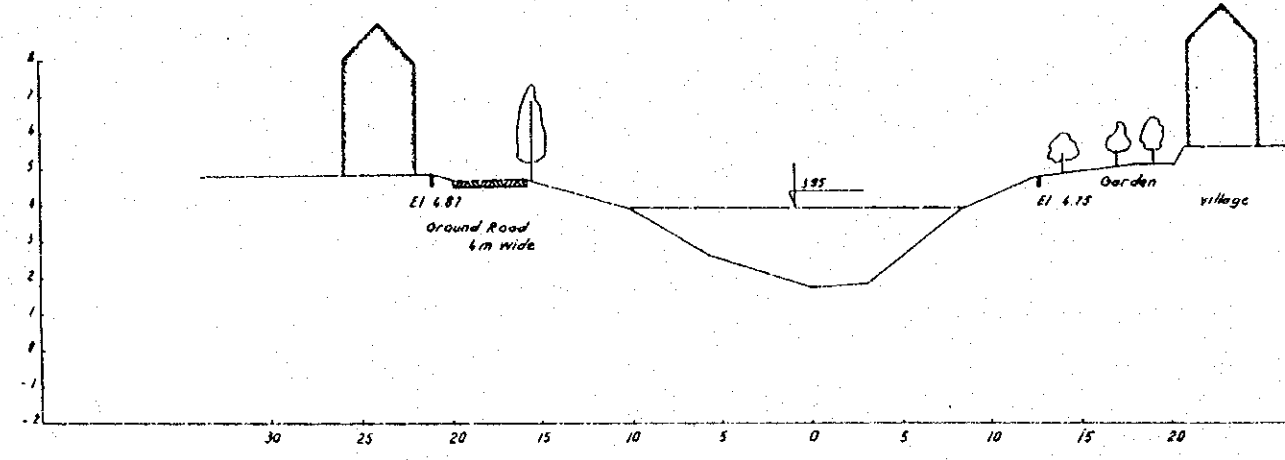
L K 3.6



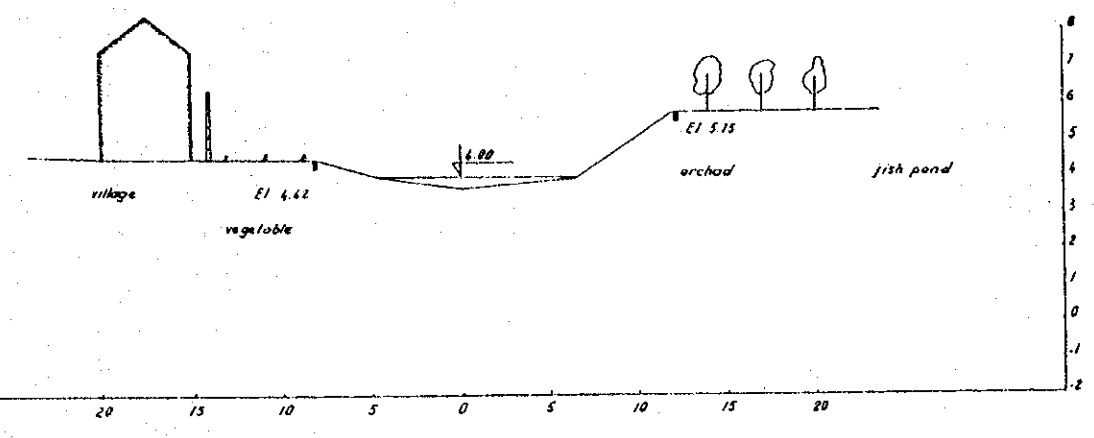
L K 4.2



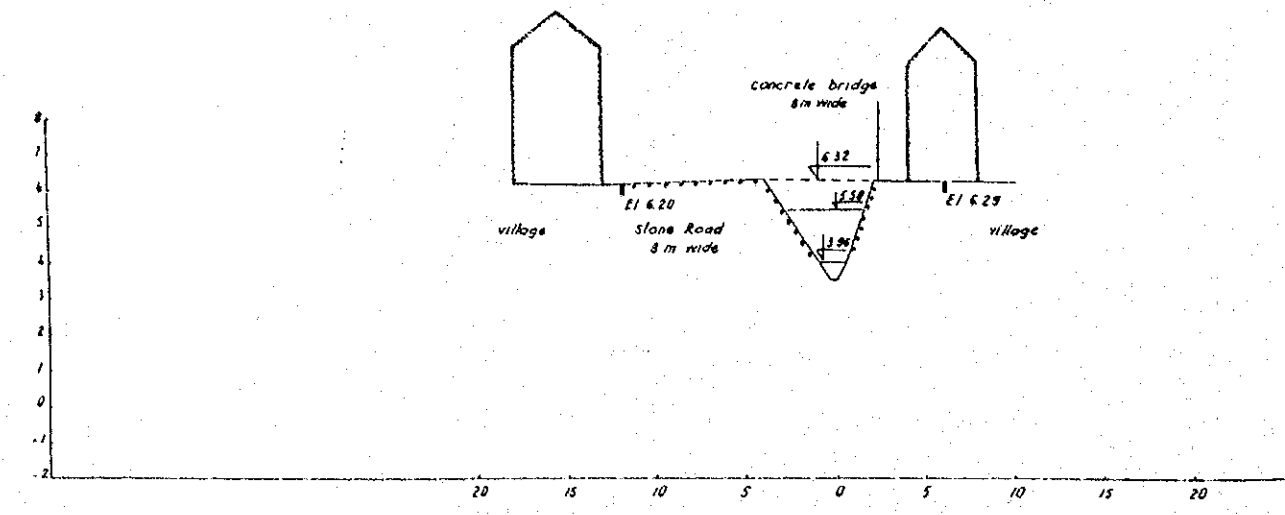
L K 3.8



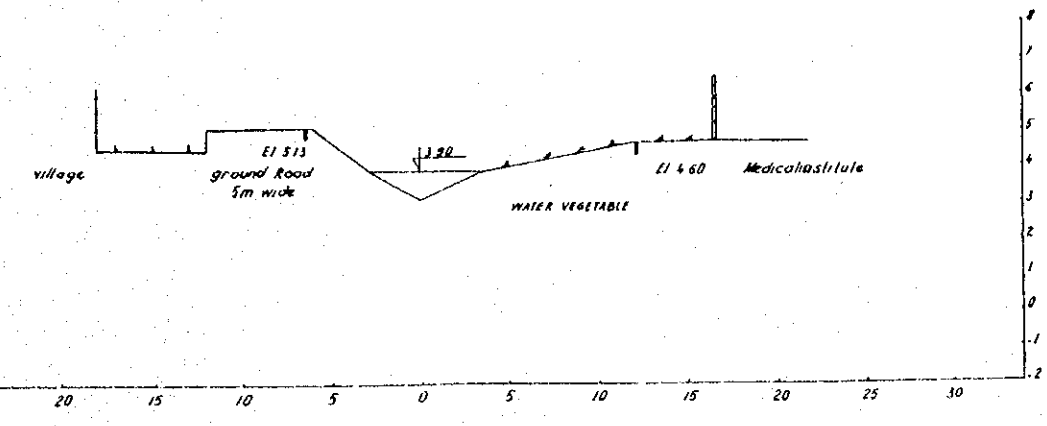
L K 4.4



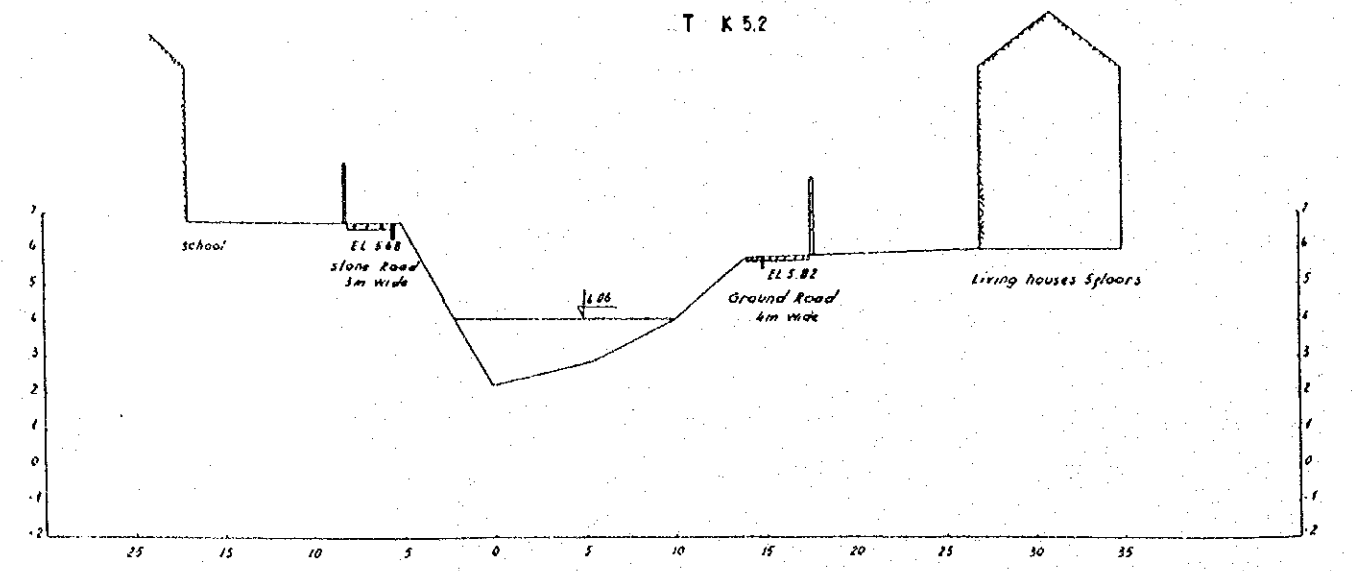
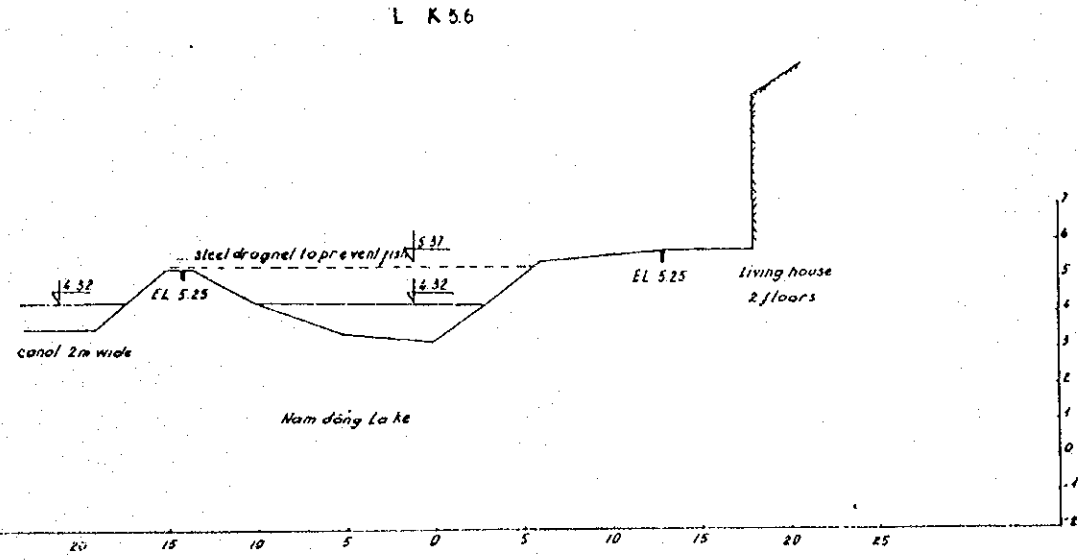
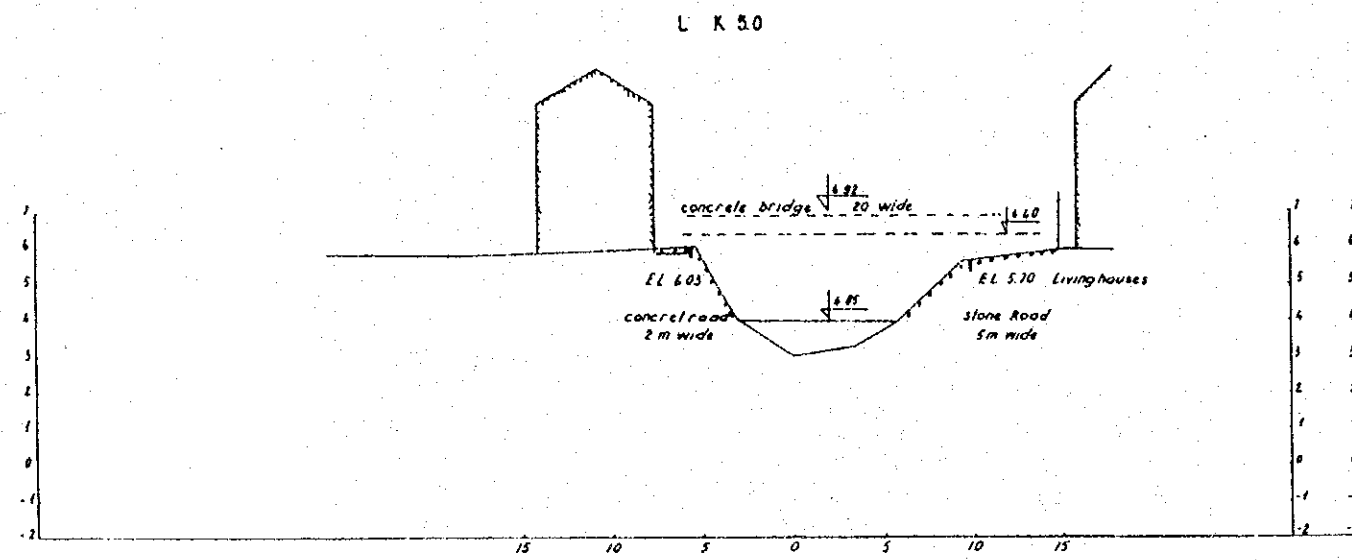
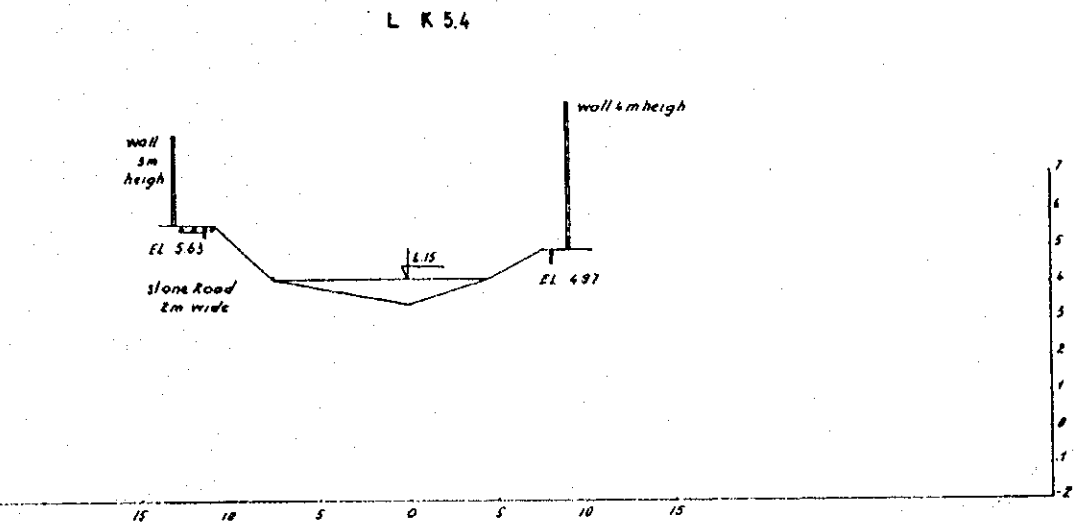
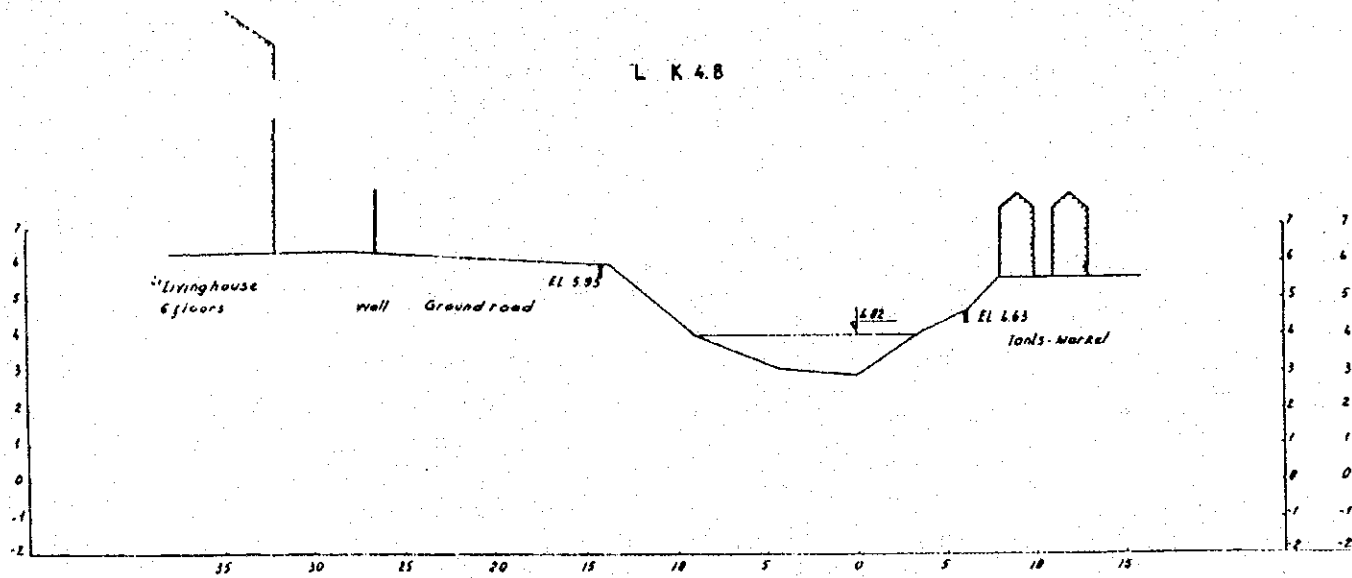
L K 4.0



