

10. CHLORINATION BUILDING

I-307

§ 1 ASSUMED LOAD

FLOOR LOAD TABLE

TITLE	MATERIAL	(t/m ³)	TICK. (cm)	WEIGHT (kg/m ²)		DL (kg/m ²)	LL (kg/m ²)	TL (kg/m ²)	NOTE
ROOF	WATER PROOFING			10	TO	360	180	540	
	CEMENT MORTAR	2.00	3.0	40	FLOOR				
	SLAB	2.40	12.0	288	TO				
	CEILING			20	BEAM				
					TO				
					FRAME	180	490		

DEAD LOAD OF GIRDER, COLUMN, WALL

① GIRDER, BEAM

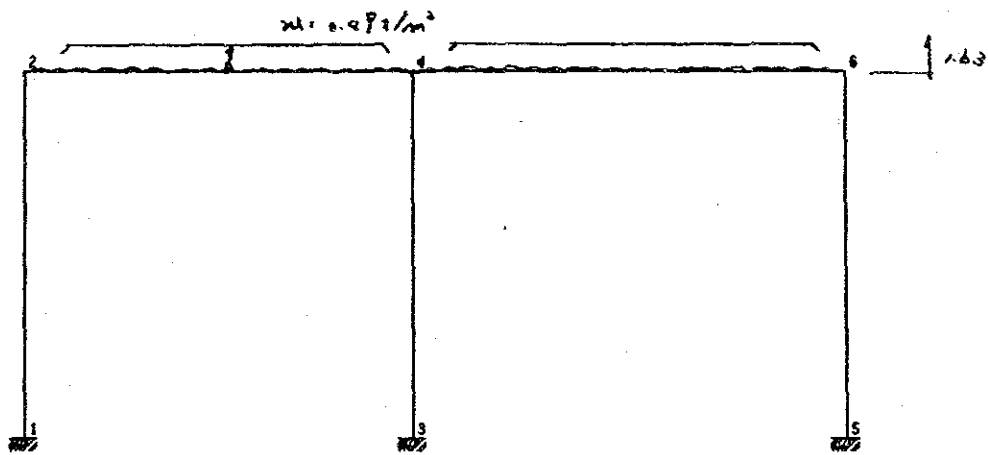
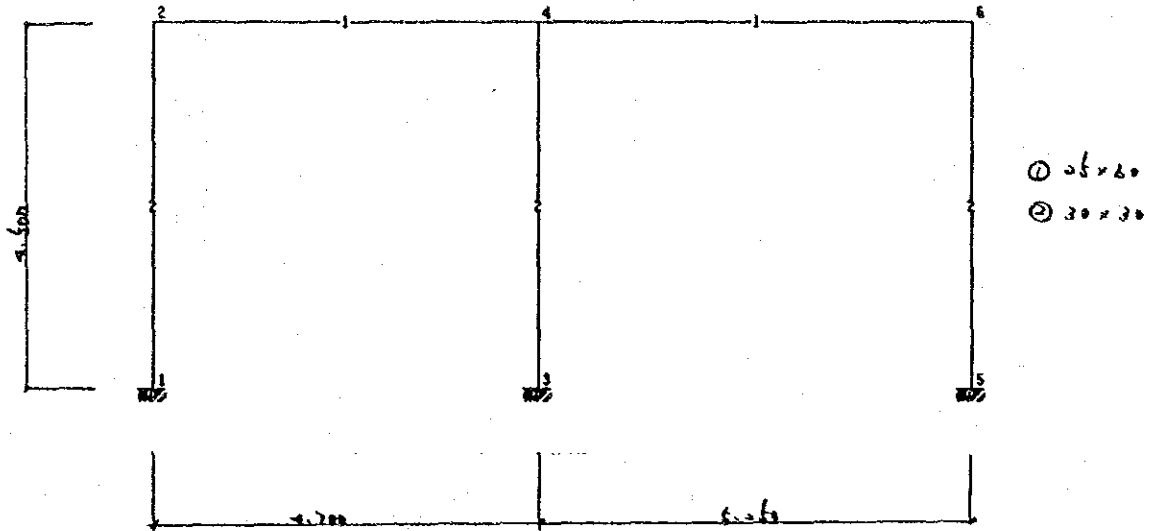
NO	B	D	CONCRETE	FINISHED	WEIGHT
	25.0	60.0	288	63	360

② COLUMN

NO	B	D	CONCRETE	FINISHED	WEIGHT
	30.0	30.0	216	65	290

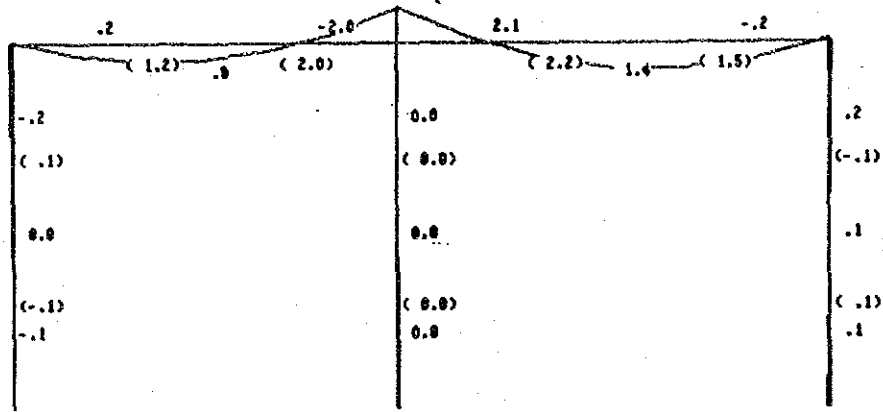
5.3 CALCULATION OF STRESS

3.1 INPUT DATA



$q = 0.36 \text{ k/m}$

3.2 STRESS DIAGRAM.



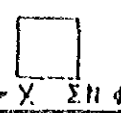
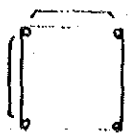
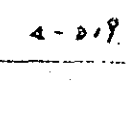

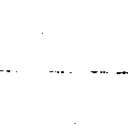



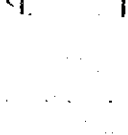



3.4 DESIGN OF GIRDER AND COLUMN

3.1 GIRDER

UD-011

NO (')	PLACE	SECTION			M (mm)			Q (kN)			MAIN BAR			STIRRUP		TOP BAR BOTTOM BAR
		b (cm)	D (cm)	d (cm)	L ₁	R	T ₁	I	E	T	C (kg/cm ²)	P ₁ (%)	P ₂ (cm)	r (kg/cm ²)	pw	
		b _d (10 ³ cm)	D _d (10 ³ cm)	d _d (cm)	L ₁	R'	T ₁	Q ₁	Q ₂	Q ₃	r	af. (cm)	py (cm)	a	af. cm	
1	E	25	60	58	2.2			2.2				2.2		1.96	0.30	3 - D/9
	C				1.4							2.2		2.10	0.30	3
	E															
2	E															- D
	C															
	E															
3	E															- D
	C															
	E															
4	E															- D
	C															
	E															
5	E															- D
	C															
	E															
6	E															- D
	C															
	E															

4.2 COLUMN

NO		SECTION				STRESS			MAIN BAR				HOOP		Y Σ II φ			
		b(cm)	D(cm)	bD (10 ³ cm ²)	bD ² (10 ³ cm ³)	P (t)	M _x (tm)	Q (t)	P/bd (kg/cm)	M/bD ² (kg/cm)	P _s (%)	ad (cm)	r (kg/cm ²)	η _{sp} (cm)				
C ₁	X	30	30		L	0.5	0.2	0.1			0							
					E													
					T ₁													
	Y				T ₂													
					L													
					E													
C	X	T ₁																
		T ₂																
		L																
C	Y	E																
		T ₁																
		T ₂																
C	X	L																
		E																
		T ₁																
C	Y	T ₂																
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C	X	T ₁																
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C	X	L																
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C	Y	T ₂																
		L																
		E																
C	X	T ₁																
		T ₂																
		L																
C	Y	E																
		T ₁																
		T ₂																

S. S DESIGN OF SLAB

1	NAME	W ₀	L _x	L _y	POST	W	NC	t	PLACE	M	At	DIO
1	ROOF	50	180	200	470	518	S1	12.0	MAIN BAR X MAIN BAR Y	(U) 0.17 (D) 0.11 (U) 0.09 (D) 0.06	1.33 0.88 0.78 0.52	D10 D10 D10 D10

CSI

$\frac{1}{2}$ h.o.tank

↳

M = 0.212m

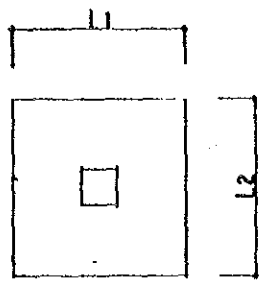
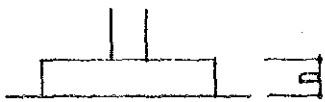
A = 0.87A

$\frac{1}{2}$ 18cm (cd: 11cm)

A₂ = 3.52 m² (1.54 x 6.08 m) 0.13 @ 1.6

T = 0.82 kg/m² < S_A

5.6 DESIGN OF FOUNDATION



$f_a = 20.0 \text{ t/m}^2$
 $f_a' = 20.0 - 2.0 \times 1.0 \times 1.0 = 18.0 \text{ t/m}^2$

F ₁	$L_1 \times L_2 = 700 \times 700$	$D = 300$	$(d = 200 \text{ mm})$
	$M = 20.0 \times 0.70 \times 0.30^2 / 2 = 0.39 \text{ t-m}$		$a_t = 1.24 \text{ cm}^2$
	$Q = 20.0 \times 0.70 = 14.0 \text{ t}$		$\phi = 10.6 \text{ t/cm}^2$
			$\tau = 3.19 \text{ t/cm}^2 < f_s$

F	$L_1 \times L_2 =$	$D =$	$(d =)$
	$M =$		$a_t =$
	$Q =$		$\phi =$
			$\tau =$

F	$L_1 \times L_2 =$	$D =$	$(d =)$
	$M =$		$a_t =$
	$Q =$		$\phi =$
			$\tau =$

F	$L_1 \times L_2 =$	$D =$	$(d =)$
	$M =$		$a_t =$
	$Q =$		$\phi =$
			$\tau =$

PART II WORK QUANTITY CALCULATION

1. RAW WATER TRANSMISSION
PIPELINE

List of Pipes & Valves (/)
(Transmission Pipeline)

I t e m	Quantity
A. Valve	
A1. Gate Valve $\phi 800$ (with Bell-Mouth) (with operation stand and sprindle)	1 NO.
A2. Sluice Valve $\phi 150$ (with operation handle)	1 NO.
A3. Air Valve $\phi 75$ (with Ball valve)	5 NOS.
B. Transmission Main ($\phi 800$)	
B1. DIP Straight pipe $\phi 800 \times 5.500$ (Flexible joints)	388 NOS.
B2. DIP Bend $\phi 800 \times 90^\circ$ (Double sockets)	2 NOS.
B3. DIP Bend $\phi 800 \times 45^\circ$ (Double sockets)	9 NOS.
B4. DIP Bend $\phi 800 \times 22\frac{1}{2}$ (Double sockets)	8 NOS.
B5. DIP Bend $\phi 800 \times 11\frac{1}{4}$ (Double sockets)	13 NOS.
B6. DIP Tee $\phi 800 \times 150$ (Flanged on double sockets)	6 NOS.
B7. DIP Tee $\phi 800 \times 150$ (Flanged on double sockets)	1 NOS.

