

ザイール共和国
マタディ橋梁建設計画調査報告書

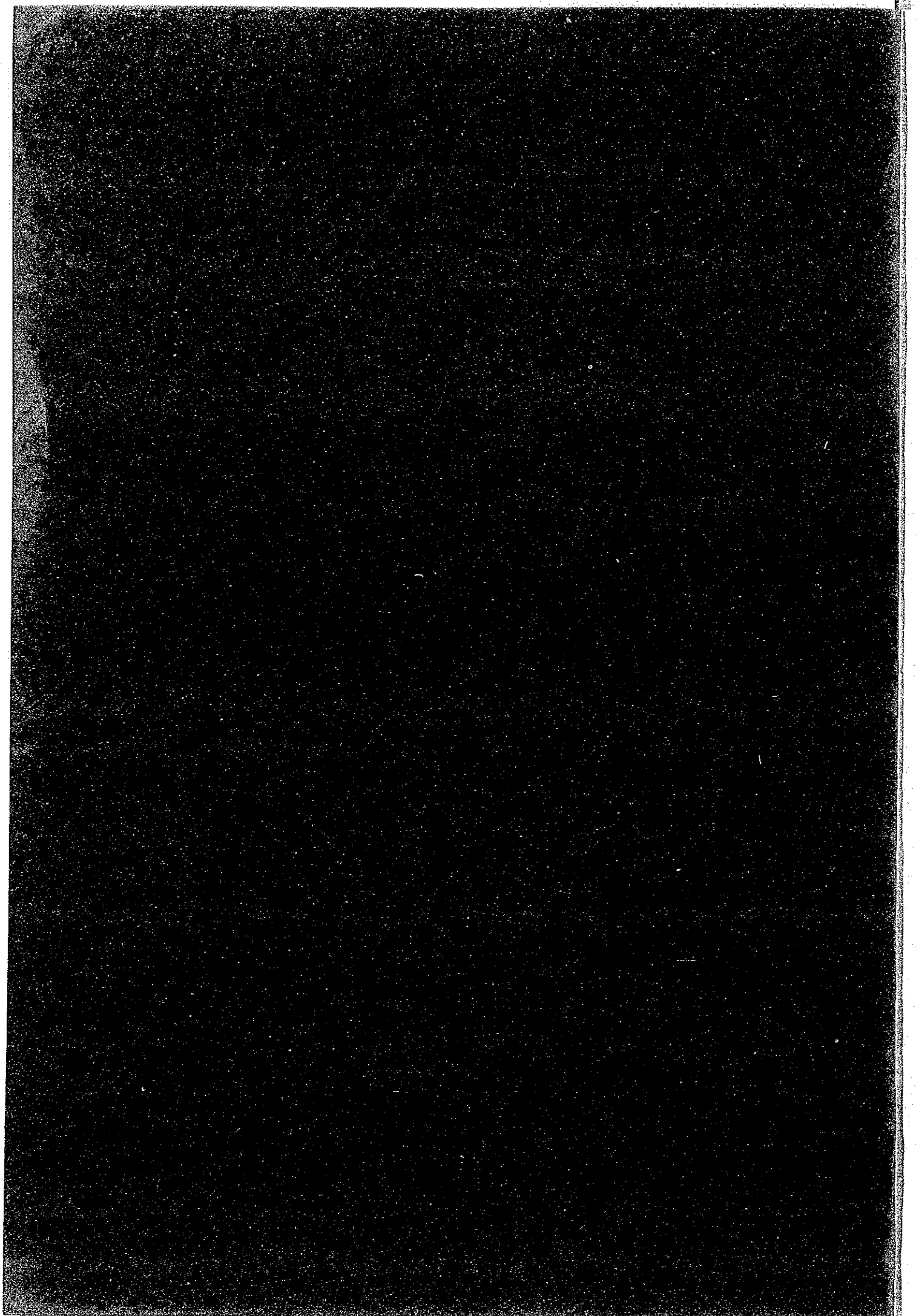
橋梁下部工数量計算書

昭和 53 年 5 月

国際協力事業団

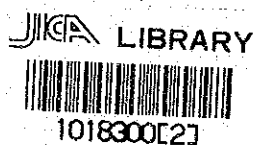
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マタディ橋梁建設計画調査報告書

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昭和 53 年 5 月

国際協力事業団

國際協力事業団	
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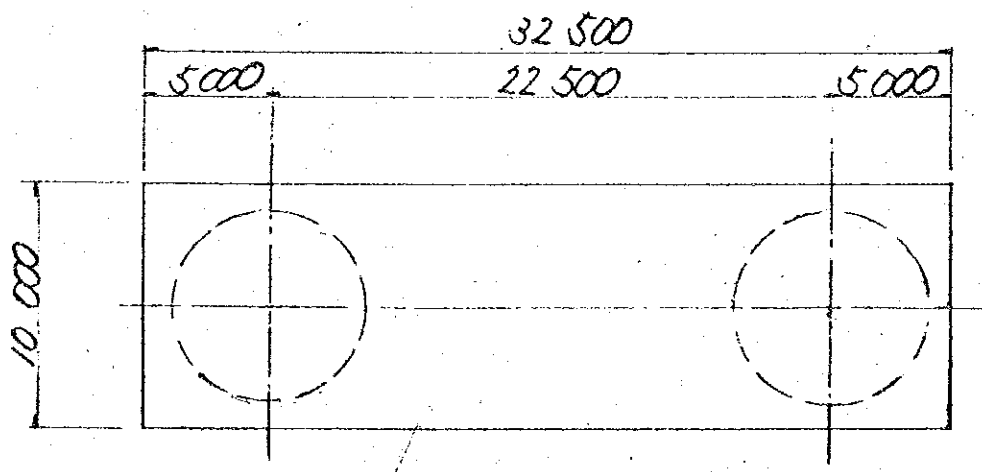
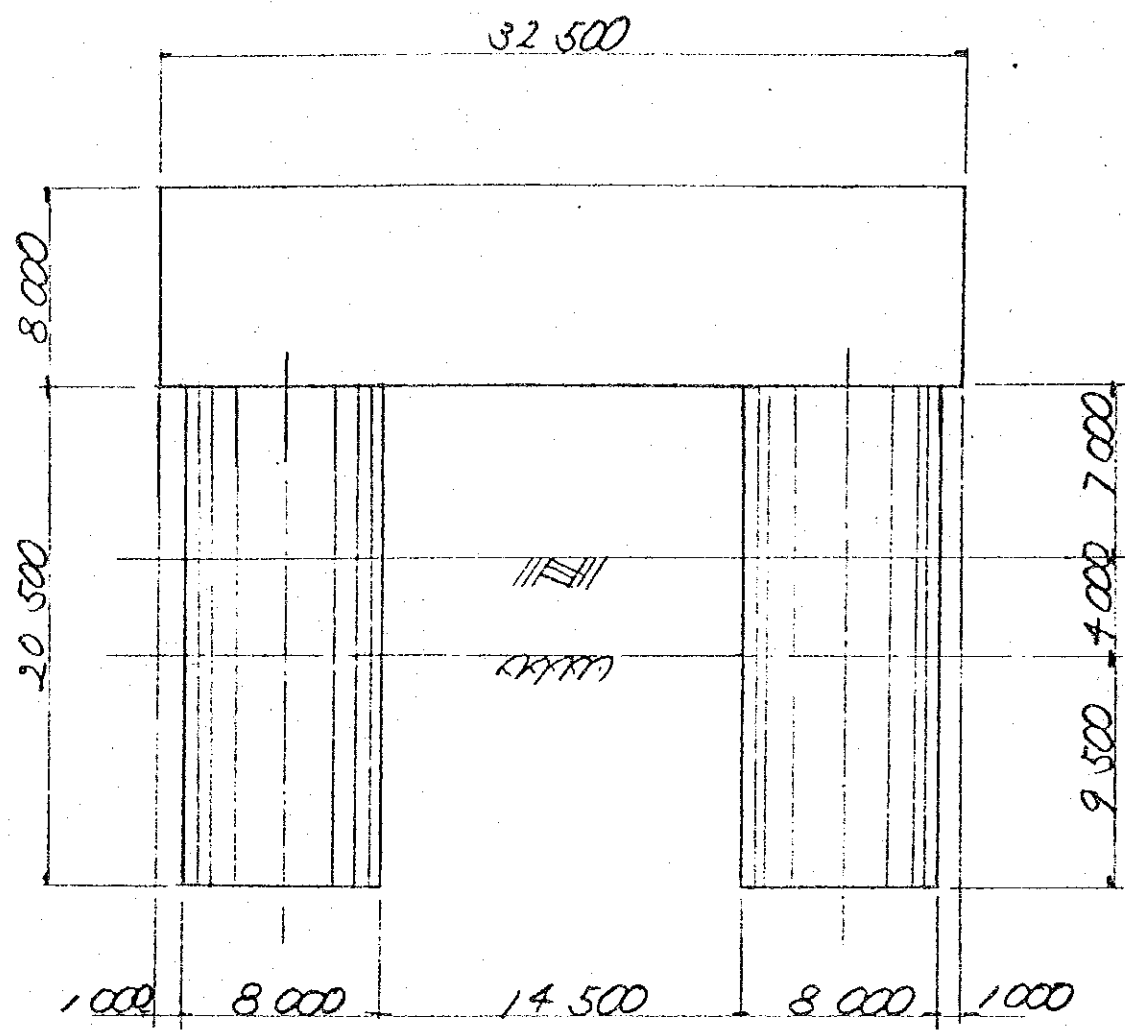
1. 数量総括表

		単位	マタデイ側		ボマ側		
			数量	記事	数量	記事	
橋	根掘り	土砂	m ³	200	余掘り(土砂) 50 m ³	1450	余掘り(土砂) 2850 m ³
		軟岩	"	200	" (軟岩) 50 "	650	" (軟岩) 620 "
		硬岩	"	960	" (硬岩) 0 "	2060	" (硬岩) 0 "
脚	コンクリート体積	梁	"	2600	掘削合計 1460 m ³	2600	掘削合計 7630 m ³
		柱	"	2060	埋戻し土量 0 m ³	600	埋戻し土量 0 m ³
	鉄筋量	梁	kg	54739	総合計 79363 kg	54739	総合計 66646 kg
柱	"	24624	11907				
ア ン	根掘り	土砂	m ³	3670	余掘り(土砂) 4380 m ³	4360	余掘り(土砂) 8940 m ³
		軟岩	"	3120	" (軟岩) 1930 "	2550	" (軟岩) 3170 "
		硬岩	"	34270	" (硬岩) 1920 "	43830	" (硬岩) 3940 "
カ レ	コンクリート体積	本体	"	23360	掘削合計 49290 m ³	23360	掘削合計 66790 m ³
		桁	"	1710	埋戻し土量 10070 m ³	1710	埋戻し土量 7410 m ³
		箱	"	180	埋戻し砕石(工事用進入路用) 570 m ³	180	埋戻し砕石(工事用進入路用) 570 m ³
ツ ジ	鉄筋量	本体	kg	314114	工事用進入路埋戻し用捨コン 810 m ³	314114	工事用進入路埋戻し用捨コン 810 m ³
		桁	"	135018		135018	
		箱	"	17707		17707	
スプレーサドル		"	"	24370		24370	
アンカーフレーム		"	"	585000	引張材, アンカーガードを含む	585000	引張材, アンカーガードを含む
スプレーサドル支持フレーム		"	"	2930		2930	

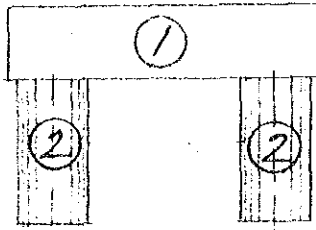
2. 主塔橋脚の数量.

(1). マタデア側

(a). 一般形状寸法



(b) コンクリート体積

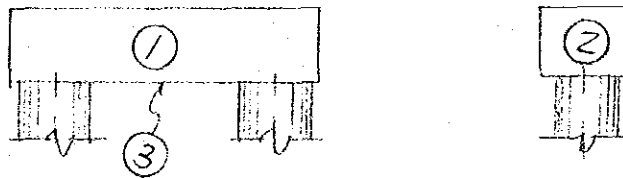


$$(i) \text{ 梁 } \textcircled{1} \quad 8.0 \times 10.0 \times 32.5 = 2600.000 \text{ m}^3$$

$$(ii) \text{ 柱 } \textcircled{2} \quad \pi \times 4.0^2 \times 20.5 \times 2 = 2060.885 \text{ ''}$$

(c) 型 枠

(i) 梁



$$\textcircled{1} \quad 8.0 \times 32.5 \times 2 = 520.000 \text{ m}^2$$

$$\textcircled{2} \quad 8.0 \times 10.0 \times 2 = 160.000 \text{ ''}$$

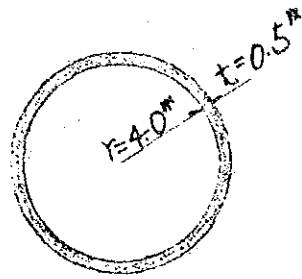
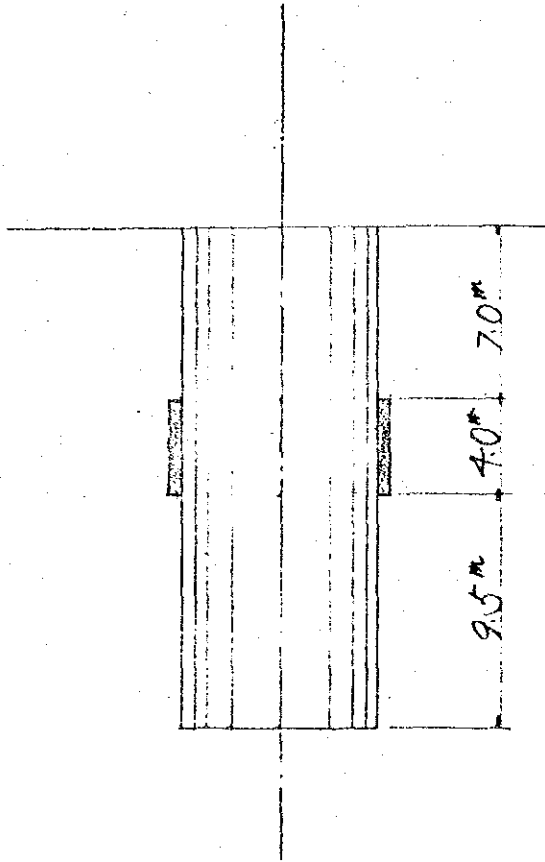
$$\textcircled{3} \quad 10.0 \times 32.5 - \pi \times 4.0^2 \times 2 = 224.469 \text{ ''}$$