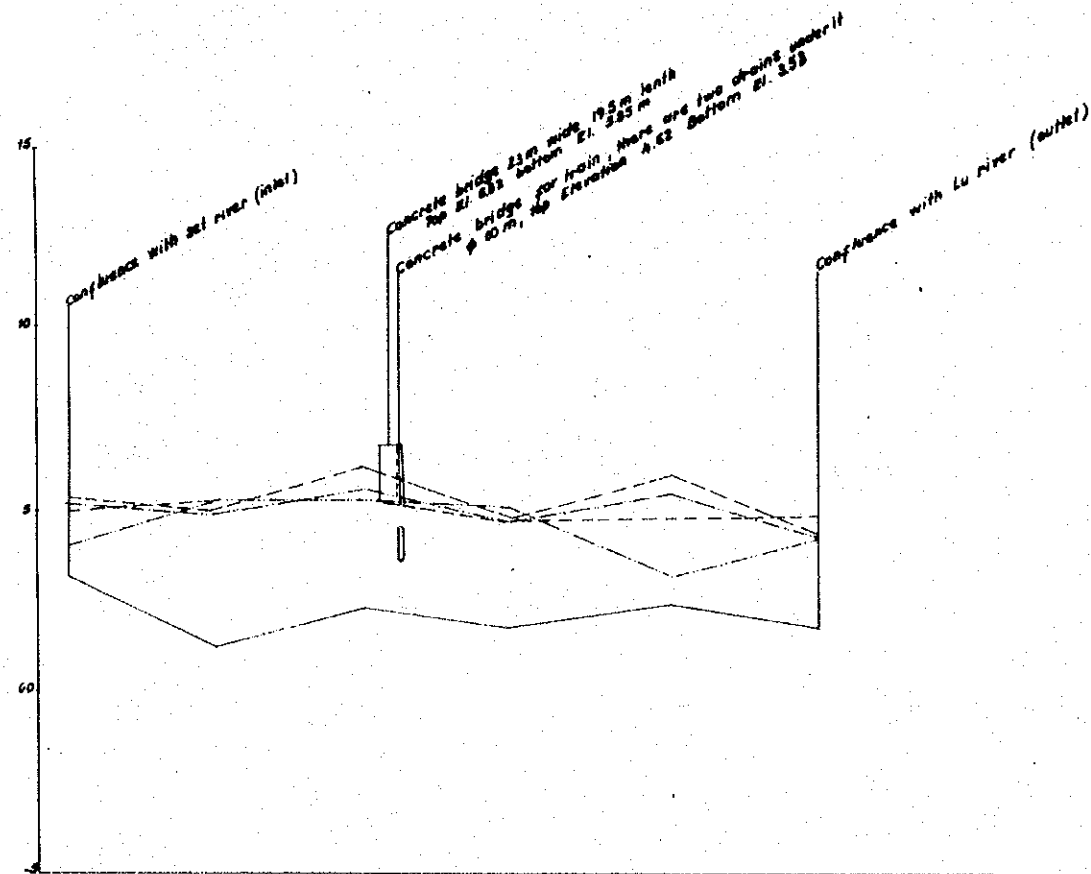
L K 4.6



<p>SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY</p>	REVISION NO & DATE	DESIGNED BY & DATE	<p>TITLE CROSS SECTIONS OF LU RIVER FROM K.36 TO K.46</p>
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	
<p>JICA JAPAN INTERNATIONAL COOPERATION AGENCY</p>			<p>SCALE H=1:200 V=1:100</p>
			<p>DWC NO LC 4/5</p>



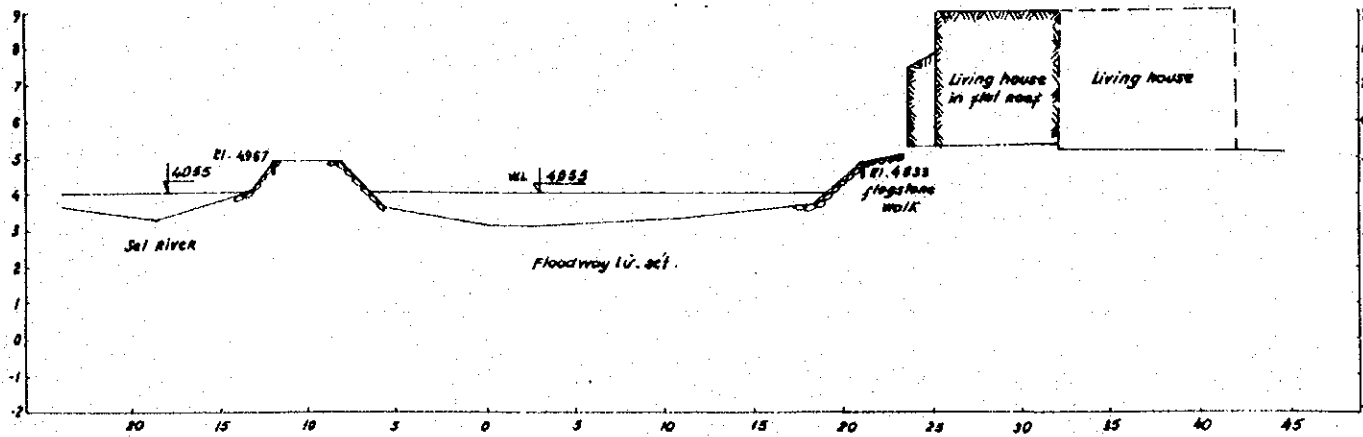
SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEM IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF LU RIVER FROM K 4.8 TO NAM DONG LA KE SCALE H= 1:200 V= 1:100 DWG NO LC 5/5
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	



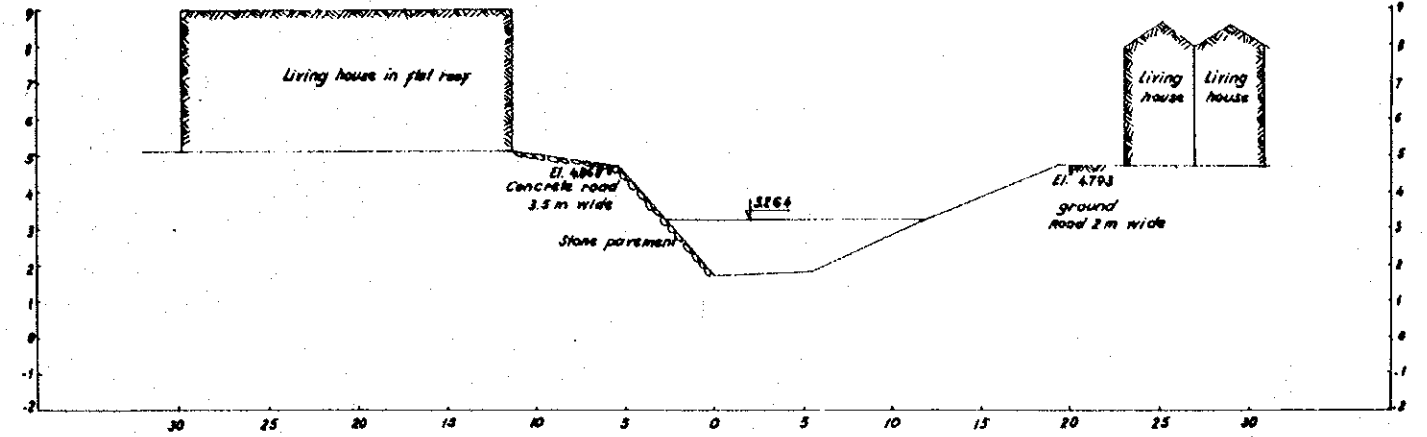
DESIGN DIKE CROWN							
DESIGN HIGH WATER							
DESIGN RIVER BED							
EXISTING DIKE CROWN	RIGHT	5.35	4.962	6.000	4.794	6.000	4.47
	LEFT	4.87	6.30	5.30	6.15	4.80	4.95
EXISTING LAND SIDE GROUND	RIGHT	5.15	4.80	5.64	4.70	4.50	4.22
	LEFT	4.08	6.30	5.33	5.15	3.10	4.30
EXISTING RIVER BED		2.78	2.57	2.802	2.89	2.401	1.786
ACCUMULATIVE DISTANCE		00.00	200.00	406.00	611.00	840.00	1046.00
DISTANCE			200.00	206.00	208.00	229.00	286.00
SECTION NO		FL 100	FL 102	FL 104	FL 106	FL 08	FL 10

SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION	NO	DATE	DESIGNED BY	DATE	TITLE LONGITUDINAL OF LU-SET FLOODWAY SCALE H:1:5000, V:1:100 DWG NO. FL.L.1/1
				DRAWN BY	DATE	
				CHECKED BY	DATE	
				APPROVED BY	DATE	