List of Pipes & Valves (2)
(Transmission Pipeline)

I t e m	Quantity
⁷ B8 DIP Taper ^{150 75} φ800 x 600 (Double-flanged)	(5) Nos.
B9 DIP Man hole cover φ600 x 75 (Double-flanged)	5 Nos.
⁸ B10 DIP Collar φ800	16 Nos.
⁹ B11 DIP Flanged spigot φ800	1 No.
B12 DIP Retained joint φ800	68 Sets
¹⁰ B13 Bolts/Nuts & Rubber packing for flange	
- For (φ800) DIP	27 sets
- For φ ¹⁵⁰ 600 "	5 " "
- For φ75 "	10 " "

List of Pipes & Valves (3)
(Transmission Pipeline)

I t e m	Quantity
C. Drain pipe (Ø150)	
C1. DIP ^{Straight} Flanged pipe $\phi 150 \times 5.500$ (Double flanged) Flexible joints	5 NOS.
C2. DIP Bend $\phi 150 \times 90^\circ$ (Double flanged)	2 NOS.
C3. DIP Flanged socket piece $\phi 150$	2 NOS.
C4. DIP Flanged spigot piece $\phi 150$	1 NO
C ₅ . Bolts/Nuts & Rubber packing for flange - FOR $\phi 150$ DIP	5 NOS.

(Pipe Installation Work)

(Transmission Pipeline)

I t e m	Quantity
DIP Installation	2131.05 m
" "	29.82 m
" Flexible joints work	496 NOS.
" " " "	1 NO.
Restrained joints compose	58 NOS.
" pipe cutting	53 NOS.
" " " "	1 NO.
Flanges joints compose	2 NOS.
" " " "	14 NOS.
-----	9 NOS.
" " " "	10 NOS.

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(Pipe Installation Work) - Air Valve - ①
Quantity Calculation Sheet
 (Transmission Pipeline)

Item	Calculation	Quantity
1. Air Box (5 Nos.)	<p>Box cover</p> <p>ϕ 1250¹³⁰⁰ x 50^H</p> <p>Steel L-50x50x3.2 $l = \frac{m}{2.53} \quad g = 2.38$</p> <p>Checked plate $t = 3.2 \quad s = \frac{m^2}{1.33} \quad g = 26.82$</p> <p>Steel bar $\phi 12 \quad l = 1.00 \quad g = 0.888$</p> <p>$\Sigma W = \frac{kg}{51.03}$</p> <p>steel belt ~ with chain and Key ~ ϕ 1250¹²³⁰ x 50 x 3.2^t</p> <p>R-50 x 3.2^t $l = \frac{m}{4.14} \quad g = 1.766$</p> <p>$\Sigma W = \frac{kg}{7.35}$</p> <p>Rainforced Concrete Pipe L インクリート管 ϕ 1000¹⁰⁵⁰ x 1500⁹⁰⁰ (RCP)</p>	<p>5 Nos.</p> <p>5 Nos.</p> <p>5 Nos.</p>



(Pipe Installation Work) - Air Valve - ②
Quantity Calculation Sheet
 (Transmission Pipeline)

Item	Calculation	Quantity
2. 鉄筋コンクリート Concrete	$C = 210 \text{ kg/cm}^2 \quad (4 \text{ Nos.})$ $1.50 \times 1.50 \times 1.90 \times 4 = 17.100$ $- 0.82^2 \times \frac{\pi}{4} \times 1.50 \times 4 = \ominus 3.168$ Total 13.932	13.9 m ³
3. 型枠 Formwork	$1.50 \times 1.90 \times 4 = 11.40$ $- 0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.06$ Total 10.34	10.3 m ³
4. 鉄筋 Steel bars	$\phi 13$ $\phi 13$ $\phi 16$	156.0 kg 257.6 kg 254.6 kg

(Pipe Installation Work) - Air Valve - (3)

Air Valve ~ 4 sites Steel Bars List
(Transmission Pipeline)

Summary Table	Size (mm)	Total Length (m)	Unit Weight (kg/m)	Total Weight (kg)	Remarks
	¹³ D12	156.800	0.985	156.0	
	D16	163.200	1.56	254.6	
	Total			410.6	

Detail List

NO.	Size (mm)	Unit Length (m)	Q'ty	Length (m)	Shape
	D16	5.100 3.200	Nos. 32	163.200 166.400	<p style="text-align: center;">1.400 1.400 2.57 200 200 l = 5.100</p>
	¹³ D12	1.400	112	156.800	



(Pipe Installation Work) - Bend and Double Bends ①
Quantity Calculation Sheet (1)
 (Transmission Pipeline)

Item	Calculation	Quantity
1. 鉄筋コンクリート Concrete	$c = 210 \text{ kg/cm}^2$ <p>(1) $11^\circ \frac{1}{4} \sim 10 \text{ sites}$</p> $1.80 \times 1.90 \times 1.30 \times 10 = 44.460$ $- 0.82^2 \times \frac{\pi}{4} \times 1.90 \times 10 = \ominus 10.039$ <p>(2) $22^\circ \frac{1}{2} \sim 4 \text{ sites}$</p> $1.80 \times 2.10 \times 1.30 \times 4 = 19.656$ $- 0.82^2 \times \frac{\pi}{4} \times 2.10 \times 4 = \ominus 4.436$ <p>(3) $45^\circ \sim 1 \text{ site}$</p> $1.80 \times 3.50 \times 1.30 = 8.190$ $- 0.82^2 \times \frac{\pi}{4} \times 3.50 = \ominus 1.848$ <p>$L = 6.50 - L = 14.63$</p> <p>(4) NO1 Double Bends $45^\circ \sim 45^\circ$</p> $1.65 \times 1.700 \times 8.045 = 22.566$ $- 0.82^2 \times \frac{\pi}{4} \times 8.045 = \ominus 4.249$ <p>$L = 689.21 - L = 697.00$</p> <p>(5) NO2 Double Bends $45^\circ \sim 45^\circ$</p> $1.65 \times 1.70 \times 8.142 = 22.838$ $- 0.82^2 \times \frac{\pi}{4} \times 8.142 = \ominus 4.300$	

(Pipe Installation Work) - Bend and Double Bends - (2)
Quantity Calculation Sheet (2)
 (Transmission Pipeline)

Item	Calculation	Quantity
	$L=750.72 \sim L=758.58$ (6) NO3 Double Bends $45^\circ \times 45^\circ$ $1.80 \times 1.30 \times 7.86 = 18.392$ $-0.82^2 \times \frac{\pi}{4} \times 7.86 = \ominus 4.151$ $L=2108.93 \sim 2115.26$ (7) NO4 Double Bends $45^\circ \sim 45^\circ$ $1.80 \times 1.30 \times 6.930 = 14.812$ $-0.82^2 \times \frac{\pi}{4} \times 6.33 = \ominus 3.343$ Total 118.553	118.6 #3
2. 型 枠 Formwork	(1) $(1.65 + 1.90) \times 2 \times 1.30 \times 10 = 92.300$ $-0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.056$ (2) $(1.80 + 2.10) \times 2 \times 1.30 \times 4 = 40.560$ $-0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.056$ (3) $(1.80 + 3.50) \times 2 \times 1.30 = 13.780$ $-0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.056$ (4) $(1.65 + 8.045) \times 2 \times 1.70 = 32.963$ $-0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.056$ (5) $(1.65 + 8.142) \times 2 \times 1.70 = 33.293$ $-0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.056$	

(Pipe Installation Work) - Bend and Double Bend - ③
Quantity Calculation Sheet (3)
 (Transmission Pipeline)

Item	Calculation	Quantity
	$(6) (1.80 + 7.86) \times 2 \times 1.30 = 25.116$ $- 0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.056$ $(7) (1.80 + 6.330) \times 2 \times 1.30 = 21.138$ $- 0.82^2 \times \frac{\pi}{4} \times 2 = \ominus 1.056$	
	Total 251.758	251. ⁸ m ²
3. 鉄筋 Steel bars	$\overset{13}{D12}$ $D16$	3941.0 7475.³ kg 2435.9 kg

(Pipe Installation Work)

Concrete Protection

Bend and Double bends Steel Bars List (1)
(Transmission Pipeline)

Summary Table	Size (mm)	Total Length (m)	Unit Weight (kg/m)	Total Weight (kg)	Remarks
	D12 ¹³	1512 ⁷⁸⁷	568 ^{0.445}	1473 ^{1505.2}	
	D16	1561.500	1.56	2435.9	
	Total			3941.0 3907.2	

Detail List

NO.	Size (mm)	Unit Length (m)	Q'ty	Length (m)	Shape	
			Nos.			
Bend 11 ^{0.1} / ₂ ~ 10 sites						
①	D16	4.500	110	495.000	(See Detail)	
②	D12 ¹³	1.800	240	432.000		
Bend 22 ^{0.1} / ₂ ~ 4 sites						
①	D16	4.500	40	180.000		
②	D16	2.600	12	31.200		
③	D12 ¹³	2.000	96	192.000		
Bend 45° ~ 1 site						
①	D16	4.500	16	72.000		
②	D16	2.600	15	39.000		
③	D12 ¹³	3.400	24	81.600		

(Pipe Installation Work)
 Concrete protection
 Bend and Double bends Steel Bars List (2)
 (Transmission Pipeline)

NO.	Size (mm)	Unit Length (m)	Qty	Length (m)	Shape
No.1 Double Bends 45°-45°					(See Detail)
1	D16	5.250	33	169.950	
2	D16	3.000	10	30.000	
3	D16	3.450	4	13.800	
4	¹³ D12	8.3.35 8.325	27	225.045 224.235	
5	D16	1.000	4	4.000	
No.2 Double Bends 45°-45°					
1	D16	5.150	33	169.950	
2	D16	3.000	10	30.000	
3	D16	3.500	4	14.000	
4	¹³ D12	8.432 8.422	27	227.664 227.394	
No.3 Double Bends 45°-45°					
1	D16	4.500	33	148.500	
2	D16	2.800	10	28.000	
3	D16	3.150	2	6.300	
4	D16	3.250	2	6.500	
5	¹³ D12	8.150 8.220	24	195.600 197.280	
No.4 Double Bend 45°-45°					
1	D16	4.500	25	112.500	

(Pipe Installation Work)

Concrete protection

Bend and Double bends Steel Bars List (3)

(Transmission Pipeline)

NO.	Size (mm)	Unit Length (m)	Qty	Length (m)	Shape
2	D16	2.600	10 Nos.	26.000	(See Detail)
3	D16	3.150	2	6.300	
4	D16	3.250	2	6.500	
5	13 D12	6.620 6.590	24	158.880 158.160	

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(Trench Work)
(Earth Work)