$$\text{合 計} = 904.469 \text{ m}^2$$

(ii) 柱

$$A = \pi \times 8.0 \times 7.0 \times 2 = 351.858 \text{ m}^2$$

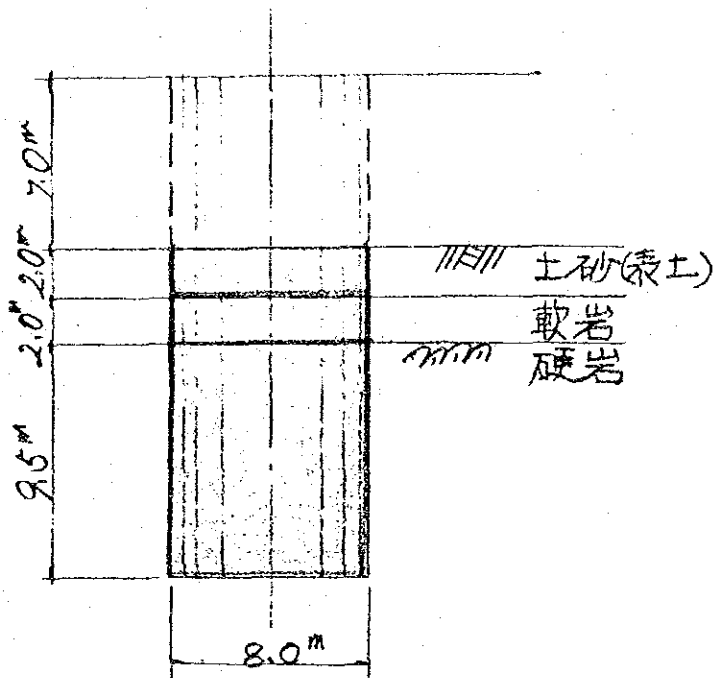
(d) コンクリート枠



$$V = \pi \times (4.5^2 - 4.0^2) \times 4.0 \times 2 = 106.814 \text{ m}^3$$

(e) 土積計算書

(i) 根掘り



(土砂)

$$V = \pi \times 4.0^2 \times 2.0 \times 2 = 201 \text{ m}^3$$

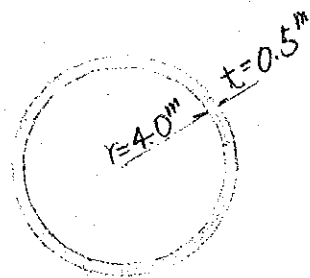
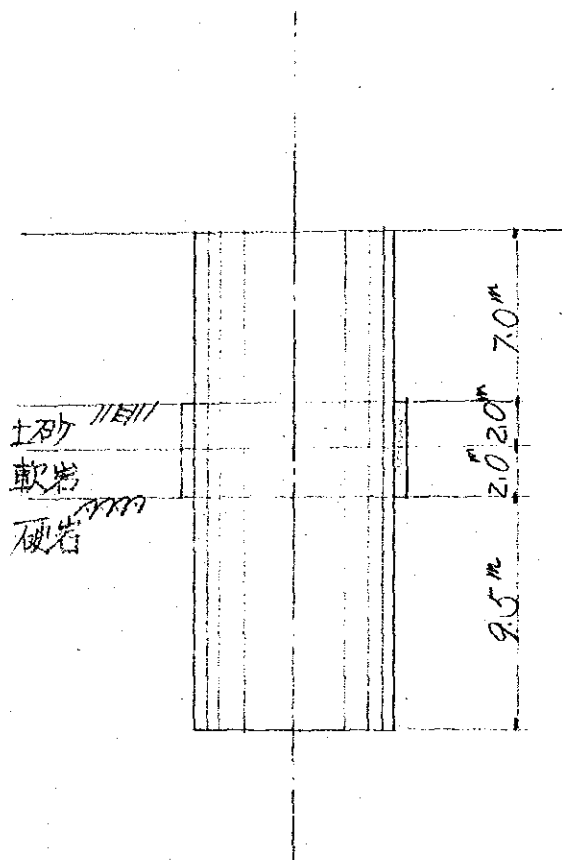
(軟岩)

$$V = \pi \times 4.0^2 \times 2.0 \times 2 = 201 \text{ m}^3$$

(硬岩)

$$V = \pi \times 4.0^2 \times 9.5 \times 2 = 955 \text{ m}^3$$

(ii) 余掘り



(土砂)

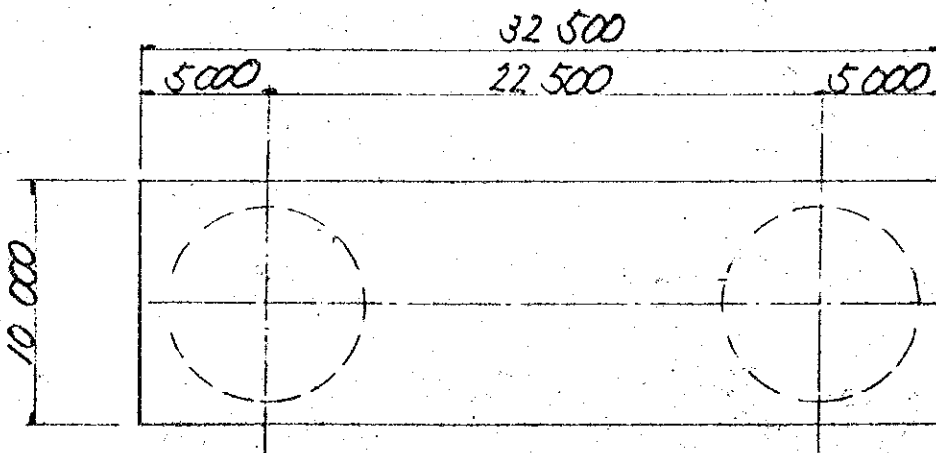
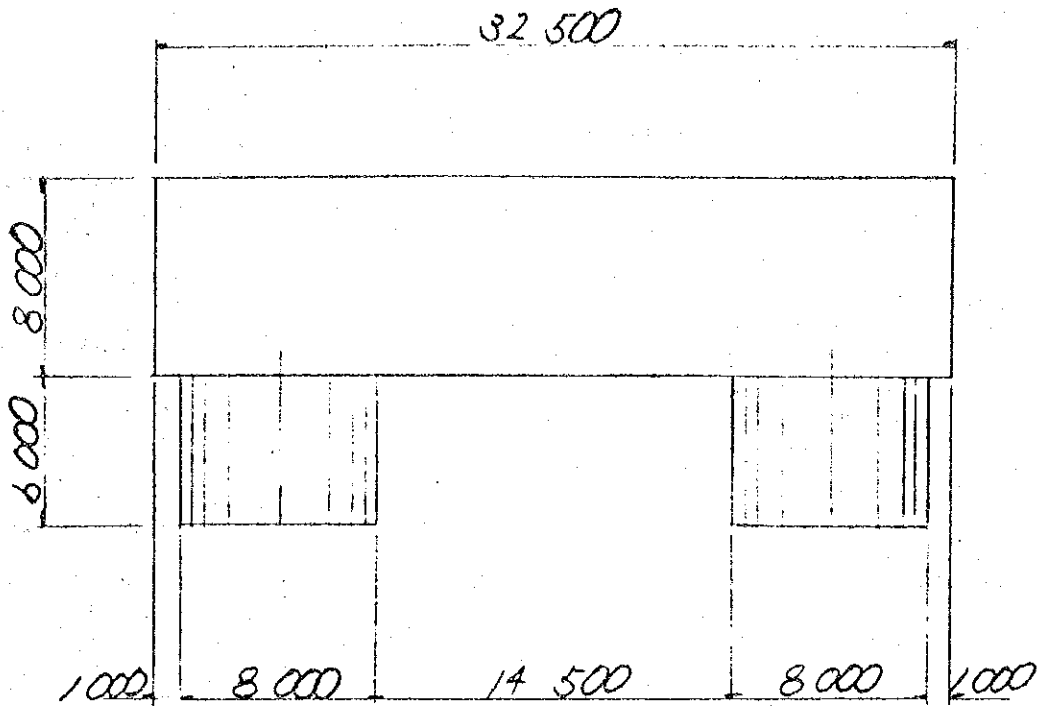
$$V = \pi \times (4.5^2 - 4.0^2) \times 2.0 \times 2 = 53 \text{ m}^3$$

(軟岩)

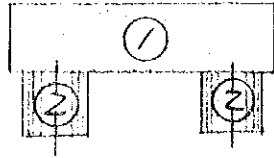
$$V = \pi \times (4.5^2 - 4.0^2) \times 2.0 \times 2 = 53 \text{ m}^3$$

(2) ボマ側

(a) 一般形状寸法



(b) コンクリート体積

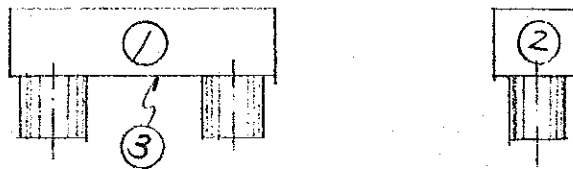


(i) 梁 ① $8.0 \times 10.0 \times 32.5 = 2600.000 \text{ m}^3$

(ii) 柱 ② $\pi \times 4.0^2 \times 6.0 \times 2 = 603.186 \text{ m}^3$

(c) 型枠

(i) 梁



① $8.0 \times 32.5 \times 2 = 520.000 \text{ m}^2$

② $8.0 \times 10.0 \times 2 = 160.000 \text{ m}^2$

③ $10.0 \times 32.5 - \pi \times 4.0^2 \times 2 = 224.469 \text{ m}^2$

合計 = 904.469 m^2

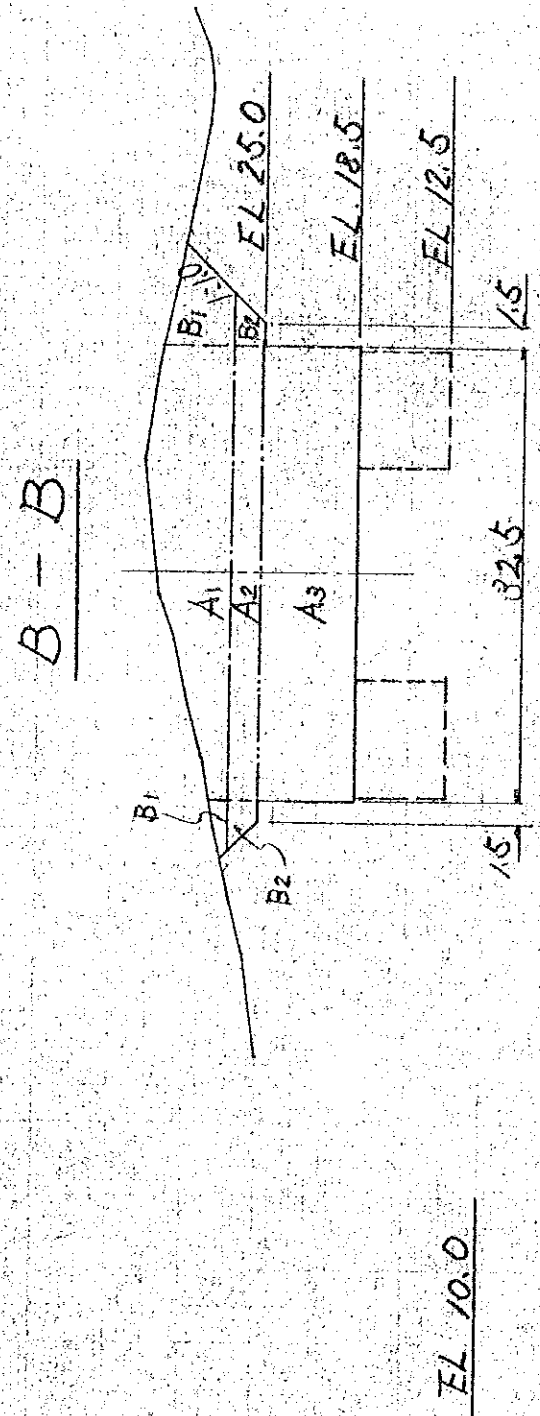
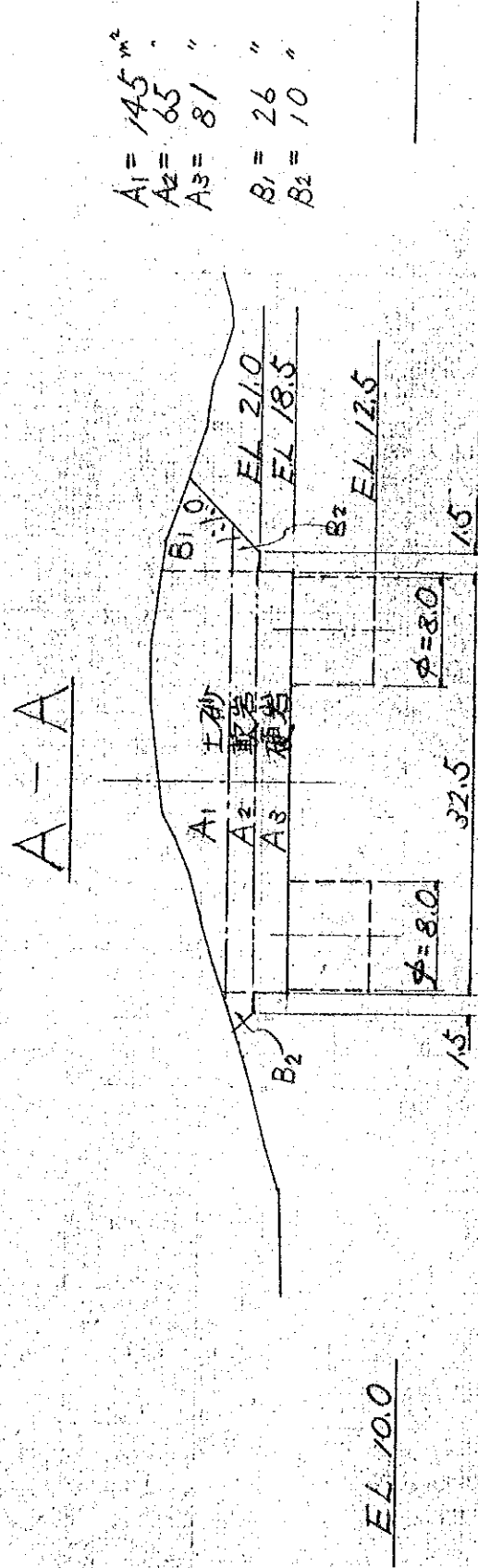
(d) 土積計算書

(ボマ側)