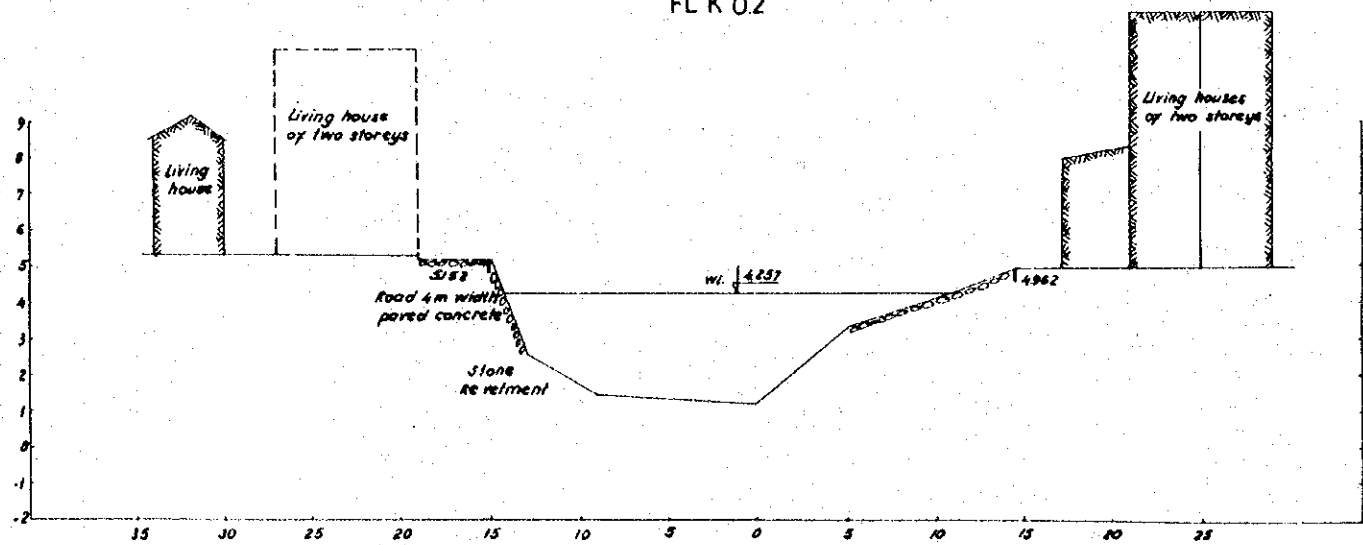
FL K 00



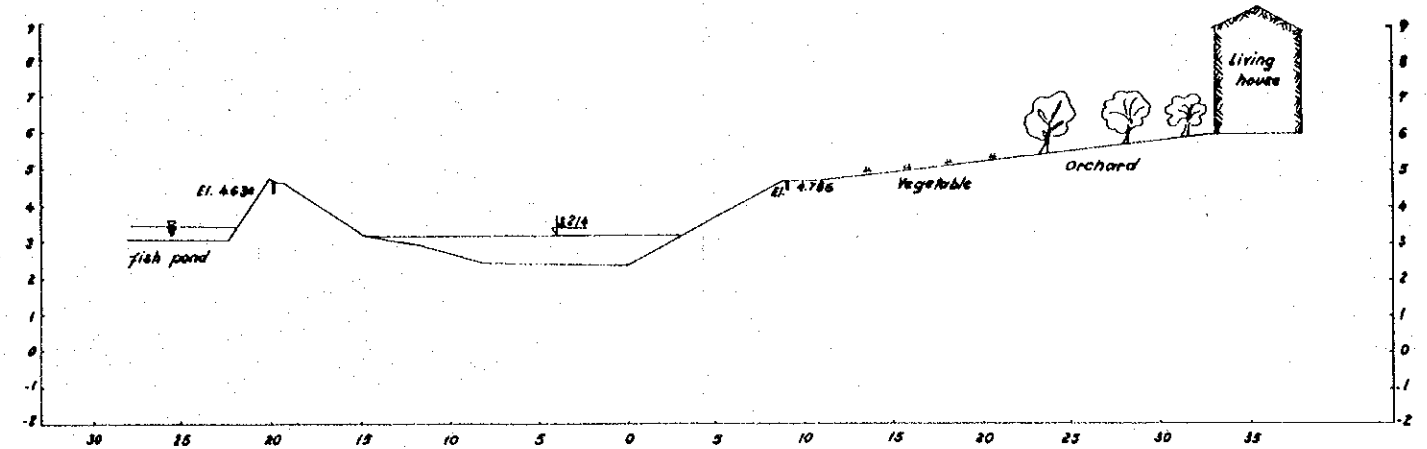
FL K 06



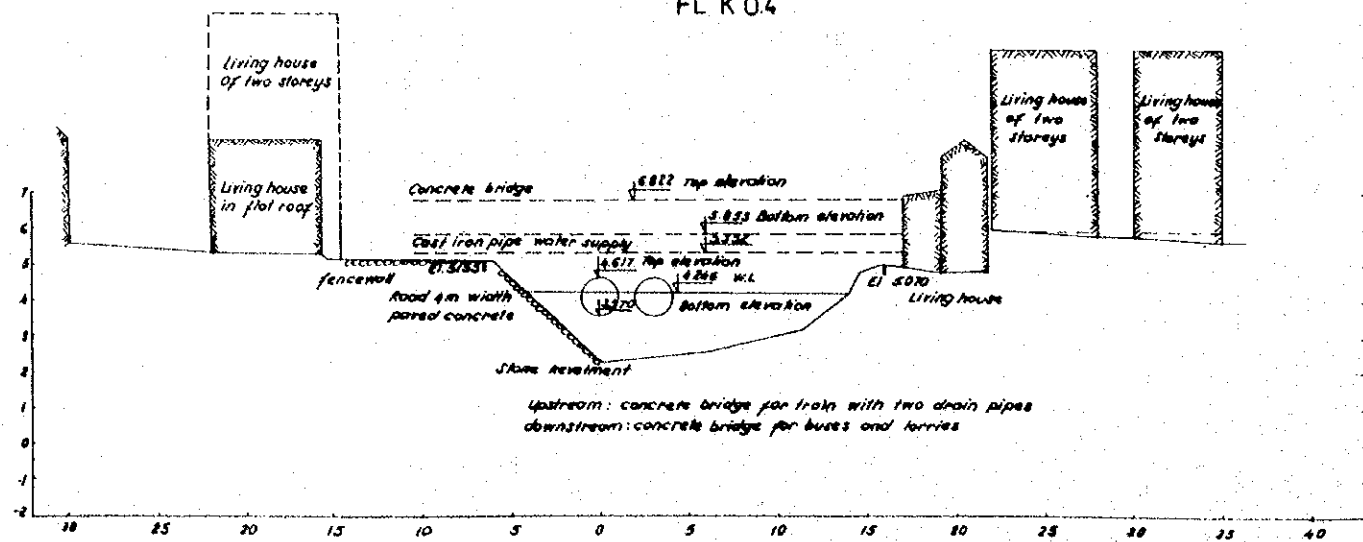
FL K 02



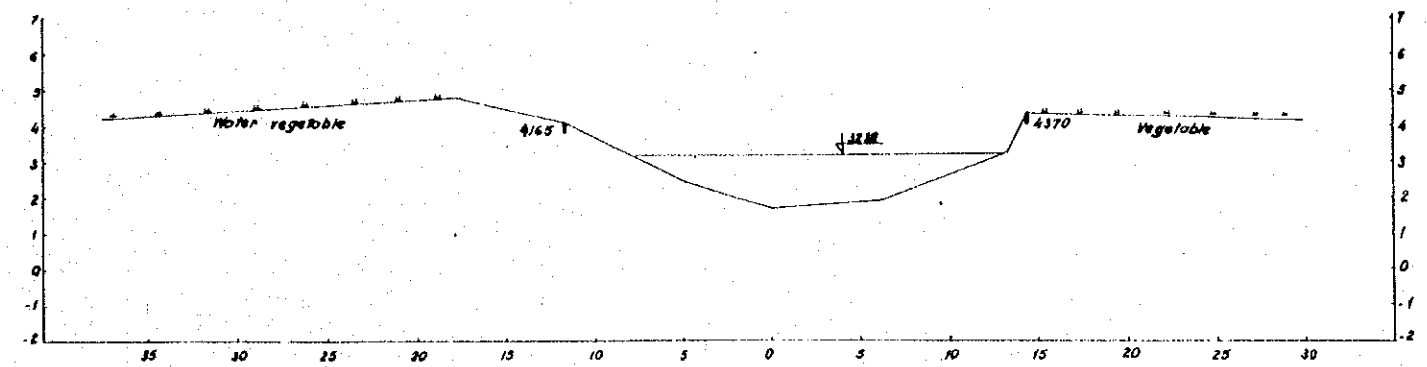
FL K 08



FL K 04

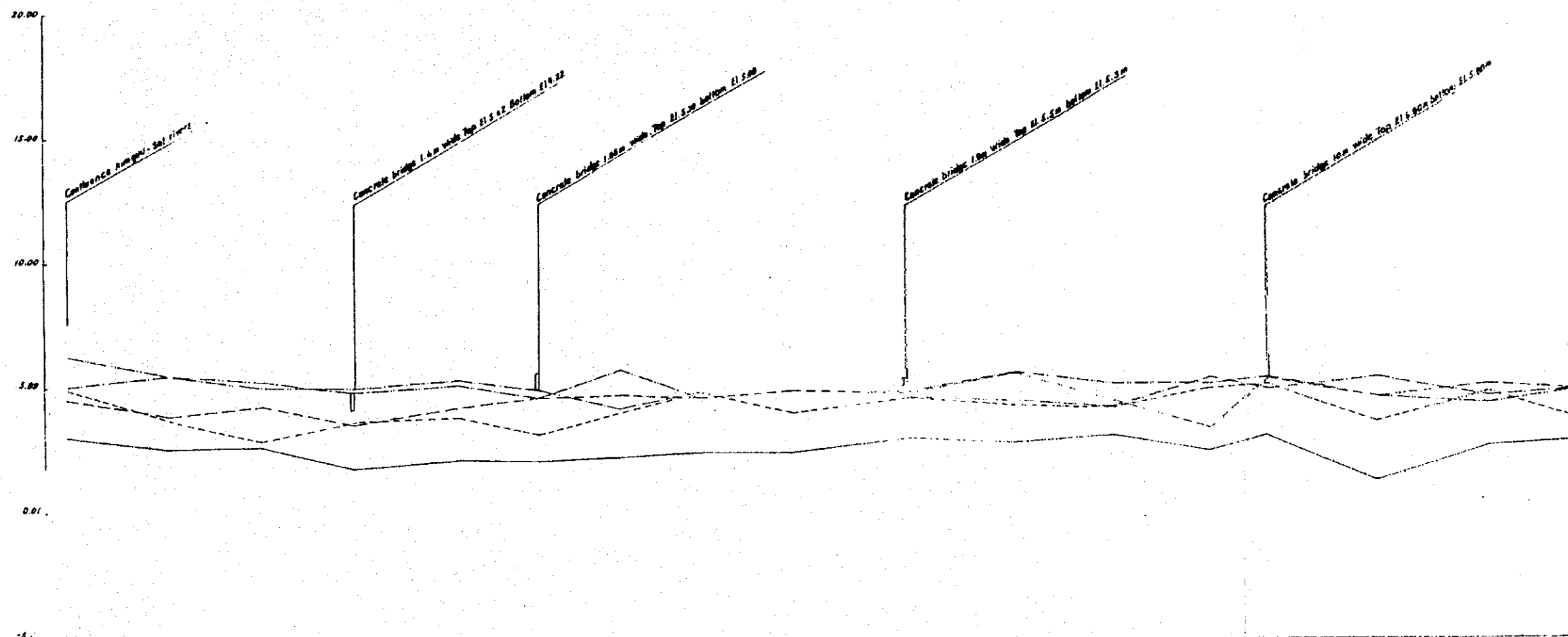


FL K 10



SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTION OF LU-SET FLOODWAY FIK00-F1 K10 SCALE H 1:200 ; V 1:100 DWG NO FL-C-1/1
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

3. Longitudinal and Cross Sections of Set River



DESIGN DIKE CROWN		
DESIGN HIGH WATER		
DESIGN RIVER BED		
EXISTING DIKE CROWN	RIGHT	5.45 5.50 5.40 5.05 5.35 5.01 4.25 4.93 4.10 4.75 4.1 4.25 5.35 4.45 5.05
	LEFT	6.25 5.50 5.30 4.80 5.15 4.67 5.77 4.70 5.05 4.85 5.24 4.27 5.35 5.54 5.67
EXISTING LAND SIDE GROUND	RIGHT	4.30 3.70 2.70 3.70 3.80 3.20 4.40 4.80 4.15 4.71 4.40 4.35 5.20 5.67 5.05
	LEFT	4.50 3.80 4.30 3.60 4.30 4.70 4.80 4.70 5.02 4.90 4.70 4.80 5.30 5.28 5.10
EXISTING RIVER BED		3.00 2.70 2.70 1.80 2.50 2.15 2.30 2.60 2.50 2.70 2.80 2.80 2.80 2.40 2.85
ACCUMULATIVE DISTANCE		0.00 207.48 407.04 589.24 803.97 972.12 1139.35 1310.05 1501.55 1702.82 1902.82 2102.82 2302.82 2502.82 2702.82
DISTANCE		0.00 207.48 407.04 589.24 803.97 972.12 1139.35 1310.05 1501.55 1702.82 1902.82 2102.82 2302.82 2502.82 2702.82
SECTION NO		S K0.0 S K0.2 S K0.4 S K0.6 S K0.8 S K1.0 S K1.2 S K1.4 S K1.6 S K1.8 S K2.0 S K2.2 S K2.4 S K2.6 S K2.8