Quantity Calculation Sheet (1)
(Transmission Pipeline)

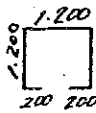

Item	Calculation	Quantity
Key Plan	<p>Concrete protection $\Sigma l = 655.53 \text{ m}$ (1300x1300) Aggregate 5mm Basalt $\Sigma l = 854.12 \text{ m}$ (1300x1300) " " $\Sigma l = 334.68 \text{ m}$ (1700x1220) Total 1,844.33 m</p> <p>(Key Plan)</p> <p>River Crossing No. 1 River Crossing No. 2</p> <p>① $l = 5.32$ $l = 25.05$ $l = 12.52$ $l = 70.57$ ② $l = 5.32$ $l = 25.05$ $l = 12.52$ $l = 70.57$ ③ $l = 5.32$ $l = 25.05$ $l = 12.52$ $l = 70.57$ ④ $l = 5.32$ $l = 25.05$ $l = 12.52$ $l = 70.57$ ⑤ $l = 24.90$ $l = 11.17$ $l = 9.64$ ⑥ $l = 24.90$ $l = 11.17$ $l = 9.64$ ⑦ $l = 24.90$ $l = 11.17$ $l = 9.64$ ⑧ $l = 24.90$ $l = 11.17$ $l = 9.64$</p> <p>⑩ $l = 388.81$ ⑪ $l = 2.52$ ⑫ $l = 30.63$ $l = 38.20$ ⑬ $l = 53.72$ $l = 96.19$ $l = 14.06$</p>	<p>Total 1,844.33 m</p> <p>(128.25) (128.25) (128.25)</p>

(Trench Work)
(Earth Work)

Quantity Calculation Sheet (2)
(Transmission Pipeline)

Item	Calculation	Quantity
	<p> (227.38) (29.99) (17.33) (97.57) (138.78) (11.62) (27.50) </p>	<p> (24.43) (155.49) (107.71) (16.65) </p>

(Trench Work)
 Quantity Calculation Sheet (3)
 (Transmission Pipeline)

Item	Calculation	Quantity
1. Pipe Protection (655.53 m)	Concrete 鉄筋コンクリート $C=210 \text{ kg/cm}^2$	
	$1.30 \times 1.30 \times 1.00 \text{ m}^3 = 1.69$	
	$- 0.82^2 \times \frac{\pi}{4} \times 1.00 \text{ m}^3 = \ominus 0.53$	
	Total $1.16 \text{ m}^3/\text{m}$	
	$1.16 \times 655.53 = 760.41$	760.4 m^3
	Formwork 型枠	
	$1.30 \times 1.00 \times 2 = 2.60 \text{ m}^2/\text{m}$	
	$2.60 \times 655.53 = 1704.37$	1704.4 m^2
	Steel bar 鉄筋 D13	
	 $l=4.000 \quad N = \frac{3290}{655.53} \approx 5$	
 $l = \frac{1.000}{340} \times 134 \approx 655.53 = \text{---}$		
$l = \frac{1.078}{1.078} \quad N = 21$		
$4.000 \times 5 \times 0.995 = 19.90$ $4.000 \times 5 \times 0.995 = 19.90$ $1.078 \times 21 \times 0.995 = 22.53$ $1.078 \times 21 \times 0.995 = 22.53$		
Total 42.42 kg/m 41.45 kg/m		
$42.42 \times 655.53 = 27801.582$	$27,801.5 \text{ kg}$ $27,144 \text{ kg}$	

(Trench Work)

Quantity Calculation Sheet (4)

(Transmission Pipeline)

Item	Calculation	Quantity
2. Aggregate	<p>5mm Basalt</p> $1300 \times 1300 \sim l = 854.12 \text{ m}$ $1700 \times 1220 \sim l = 334.68 \text{ m}$ $\Sigma l = 1188.80 \text{ m}$ $130 \times 1.30 \times 854.12 = 1443.46$ $170 \times 1.22 \times 334.68 = 694.13$ $- 0.82^2 \times \frac{\pi}{4} \times 1188.80 = \ominus 627.81$ $\text{Total } 1,509.78$	$1,509.78 \text{ m}^3$
3. 木杭矢板 Trench-support work	$B = 1.70$ $H = 3.00$ (* Aggregate 1700x1220)	334.68 m
4. コンクリート破却 Demolition of concrete of existing wall	$1.30 \times 1.30 \times 1.96 = 3.31$	3.31 m^3

(Earth Work)

SUMMARY OF EARTH WORK
(Transmission Pipeline)

Item	Quantity
- Excavation (Rock : $3,944 \text{ m}^3$ Soil : $2,629 \text{ m}^3$)	$6,573 \text{ m}^3$
- Cutting (Rock : 499 m^3 Soil : 498 m^3)	997 m^3
- Back-filling (Selected material)	$4,122 \text{ m}^3$
- Soil Disposal (Rock : $3,448 \text{ m}^3$)	$3,448 \text{ m}^3$
- Slope protection work	890 m^2
- Trench-ground leveling work	$2,559 \text{ m}^2$

(Earth Work)

Earth Work Calculation Sheet (A)-1

(Transmission Pipeline)

Station (No.)	Type of Soil	Distance m	Excavation			Cutting			Backfilling					
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³			
000		6.50	—	—	—	—	—	—	—	—	—	—	—	—
650		7.93	1.02	1.02	8.07	—	—	—	—	—	—	—	—	—
1443		5.32	1.02	1.02	5.43	—	—	—	—	—	—	—	—	—
1975		0.95	1.46	1.46	1.39	—	—	—	—	—	—	—	—	—
(No.1)			1.46	1.46	1.39	—	—	—	—	—	—	—	—	—
2070		0.95	1.46	1.46	1.39	—	—	—	—	—	—	—	—	—
2165		19.06	1.02	1.16	22.11	—	—	—	—	—	—	—	—	—
(No.2)			1.29	1.29	7.71	—	—	—	—	—	—	—	—	—
4071		5.98	1.29	1.29	7.71	—	—	—	—	—	—	—	—	—
4669		2.10	2.29	0.98	2.06	—	—	—	—	—	—	—	—	—
4879		12.52	0.67	0.67	8.39	—	—	—	—	—	—	—	—	—
(No.3)			0.97	0.97	1.02	—	—	—	—	—	—	—	—	—
6131		1.05	0.97	0.97	1.02	—	—	—	—	—	—	—	—	—
6236		1.05	0.97	0.97	1.02	—	—	—	—	—	—	—	—	—
(No.4)			0.67	1.47	1.992	—	—	—	—	—	—	—	—	—
6341		13.55	2.27	1.47	1.992	—	—	—	—	—	—	—	—	—
(IPNO1)			2.27	1.47	1.992	—	—	—	—	—	—	—	—	—
7696		5.43	0.52	1.40	7.60	—	—	—	—	—	—	—	—	—
(No.5)			1.18	1.18	23.61	—	—	—	—	—	—	—	—	—
8239		20.01	1.83	2.06	27.85	—	—	—	—	—	—	—	—	—
(No.6)			2.28	2.38	26.97	—	—	—	—	—	—	—	—	—
10240		13.52	2.28	2.38	26.97	—	—	—	—	—	—	—	—	—
(IPNO2)			2.47	2.46	6.64	—	—	—	—	—	—	—	—	—
11592		11.33	2.47	2.46	6.64	—	—	—	—	—	—	—	—	—
(IPNO3)			2.44	2.44	171.20	—	—	—	—	—	—	—	—	—
12725		2.70	2.44	2.44	171.20	—	—	—	—	—	—	—	—	—
(No.6)			—	—	—	—	—	—	—	—	—	—	—	—
12995			—	—	—	—	—	—	—	—	—	—	—	—
(No.7)			—	—	—	—	—	—	—	—	—	—	—	—
SubTotal()			—	—	—	—	—	—	—	—	—	—	—	—

Earth Work Calculation - Sheet (A)-2
(Transmission Pipeline)

Station (NO.)	Type of Soil	Distance m	Soil Disposal		Slope-Protection		Trench-Ground Leveling					
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Width m	Width (Ave) m	Q'ty m ²	
0 00												
6 50		6.50	1.02	1.02	7.07			1.65	1.65			
14 43		6.93	1.02	1.02	5.43			1.30	1.30			
19 75		5.32	1.02	1.02	1.39			1.80	1.80			
(NO.1)		0.95	1.46	1.46	1.39			1.80	1.80			
20 70		0.95	1.46	1.46	1.39			1.80	1.80			
21 65		19.06	1.02	1.02	22.11			1.30	1.30			
(NO.2)		5.98	1.29	1.29	7.71			1.30	1.30			
40 71		2.10	0.67	0.67	1.41			1.80	1.80			
46 69		12.52	0.67	0.67	8.39			1.30	1.30			
48 79		1.05	0.97	0.97	1.02			1.80	1.80			
61 31		1.05	0.97	0.97	1.02			1.80	1.80			
(NO.3)		13.55	0.57	0.57	15.99			1.30	1.30			
62 36		5.43	1.69	1.69	6.03			1.30	1.30			
63 41		20.01	0.57	0.57	22.21			1.30	1.30			
(IPNO.1)		13.52	1.69	1.69	27.85			1.30	1.30			
76 96		11.33	1.69	1.69	19.15			1.30	1.30			
(NO.4)		2.70	1.69	1.69	4.56			1.30	1.30			
82 39			1.69	1.69				1.30	1.30			
(NO.5)					127.73							164.67
(IPNO.2)												
102 40												
(IPNO.3)												
115 92												
(IPNO.3)												
127 25												
(NO.6)												
129 95												
SubTotal ()												

Earth Work Calculation Sheet (B)-1
(Transmission Pipeline)

Station (NO.6)	Type of Soil	Distance m	Excavation		Cutting		Backfilling	
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
129 95		4 03	2 44	2 44	—	—	2 75	—
133 98		6 70	2 44	2 44	—	—	0 75	3 02
140 68		20 00						
160 68		14 05						
174 73		1 90						
176 63		4 05						
180 68		14 05						
194 73		1 90						
196 63		4 05						
200 68		10 00						
210 68		1 90						
212 58		7 50						
220 08		0 60	1 76	1 76	—	—	0 07	0 04
220 68		9 75	1 76	1 57	—	—	0 07	2 93
230 43		7 05	1 38	1 38	—	—	0 52	3 67
237 48		2 10	1 38	0 73	—	—	0 52	1 09
239 58		9 67	0 08	0 08	—	—	0 52	5 03
249 25			0 08	0 08	—	—	4 36	
SubTotal ()			0 13	38 23			4 36	15 78