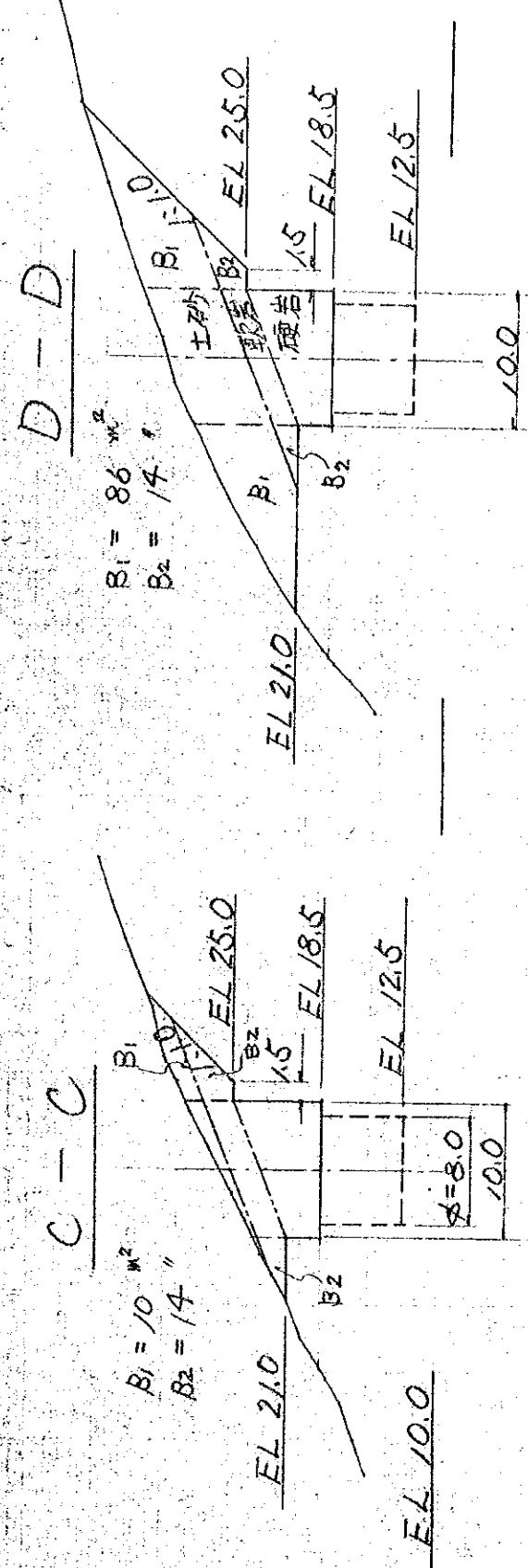
(P13, P54参照)

断面	根掘り				余掘り				摘要
	距離	断面	平均断面	立米	距離	断面	平均断面	立米	
(土砂)									
A-A	0	145			0	26			横断
B-B	10	144	144.5	1445	10	24	25	250	"
C-C					0	10			縦断
D-D					16.25	86	48	780	"
E-E					16.25	98	92	1495	"
								320	隅角
小計				1445				2845	
(取岩)									
A-A	0	65			0	10			横断
B-B	10	65	65	650	10	10	10	100	"
C-C					0	14			縦断
D-D					16.25	14	14	228	"
E-E					16.25	14	14	228	"
								66	隅角
小計				650				622	
(硬岩)									
A-A	0	81							横断
B-B	10	211	146	1460		0			"
深礎				$\pi \times 4.0^2 \times 6.0 \times 2 = 603$		0			
小計				2063				0	
合計				4158				3467	

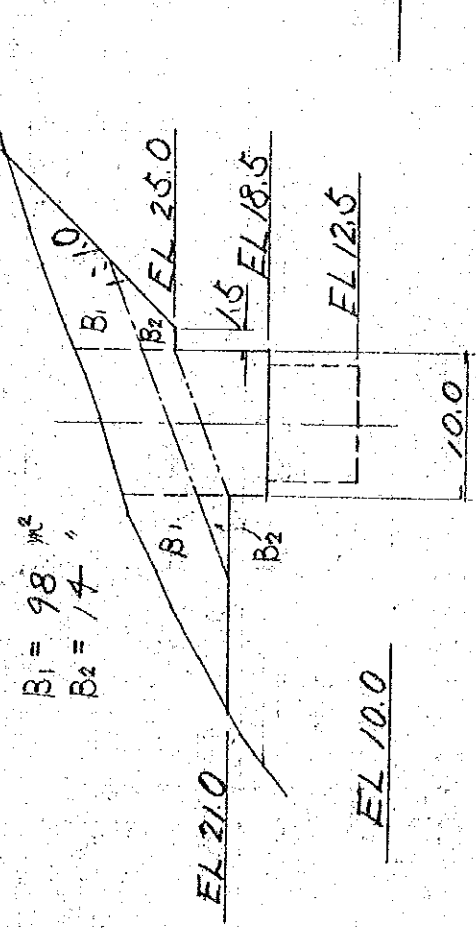
掘削横断面図 (ボマ側)



掘削縦断面図 (ボマ側)



E-E



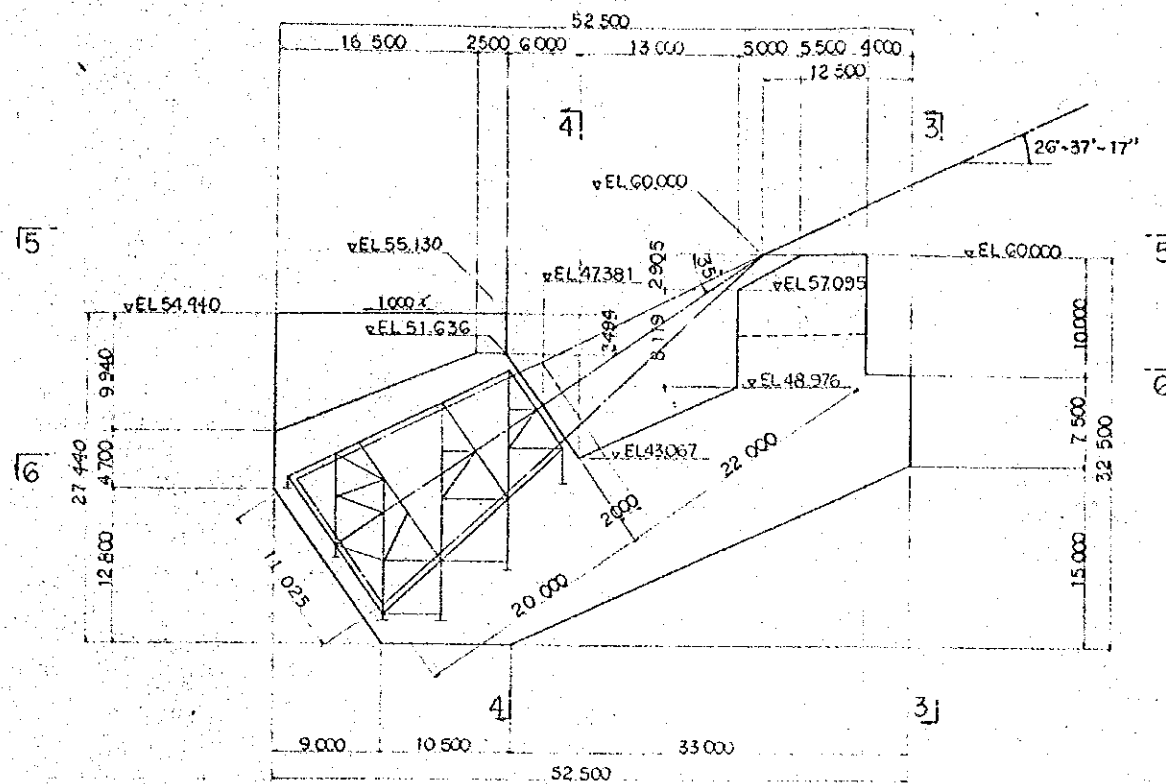
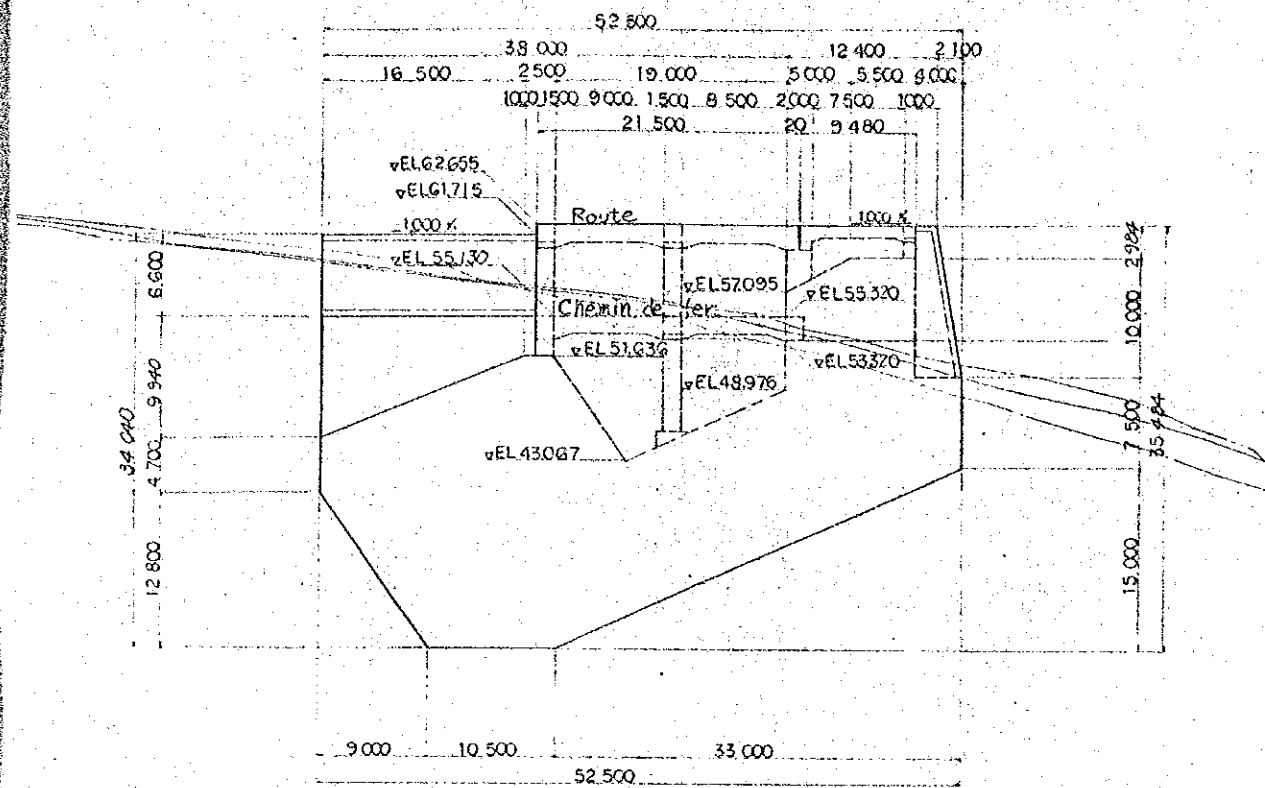
3. アンカレッジ数量

(1) マタダイ側

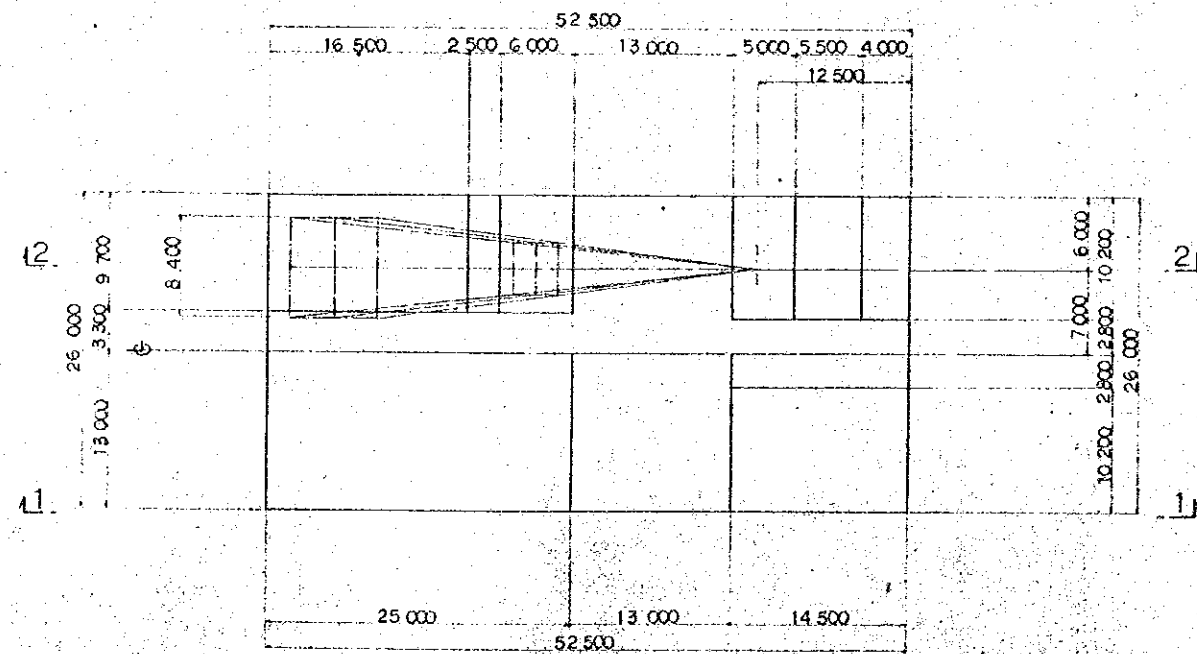
(a) 一般形状寸法 SECTION 1-1

DESSIN GÉNÉRAL DE CONSTRUCTION
(Béton massif d'ancrage)