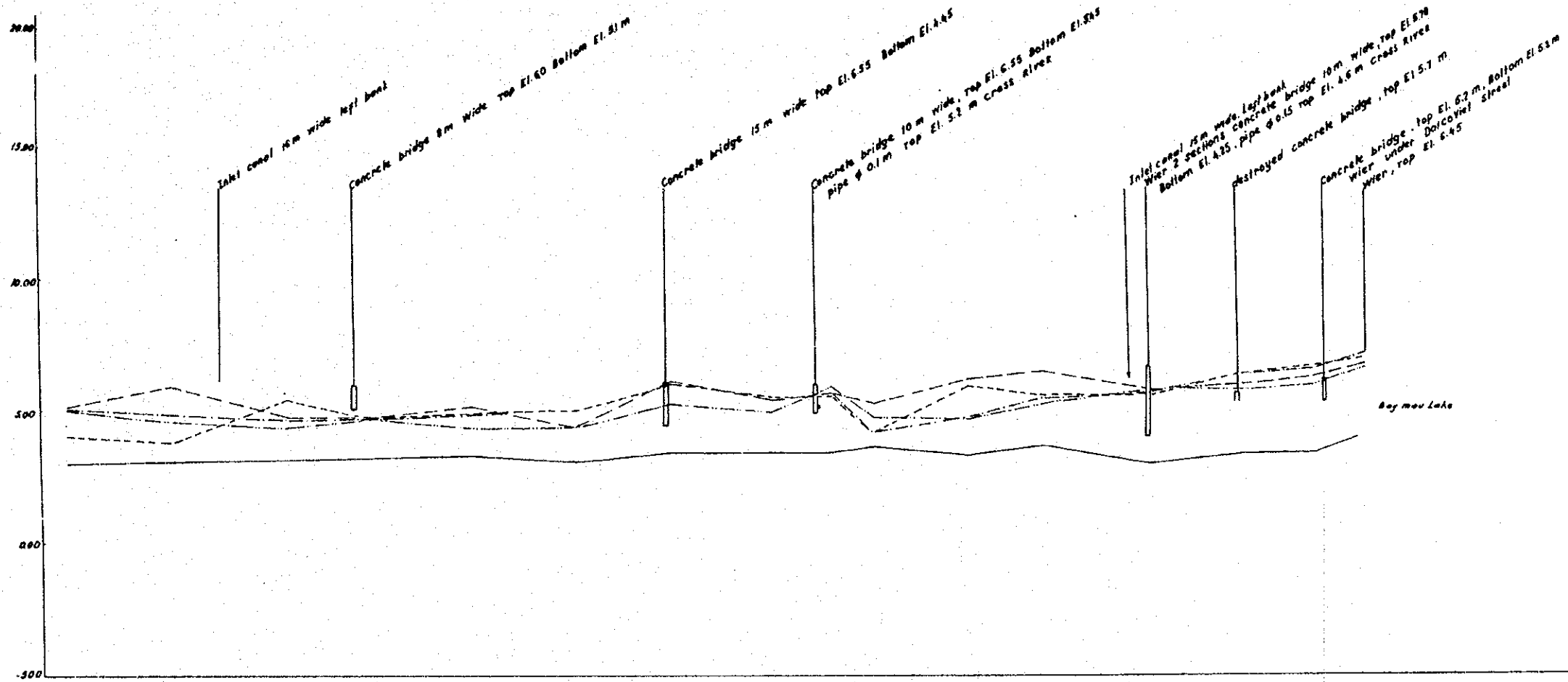
SOCIALIST REPUBLIC OF VIETNAM
THE STUDY ON URBAN DRAINAGE AND WASTEWATER
DISPOSAL SYSTEMS IN HANOI CITY

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

REVISION NO & DATE	DESIGNED BY & DATE
	DRAWN BY & DATE
	CHECKED BY & DATE
	APPROVED BY & DATE

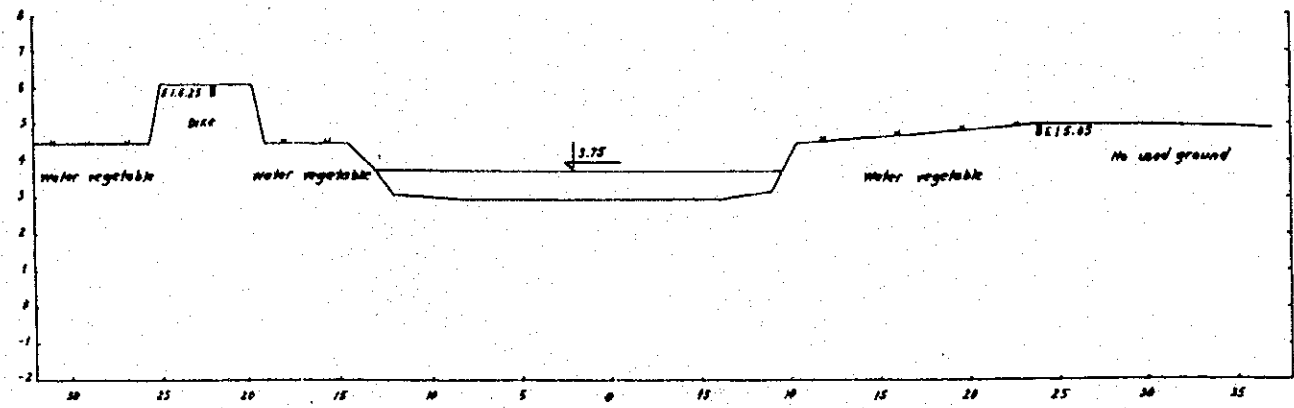
TITLE
LONGITUDINAL SECTION OF SET RIVER
FROM K0.0 TO K3.2

SCALE H=1:5000 V=1:100 DWG NO 52 1/2

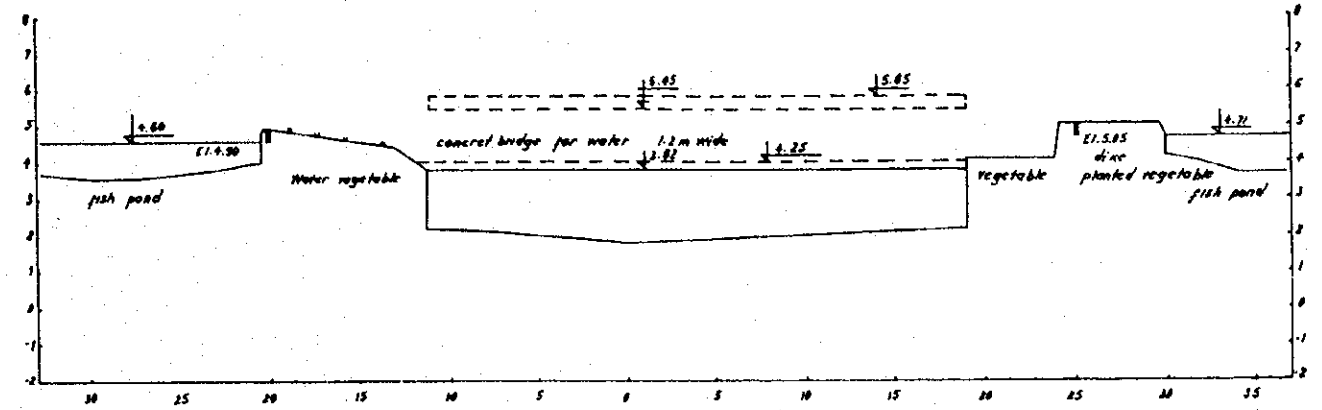


DESIGN DIKE CROWN		
DESIGN HIGH WATER		
DESIGN RIVER BED		
EXISTING DIKE CROWN	RIGHT	5.04 4.75 4.76 4.71 4.86 5.10 5.98 5.40 5.75 4.22 4.80 5.51 5.70 6.42 6.62 6.67
	LEFT	5.01 4.66 4.48 4.70 4.36 4.39 5.16 4.95 5.93 4.72 4.75 5.10 5.84 5.83 5.98 6.57
EXISTING LAND SIDE GROUND	RIGHT	4.02 3.80 5.10 4.76 5.01 5.03 5.58 5.30 5.60 4.20 6.00 5.60 5.60 6.45 6.75 6.80
	LEFT	5.10 5.90 4.20 4.80 5.20 4.40 6.10 5.40 5.70 5.10 6.20 6.30 5.82 6.00 6.30 6.80
EXISTING RIVER BED		3.00 3.10 3.15 3.20 3.30 3.10 3.40 3.40 3.45 3.65 3.70 3.70 3.00 3.40 3.45 4.10
ACCUMULATIVE DISTANCE		3112.72 3207.27 3511.99 3688.74 3890.47 4072.11 4276.96 4457.92 4601.09 4766.06 4950.16 5108.62 5318.89 5515.92 5616.02
DISTANCE		169.19 194.45 226.72 254.78 291.10 342.86 387.81 431.96 474.27 514.87 553.16 589.04 610.57 618.21 634.03 646.13
SECTION NO		K32 K34 K36 K38 K40 K42 K44 K46 K48 K50 K52 K54 K56 K58 K60