Earth Work Calculation - Sheet (B) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope-Protection		Trench-Ground Leveling				
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Width m	Width (Ave) m	Qty m ²
(NO.6) 129.95		4.03	1.69	1.69	—	—	1.30	1.30	—	—	5.24
133.98		6.70	1.69	1.69	—	—	1.30	1.30	—	—	—
(NO.7) 140.68		20.00									
(NO.8) 150.68		14.05									
174.73		1.90									
176.63		4.05									
(NO.9) 180.68		14.05									
194.73		1.90									
196.63		4.05									
(NO.10) 200.68		10.00									
210.68		1.90									
212.58		7.50									
220.08		0.60	1.69	1.69	1.01	—	1.30	1.30	—	—	0.78
(NO.11) 220.68		9.75	1.69	1.54	15.02	—	1.30	1.30	—	—	12.68
(IPNO.4) 230.43		7.05	1.38	1.38	9.73	—	1.30	1.30	—	—	9.17
237.48		2.10	1.38	0.72	1.51	—	1.30	1.30	—	—	3.78
239.68		9.67	0.08	0.08	0.77	—	1.30	1.30	—	—	12.57
249.25			0.08	0.08	0.77	—	1.30	1.30	—	—	—
Subtotal ()			0.13	—	34.85	—	—	—	—	—	44.22

Earth Work Calculation Sheet (C) - 1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation			Cutting			Backfilling		
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
249 25 (NO.12)		0 95	0.08 0.13	0.13	0.12				4.36 4.36	4.36	4.14
250 20		0 95	0.13 0.13	0.13	0.12				3.72 3.72	3.72	3.53
251 15		9 64	0.08 0.80	0.80	7.71				3.72 3.72	3.72	35.86
260 79		2 10	0.80 0.80	0.80	1.68				3.72 3.72	3.72	1.81
262 89 (NO.13)		8 21	1.37 1.37	1.37	11.25				0.60 0.60	0.60	4.93
271 10		20 49	1.37 1.82	1.37	28.07				0.60 0.60	0.60	12.29
291 59 (NO.14)		1 25	1.82 1.82	1.82	2.28				0.58 0.58	0.58	0.73
292 84		0 25	1.82 1.82	1.82	0.46				0.58 0.58	0.58	0.15
293 09		6 91	1.82 1.82	1.82	12.58				0.58 0.58	0.58	4.01
300 00		1 90	1.18 1.18	1.18	2.24				0.12 0.12	0.12	0.23
301 90 (NO.15)		11 62	1.18 1.18	1.18	13.71				0.12 0.12	0.12	1.39
313 52 (NO.16)		20 00	1.03 0.87	1.03	20.60				0.02 0.02	0.02	1.40
333 52 (NO.17)		20 00	0.98 0.98	0.93	18.60				0.01 0.01	0.01	0.40
353 52 (IPNO.5)		18 81	1.45 1.45	1.22	22.95				0.01 0.01	0.01	0.19
372 33 (NO.18)		1 47	1.51 1.51	1.51	2.22				0.00 0.00	0.00	0.01
373 80 (NO.19)		20 00	1.56 1.26	1.41	28.20				0.02 0.02	0.02	4.20
393 80 (NO.20)		20 01	1.26 0.81	1.04	20.81				0.40 0.48	0.44	8.80
413 81 SubTotal()					193.60						90.07

Earth Work Calculation - Sheet (C) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope - Protection		Trench - Ground Leveling	
			Area m ²	Area(Ave) Volume m ³	Area m ²	Area(Ave) Volume m ³	Width m	Width (Ave) m
249.25			0.08				1.30	
(NO12)		0.95	0.13	0.12			1.80	
250.20			0.13				1.80	1.71
251.15		0.95	0.13	0.12			1.30	
251.15		9.64	0.08	7.71			1.30	12.53
260.79			0.08				1.80	
262.89		2.10	0.08	1.68			1.80	3.78
(NO13)		8.21	1.37	11.25			1.30	10.67
271.10			1.37				1.30	
291.59		20.49	1.37	28.07			1.30	26.64
(NO14)		1.25	1.82	2.28			1.80	
292.84			1.82				1.80	2.25
293.09		0.25	1.82	0.46			1.30	0.33
300.00			1.82				1.30	
301.90		6.91	1.82	12.58			1.30	8.98
(NO15)		1.90	1.82	2.24			1.80	
313.52			1.82				1.80	3.42
(NO16)		11.62	1.18	13.71			1.30	15.11
333.52			1.18				1.30	
(NO17)		20.00	1.03	20.60			1.30	26.00
353.52			0.98	18.60			1.30	26.00
(IPNO5)		18.81	1.22	22.95			1.30	24.45
372.33			1.45				1.30	
(NO18)		1.47	1.51	2.22			1.30	1.91
373.80			1.56				1.30	
(NO19)		20.00	1.41	28.20			1.30	26.00
392.80			1.26				1.30	
(NO20)		20.01	1.04	20.81			1.30	26.01
413.81			0.81				1.30	
Subtotal()				193.58				217.50

Earth Work Calculation Sheet (D) - 1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation			Cutting			Backfilling		
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
(NO.20) 413 81		20.03	0.81	0.82	16.42			0.46	0.25	5.01	
(NO.21) 433 84		20.00	0.82	0.82	16.40			0.02	0.03	0.60	
(NO.22) 453 84		20.00	0.82	0.81	16.20			0.03	0.05	1.00	
(NO.23) 473 84		20.00	0.79	0.72	14.40			0.06	0.07	1.40	
(NO.24) 493 84		20.00	0.64	0.60	12.00			0.07	0.09	1.80	
(NO.25) 513 84		20.00	0.55	0.88	17.61			0.11	0.10	2.00	
(NO.26) 533 85		20.01	1.20	1.33	11.11			0.09	0.05	0.42	
(IPNO.6) 542 20		8.35	1.45	1.46	16.69			0.01	0.01	0.11	
(NO.27) 553 63		11.43	1.46	1.52	30.57			0.00	0.14	2.82	
(NO.28) 573 74		20.11	1.58	1.51	11.94			0.28	0.41	3.24	
(IPNO.7) 581 65		7.91	1.43	1.46	17.71			0.53	0.28	3.40	
(NO.29) 593 78		12.13	1.48	1.46	29.21			0.03	0.09	1.80	
(NO.30) 613 79		20.01	1.43	1.50	26.01			0.15	0.21	4.20	
(NO.31) 633 80		20.01	1.16	1.20	24.02			0.27	0.19	3.80	
(NO.32) 653 82		20.02	1.23	0.99	19.84			0.11	0.25	5.01	
(NO.33) 673 86		20.04	0.75	1.64	25.17			0.39	0.61	9.36	
689 21		15.35	2.52	3.80	21.28			0.83	0.99	5.54	
(NO.34) 694 81		5.60	3.80	3.80				0.99	0.99		
SubTotal()					326.58					51.51	

Earth Work Calculation - Sheet (D) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope - Protection		Trench - Ground Leveling			
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Width m	Width (Ave) m
(NO.20) 413.81			0.81	0.82	16.42			1.15	1.15	23.03
(NO.21) 433.84		20.00	0.82	0.82	16.40			1.15	1.15	23.00
(NO.22) 453.84		20.00	0.82	0.81	16.20			1.15	1.15	23.00
(NO.23) 473.84		20.00	0.79	0.72	14.40			1.15	1.20	24.00
(NO.24) 493.84		20.00	0.64	0.60	12.00			1.15	1.20	24.00
(NO.25) 513.84		20.01	0.55	0.58	17.61			1.15	1.15	23.01
(NO.26) 533.85		8.35	1.20	1.33	11.11			1.15	1.15	9.60
(IPNO.6) 542.20		11.43	1.45	1.46	16.69			1.15	1.15	13.14
(NO.27) 553.63		20.11	1.46	1.52	30.57			1.15	1.15	23.13
(NO.28) 573.74		7.91	1.58	1.51	11.94			1.15	1.15	9.10
(IPNO.7) 581.65		12.13	1.43	1.46	17.71			1.15	1.15	13.95
(NO.29) 593.78		20.01	1.48	1.46	29.21			1.15	1.15	23.01
(NO.30) 613.77		20.01	1.43	1.30	26.01			1.15	1.15	23.01
(NO.31) 633.80		20.02	1.16	1.20	24.02			1.15	1.15	23.02
(NO.32) 653.82		20.04	1.23	0.99	19.84			1.15	1.15	23.05
(NO.33) 673.86		15.35	0.75	1.22	18.73			1.15	1.23	18.88
689.21		5.10	1.69	2.81	15.74			1.65	1.65	9.24
(NO.34) 694.21			2.81							
SubTotal ()			2.81		314.60					329.17

Earth Work Calculation - Sheet (E) - 1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation		Cutting		Backfilling		Q'ty m ³	
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³		Width m ²
(NO.34) 694.81		2.19	3.80	3.80	8.32			0.99	0.99	2.17
(IPNO.8) 697.00		0.06	2.52	2.48	0.15			0.83	0.84	0.05
(NO.35) 697.06		18.27	2.44	2.29	41.84			0.85	0.70	26.00
715.33			2.14					0.55	0.70	14.00
(NO.36) 735.33		20.00	2.43	2.29	45.80			0.84	0.90	13.85
750.72		15.39	2.64	2.54	39.09			0.95	1.33	8.13
(NO.37) 756.83		6.11	3.67	3.67	22.42			1.33	1.33	2.33
758.58		1.75	3.67	3.67	6.42			1.33	1.04	18.51
(NO.38) 776.38		17.80	2.64	2.68	47.70			0.95	1.13	22.60
(NO.39) 796.38		20.00	2.72	2.72	54.40			1.13	0.74	14.80
(NO.40) 816.38		20.00	1.93	2.33	46.60			0.34	0.61	12.20
(NO.41) 836.38		20.00	2.47	2.20	44.00			0.88	0.88	16.18
854.77		18.39	2.47	2.47	45.42			0.88	0.88	1.42
(NO.42) 856.38		1.61	3.61	3.61	5.81			0.88	1.20	2.27
858.27		1.89	3.61	3.61	6.82			1.20	1.20	16.87
(IPNO.9) 872.33		14.06	2.47	2.68	27.68			1.20	1.41	2.14
(NO.43) 873.85		1.52	2.89	3.10	4.71			1.62	1.62	1.62
874.85		1.00	3.31					1.62		
SubTotal ()					457.18					175.14

Earth Work Calculation - Sheet (E)-2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope-Protection		Trench - Ground Leveling	
			Area m ²	Area(Ave) Volume m ³	Area m ²	Area(Ave) Volume m ³	Width m	Width (Ave) m
(NO.34) 694	81	2.19	2.81	6.15	—	—	1.65	3.61
697	00	0.06	1.69	0.10	—	—	1.30	0.08
(IPNO.8) 697	06	18.27	1.59	29.05	—	—	1.30	23.75
(NO.35) 715	33	20.00	1.59	31.80	—	—	1.30	26.00
(NO.36) 735	33	15.39	1.69	25.24	—	—	1.30	20.01
750	72	6.11	2.34	14.30	—	—	1.80	11.00
(NO.37) 756	83	1.75	2.34	4.10	—	—	1.80	3.15
758	58	17.80	1.69	29.19	—	—	1.30	23.14
(NO.38) 776	38	20.00	1.59	31.80	—	—	1.30	26.00
(NO.39) 796	38	20.00	1.59	31.80	—	—	1.30	26.00
(NO.40) 816	38	20.00	1.59	31.80	—	—	1.30	26.00
(NO.41) 836	38	18.39	1.59	36.33	—	—	1.30	23.91
854	77	1.61	2.34	2.72	—	—	1.80	2.90
(NO.42) 856	38	1.89	1.69	3.19	—	—	1.80	3.40
858	27	14.06	2.34	28.40	—	—	1.30	18.28
(IPNO.9) 872	33	1.52	1.69	2.57	—	—	1.30	1.98
(NO.43) 873	85	1.00	1.69	2.57	—	—	1.30	1.98
874	85				—	—		
SubTotal()				308.44				239.21