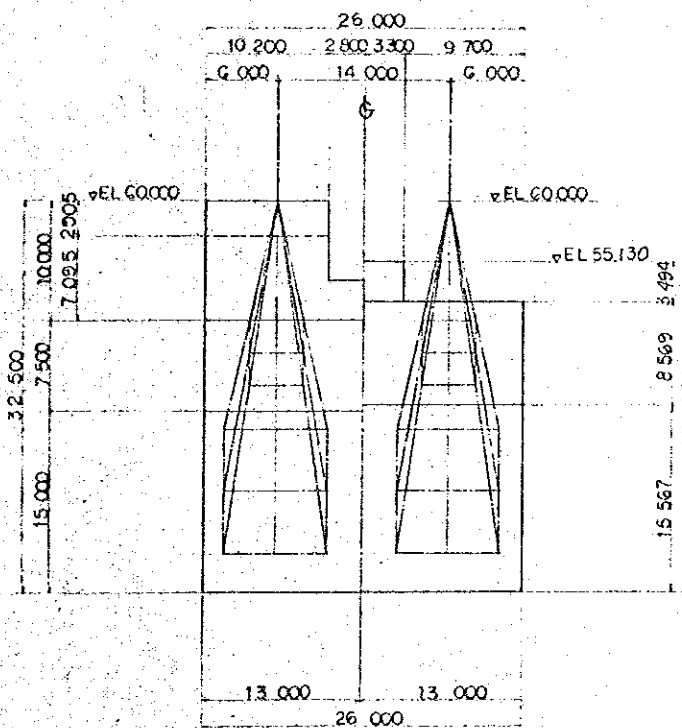
ECH. 1:300



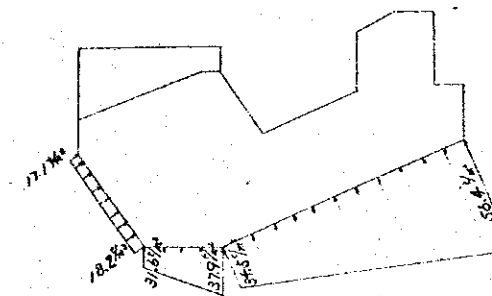
SECTION 5-5
SECTION 6-6



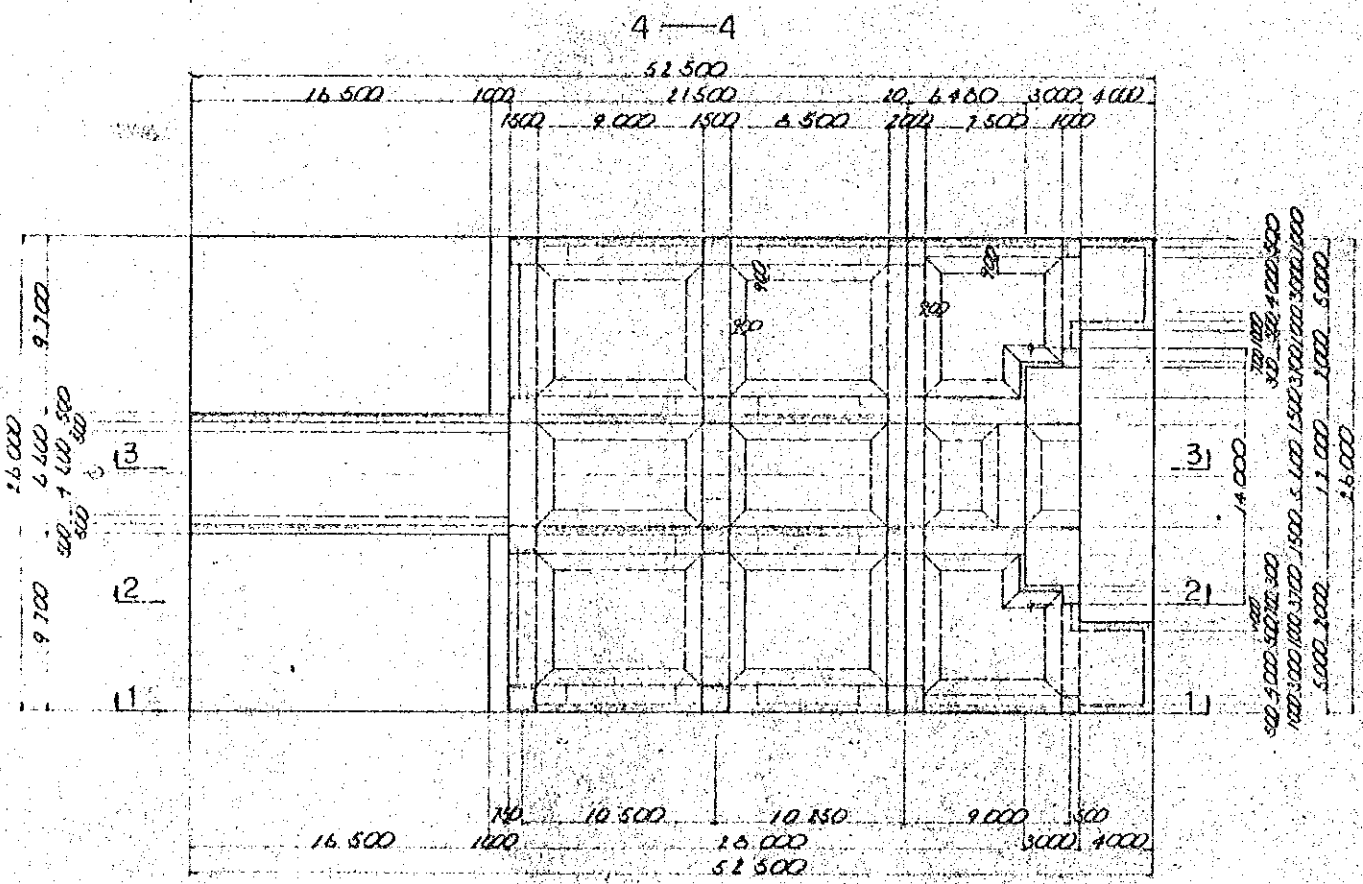
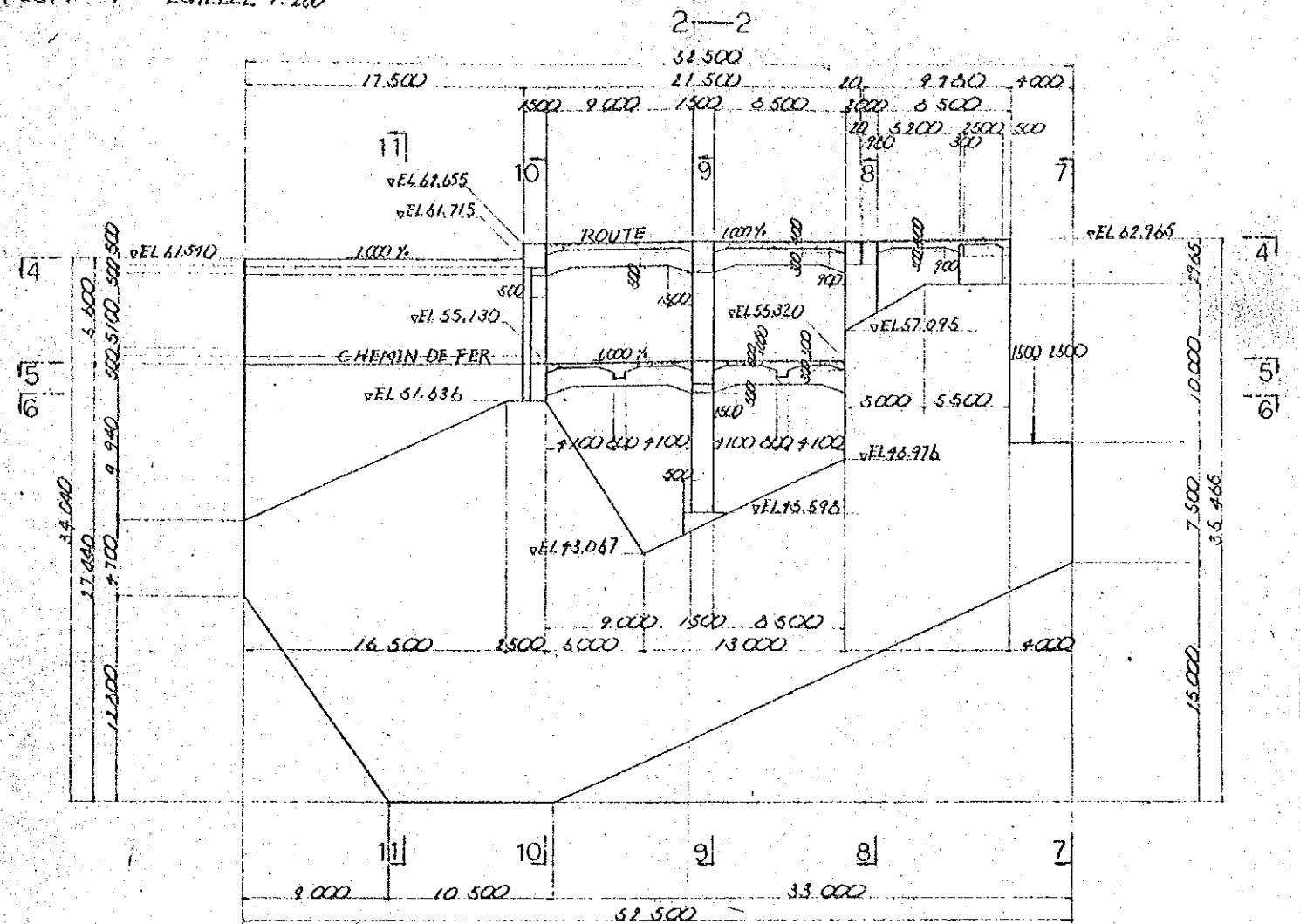
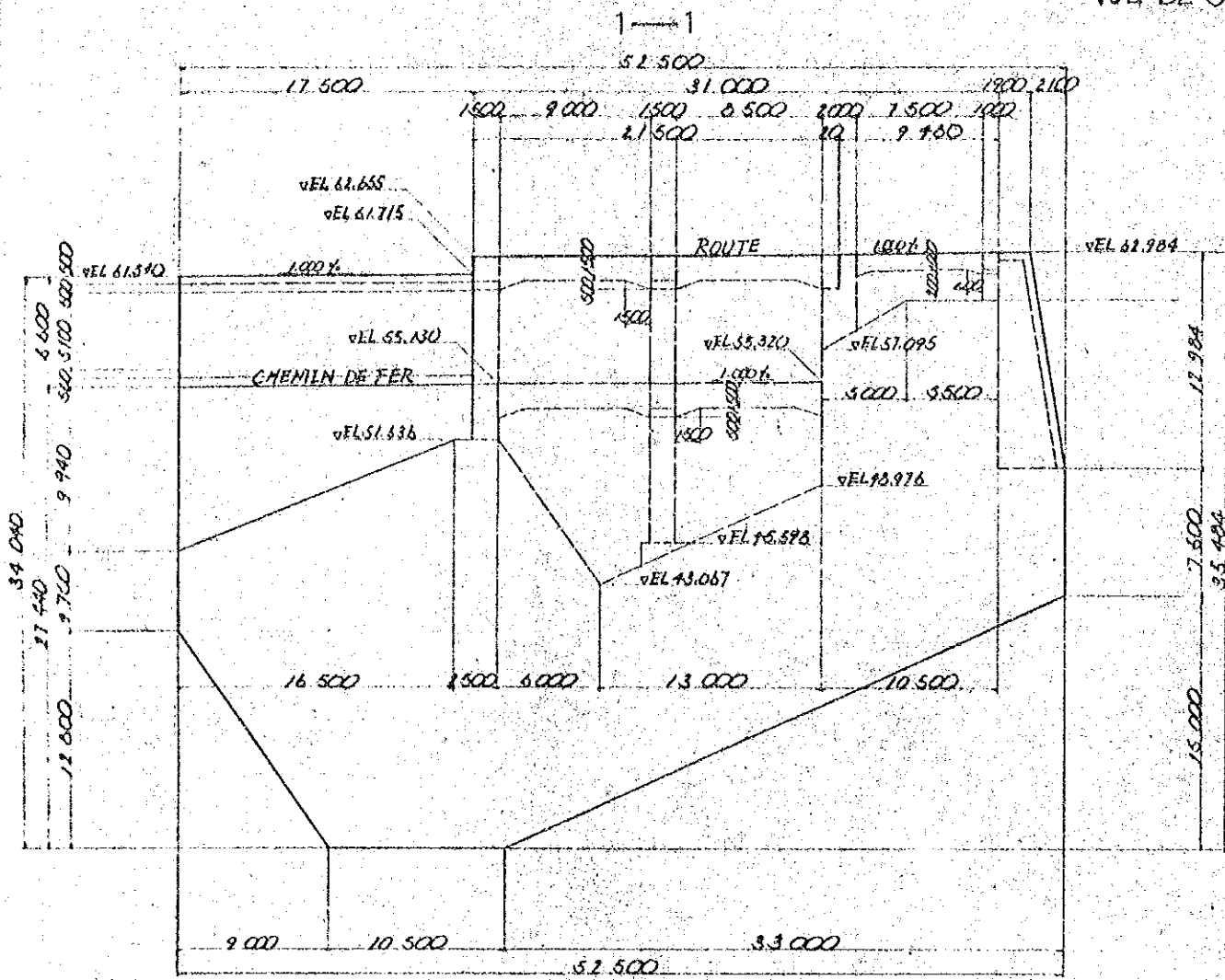
SECTION 3-3 SECTION 4-4