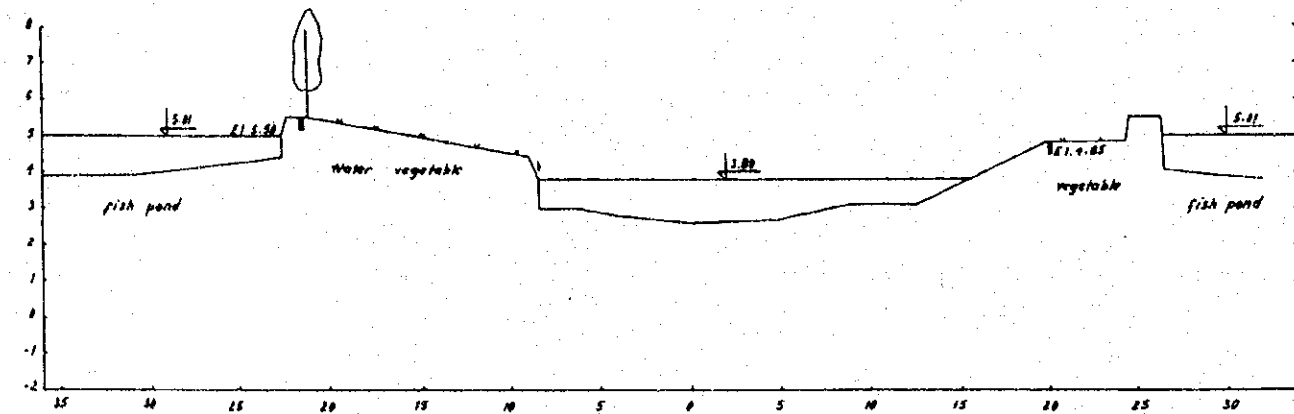
S K 0.0



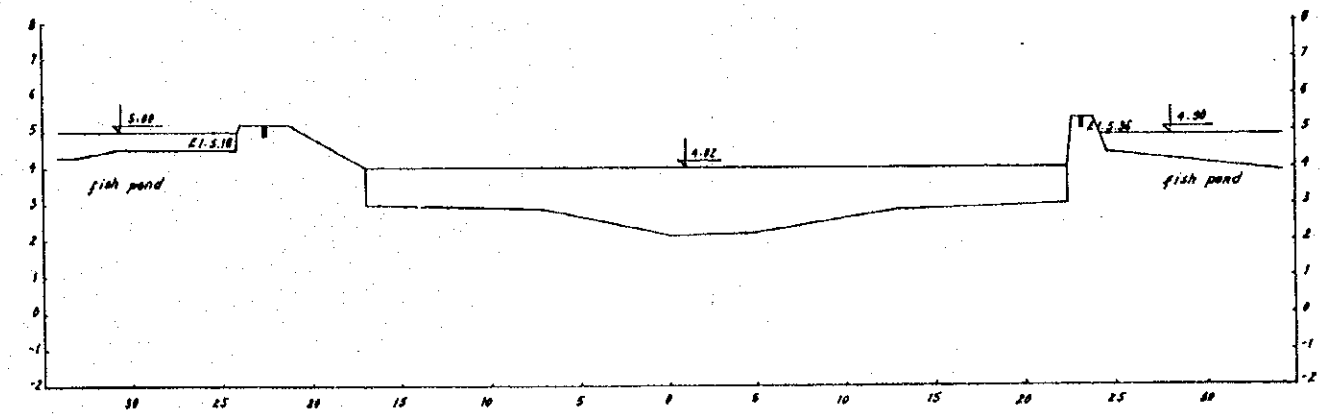
S K 0.6



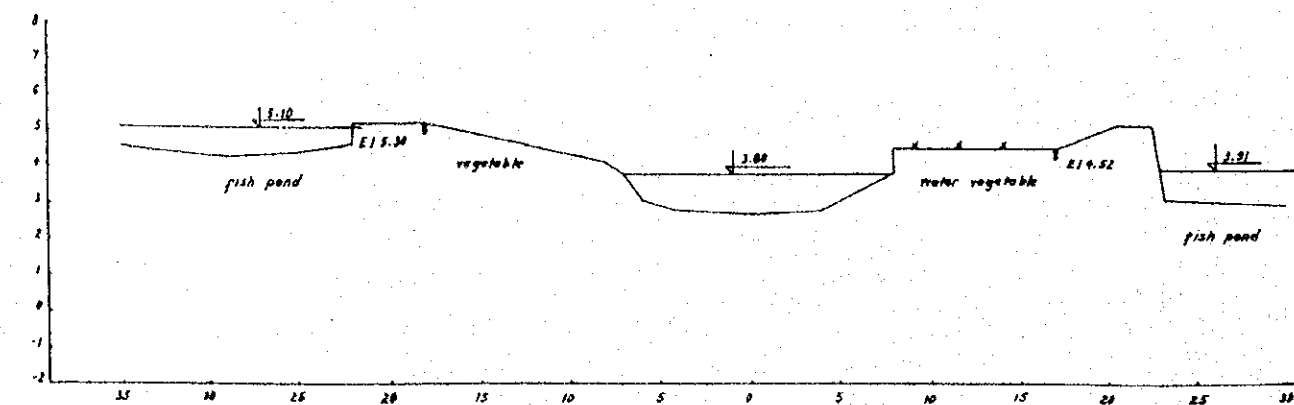
S K 0.2



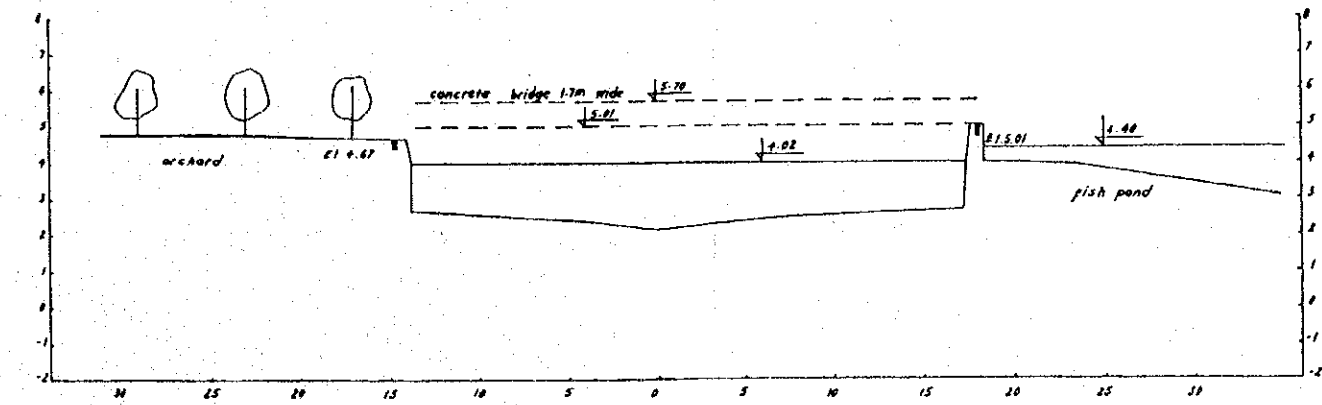
S K 0.8



S K 0.4



S K 1.0



SOCIALIST REPUBLIC OF VIET NAM
THE STUDY ON URBAN DRAINAGE AND WASTEWATER
DISPOSAL SYSTEMS IN HANOI CITY

JICA

JAPAN INTERNATIONAL COOPERATION AGENCY

REVISION NO & DATE

DESIGNED BY & DATE

DRAWN BY & DATE

CHECKED BY & DATE

APPROVED BY & DATE

TITLE

CROSS SECTION OF SET RIVER

FROM K0.0 TO K1.0

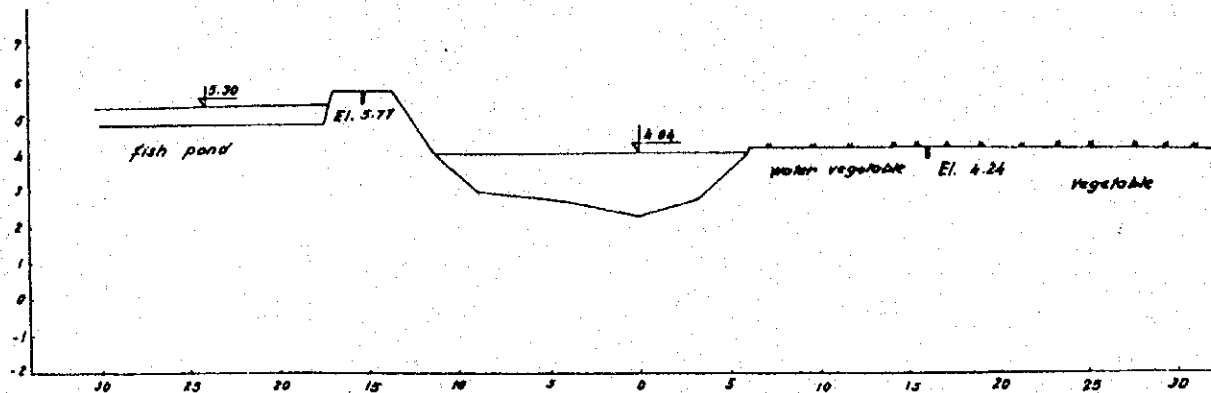
SCALE

H: 1:200

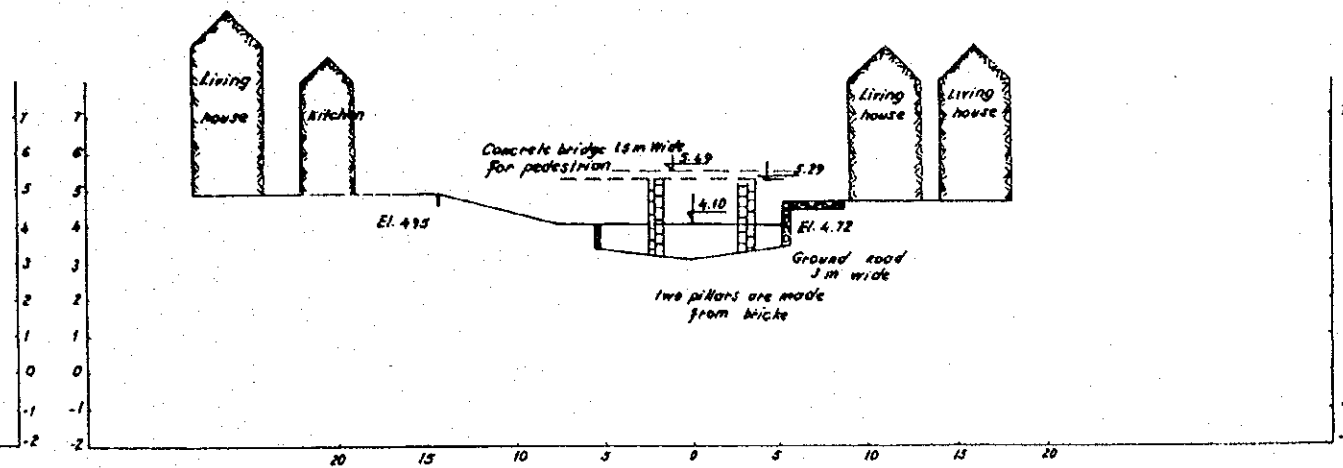
V: 1:100

DWG NO SC 1/6

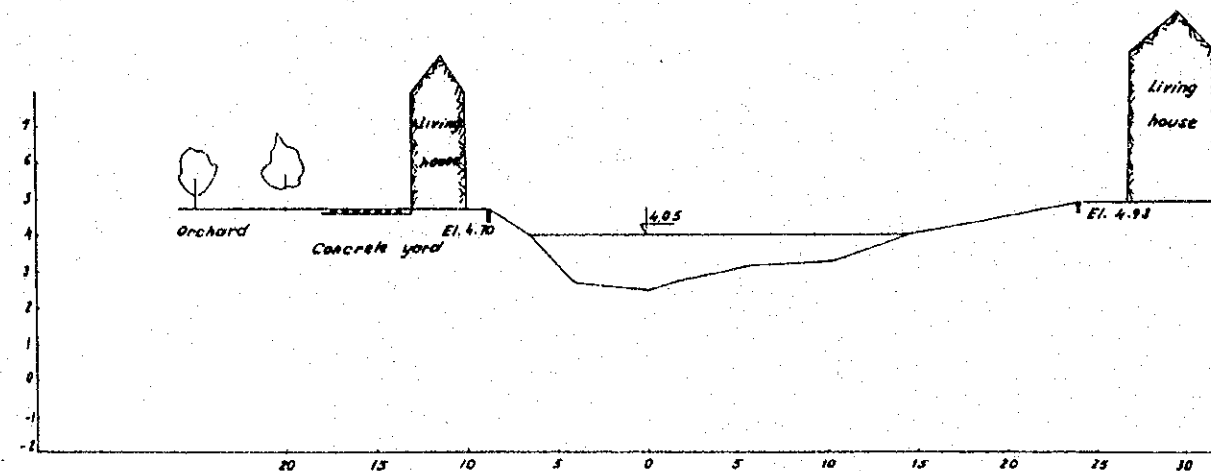
S K12



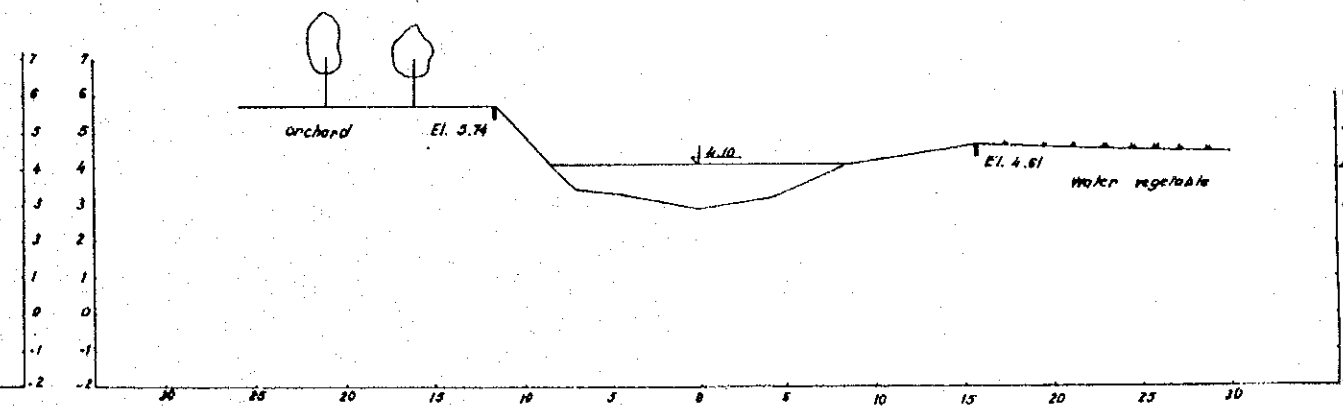
S K18



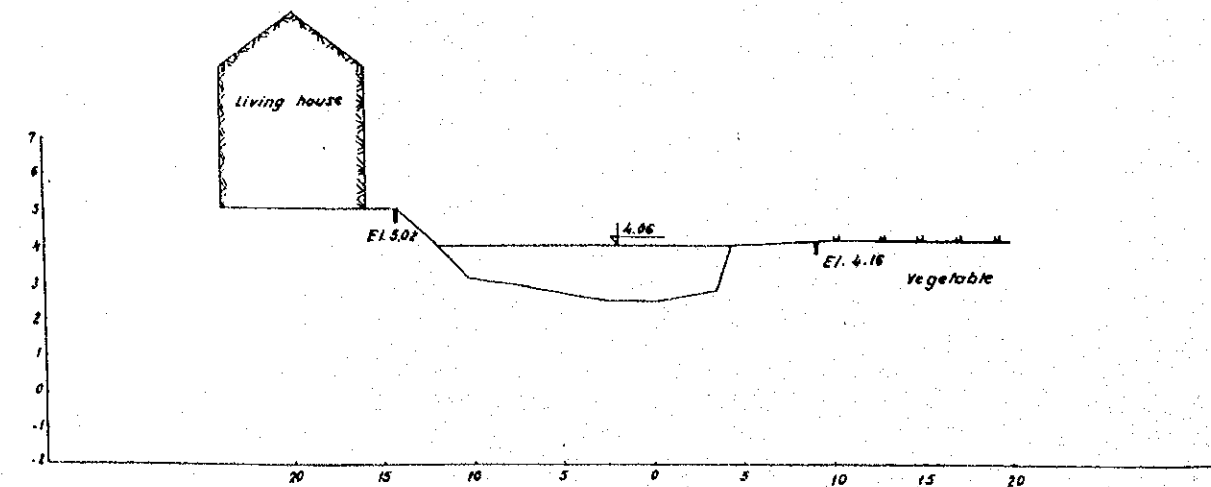