Earth Work Calculation Sheet (F)-1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation		Cutting		Backfilling	
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
874 85 (NO.44)		19 00						
893 85 (NO.45)		20 00						
913 85		19 05						
932 90 (NO.46)		0 95						
933 85		0 95						
934 80 (NO.47)		19 44						
954 84		1 73						
955 97		1 90						
957 87 (NO.48)		16 43						
974 30		20 00						
(NO.49) 994 30		7 12						
1001 42 (NO.50)		12 85	0.53	0.53	6.83			
1014 30 (NO.51)		0 15	0.53	0.55	0.08			
1014 45		17 16	0.57	0.57	9.98			
1032 15 (NO.52)		0 75	0.47	0.47	0.35			
1032 90		0 75	0.47	0.47	0.35			
1033 55 (NO.52)		19 35	1.85	1.85	35.80	2.11	0.08	40.83
1052 90			1.85			4.21	0.16	
Subtotal ()					53.19			40.83

Earth Work Calculation - Sheet (F) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope-Protection		Trench - Ground		Leveling Qty m ²	
			Area m ²	Area(Ave) Volume m ³	Area m ²	Area(Ave) Volume m ³	Width m	Width (Ave) m		
874 85 (NO.44)		19.00								
893 85 (NO.45)		20.00								
913 85		19.05								
932 90 (NO.46)		0.95								
933 85										
934 80										
(NO.47)		19.44								
954 84		1.73								
955 97										
957 87		1.90								
(NO.48)		16.43								
974 30		20.00								
(NO.49)										
994 30		7.12								
1001 42 (NO.50)		12.88	0.53	0.53	6.83		1.30	1.30	16.74	
1014 30 (IPNO.10)		0.15	0.53	0.55	0.08		1.30	1.30	0.20	
1014 45		17.16	0.47	0.57	9.78		1.30	1.30	22.31	
1032 05 (NO.51)		0.75	0.47	0.47	0.35		1.80	1.80	1.35	
1032 80		0.75	0.47	0.47	0.35		1.80	1.80	1.35	
1033 55 (NO.52)		19.35	5.90	5.90	114.17		1.30	1.30	25.16	
1052 90			5.90			3.35	1.30			
SubTotal()					131.56	32.51				67.11

Earth Work Calculation Sheet (9) - 1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation			Cutting			Backfilling		
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
(NO.52) 1052/90 (IPNO.11)		6.51	1.85	1.97	12.82	4.21	2.62	17.56	0.16	0.28	1.82
(NO.53) 1059/41 (NO.53)		12.34	2.08 2.55 2.37	2.32	28.63	1.03	3.91	48.25	0.39 0.86 0.78	0.63	7.77
(NO.54) 1071/75 (NO.54)		20.00	2.60	2.49	49.80	6.79	3.40	18.80	1.01	0.90	18.80
(NO.55) 1091/75 (NO.55)		19.02	2.54	2.57	48.88	—	—	18.64	0.95	0.98	18.64
(NO.56) 1110/77 (NO.56)		20.04	2.47	2.51	50.30	—	—	18.44	0.88	0.92	18.44
(NO.57) 1130/81 (NO.57)		20.03	2.60	2.54	50.88	—	—	19.03	1.01	0.95	19.03
(NO.58) 1150/84 (NO.58)		20.04	2.47	2.54	50.90	—	—	17.05	0.88	0.85	17.05
(NO.59) 1170/88 (NO.59)		20.06	2.41	2.44	48.95	—	—	19.04	0.82	0.95	19.04
(NO.60) 1190/94 (NO.60)		20.04	2.67	2.54	50.90	—	—	17.05	1.08	0.85	17.05
(NO.61) 1210/98 (IPNO.12)		2.61	2.21	2.44	6.37	—	—	2.22	0.62	0.70	1.22
(NO.62) 1213/59 (NO.61)		16.03	2.47	2.34	37.51	—	—	11.22	0.78	0.78	0.29
(NO.63) 1229/62 (NO.63)		0.37	2.47	2.47	0.91	—	—	0.29	0.78	0.61	0.92
(NO.64) 1229/99 (NO.64)		1.50	2.20	2.34	3.51	—	—	0.92	0.43	0.43	0.92
(NO.65) 1231/49 (NO.62)		18.13	2.20	2.20	39.88	—	0.25	4.53	0.43	0.43	7.80
(NO.66) 1249/62 (NO.63)		20.03	2.20	2.11	42.26	0.45	0.25	5.01	0.43	0.43	8.61
(NO.67) 1269/65 (NO.64)		20.05	2.02	2.34	46.92	—	—	15.04	0.43	0.75	15.04
(NO.68) 1289/70 (NO.65)		20.04	2.65	2.54	—	—	—	19.04	1.06	0.95	19.04
(NO.69) 1309/74 (NO.65)		—	2.42	—	—	—	—	—	0.83	—	—
SubTotal ()		—	—	—	569.42	—	—	75.35	—	—	204.77

Earth Work Calculation - Sheet (4) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope-Protection		Trench-Ground Leveling	
			Area m ²	Area(Ave) Volume m ³	Area m ²	Area(Ave) Volume m ³	Width m	Width (Ave) m
(NO52) 90			4.90		3.35		1.30	
(PNO11)		6.51	2.72	28.06	2.19	14.26	1.30	8.46
(NO53) 41		12.34	8.98	59.10	2.67	32.95	1.30	16.04
(NO71) 75		20.00	8.98		2.15		1.30	26.00
(NO54) 75			1.59	100.80			1.30	
(NO55) 77		19.02	1.59	30.24			1.30	24.73
(NO56) 81		20.04	1.59	31.86			1.30	26.05
(NO57) 84		20.03	1.59	31.85			1.30	26.04
(NO58) 88		20.04	1.59	31.86			1.30	26.05
(NO59) 88		20.06	1.59	31.90			1.30	26.08
(NO60) 94		20.04	1.59	31.86			1.30	26.05
(NO60) 98			1.59				1.30	
(PNO12) 59		2.61	1.69	4.28			1.30	3.93
(NO61) 62		16.03	1.69	27.09			1.30	20.84
(NO61) 62		0.37	1.69	0.63			1.80	0.57
(NO61) 99		1.50	1.69	2.46			1.80	2.70
(NO61) 49		18.13	1.59	28.83			1.80	23.57
(NO62) 62		20.03	1.59	31.85	0.60	10.88	1.30	26.04
(NO63) 65		20.05	1.59	31.88	0.60	12.03	1.30	26.07
(NO64) 70		20.04	1.59	31.86			1.30	26.05
(NO65) 74			1.59				1.30	
SubTotal()				546.41		70.12		335.34

Earth Work Calculation Sheet (H) - 1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation			Cutting			Backfilling		
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
(NO.65) 74			2.42						0.83		
1309 (IPNO13) 52		9.78	2.76	2.59	25.33				1.17	1.00	9.78
1319 (NO.66) 09		9.57	2.71	2.74	26.22				1.12	1.15	11.01
1329 (NO.67) 09		20.00	2.59	2.65	53.00				1.00	1.06	21.20
1349 (NO.68) 09		20.00	3.26	2.93	58.60				1.67	1.34	26.80
1369 (NO.69) 09		20.00	2.02	2.64	52.80				0.43	1.05	21.00
1389 (NO.70) 10		20.01	1.11	1.57	31.42				0.99	0.71	14.21
1409 (NO.71) 10		20.00	3.07	2.09	41.80				1.48	1.24	24.80
1429 (NO.72) 10		20.00	2.60	2.84	56.80				1.15	1.32	26.40
1449 (NO.73) 10		9.77	2.60	2.60	25.40	6.02	6.02	58.82	1.15	1.15	11.24
1458.87		1.90	2.67	2.64	5.02	6.07	6.07	11.53	1.22	1.19	2.26
1460.77		10.45	2.67	2.67	27.90	6.11	6.11	63.85	1.22	1.22	12.75
1471.22 (IPNO.14)		0.60	2.67	2.67	1.60	6.11	6.11	3.32	1.22	1.22	0.73
1471.82 (NO.74)		18.76	2.67	2.31	43.34	4.96	4.96	109.37	1.22	0.86	16.13
1490.58 (NO.75)		20.00	1.95	2.73	54.60	6.69	6.69	168.80	0.50	1.28	25.60
1510.58		6.75	3.51	3.51	23.69	10.18	10.18	68.72	2.06	2.06	41.77
1517.33		1.90	3.51	3.01	5.72	10.18	10.18	16.87	2.06	1.56	2.96
1519.23 (IPNO.15)		8.16	2.50	2.50	20.40	7.58	7.58	61.85	1.05	1.05	8.57
1527.39			2.50			7.58	7.58		1.05		
Sub Total ()					553.64			563.13			277.21

Earth Work Calculation - Sheet (H) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope-Protection		Trench-Gravel Leveling			
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Width m	Width (Ave) m
(NO.65) 74			1.59	1.59	1.55			1.30	1.30	12.71
(IPNO.13) 52		9.78	1.59	1.59	1.55			1.30	1.30	12.44
(NO.66) 09		9.57	1.59	1.59	1.52			1.30	1.30	26.00
(NO.67) 09		20.00	1.59	1.59	3.80			1.30	1.30	26.00
(NO.68) 09		20.00	1.59	1.59	3.80			1.30	1.30	26.00
(NO.69) 09		20.00	1.59	1.59	3.80			1.30	1.30	26.00
(NO.70) 10		20.01	1.11	1.35	27.01			1.30	1.30	26.01
(NO.71) 10		20.00	1.59	1.55	27.00			1.30	1.30	26.00
(NO.72) 10		20.00	1.59	4.60	22.00		1.58	1.30	1.30	26.00
(NO.73) 22		9.77	7.61	7.61	74.35	3.15	3.15	1.30	1.30	12.70
(IPNO.14) 82		1.90	7.61	7.66	14.55	3.15	3.33	1.80	1.80	3.42
(NO.74) 58		10.45	7.70	7.70	80.47	3.50	3.50	1.30	1.30	13.59
(NO.75) 58		0.60	7.70	7.13	4.28	3.50	3.35	1.30	1.30	0.78
(NO.76) 58		18.76	6.54	7.42	139.20	3.20	3.55	1.30	1.30	24.39
(NO.77) 33		20.00	8.28	10.03	200.60	3.90	4.20	1.30	1.30	26.00
(NO.78) 33		6.75	11.77	11.77	79.45	6.50	6.50	1.30	1.30	8.78
(NO.79) 33		1.90	11.77	10.47	19.89	6.50	6.05	1.80	1.80	3.42
(NO.80) 39		8.16	9.17	9.17	74.83	5.60	5.60	1.30	1.30	10.61
SubTotal ()			9.17		259.80	5.60				288.84