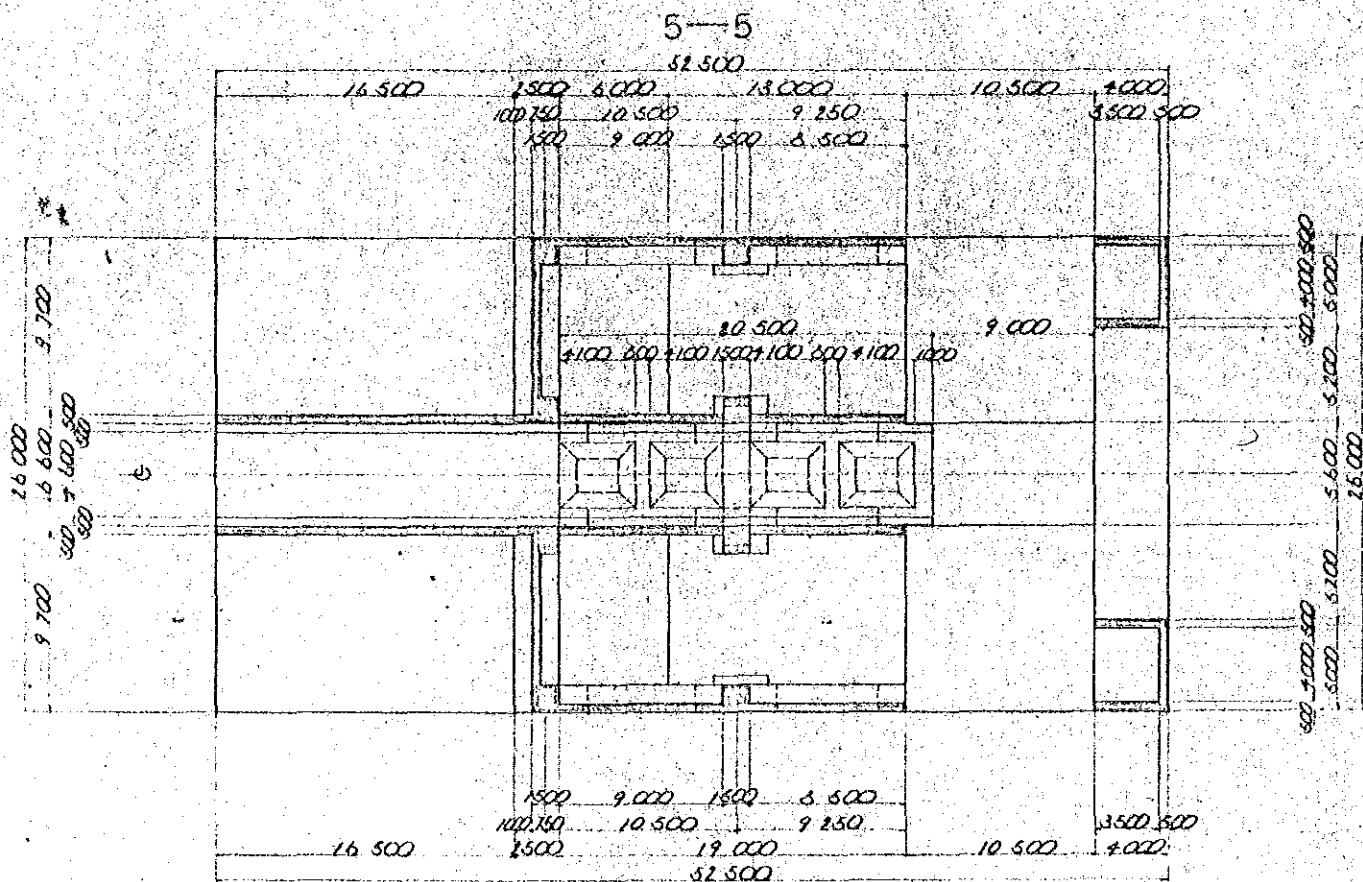
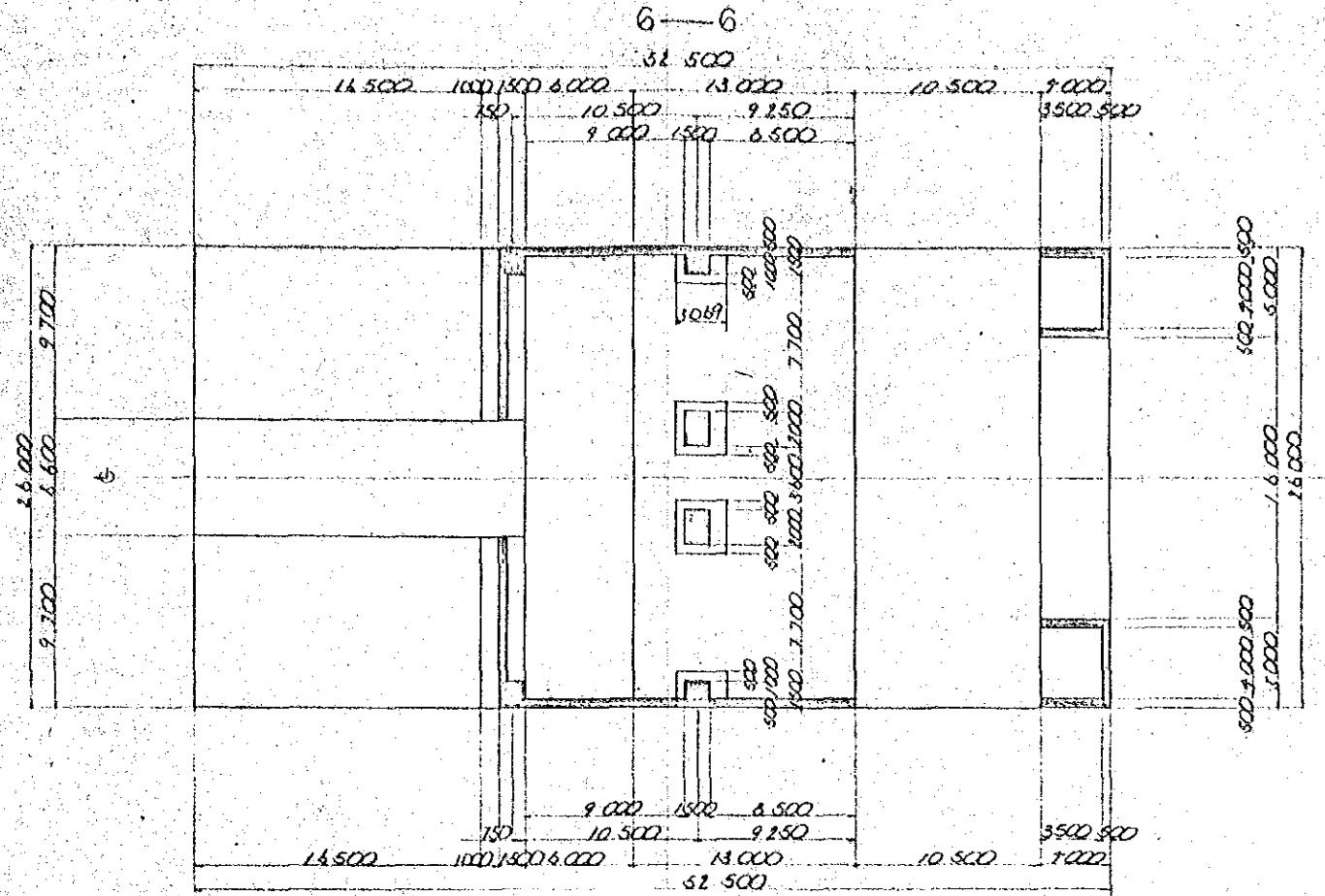
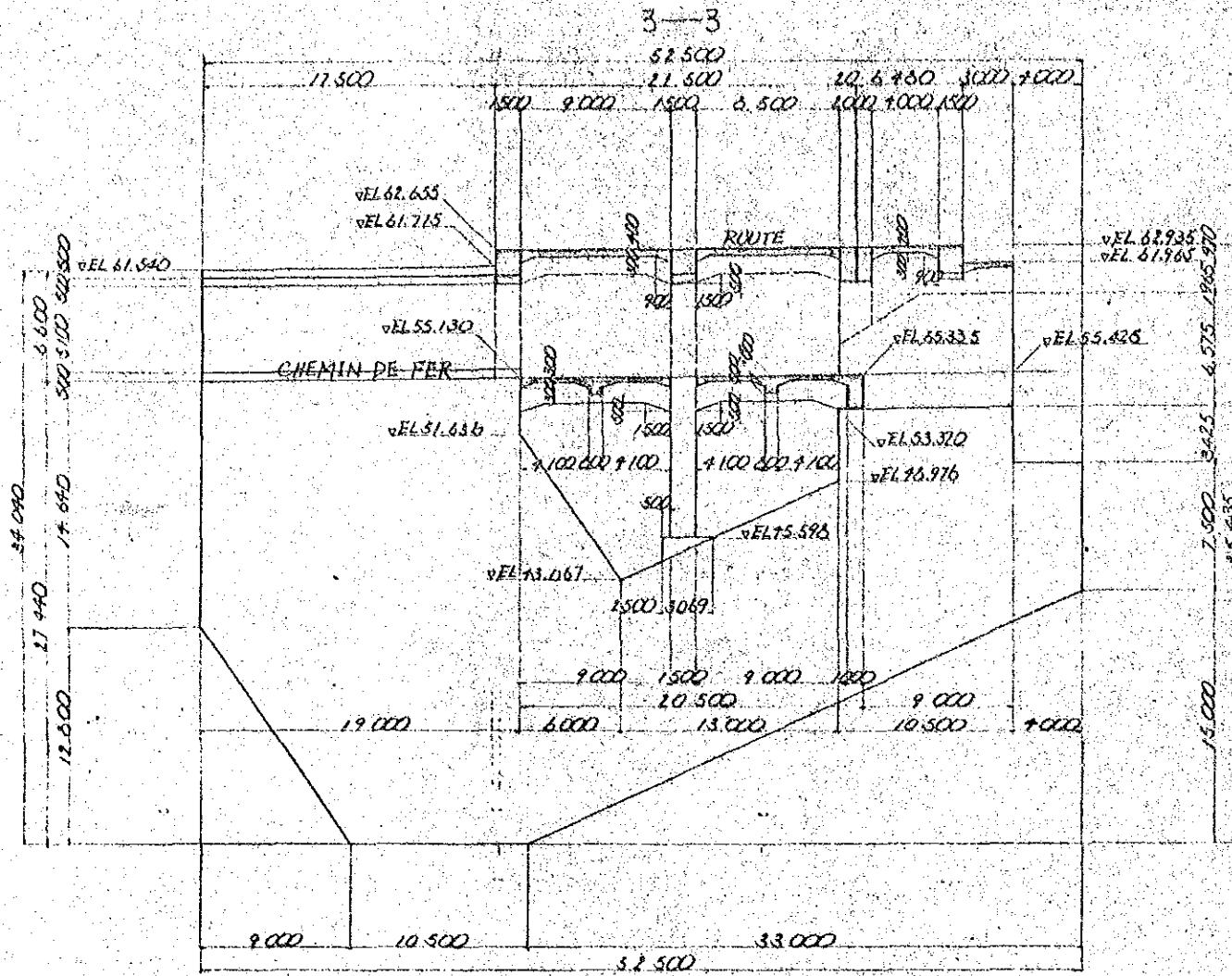
Reaction de la fondation



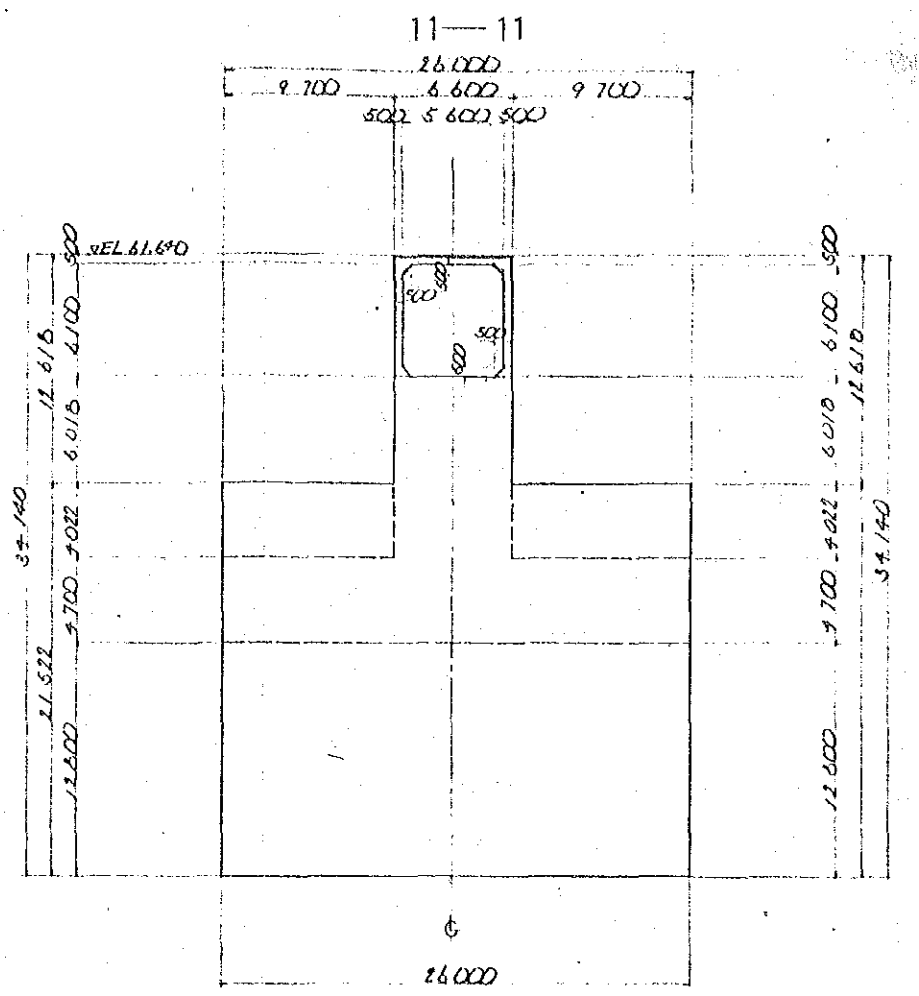
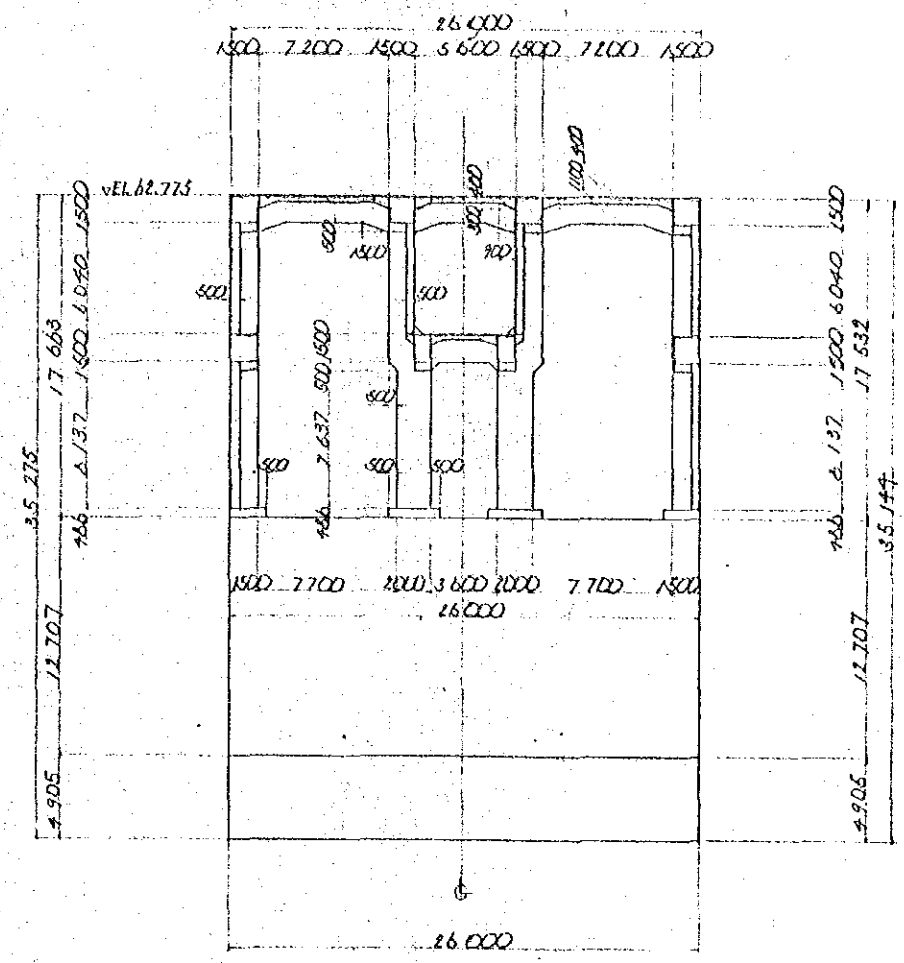
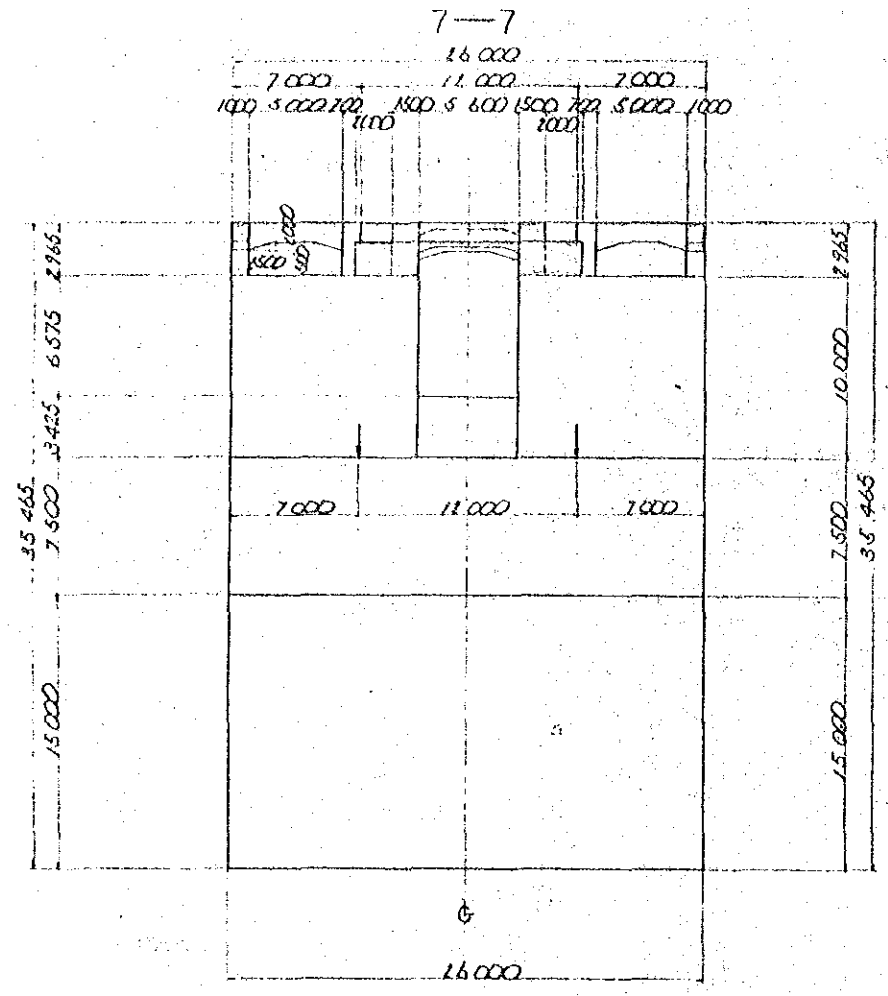
VUE DE SECTION - 1 ECHELLE 1:200