S K14



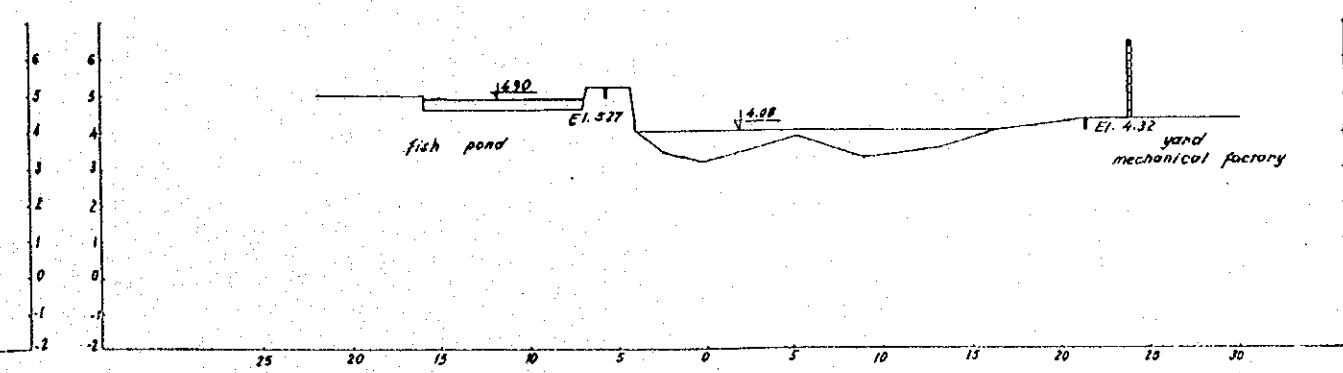
S K20



S K16



S K22



SOCIALIST REPUBLIC OF VIETNAM
THE STUDY ON URBAN DRAINAGE AND WASTEWATER
DISPOSAL SYSTEMS IN HANOI CITY

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

REVISION NO. & DATE

DESIGNED BY & DATE

DRAWN BY & DATE

CHECKED BY & DATE

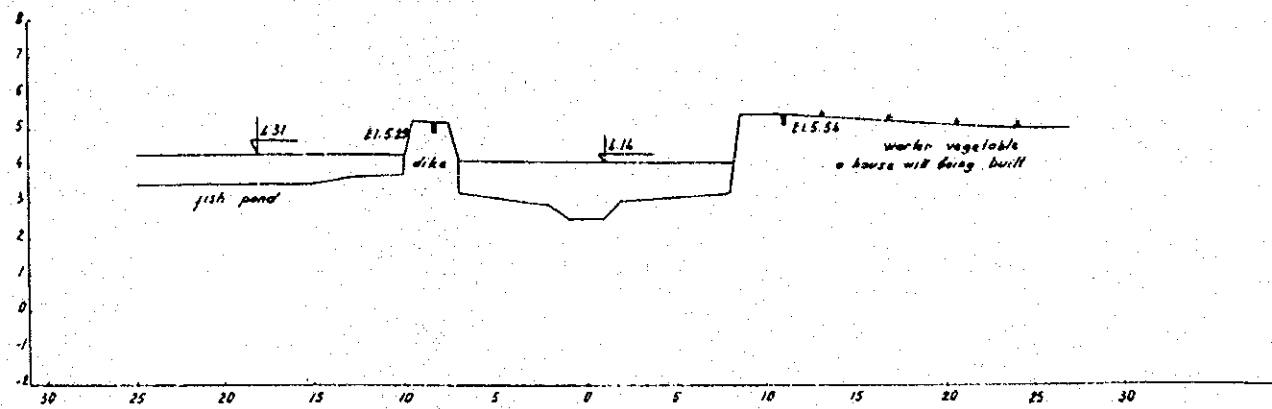
APPROVED BY & DATE

TITLE CROSS SECTIONS OF SET RIVER FROM K12 TO K22

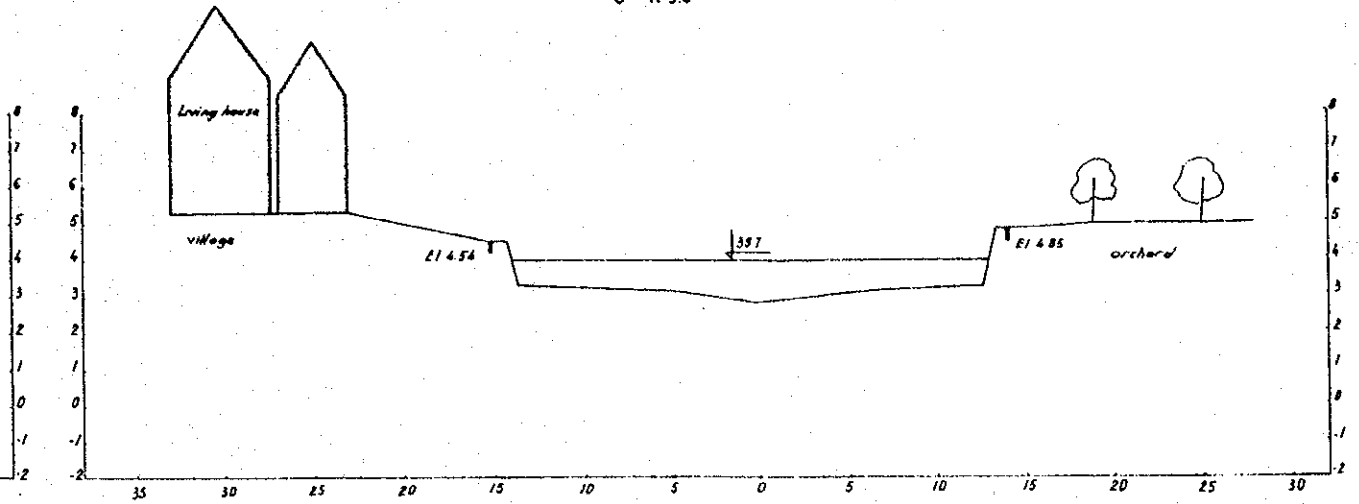
SCALE H = 1:200 V = 1:100

DWC NO. SC 2 / 6

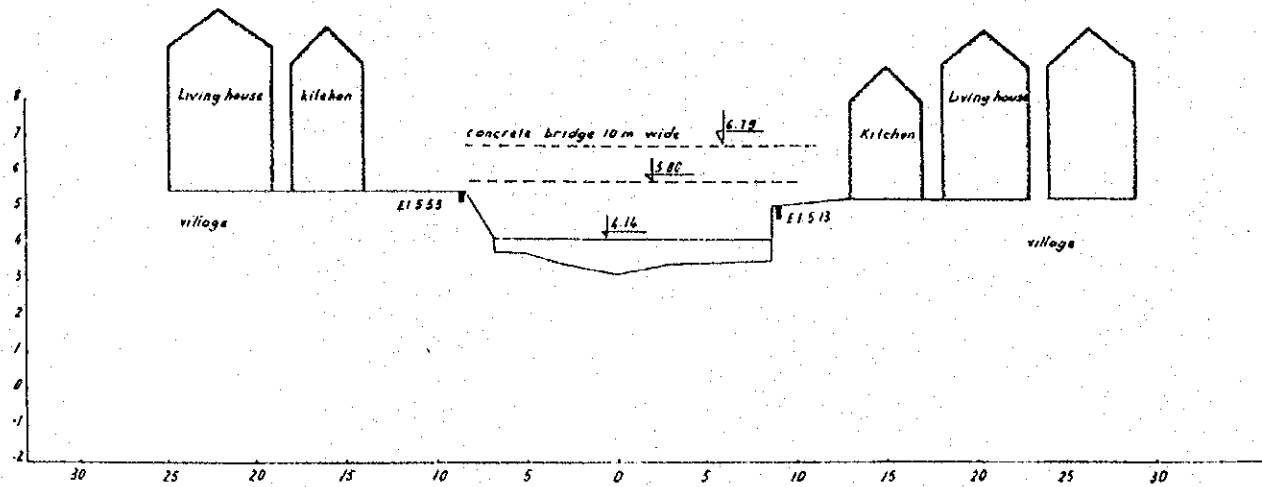
S K 2.4



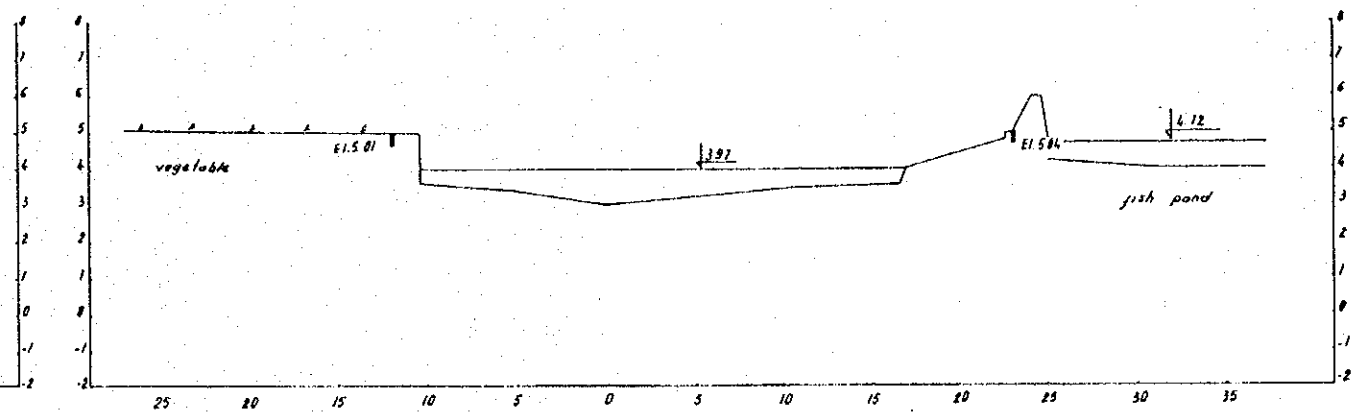
S K 3.0



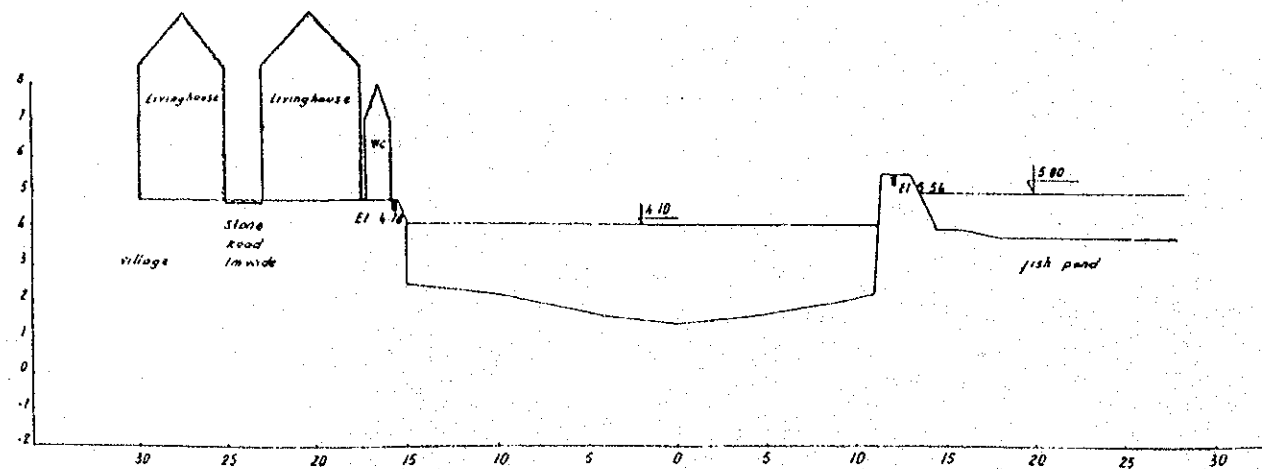
S K 2.6



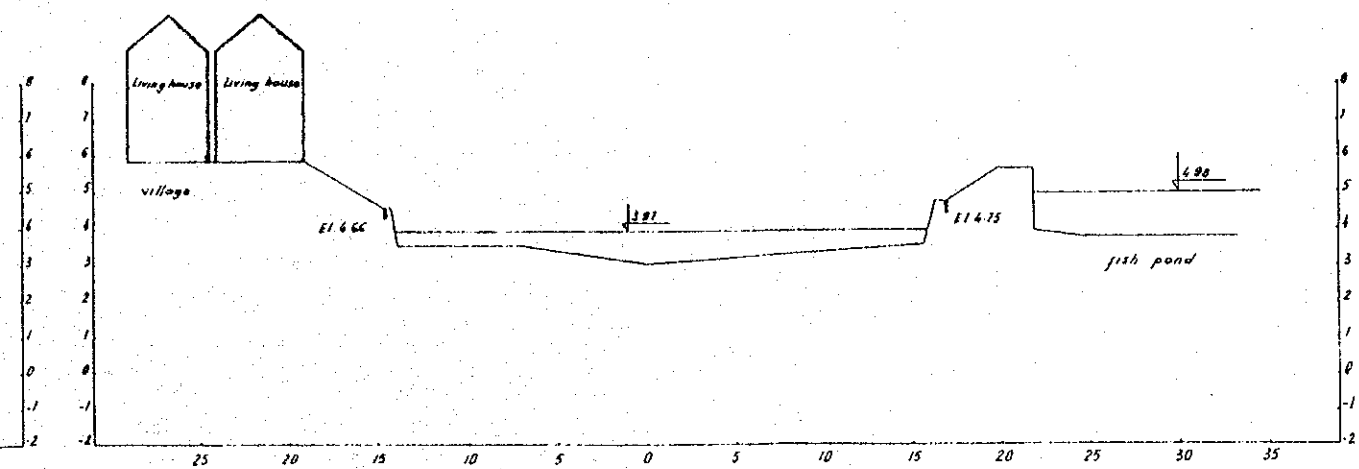
S K 3.2



S K 2.8

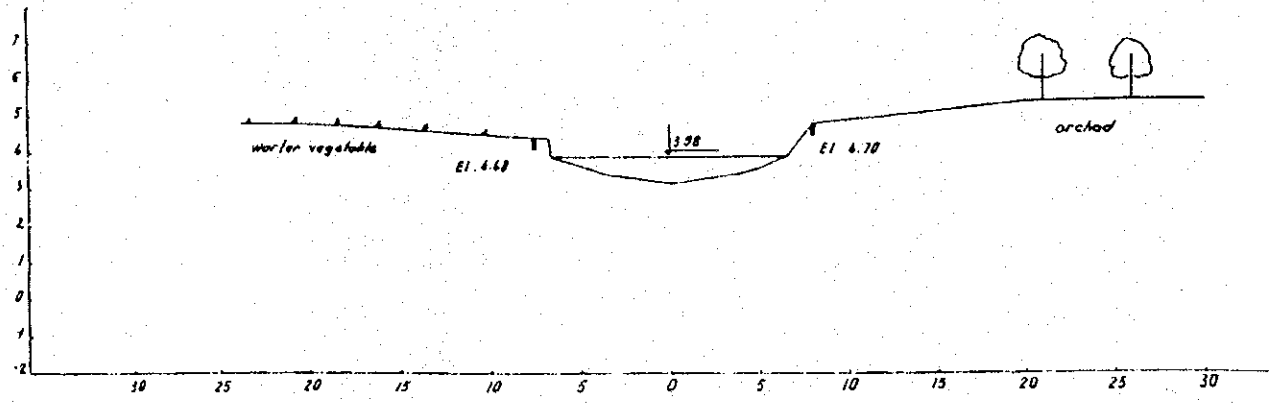