Earth Work Calculation Sheet (I) - 1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation			Cutting			Backfilling		
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
(IPNO15) 1527 39		1.29	2.50	2.55	3.29	7.58	10.85	14.00	1.05	1.11	1.43
(NO.76) 1528 68		19.61	2.60	2.40	47.06	14.11	9.22	180.80	1.15	0.95	18.63
(NO.77) 1548 29		20.02	2.20	2.40	48.04	4.32	2.93	58.66	0.75	0.92	18.42
(NO.78) 1568 31		26.68	2.60	2.56	68.30	1.53	0.77	20.54	1.09	1.01	26.95
(NO.79) 1594 99		13.34	2.52	2.58	34.42	—	—	—	0.93	0.99	13.21
(NO.80) 1608 33		8.47	2.64	2.56	21.68	—	—	—	1.05	0.92	7.79
1616 80		0.95	2.47	3.42	3.25	—	—	—	0.78	1.08	1.03
(IPNO16) 1617 75		0.95	3.42	3.42	3.25	—	—	—	1.08	1.08	1.03
1618 72		10.70	2.47	2.54	27.18	—	—	—	1.08	0.90	9.63
(NO.81) 1629 40		20.03	2.60	2.65	53.08	—	—	—	1.01	1.06	21.23
(NO.82) 1649 43		20.02	2.70	2.62	52.45	—	—	—	1.11	1.03	20.62
(NO.83) 1669 45		20.09	2.54	2.44	49.02	—	—	—	0.95	0.85	17.08
(NO.84) 1689 54		20.01	2.34	2.34	46.82	—	—	—	0.75	1.03	20.61
(NO.85) 1709 55		19.85	2.34	2.47	49.03	—	—	—	1.30	1.30	25.81
(NO.86) 1729 40		12.14	2.60	2.73	33.14	—	—	—	1.30	1.30	15.78
(IPNO17) 1741 54		15.94	2.86	2.64	42.08	—	—	—	1.30	1.01	16.10
1757 48		0.95	2.47	3.33	3.16	—	—	—	0.72	0.99	0.94
(NO.87) 1758 43			3.33	3.33	3.16	—	—	—	0.99	0.99	0.94
SubTotal ()			3.33		525.25			274.00			236.29

Earth Work Calculation - Sheet (I) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope-Protection		Trench-Ground Leveling	
			Area m ²	Area(Ave) Volume m ³	Area m ²	Area(Ave) Volume m ³	Width m	Width (Ave) m
(IPNO15)								
1527	39	1.29	9.17	24.87	5.60	7.30	1.30	1.68
(NO.76)	68		15.70	10.81	8.80	7.25	1.30	25.49
1528		19.61	5.91	10.81	5.70	4.70	1.30	26.03
(NO.77)	29		3.12	4.52	3.70	1.85	1.30	34.68
(NO.78)	31	20.02	1.59	2.36			1.30	17.34
1568		26.68	1.59	1.59			1.30	11.01
(NO.79)	99	13.34	1.59	1.64			1.30	17.71
1594		8.47	1.69	1.64			1.30	13.91
(NO.80)	33	0.95	2.34	2.34			1.30	26.04
1616	80	0.95	2.34	2.34			1.30	26.03
(IPNO.16)	75		2.34	2.34			1.30	26.01
1617		10.70	1.69	1.64			1.30	25.81
(NO.81)	70		1.59	1.59			1.30	15.78
1629	40	20.05	1.59	1.59			1.30	20.72
(NO.82)	43		1.59	1.59			1.30	17.1
1649		20.05	1.59	1.59			1.30	26.04
(NO.83)	45		1.59	1.59			1.30	26.03
1669		20.05	1.59	1.59			1.30	26.12
(NO.84)	54		1.59	1.59			1.30	26.01
1689		20.01	1.59	1.59			1.30	25.81
(NO.85)	55	19.85	1.59	1.59			1.30	15.78
1709		13.14	1.59	1.59			1.30	20.72
(NO.86)	40		1.59	1.59			1.30	17.1
1729		15.94	1.59	1.59			1.30	26.04
(IPNO.17)	54		1.59	1.59			1.30	26.03
1741		0.95	2.34	2.34			1.30	26.12
(NO.87)	48		2.34	2.34			1.30	26.01
1758			2.34	2.34			1.30	25.81
(NO.87)	43		2.34	2.34			1.30	15.78
SubTotal()				661.26		294.93		301.78

Earth Work Calculation Sheet (J) - 1
(Transmission Pipeline)

Station	Type of Soil	Distance m	Excavation			Cutting			Backfilling		
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³
(NO.87) 43			3.33	3.33	3.16				0.99	0.99	0.94
1758		0.95	3.33	3.33				0.99	0.99		
1759		11.62	2.41	2.41	28.00	0.27	0.27	0.72	0.72	8.37	
1771		0.75	2.41	2.41	1.81	0.54	0.54	0.72	0.72	1.19	
1771		0.75	4.51	2.51	1.88	0.54	0.54	2.44	2.44	1.83	
1772		5.95	4.51	2.51	14.93	0.54	0.54	2.44	2.44	14.52	
(NO.88) 45		20.33	4.51	7.23	146.96	0.54	0.54	2.44	5.22	106.12	
1778		5.17	10.06	11.51	59.51	0.54	0.75	7.99	9.31	48.13	
(NO.89) 78		11.63	12.96	14.42	157.70	0.96	1.11	10.62	12.22	142.12	
1798		13.85	15.88	15.88	219.94	1.26	0.63	13.81	13.81	191.27	
(NO.90) 95			15.88					13.81			
1815								13.81			
1829								13.81			
(NO.91) 83											
1843		3.39	19.32	20.23	71.82			17.25	18.16	64.47	
(IPNO.19) 22		16.63	21.14	19.92	331.27			19.07	17.85	296.85	
1847		20.00	18.70	18.79	375.80			16.63	16.72	334.40	
(NO.92) 85		17.00	18.88	18.63	316.71			16.81	16.56	281.52	
1863		3.03	18.38	17.41	52.75			16.31	15.34	46.48	
(NO.93) 85		20.00	16.43	14.98	299.60			14.36	12.91	258.20	
1900			13.53					11.46			
(NO.94) 88											
1903											
(NO.95) 88											
1923											
Subtotal ()					2091.84					73.67	1796.41

Tunnel Crossing

Earth Work Calculation - Sheet (J) - 2
(Transmission Pipeline)

Station	Type of Soil	Distance m	Soil Disposal		Slope - Protection		Trench - Grand Leveling					
			Area m ²	Area(Ave) m ²	Volume m ³	Area m ²	Area(Ave) m ²	Volume m ³	Width m	Width (Ave) m	Qty m ²	
(NO.87)												
1752.43		0.95	2.34	2.34	2.22			1.80	1.80	1.71		
1759.38		1.62	1.69	1.69	9.64			1.30	1.30	1.51		
1771.00		0.75	1.69	1.69	1.27	2.00		1.80	1.80	1.35		
1777.75		0.75	2.07	2.07	1.55	2.00		1.80	1.80	1.35		
1772.50		5.95	2.07	2.07	12.32	2.00		1.70	1.70	10.12		
(NO.88)		20.33	2.07	2.34	47.57	2.00		1.70	1.70	34.56		
1778.45		6.17	2.61	2.96	15.30	2.50		1.80	1.80	9.05		
(NO.89)		11.63	3.30	2.45	28.49	2.05		1.70	1.70	20.35		
(IPNO.18)		13.85	1.60	1.60	22.16	1.60		1.70	1.70	23.55		
1803.95			1.60					1.70	1.70			
1815.52												
1822.43												
(NO.91)												
1845.83		3.39	2.07	2.07	7.35			1.70	1.70	5.76		
(IPNO.19)		16.63	2.07	2.07	34.42			1.70	1.70	28.27		
1847.22		20.00	2.07	2.07	41.40			1.70	1.70	34.00		
(NO.92)		17.00	2.07	2.07	35.19			1.70	1.70	28.90		
1863.85		3.03	2.07	2.07	6.27			1.70	1.70	5.15		
(NO.93)		20.00	2.07	2.07	41.40			1.70	1.70	34.00		
1883.85		20.00	2.07	2.07	41.40			1.70	1.70	34.00		
(IPNO.20)		20.00	2.07	2.07	41.40			1.70	1.70	34.00		
1900.85			2.07	2.07				1.70	1.70			
(NO.94)			2.07	2.07				1.70	1.70			
1903.88			2.07	2.07				1.70	1.70			
(NO.95)			2.07	2.07				1.70	1.70			
1923.88			2.07	2.07				1.70	1.70			
SubTotal()					316.55							253.23
												113.72

TUNNEL CROSSING

(Intake Facility Work)

Quantity Calculation Sheet (1)

(Transmission Pipeline)

Item	Calculation	Quantity
<p>1. スチールスクリーン Steel Screen</p>	<p>Screen (Tar-Epoxy painting) a. スクリーン (タールエポキシ塗装仕上) $500'' \times 3100'' \times 9$ pieces 重量 1枚当り Weight per piece 59.077 kg/pcce L-50x50x6 $\rho = 4.43$ kg/m (0.00) $\phi 8$ $\rho = 0.395$ (60.60) 59.077×9 pieces = 534.693 kg</p> <p>Guide channel (Tar-Epoxy painting) b. ガイドチャンネル (タールエポキシ塗装仕上) $5.970'' \times 3.00''$ (11.94) ガイド E-100x50x5 $\rho = 9.36$ kg/m (3.40) フロアサポート L-100x100x7 $\rho = 10.7$ " (5.30) サポート E-100x50x5 $\rho = 9.36$ " (3.675) スチール棒 埋込鉄筋 D12 $\rho = 0.974$ $\Sigma \rho = 210.68$ kg</p>	<p>1 式 L.S.</p> <p>1 式 L.S.</p>
<p>2. マンホールカバー Manhole Cover</p>	<p>Checkered plate (3.2mm) 鋼鋼板 取手 鍵付 with Grip and Key Tar-Epoxy painting タールエポキシ塗装仕上 $(1.093) 950 \times 950 \times 50''$ $\rho = 26.82$ kg/m² (1.00) 取手 $\phi 12$ $\rho = 0.888$ kg/m $\Sigma \rho = 30.2$ kg</p>	<p>1 No.</p>

(Intake Facility Work)

Quantity Calculation Sheet (2)

(Transmission Pipeline)

Item	Calculation	Quantity
3. 足掛金物 Step Bars	<p>Tax-Epoxy painting 7-16エポキシ塗装仕上</p> <p>$\phi 20$ $g = 2.466 \frac{\text{kg}}{\text{m}}$ $W = 300$ $l = 0.80^{\text{m}}$</p> <p>$2.466 \times 0.80 = 1.97 \frac{\text{kg}}{\text{piece}}$</p> <p>($\Sigma g = 1.97 \times 20 = 39.4 \text{ kg}$)</p>	<p>pieces 20</p>
4. 仮設管 Temporary Water Supply Pipes	<p>steel pipe $\phi 450$ $9.05^{\text{m}} \times 2 = 18.10^{\text{m}}$ $l = 18.1^{\text{m}}$</p> <p>" $\phi 600$ $l = 9.75^{\text{m}}$</p>	