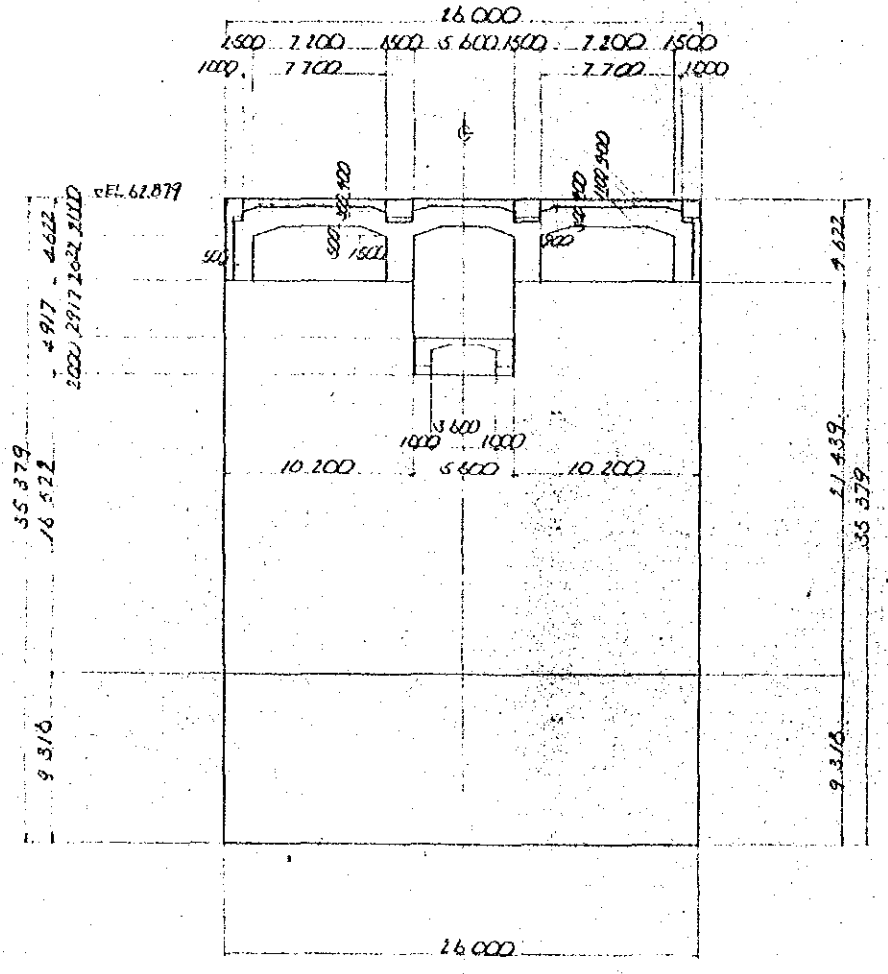
VUE DE SECTION - 2 ECHELLE 1:200



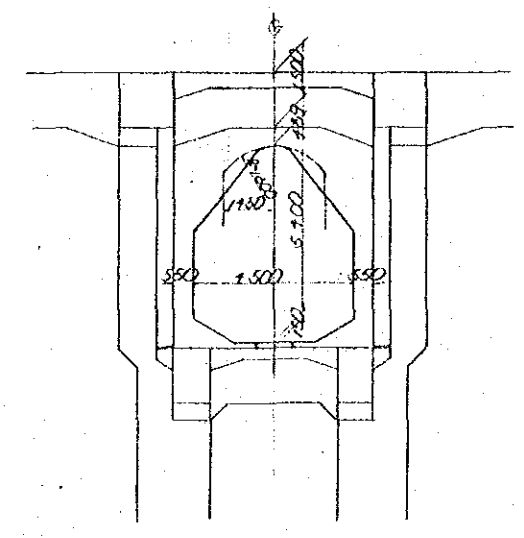
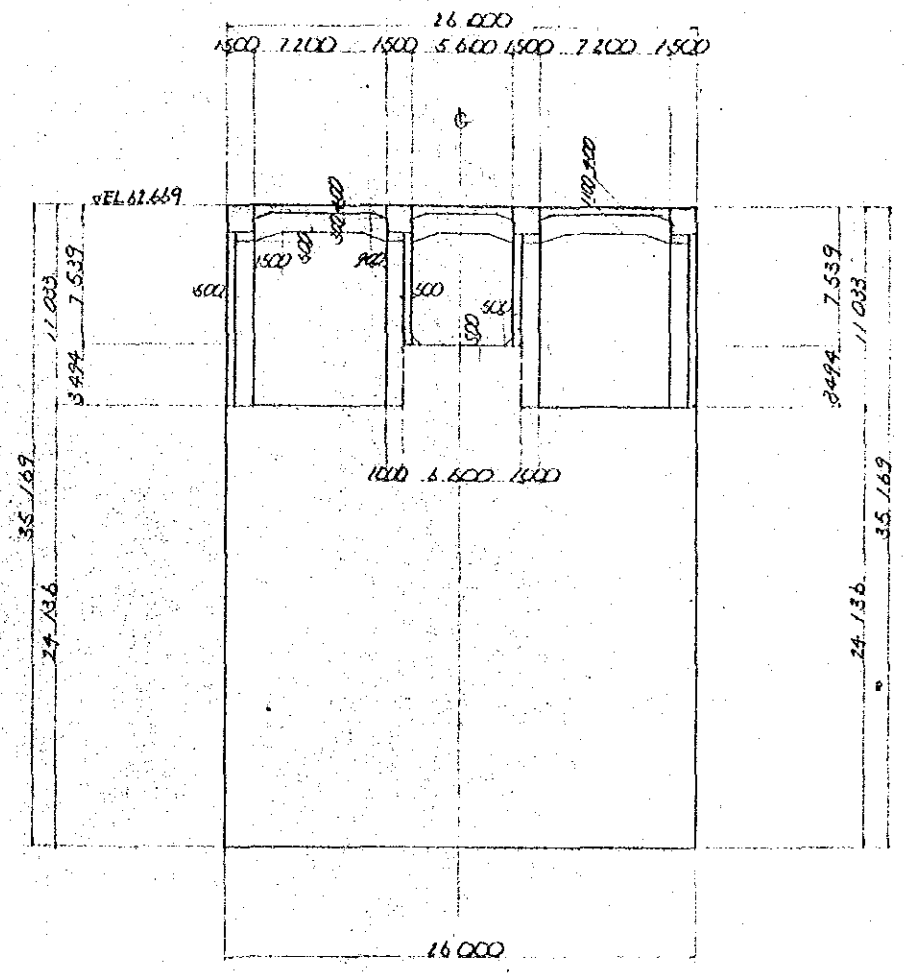
VUE DE SECTION - 3 ECHELLE 1:200
9-9



8-8

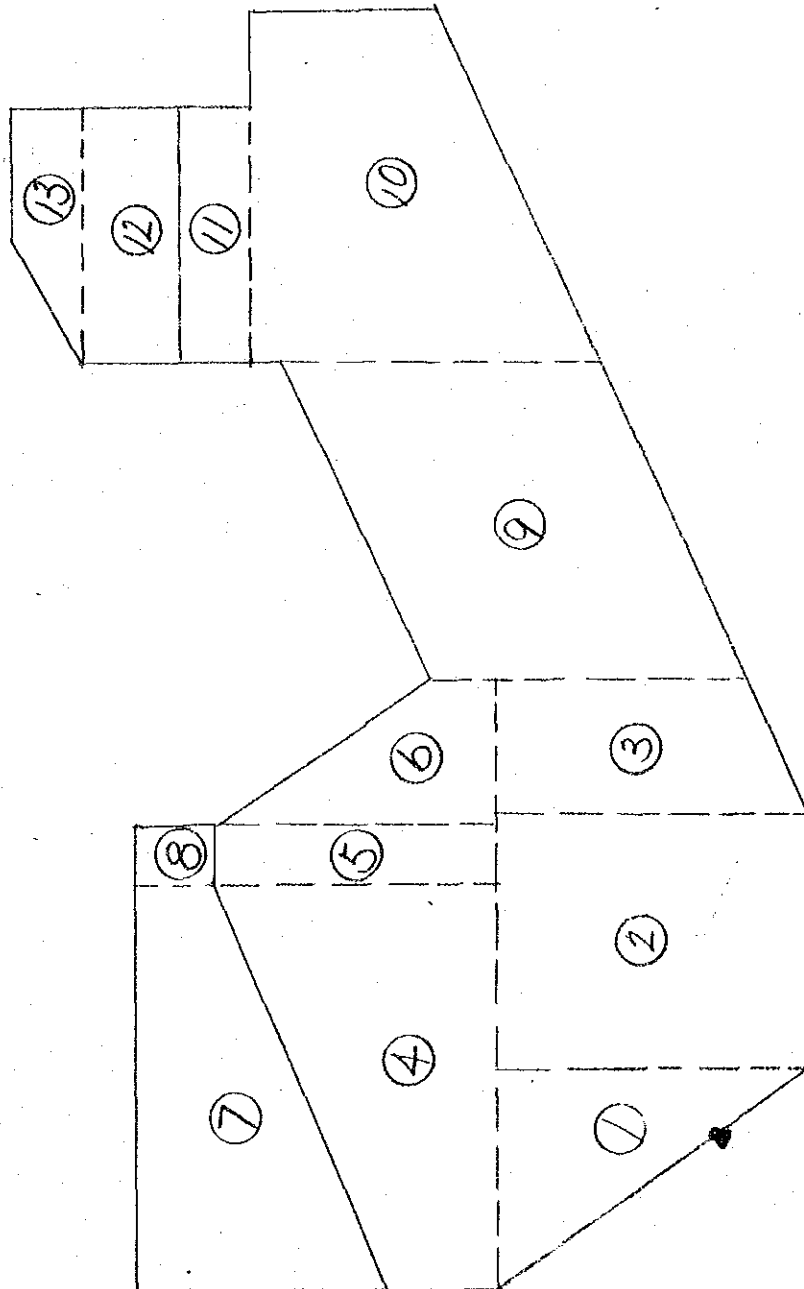


10-10



(b) コンクリート体積

(i) 本体



- ① $\frac{1}{2} \times 9.00 \times 12.80 \times 26.00 = 1497.600$ ¹⁰³
- ② $10.50 \times 12.80 \times 26.00 = 3494.400$
- ③ $(10.30 + 12.80) \times \frac{1}{2} \times 5.50 \times 26.00 = 1651.650$
- ④ $(4.70 + 11.336) \times \frac{1}{2} \times 16.50 \times 26.00 = 3439.722$
- ⑤ $2.50 \times 11.336 \times 26.00 = 736.840$
- ⑥ $(2.787 + 11.336) \times \frac{1}{2} \times 6.00 \times 26.00 = 1100.034$
- ⑦ $(3.339 + 9.81) \times \frac{1}{2} \times 16.50 \times 6.60 = 715.963$
- ⑧ $(3.364 + 3.339) \times \frac{1}{2} \times 2.50 \times 6.60 = 55.300$
- ⑨ $13.067 \times 13.00 \times 26.00 = 4416.646$
- ⑩ $(7.50 + 14.091) \times \frac{1}{2} \times 19.50 \times 26.00 = 4029.904$
- ⑪ $(3.19 + 3.295) \times \frac{1}{2} \times 10.50 \times 26.00 = 885.203$
- ⑫ $(3.905 + 3.60) \times \frac{1}{2} \times 10.50 \times 10.20 \times 2 = 825.206$
- ⑬ $(5.50 + 10.50) \times \frac{1}{2} \times 2.905 \times 10.20 \times 2 = 974.096$

合計 23362.564¹⁰³

(ii) 桁
(道路床版)