S K 3.4

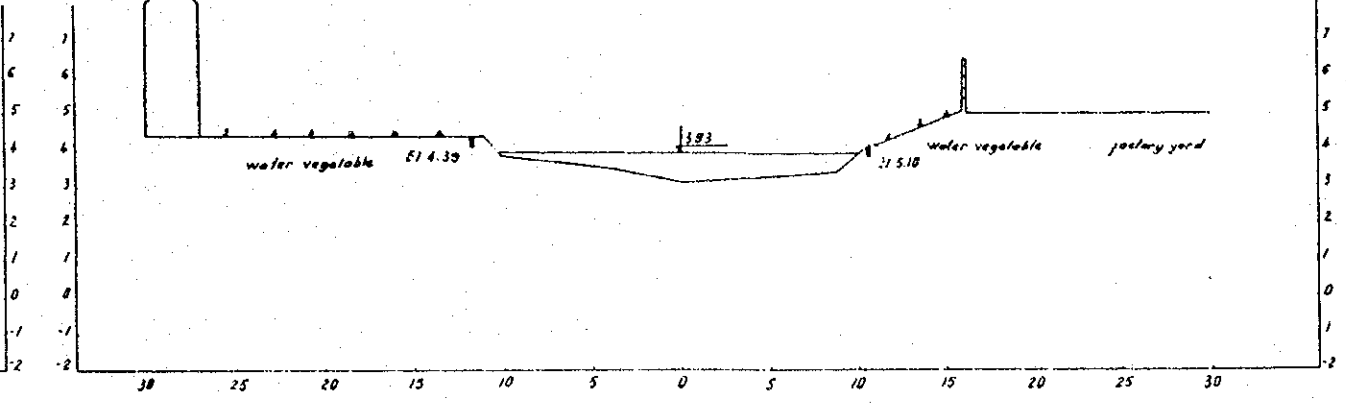


SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE		TITLE CROSS SECTIONS OF SET RIVER FROM K.2.4 TO K.3.4 SCALE H=1:200 V=1:100 DWG NO SC 3 / 6
		DRAWN BY & DATE		
		CHECKED BY & DATE		
		APPROVED BY & DATE		

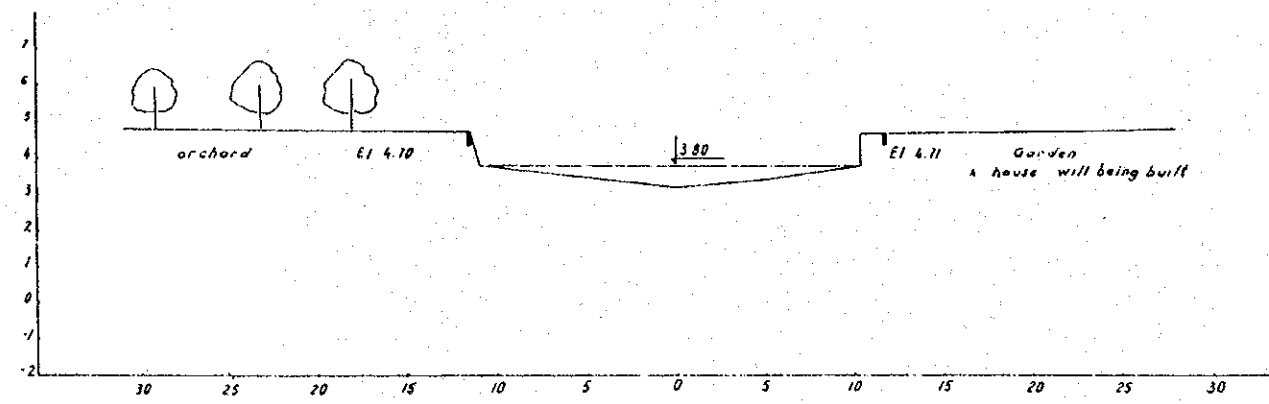
S K 3.6



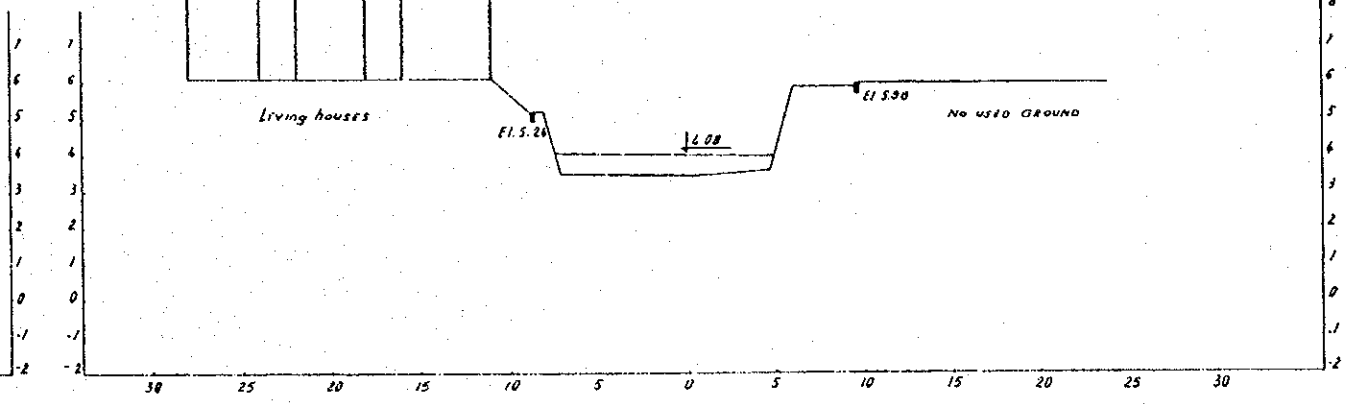
S K 4.2



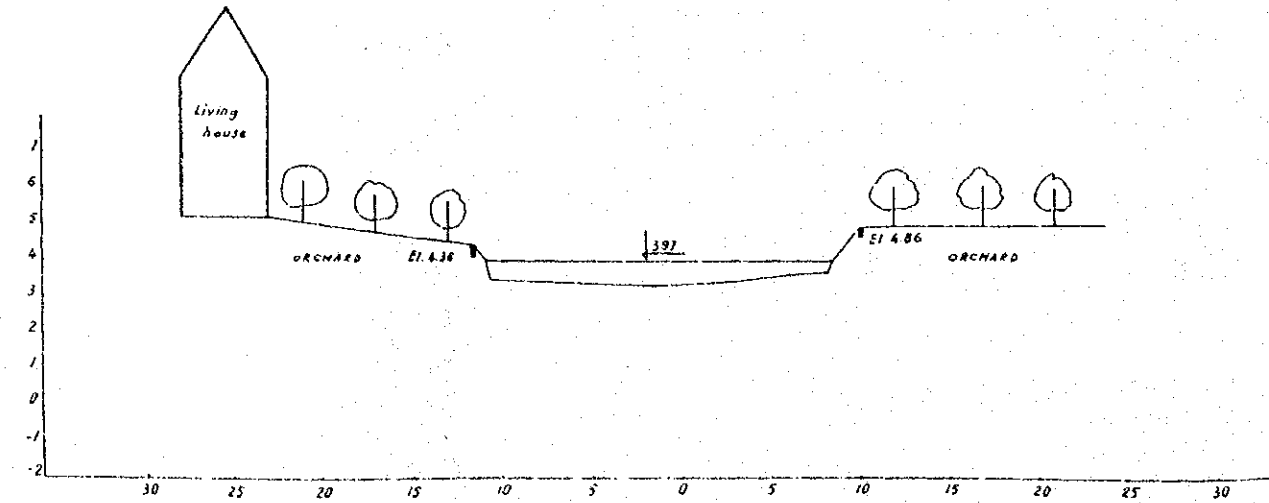
S K 3.8



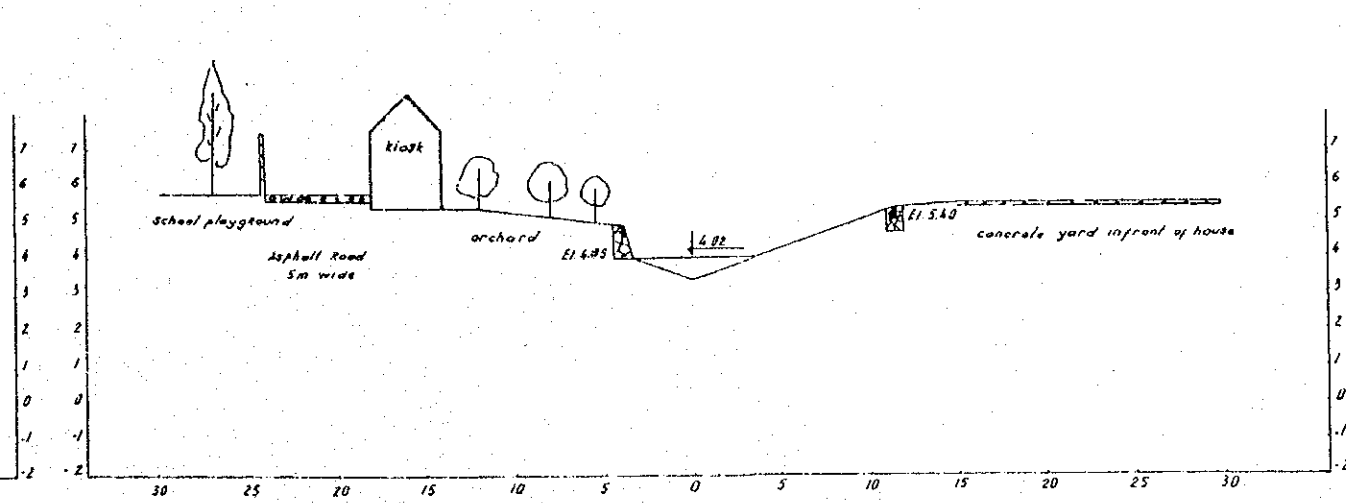
S K 4.4



S K 4.0

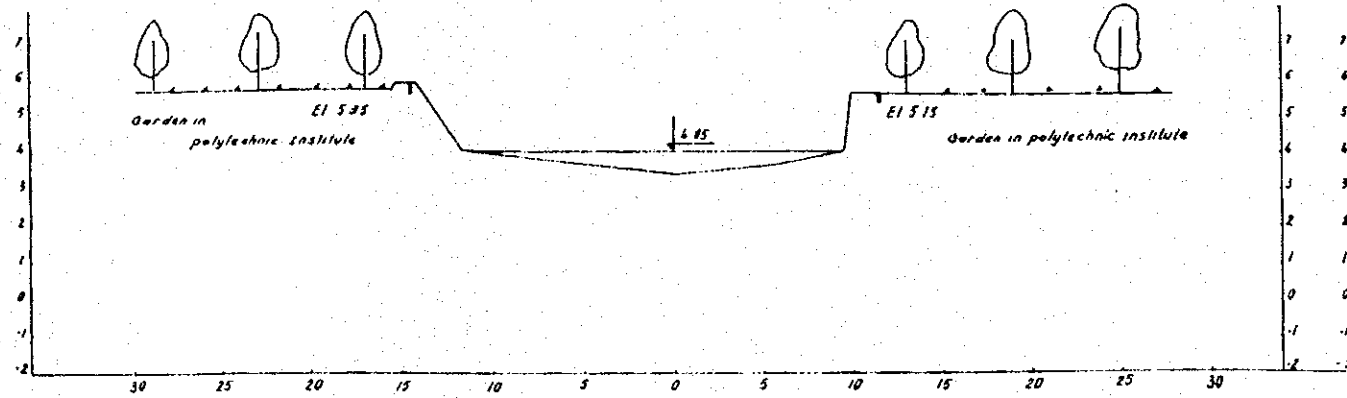


S K 4.6

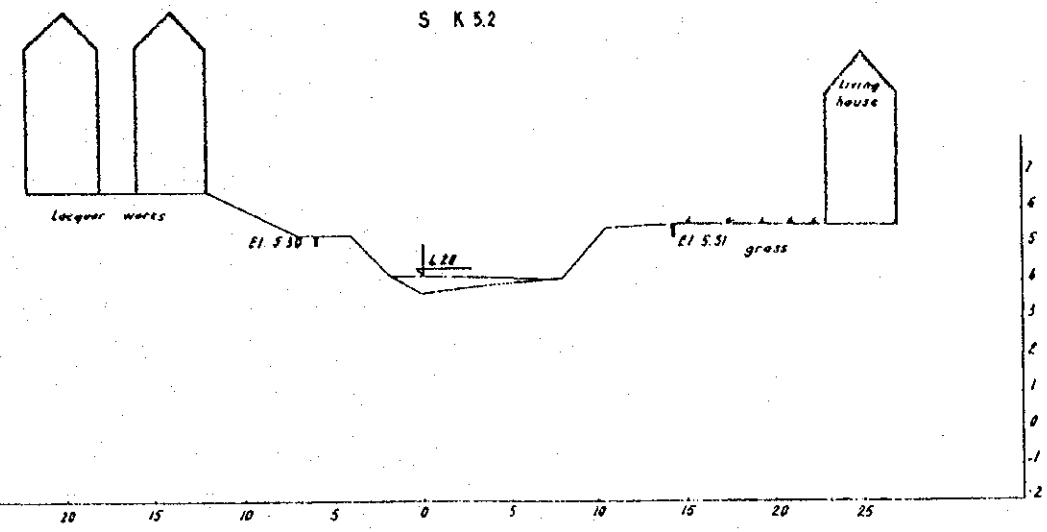


SOCIALIST REPUBLIC OF VIET NAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF SET RIVER FROM K3.6 TO K4.6 SCALE H=1:200 V=1:100 DWG NO 30 4 / 4
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	