(Intake Facility Work)

Quantity Calculation Sheet (3)

(Transmission Pipeline)

Item	Calculation	Quantity
5 鉄筋コンクリート Reinforced concrete	$C = 210 \text{ kg/cm}^2$	
(砂床)	$17.10 \times 4.30 \times 0.30 = 22.059$	
(")	$8.00 \times 0.30 \times 0.30 = 0.720$	
(竹材)	$15.80 \times 0.30 \times 1.00 = 4.740$	
(")	$0.30 \times 0.30 \times 1.00 = 0.090$	
(取水口)	$6.27 \times 1.65 \times 3.60 = 37.244$	
(")	$5.62 \times 1.35 \times 3.00 = 22.761$	
(")	$3.00 \times 0.10 \times 0.25 = 0.075$	
(人孔)	$0.90 \times 0.90 \times 0.15 = 0.081$	
(")	$0.60 \times 0.60 \times 0.35 = 0.126$	
(10L-30V 29-4)	$0.60 \times 0.60 \times 0.20 = 0.072$	
(4ボルト 574-1)	$1.40 \times 1.00 \times 0.40 = 0.560$	
(ハコ)	$0.30 \times 0.30 \times \frac{1}{2} \times 3 \times 2 = 0.270$	
	Total 42.334	42.3
6. 均質コンクリート Bedding concrete	$C = 135 \text{ kg/cm}^2$	
(砂床)	$17.10 \times 4.30 \times 0.40 = 29.412$	
(")	$8.00 \times 0.30 \times 0.40 = 0.960$	
(ハコ)	$0.30 \times 0.30 \times \frac{1}{2} \times 1.40 = 0.063$	
	Total 28.389	28.4

(Intake Facility Work)

Quantity Calculation Sheet (4)

(Transmission Pipeline)

Item	Calculation	Quantity
7. 填充コンクリート concrete filling	$2.00 \times 1.70 \times 4.85 = 16.490$ $(\text{パイプ}) - 0.82^2 \times \frac{\pi}{4} \times 4.85 = \ominus 2.561$ Total 13.929	13.9 ²³
8. 型枠 Formwork	(材料) $15.80 \times 1.00 \times 2 = 31.600$ (") $4.30 \times 1.00 \times 2 = 8.600$ (") $0.30 \times 1.00 = 0.300$ (板木ゲート)外 $0.30 \times 5.97 \times 2 = 3.582$ (")外 $1.00 \times 5.97 = 5.970$ (")外 $0.25 \times 3.00 = 0.750$ (")内 $1.35 \times 5.72 \times 2 = 15.444$ (")内 $3.00 \times 5.07 = 15.210$ (")ハチ $0.424 \times 3.00 \times 2 = 2.544$ (入孔)内 $0.60 \times 0.85 \times 4 = 0.840$ (")外 $0.10 \times 0.90 \times 4 = 0.360$ オペレーション (スラット) $0.20 \times 0.60 \times 4 = 0.480$ サポート (ジョイント) $1.40 \times 0.40 = 0.560$ (") $1.00 \times 0.40 \times 2 = 0.800$ (ハチ) $- 0.30 \times 0.30 \times \frac{1}{2} \times 6 = \ominus 0.270$	

(Intake Facility Work)

Quantity Calculation Sheet (5)

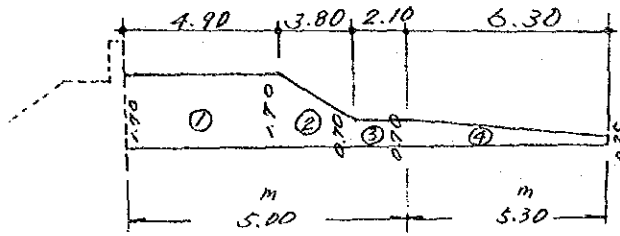
(Transmission Pipeline)

Item	Calculation	Quantity
	(取水ゲート)内 $-0.82 \times \frac{\pi}{4} = \ominus 0.528$	
	(ダム内) $17.10 \times 0.30 = 5.130$	
	(") $4.30 \times 0.30 = 1.290$	
	Total 92.662	92.7 m ²
9. コンクリート研削 Demolition of existing concrete/rock	(鉄筋コンクリート) ~ 処理含む (水圧機) $2.00 \times 1.70 \times 4.85 = 16.49$ (取水口) $3.60 \times 1.65 \times 6.27 = 37.24$	
	Total 53.73	53.7 m ³
10. 支柱 Support	$1.35 \times 5.77 \times 3.00 = 23.668$	23.4 m ³ 空
11. 足場 Support	$3.60 + 1.00 \times 5.97 = 27.462$	27.5 m ²

(Intake Facility Work)

Quantity Calculation Sheet (6)

(Transmission Pipeline)

Item	Calculation	Quantity
<p>12. 掘前 Excavation</p>	 <p>① $1.70 \times 4.90 \times 5.00 = 41.65$ ② $\frac{1.70+0.70}{2} \times 3.80 \times 5.00 = 22.80$ ③ $2.10 \times 0.70 \times 5.00 = 7.35$ ④ $\frac{0.70+0.25}{2} \times 6.30 \times 5.30 = 15.86$</p> <p>(松内床) $17.10 \times 4.30 \times 0.70 = 51.47$ (") $- 8.00 \times 0.30 \times 0.70 = -1.68$</p> <p>Total 137.45</p>	<p>137.45^{m³}</p>
<p>13. 残土処理 Disposal</p>	<p>same as above</p> <p>= 137.45</p>	<p>137^{m³}</p>

(Intake Facility Work)

Quantity Calculation Sheet (7)

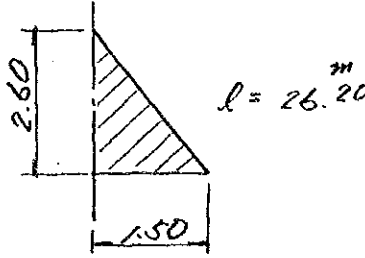
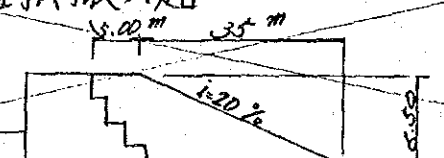
(Transmission Pipeline)

Item	Calculation	Quantity
14. 床均 Ground-Leveling work	$17.10 \times 4.30 = 73.53$ $- 8.00 \times 0.30 = \ominus 2.40$ Total 75.93	76 ^{m²}
15. 土留矢板 Steel Sheet pile work for water shuttering	Sheet pile 鋼矢板 (止水使用) Type - II $N = 48.00 \text{ kg/m}$ $H = 6.00$ $L = 26.20 \text{ m}$ $n = 26.20 \div 0.40 = 65.5 = 66 \text{ Nos.}$ $\Sigma W = 19,008 \text{ kg}$ Supporter 腹起 1段 $H-200 \times 200 \times 8$ $W = 49.9 \text{ kg/m}$ $L = 19.10 \times 2 + 1.10 = 45.30 \text{ m}$ $\Sigma W = 2260.47 \text{ kg}$ Supporter 切梁 + 4の地 $H-200 \times 200 \times 8$ $W = 49.9 \text{ kg/m}$ $L = 108.10$ $\Sigma W = 5394.19 \text{ kg}$	Steel Weight L.S. 26.7 ton

(Intake Facility Work)

Quantity Calculation Sheet (8)

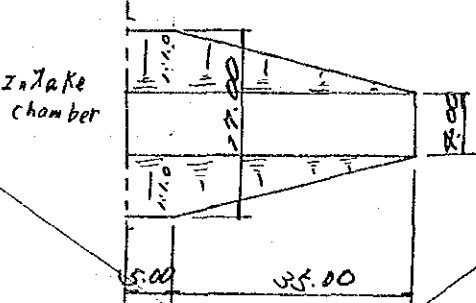
(Transmission Pipeline)

Item	Calculation	Quantity																											
16. 止水材 Water stopper	 <p> $l = 26.20^m$ 土の積 (Sand bags) $1.50 \times 2.60 \times \frac{1}{2} \times 26.20$ $= 51.09 m^3$ </p>	L.S. 1式																											
17. 水替工 Dewatering Work	<table border="0"> <tr> <td>根切</td> <td>2 日</td> <td>days</td> </tr> <tr> <td>ゴクリト打</td> <td>3 日</td> <td></td> </tr> <tr> <td>ゴクリト研</td> <td>10 日 (外7日)</td> <td></td> </tr> <tr> <td>型 枠</td> <td>4 日</td> <td></td> </tr> <tr> <td>養 生</td> <td>14 日</td> <td></td> </tr> <tr> <td>配 筋</td> <td>5 日</td> <td></td> </tr> <tr> <td>配 管</td> <td>2 日</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td>days</td> </tr> <tr> <td>土木用ホコリ使用計</td> <td>40 日</td> <td></td> </tr> </table>	根切	2 日	days	ゴクリト打	3 日		ゴクリト研	10 日 (外7日)		型 枠	4 日		養 生	14 日		配 筋	5 日		配 管	2 日		Total		days	土木用ホコリ使用計	40 日		days 40日
根切	2 日	days																											
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配 管	2 日																												
Total		days																											
土木用ホコリ使用計	40 日																												
18. 仮設道路 Approach slope work																													

(Intake Facility Work)

Quantity Calculation Sheet (9)

(Transmission Pipeline)

Item	Calculation	Quantity
	 <p>Intake chamber</p> <p>Earth Volume 路体土量</p> $\frac{4.00 + 17.00}{2} \times 5.00 \times 35.00 = 341.25$ $\frac{4.00 + 17.00}{2} \times 5.00 \times 35.00 \times \frac{1}{3} = 796.25$ <p>Total 1137.5^{m³}</p>	<p>L.S. 1式</p>
<p>18 鉄筋 Steel bars</p>	<p>13 D12 D16</p>	<p>kg 7590.7 1422.9 1587.1</p>

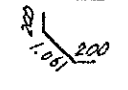
Intake Facility Steel Bars List (1)
(Transmission Pipeline)

Summary Table	Size (mm)	Total Length (m)	Unit Weight (kg/m)	Total Weight (kg)	Remarks
	13 D12	1430.136 1427.846	0.375 0.374	1422.7 1390.7	
	D16	1017.360	1.56	1587.1	
	Total	2447.496 2445.846		3010.8 2977.8	