柱	$\cdot 1.00 \times 1.00 \times 2.834 \times 4$	$= 11.336 \text{ m}^3$
	$\cdot 1.50 \times 2.00 \times 2.492 \times 2$	$= 14.952 \text{ "}$
	$\cdot 1.50 \times 1.50 \times 17.046 \times 2$	$= 76.707 \text{ "}$
	$\cdot 2.00 \times 1.50 \times 9.507 \times 2$	$= 57.042 \text{ "}$
	$\cdot (1.50 + 2.00) \times \frac{1}{2} \times 1.5 \times 2 \times 0.5$	$= 2.625 \text{ "}$
	$\cdot 1.50 \times 1.50 \times 7.539 \times 2$	$= 33.926 \text{ "}$
	$\cdot 1.50 \times 1.50 \times 10.903 \times 2$	$= 49.057 \text{ "}$
	$\cdot 1.00 \times 1.50 \times 3.384 \times 2$	$= 10.092 \text{ "}$
	$\cdot 3.20 \times 3.00 \times 1.834 \times 2$	$= 35.213 \text{ "}$
	$\cdot 1.50 \times 2.823 \times 2.50 \times 2$	$= 21.173 \text{ "}$
	$\cdot (2.779 + 5.653) \times \frac{1}{2} \times 5.000 \times 1.50 \times 2$	$= 63.240 \text{ "}$
	$\cdot 1.50 \times 1.50 \times 7.539 \times 2$	$= 33.926 \text{ "}$
台座	$\cdot 1.395 \times 3.069 \times \frac{1}{2} \times 2.00 \times 2$	$= 8.563 \text{ "}$
	$\cdot 1.395 \times 3.069 \times \frac{1}{2} \times 3.00 \times 2$	$= 12.844 \text{ "}$
	$\cdot 1.50 \times 2.00 \times \frac{1}{2} \times 1.162 \times 2$	$= 3.846 \text{ "}$

小計 = 434.549 m³

$$\begin{aligned} \text{梁} \cdot 1.00 \times 1.00 \times 5.00 \times 2 \\ + \frac{1}{2} \times 0.50^2 \times 1.00 \times 4 \end{aligned} = 10.500 \text{ m}^3$$

$$\begin{aligned} \cdot 1.50 \times 1.50 \times 5.60 \times 3 \\ + \frac{1}{2} \times 0.50 \times 1.50^2 \times 6 \end{aligned} = 41.175 "$$

$$\begin{aligned} \cdot 1.50 \times 1.50 \times 7.20 \times 4 \\ + \frac{1}{2} \times 0.50 \times 1.50^2 \times 8 \end{aligned} = 69.300 "$$

$$\begin{aligned} \cdot 0.98 \times 1.50 \times 26.00 \\ + 0.50 \times \frac{1}{2} \times (4.50 + 1.50) \times 0.98 \times 3 \end{aligned} = 42.630 "$$

$$\begin{aligned} \cdot 1.00 \times 1.50 \times 26.00 \\ + 0.50 \times 2 \times (4.50 + 1.50) \times 1.00 \times 3 \end{aligned} = 43.500 "$$

$$\begin{aligned} \cdot 1.00 \times 1.00 \times 7.50 \times 2 \\ + \frac{1}{2} \times 0.20 \times 0.60 \times 1.00 \times 4 \end{aligned} = 17.400 "$$

$$\begin{aligned} \cdot 1.50 \times 1.50 \times 8.50 \times 4 \\ + \frac{1}{2} \times 0.50 \times 1.50^2 \times 8 \end{aligned} = 81.000 "$$

$$\begin{aligned} \cdot 1.50 \times 1.50 \times 9.00 \times 4 \\ + \frac{1}{2} \times 0.50 \times 1.50^2 \times 8 \end{aligned} = 85.500 "$$

$$\text{小計} = 391.005 \text{ m}^3$$

$$\text{床版} \cdot 5.00 \times 7.50 \times 0.40 \times 2 + 0.70 \times 7.50 \times 0.40 \times 2$$

$$+ 2.00 \times 5.20 \times 0.40 \times 2 + \frac{1}{2} \times 0.30$$

$$\times 0.90 \times (7.5 \times 4 + 5.90 \times 2 + 3.90 \times 2 + 2.00 \times 2) = 49.756 \text{ m}^3$$

$$\cdot 7.00 \times 5.60 \times 0.40 + \frac{1}{2} \times 0.30$$

$$\times 0.90 \times (5.60 \times 2 + 2.70 \times 2) = 11.201 \text{ m}^3$$

$$\cdot 5.60 \times (9.00 + 8.50) \times 0.40$$

$$+ \frac{1}{2} \times 0.30 \times 0.90 \times (5.60 \times 4 + 7.20 \times 2 + 6.70 \times 2) = 45.977 \text{ m}^3$$

$$\cdot 7.20 \times (9.00 + 8.50) \times 0.40 \times 2 + \frac{1}{2} \times 0.30$$

$$\times 0.90 \times (7.20 \times 8 + 7.20 \times 4 + 6.70 \times 4) = 116.082 \text{ m}^3$$

$$\text{小計} = 223.016 \text{ m}^3$$

$$\begin{aligned}
 & \text{壁} \cdot (1.90 + 4.00) \times \frac{1}{2} \times 12.853 \times 0.5 \times 4 & = 75.833^{\text{m}^3} \\
 & \cdot \sqrt{2.10^2 + 12.853^2} \times 0.50 \times 4.00 \times 2 & = 52.092^{\text{m}^3} \\
 & \cdot 4.00 \times 1.40 \times 0.50 \times 2 & = 5.600^{\text{m}^3} \\
 & \cdot 1.50 \times 0.50 \times 2.834 \times 2 & = 4.251^{\text{m}^3} \\
 & \cdot 0.30 \times (2.30 + 1.70) \times 2 \times 1.00 & = 2.400^{\text{m}^3} \\
 & \cdot 1.653 \times 4.50 \times 0.50 + \frac{1}{2} \times (1.634 + 3.392) \\
 & \quad \times 3.00 \times 0.50 \times 2 + \frac{1}{2} \times (7.50 + 6.30) \times 0.20 \times 0.50 \times 2 & = 12.488^{\text{m}^3} \\
 & \cdot 8.50 \times 5.539 \times 0.50 \times 4 + \frac{1}{2} \times (8.50 + 5.50) \times 0.50 \times 4 & = 108.163^{\text{m}^3} \\
 & \cdot (4.214 + 7.993) \times \frac{1}{2} \times 8.50 \times 0.50 \times 2 \\
 & \quad + \frac{1}{2} \times (8.50 + 5.50) \times 0.50^2 \times 2 & = 55.380^{\text{m}^3} \\
 & \cdot 9.00 \times 5.539 \times 0.50 \times 4 \\
 & \quad + \frac{1}{2} \times (9.00 + 6.00) \times 0.50^2 \times 4 & = 107.202^{\text{m}^3} \\
 & \cdot (8.887 + 9.993) \times \frac{1}{2} \times 3.00 \times 0.50 \times 2 \\
 & \quad + (1.364 + 9.993) \times \frac{1}{2} \times 6.00 \times 0.50 \times 2 \\
 & \quad + (9.00 + 6.00) \times \frac{1}{2} \times 0.50^2 \times 2 & = 66.141^{\text{m}^3} \\
 & \cdot 7.20 \times 8.889 \times 0.50 \times 2 \\
 & \quad + \frac{1}{2} \times (4.50 + 7.20) \times 0.50^2 \times 2 & = 66.926^{\text{m}^3}
 \end{aligned}$$

小計 556.476^m³

$$\text{合計 } 434.549 + 391.005 + 223.016 + 556.476$$

$$= 1605.046^{\text{m}^3}$$

鉄道床版

$$\begin{aligned}
 & \cdot 1.00 \times 1.50 \times 1.00 \times 2 \\
 & \quad + \frac{1}{2} \times 0.50 \times 1.50 \times 1.00 \times 4 \\
 & = 31.500 \text{ m}^3 \\
 & \cdot 1.00 \times 1.50 \times 9.00 \times 2 \\
 & \quad + \frac{1}{2} \times 0.50 \times 1.50 \times 1.00 \times 4 \\
 & = 28.500 \text{ m}^3 \\
 & \cdot 1.50 \times 1.50 \times 3.60 \\
 & \quad + \frac{1}{2} \times 0.50^2 \times 1.50 \times 2 \\
 & = 8.475 \text{ m}^3 \\
 & \cdot 0.80 \times 1.00 \times 3.60 \times 2 \\
 & \quad + \frac{1}{2} \times 0.50 \times 1.50 \times 0.80 \times 4 \\
 & = 6.960 \text{ m}^3 \\
 & \cdot 1.00 \times 2.00 \times 3.60 \\
 & \quad + 1.50 \times 0.50 \times 1.00 \times 2 \\
 & = 8.700 \text{ m}^3 \\
 & \text{小計} \quad 84.135 \text{ m}^3
 \end{aligned}$$

$$\begin{aligned}
 \text{床版} & \cdot 4.10 \times 3.60 \times 0.30 \times 4 + \frac{1}{2} \times 0.30 \times \\
 & \quad 0.90 \times (3.50 + 3.00) \times 8 \\
 & = 24.732 \text{ m}^3
 \end{aligned}$$

$$\text{合計} \quad 84.135 + 24.732 = 108.867 \text{ m}^3$$

ラーメン部総合計

$$1605.046 + 108.867 = 1713.913 \text{ m}^3$$

iii) 箱

$$6.60 \times 17.50 \times 0.50 \times 2 = 115.500 \text{ m}^3$$

$$5.60 \times 17.50 \times 0.50 = 49.000 \text{ "}$$

$$\frac{1}{2} \times 0.50^2 \times (38.00 + 17.50) \times 2 = 13.875 \text{ "}$$

$$\text{合計 } 178.375 \text{ m}^3$$

(IV) コンクリート体積総合計

本体	23 362.564	m ³
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ラーメン部	1 713.913	"
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箱	178.375	"
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総合計	25 254.852	m ³
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(C) 型样

i) 本体型样

外面	$\frac{1}{2} (2.50 + 9.136) \times 16.5 \times 2$	=	191.994 ^{m²}
	$9.136 \times 2.50 \times 2$	=	45.680 "
	$\frac{1}{2} (0.567 + 9.136) \times 6.00 \times 2$	=	58.218 "
	$\frac{1}{2} (0.567 + 6.476) \times 13.00 \times 2$	=	91.559 "
	$14.50 \times 7.50 \times 2$	=	217.500 "
	$10.50 \times 7.095 \times 2$	=	148.995 "
	$\frac{1}{2} (10.50 + 5.50) \times 2.905 \times 2$	=	46.480 "
前面	7.50×26.00	=	195.000 "
	$10.00 \times 10.20 \times 2$	=	204.000 "
	5.60×3.295	=	18.452 "
背面	2.50×26.00	=	65.000 "
	9.81×5.60	=	54.936 "
	$\sqrt{16.50^2 + 6.636^2} \times 10.20 \times 2$	=	362.803 "
内面	$\frac{1}{2} (5.50 + 10.50) \times 2.905 \times 2$	=	46.480 "
	$\frac{1}{2} (6.705 + 6.810) \times 10.50 \times 2$	=	141.908 "
	$\sqrt{5.00^2 + 2.905^2} \times 10.20 \times 2$	=	117.966 "
	$8.119 \times 10.20 \times 2$	=	165.828 "
	4.214×5.60	=	23.598 "
	$\sqrt{13.00^2 + 5.909^2} \times 26.00$	=	371.278 "
	$\sqrt{6.00^2 + 8.569^2} \times 26.00$	=	271.980 "

$$3.364 \times (5.60 + 2.50 \times 2) = 35.658 \text{ m}^2$$

$$\frac{1}{2} (3.364 + 9.81) \times 16.50 \times 2 = 217.371 \text{ m}^2$$

$$\frac{1}{2} \times 1.865 \times 0.75 \times 8 \times 2$$

$$+ \frac{1}{2} \times 1.582 \times 0.636 \times 2 = 12.192 \text{ m}^2$$

$$6.636 \times 5.60 = 37.162 \text{ m}^2$$

$$\text{小計} \quad 3141.838 \text{ m}^2$$

ii) 打継目型枠

$$\frac{1}{2} \times (2.20 + 15.0) \times 9.00 = 77.400 \text{ m}^2$$

$$10.50 \times 15.00 = 157.500 \text{ "}$$

$$\frac{1}{2} \times 15.00 \times 33.00 = 247.500 \text{ "}$$

$$\frac{1}{2} (2.50 + 9.136) \times 16.5 = 95.997 \text{ "}$$

$$9.136 \times 2.50 = 22.840 \text{ "}$$

$$\frac{1}{2} (0.567 + 9.136) \times 6.00 = 29.109 \text{ "}$$

$$\frac{1}{2} (0.567 + 6.476) \times 13.00 = 45.780 \text{ "}$$

$$\frac{1}{2} (7.50 + 6.476) \times 14.50 = 101.326 \text{ "}$$

$$\frac{1}{2} (3.295 + 3.190) \times 10.50 = 34.046 \text{ "}$$

$$26.00 \times (4.50 + 4.50 + 4.683) = 355.758 \text{ "}$$

 小計 1167.256 m²

(iii) 桁
(道路床版)