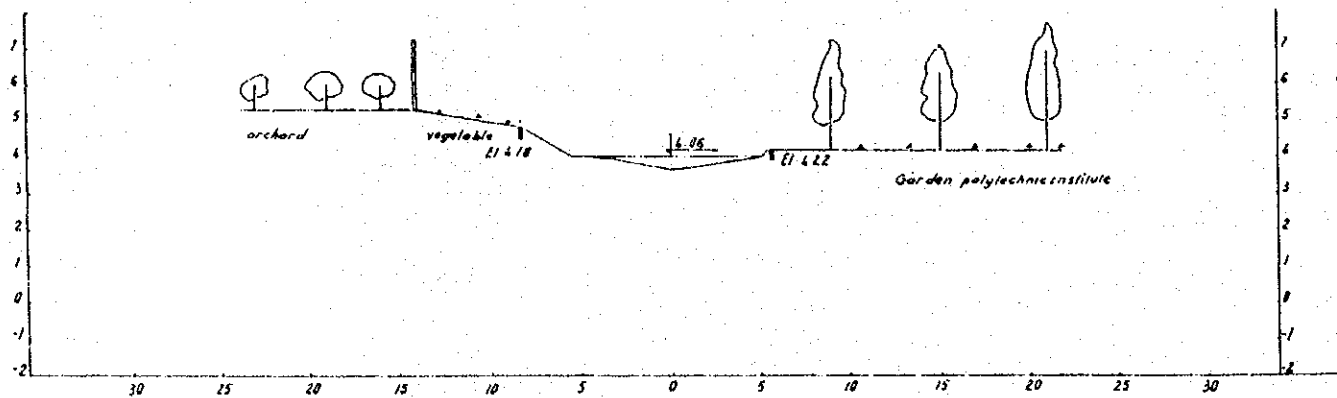
S K 4.7



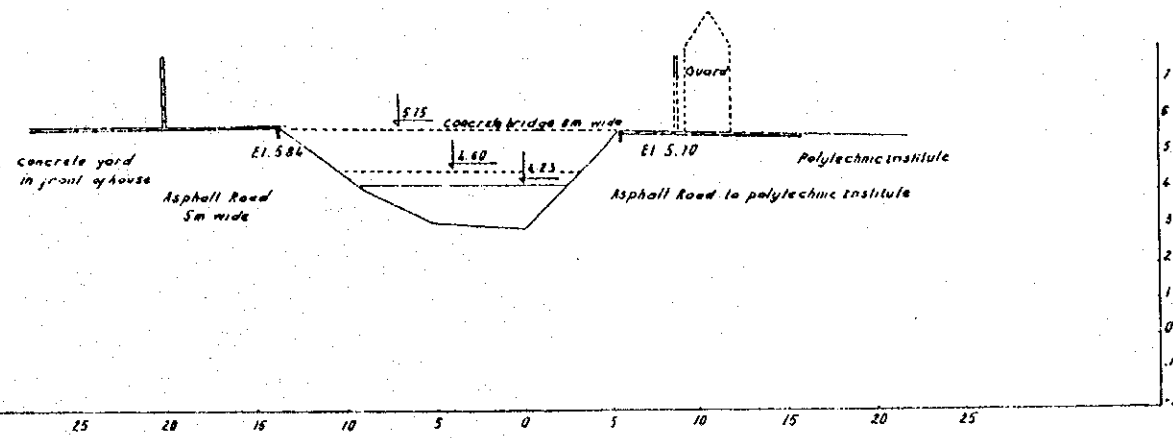
S K 5.2



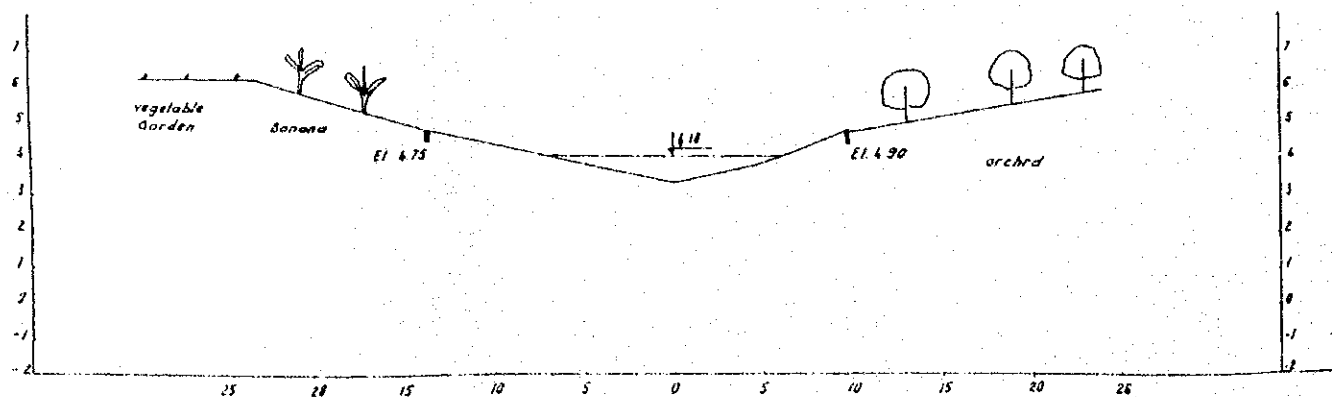
S K 4.8



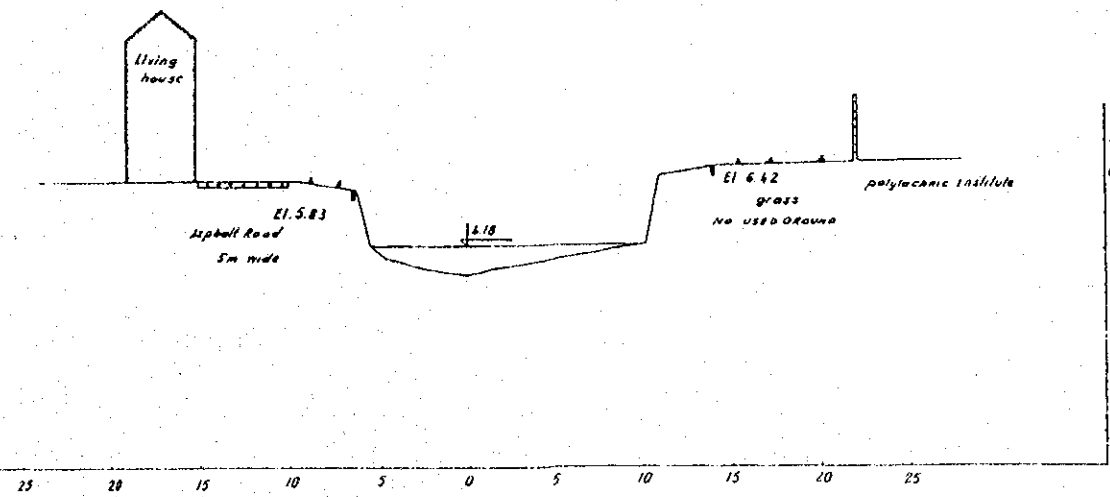
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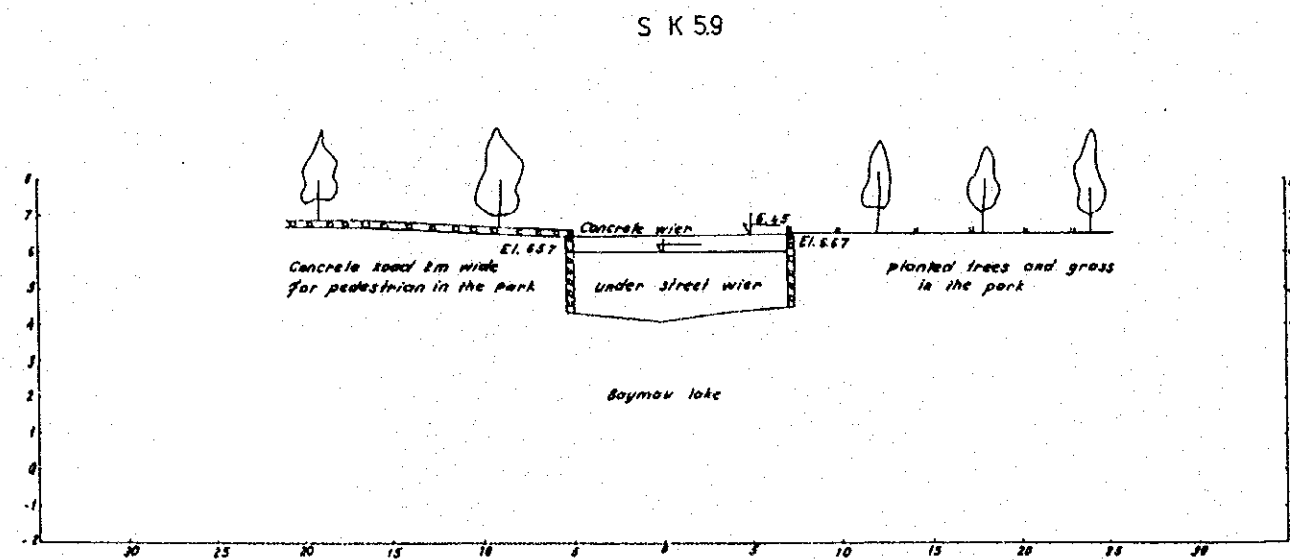
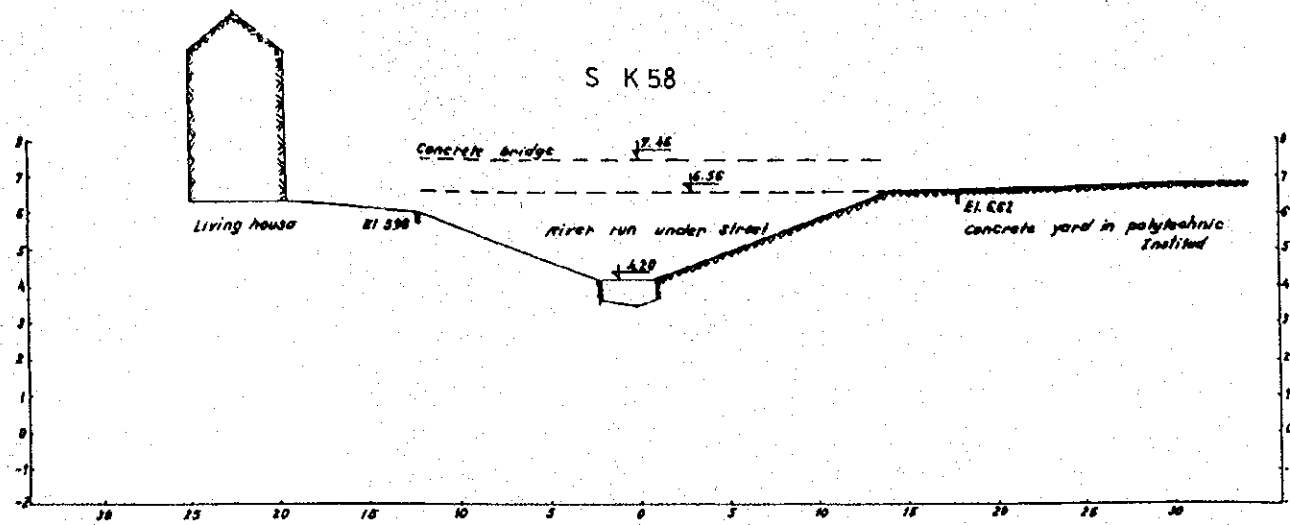
S K 5.0



S K 5.6



SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE	TITLE CROSS SECTIONS OF SET RIVER FROM K4.7 TO K5.6 SCALE H=1:200 V=1:100 DWG NO SC 5/6
		DRAWN BY & DATE	
		CHECKED BY & DATE	
		APPROVED BY & DATE	



SOCIALIST REPUBLIC OF VIETNAM THE STUDY ON URBAN DRAINAGE AND WASTEWATER DISPOSAL SYSTEMS IN HANOI CITY JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REVISION NO & DATE	DESIGNED BY & DATE		TITLE CROSS SECTIONS OF SET RIVER FROM K 58 TO BAYMAU LAKE CKALE H: 1:200 V: 1:100 DWG NO SC 4/4
		DRAWN BY & DATE		
		CHECKED BY & DATE		
		APPROVED BY & DATE		