柱	$\cdot 1.00 \times 2.834 \times 2 + 0.50 \times 2.334 \times 2$	$= 8.002 \text{ m}^2$
	$\cdot 1.00 \times 1.634 \times 2 + 0.50 \times 1.634 \times 4$	$= 6.536 \text{ "}$
	$\cdot 1.00 \times (3.00 + 3.20) \times 2$	$= 12.400 \text{ "}$
	$\cdot 2.834 \times 2.50 \times 2 + \frac{1}{2} \times (2.834 + 4.492) \times 3.00 \times 2$	$= 36.148 \text{ "}$
	$\cdot -(2.00 \times 1.50 \times 2 + 4.00 \times 0.40 \times 2 + \frac{1}{2} \times 0.30 \times 0.90 \times 4)$	$= -9.740 \text{ "}$
	$\cdot \frac{1}{2} \times (2.492 + 3.654) \times 2.00 \times 8 + 3.654 \times 1.50 \times 4$	$= 71.092 \text{ "}$
	$\cdot 2.834 \times 2.20 \times 2 + \frac{1}{2} \times (2.834 + 4.492) \times 3.00 \times 2$	$= 34.448 \text{ "}$
	$\cdot -(5.20 \times 0.40 \times 2 + \frac{1}{2} \times 0.30 \times 0.90 \times 4)$	$= -4.700 \text{ "}$
	$\cdot (3.50 + 2.30) \times 2.834 \times 2$	$= 32.874 \text{ "}$
	$\cdot -(3.50 + 2.30) \times 0.70 \times 2$	$= -8.120 \text{ "}$
	$\cdot 4.492 \times 1.50 \times 2 + 2.00 \times 0.98 \times 2$	$= 17.396 \text{ "}$
	$\cdot -1.20 \times 1.00$	$= -1.200 \text{ "}$
	$\cdot 1.50 \times 16 \times 17.046 - 2.00 \times 1.50 \times 18$	$= 355.104 \text{ "}$
	$\cdot \sqrt{0.50^2 + 0.50^2} \times 1.50 \times 4 - 0.50 \times 1.50 \times 2$	$= 2.743 \text{ "}$
	$\cdot 1.50 \times 16 \times 10.903 - 2.00 \times 1.50 \times 14$	$= 219.672 \text{ "}$
	$\cdot -0.50 \times 8.903 \times 6 - 6.60 \times 0.50 \times 4$	$= -39.909 \text{ "}$
	$\cdot -1.00 \times 2.00 \times 4 - 1.50 \times 2.00 \times 2$	$= -14.000 \text{ "}$
	$\cdot 3.00 \times 1.395 \times 2 + \frac{1}{2} \times 1.395 \times 3.069 \times 4$	$= 16.933 \text{ "}$
	小計	735.679 m^2

$$\begin{aligned}
 & \cdot 5.00 \times (1.20 + 1.20) \times 2 + (\sqrt{0.20^2 + 0.60^2} \times 2 + 3.80) \times 1.00 \\
 & \quad \times 2 - 5.00 \times 0.40 \times 2 - \frac{1}{2} \times 0.20 \times 0.60 \times 4 = 29.888^{m^2} \\
 & \cdot - 1.50 \times 0.50 \times 2 - 0.50 \times 4.00 \times 2 = - 5.500'' \\
 & \cdot - \frac{1}{2} \times (3.80 + 5.00) \times 0.20 \times 2 = - 1.760'' \\
 & \cdot 7.50 \times 1.00 \times 4 + \frac{1}{2} \times 0.20 \times 0.60 \times 8 = 30.480'' \\
 & \cdot (\sqrt{0.20^2 + 0.60^2} \times 2 + 6.30) \times 1.00 \times 2 = 15.128'' \\
 & \cdot - 7.50 \times 0.60 \times 2 = - 9.000'' \\
 & \cdot 2.00 \times 26.00 + 1.50 \times 26.00 \times 2 = 130.000'' \\
 & \cdot - 1.20 \times 1.00 \times 2 - 2.00 \times 1.50 \times 2 = - 8.400'' \\
 & \cdot - 7.70 \times 0.40 \times 2 - 5.60 \times 0.40 \times 3 = - 12.880'' \\
 & \cdot - \frac{1}{2} \times 0.30 \times 0.90 \times 10 = - 1.350'' \\
 & \cdot 1.50 \times 5.60 \times 2 + \frac{1}{2} \times 0.50 \times 1.50 \times 4 = 18.300'' \\
 & \cdot (\sqrt{0.50^2 + 1.50^2} \times 2 + 2.60) \times 1.50 = 8.643'' \\
 & \cdot - (7.20 + 5.60 + 7.20) \times 0.40 - \frac{1}{2} \times 0.30 \times 0.90 \times 6 = - 8.810'' \\
 & \cdot - 1.50 \times 1.50 \times 3 = - 6.750'' \\
 & \cdot 7.20 \times 1.50 \times 8 + \frac{1}{2} \times 0.50 \times 1.50 \times 16 = 92.400'' \\
 & \cdot 5.60 \times 1.50 \times 4 + \frac{1}{2} \times 0.50 \times 1.50 \times 8 = 36.600'' \\
 & \cdot - 7.20 \times 0.40 \times 4 - \frac{1}{2} \times 0.30 \times 0.90 \times 8 = - 12.600'' \\
 & \cdot - 5.60 \times 0.40 \times 2 - \frac{1}{2} \times 0.30 \times 0.90 \times 4 = - 5.020'' \\
 & \cdot (\sqrt{0.50^2 + 1.50^2} \times 2 + 4.20) \times 1.50 \times 6 = 66.258'' \\
 & \cdot (\sqrt{0.50^2 + 1.50^2} \times 2 + 2.60) \times 1.50 \times 3 = 25.929''
 \end{aligned}$$

$$\begin{aligned}
 & \cdot -(\sqrt{0.50^2 + 1.50^2} \times 2 + 4.20) \times 0.50 \times 2 & = - 7.362^{m^2} \\
 & \cdot -(\sqrt{0.20^2 + 0.60^2} \times 2 + 6.30) \times 0.50 \times 2 & = - 7.564'' \\
 & \cdot 8.50 \times 1.50 \times 8 + \frac{1}{2} \times 0.50 \times 1.50 \times 16 & = 108.000'' \\
 & \cdot (\sqrt{0.50^2 + 1.50^2} \times 2 + 5.50) \times 1.50 \times 4 & = 51.972'' \\
 & \cdot -8.50 \times 0.40 \times 6 - \frac{1}{2} \times 0.30 \times 0.90 \times 12 & = - 22.020'' \\
 & \cdot -(\sqrt{0.50^2 + 1.50^2} \times 2 + 6.30) \times 0.50 \times 4 & = - 18.924'' \\
 & \cdot 9.00 \times 1.50 \times 8 + \frac{1}{2} \times 0.50 \times 1.50 \times 16 & = 114.000'' \\
 & \cdot (\sqrt{0.50^2 + 1.50^2} \times 2 + 6.00) \times 1.50 \times 4 & = 54.972'' \\
 & \cdot -9.00 \times 0.40 \times 6 - \frac{1}{2} \times 0.30 \times 0.90 \times 12 & = - 23.220'' \\
 & \cdot -(\sqrt{0.50^2 + 1.50^2} \times 2 + 6.00) \times 0.50 \times 4 & = - 18.324''
 \end{aligned}$$

小計 613.086^{m²}

$$\begin{aligned}
 \text{床版} & \cdot \sqrt{0.30^2 + 0.90^2} \times (7.50 + 5.90) \times 2 = 25.433^{m^2} \\
 & \cdot (5.90 \times 3.40 + 3.90 \times 2.00) \times 2 = 55.720'' \\
 & \cdot \sqrt{0.30^2 + 0.90^2} \times (5.60 \times 10 + 2.20 \times 2 + 6.70 \times 2 \\
 & \quad + 7.20 \times 2) + 2.20 \times 3.80 + 3.80 \times 6.70 + 3.80 \times 7.20 = 144.882'' \\
 & \cdot \sqrt{0.30^2 + 0.90^2} \times (7.20 \times 4 + 6.70 \times 2 + 7.20 \times 2) \times 2 \\
 & \quad + 5.40 \times 7.20 \times 2 + 5.40 \times 6.70 \times 2 = 257.547'' \\
 & \qquad \qquad \qquad \text{小計} \quad 483.582^{m^2}
 \end{aligned}$$

$$\begin{aligned}
 \text{壁} & \cdot \frac{1}{2} \times (1.90 + 4.00) \times 12.853 \times 4 = 151.665^{m^2} \\
 & \cdot \sqrt{2.1^2 + 12.853^2} \times (5.00 + 4.00) \times 2 = 234.422'' \\
 & \cdot \frac{1}{2} \times (1.40 + 3.50) \times 12.353 \times 4 + 1.40 \times 4.00 \times 2 = 132.259'' \\
 & \cdot (1.00 + 2.00) \times 2.834 \times 2 = 17.004'' \\
 & \cdot (1.70 + 2.30) \times 2.834 \times 2 = 22.672'' \\
 & \cdot - 2.00 \times 0.40 \times 2 - \frac{1}{2} \times 0.30 \times 0.90 \times 2 = - 1.650'' \\
 & \cdot - 2.30 \times 0.30 \times 2 - \frac{1}{2} \times 0.30 \times 0.90 \times 2 = - 1.650'' \\
 & \cdot 4.50 \times 1.634 \times 4 + \frac{1}{2} \times (1.634 + 3.292) \times 3.00 \times 4 = 58.968'' \\
 & \cdot \frac{1}{2} \times (7.50 + 6.30) \times 0.20 \times 4 = 5.520'' \\
 & \cdot 5.539 \times 8.50 \times 6 + 5.039 \times 8.50 \times 2 \\
 & \quad + \sqrt{0.50^2 + 0.50^2} \times 8.50 \times 2 = 380.173'' \\
 & \cdot \frac{1}{2} \times (5.50 + 8.50) \times 0.50 \times 8 = 28.000'' \\
 & \cdot 5.539 \times 9.00 \times 6 + 5.039 \times 9.00 \times 2 \\
 & \quad + \sqrt{0.50^2 + 0.50^2} \times 9.00 \times 2 = 402.536''
 \end{aligned}$$

$$\cdot \frac{1}{2} \times (6.00 + 9.00) \times 0.50 \times 8 = 30.000 \text{ m}^2$$

$$\cdot \frac{1}{2} \times (4.214 + 7.993) \times 8.50 \times 4 - \frac{1}{2} \times 0.486 \times 1.069 \\ \times 2 + \frac{1}{2} \times (5.50 + 8.50) \times 0.5 \times 4 = 220.999 "$$

$$\cdot 1.364 \times 9.00 \times 4 + \frac{1}{2} \times (6.00 + 9.00) \times 0.50 \times 4 = 64.104 "$$

$$\cdot 9.00 \times 8.569 \times 4 - \frac{1}{2} \times 6.00 \times 8.569 \times 4 \\ - \frac{1}{2} \times 1.364 \times 3.00 \times 4 - \frac{1}{2} \times (1.167 + 1.395) \times 0.50 \times 4 = 194.910 "$$

$$\cdot 8.903 \times 7.20 \times 4 + \frac{1}{2} \times (7.20 + 4.20) \times 0.50 \times 4 = 267.806 "$$

$$\text{小計} \quad 2207.738 \text{ m}^2$$

合 計

$$735.679 + 613.086 + 483.582 + 2207.738 \\ = 4040.085 \text{ m}^2$$

$$\text{箱} \cdot (6.6 \times 3 + 5.1 \times 2 + 4.60 + 0.50 \times 1.414 \times 4) \times 17.50 = 654.990 \text{ m}^2$$

$$\cdot 6.6 \times 2 \times 0.50 + 5.60 \times 0.50 + \frac{1}{2} \times 0.50 \times 0.50 \times 4 = 9.900 "$$

$$\text{合 計} \quad 664.890 \text{ m}^2$$

(鉄道床版)

梁	$\cdot 8.50 \times 1.50 \times 4 + \frac{1}{2} \times 0.50 \times 1.50 \times 4 + 1.50 \times 2.0 \times 2$	=	58.500^{m^2}
	$\cdot 2.00 \times 3.60 \times 2 + 3.60 \times 2.015 \times 2$	=	$28.908''$
	$\cdot (\sqrt{0.50^2 + 1.50^2} \times 2 + 5.50) \times 1.50 \times 2$	=	$25.986''$
	$\cdot - 8.50 \times 0.70 \times 2 - 3.60 \times 0.70 \times 3$	= -	$19.460''$
	$\cdot (0.50 \times 1.414 \times 2 + 2.60) \times 1.50$	=	$6.021''$
	$\cdot 9.00 \times 1.50 \times 4 + \frac{1}{2} \times 0.50 \times 1.50 \times 8$	=	$57.000''$
	$\cdot (\sqrt{0.50^2 \times 1.50^2} \times 2 + 6.00) \times 1.50 \times 2$	=	$27.486''$
	$\cdot - 0.70 \times 9.00 \times 2$	= -	$12.600''$
		小計	= 171.841^{m^2}

床版 $\cdot \sqrt{0.30^2 + 0.90^2} \times (3.60 \times 4 + 7.20 \times 4) + 7.20 \times 1.8 \times 2 = 66.917^{m^2}$

合計

$$171.841 + 66.917 = 238.758^{m^2}$$

§9 合計 (型枠)

本体 3141.838^{m^2}

箱 $664.890''$

打継ぎ目 $1167.256''$

ラメラ部 (道路) $4040.085''$

(鉄道) $238.758''$

合計 9252.827^{m^2}

(d) 土積計算書

(i) 土砂 (マタデ側) (P.42~45 参照)

断面	根掘り				余掘り				摘要
	距離	断面	平均断面	立米	距離	断面	平均断面	立米	
A-A	0	52			0	20			横断
B-B	33	78	65	2145	33	43	31.5	1040	"
C-C	10.5	63	70.5	740	10.5	34	38.5	404	"
D-D	9	58	60.5	544	9	25	29.5	266	"
D'-D'	0	18			0	27			"
E-E	14	16	17	238	14	21	24	336	"
F-F					0	95			縦断
G-G					9.7	75	85	825	"
G'-G'						74	6.6	488	"
G-G					0	75			"
H-H'					9.7	32	53.5	519	"
								514	隅角
合計				3667				4377	

土 積 計 算 書

ii) 軟岩 (マクティ側) (P42~45参照)

断面	根 掘 り				余 掘 り				摘 要
	距離	断面	平均断面	立米	距離	断面	平均断面	立米	
A-A	0	56			0	10			横断
B-B	33	56	56	1848	33	10	10	330	"
C-C	10.5	56	56	588	10.5	10	10	105	"
D-D	9	56	56	504	9	10	10	90	"
D-D'	0	13			0	10			"
E-E	14	13	13	182	14	10	10	140	"
F-F					0	40			縦断
G-G					9.7	40	40	388	"
G'-G'						40	6.6	264	"
G-G					0	40			"
H-H					9.7	40	40	388	"
								162	隅角
進入路						7x4.0x2 =		56	
合計				3122				1928	

土積計算書

iii) 硬岩 (マクテ側) (P.42~45参照)

断面	根掘り				余掘り				摘要
	距離	断面	平均断面	立米	距離	断面	平均断面	立米	
A-A	0	91			0	49			横断
B-B	33	950	520.5	1176	33	0	24.5	809	"
C-C	10.5	942	946	9936		0			"
D-D	9	602	772	6951		0			"
D'-D'	0	7				0			"
E-E	14	23	15	210		0			"
F-F					0	23			縦断
G-G					9.7	23	23	223	"
G'-G'						23	6.6	152	"
G-G					0	23			"
H-H					9.7	23	23	223	"
道入路						64 x 4.0 x 2 =		512	縦断
合計				84273				1919	

土積計算書

(IV) 埋戻し(マタデ側) (P.46~47参照)

断面	埋戻し				距離	断面	平均断面	立米	摘要
	距離	断面	平均断面	立米					
A-A	0	0							横断
B-B	16	40	20	320					"
C-C	2	33	36.5	73					"
D-D	17	101	67	1139					"
D'-D'	0	318							"
E-E	17.5	384	351	6143					"
E'-E'	0	84							"
F-F	14.0	52	68	952					"
F'-F'	5	0	26	130					"
G-G	0	20							縦断
H-H	9.7	35	27.5	267					"
H'-H'		14x	6.6 =	92					"
H-H	0	35							"
I-I	9.7	27	31	301					"
前面	25x	26.0		650					"
合計				10067					