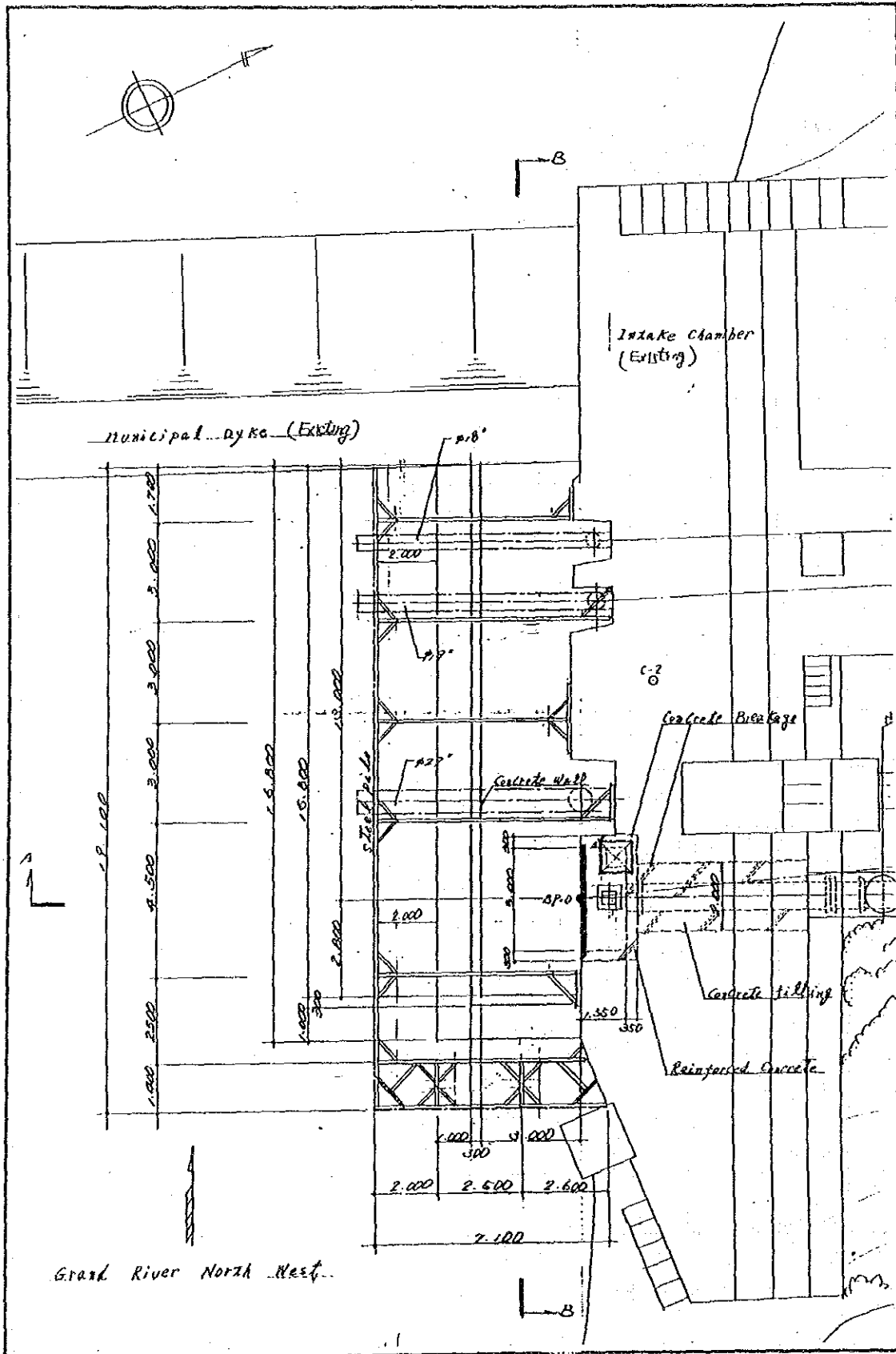
Detail List

NO.	Size (mm)	Unit Length (m)	Q'ty	Length (m)	Shape
1	13 D12	140 138	32	580.480 578.560	
2	D16	6.330	38	240.540	
3	13 D12	4.200	30	126.000	
4	13 D12	3.900	64	249.600	
5	13 D12	8.140 8.120	4	32.560 32.480	
6	13 D12	16.900 16.850	8	131.200 130.800	
7	13 D12	2.900	8	23.200	
8	D16	1.400	148	207.200	
9	D16	3.500	16	56.000	
10	D16	3.170	66	407.220	
11	D16	1.450	36	52.200	
12	D16	3.500	16	56.000	
13	13 D12	3.500	38	133.000	
14	13 D12	1.550	76	117.800	
15	13 D12	1.531	8	12.248	

In Lake Facility Steel Bars List (2)
(Transmission Pipeline)

NO.	Size (mm)	Unit Length (m)	Q'ty	Length (m)	Shape
16	¹³ D12	1.461	^{Nos.} 8	11.688	
17	¹³ D12	1.320	8	10.560	

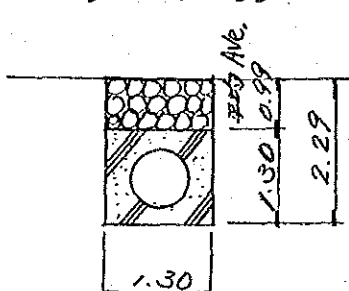
(Intake Facility Work) Temporary Work



(River Crossing No.1 Work)

Quantity Calculation Sheet (1)

(Transmission Pipeline)

Item	Calculation	Quantity
1. 鉄筋コンクリート Concrete	$C = 210 \text{ kg/cm}^2$ $1.30 \times 1.30 \times 86.10 = 145.509$ $- 0.82^2 \times \frac{\pi}{4} \times 86.10 = 45.469$ $0.50 \times 1.90 \times 1.30 \times 2 = 2.45$ $\text{Total } 102.51$	102.5 m^3
Formwork 2. 型枠 (埋殺し)	$1.30 \times 86.10 \times 2 = 223.86$	223.9 m^2
3. 鉄筋 Steel bars	13 $D 16$	1948.5 1920.5 kg 2717.5 kg
4. 掘削 Excavation	Boulders (Rock) (玉石) $L = 133.98 \sim 220.08$ $l = 86.10 \text{ m}$  $0.50 \times 1.90 \times 2.29 \times 2 = 4.35$ $1.30 \times 2.29 \times 86.10 = 256.32$ $\text{Total } 260.67$	261 m^3

(River Crossing No.1 Work)

Quantity Calculation Sheet (2)

(Transmission Pipeline)

Item	Calculation	Quantity
5. 埋戻 Back-filling	$0.50 \times 0.99 \times 1.90 \times 2 = 1.88$ $1.30 \times 0.99 \times 86.10 = 110.81$ Total 112.69	113 m ³
6. 残土処理 Disposal	261 - 113 = 148	148 m ³
7. 床均し Ground-Leveling Work	$1.30 \times 86.10 = 111.93$ $0.50 \times 1.90 \times 4 = 3.80$ Total 115.73	116 m ²
8. 仮締切 Water stopper	Sand bags 土のう積 H=1.50 m (上+下流+仕切) $l = 39.00 \times 2 + 5.00 \times 2 = 88.00$	88 m
9. 水替工 Dewatering Work	根掘 2 日 配管 2 " 配筋 1 " コンクリート養生 7 " 土留工事 Total 12 日 days	days 12 日

(River Crossing No.1 Work)

Quantity Calculation Sheet (3)

(Transmission Pipeline)

Item	Calculation	Quantity
10. 木支保板 Trench support work	$H = 2.40$ $B = 1.30$	88.10 m

River Crossing No. 1 Steel Bars List
(Transmission Pipeline)

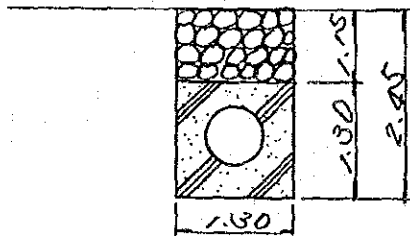
Summary Table					
Size (mm)	Total Length (m)	Unit Weight (kg/m)	Total Weight (kg)	Remarks	
D13	1958.34	0.975	1948.5		
D16	1742.000	1.56	2717.5		
Total			4666.0		
Detail List					
NO.	Size (mm)	Unit Length (m)	Q'ty	Length (m)	Shape
	D16	4.000	413	1652.000	<p> $\eta_1 = 40.75 \div 0.2 = 204$ $\eta_2 = 18.10 \div 0.2 = 91$ $\eta_3 = 23.45 \div 0.2 = 118$ $N = 413$ </p> <p> $\frac{40.75}{\text{---}} \quad \frac{18.10}{\text{---}} \quad \frac{23.45}{\text{---}}$ $\frac{2.08}{\text{---}} \quad \frac{1.70}{\text{---}} \quad \frac{1.35}{\text{---}}$ $\frac{3.04}{\text{---}} \quad \frac{1.70}{\text{---}} \quad \frac{1.35}{\text{---}}$ $l = 43.83 \quad l = 14.00 \quad l = 25.25$ $43.79 \quad 20.00 \quad 25.35$ $\Sigma l = 89.14$ </p>
	D13	87.140	21	1871.940	
Bend	D16	4.500	20	90.000	
	D13	1.800	48	86.400	

(River Crossing No.2 Work)

Quantity Calculation Sheet (1)

(Transmission Pipeline)

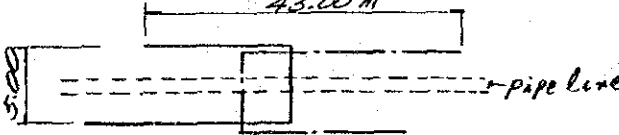
Item	Calculation	Quantity
1. 鉄筋コンクリート Concrete	$C = 210 \text{ kg/cm}^2$ $L = 874.85 \sim L = 1001.42 \quad l = 126.57 \text{ m}$ $1.30 \times 1.30 \times 126.57 = 213.90$ $- 0.82^2 \times \frac{\pi}{4} \times 126.57 = -66.84$ $0.50 \times 2.10 \times 1.30 \times 2 = 2.73$ Total 149.79	149.8 m ³
Formwork 2. 型枠 (埋殺し)	$1.30 \times 126.57 \times 2 = 329.08$	329.0 m ²
3. 鉄筋 Steel bars	$\phi 13$ DFP $\phi 16$	2852.2 2787 kg 3996.1 kg
4. 掘削 Excavation	Boulders (Rock) (玉石)	



(River Crossing No.2 Work)

Quantity Calculation Sheet (2)

(Transmission Pipeline)

Item	Calculation	Quantity
	$1.30 \times 2.45 \times 126.57 = 403.12$ $0.50 \times 2.15 \times 2.10 \times 2 = 4.51$ $\text{Total } 407.63$	408 m ³
5. 埋戻 Back-filling	$1.30 \times 1.15 \times 126.57 = 189.2$ $0.50 \times 1.15 \times 2.10 \times 2 = 2.4$ $\text{Total } 191.6$	192 m ³
6. 残土処理 Disposal	$408 - 192 = 216$	216 m ³
7. 床均し Ground-Leveling work	$1.30 \times 126.57 = 164.54$ $0.50 \times 2.10 \times 2 = 2.10$ $\text{Total } 166.64$	166 m ²
8. 仮締切 water stopper	<p>Sand bags 土のう積 H=1.50 m 43.00 m</p> 	

(River Crossing No.2 Work)

Quantity Calculation Sheet (3)

(Transmission Pipeline)

Item	Calculation	Quantity
	(上+下流+仕切) $l = 43.00 \times 2 + 5.00 \times 2 = 96.00$	96 m
9. 水管工 Dewatering work	根掘 2 日 ^{days} 配管 2 " 配筋 1 " 加工養生 7 " 土留木留 計 12 日 ^{days}	12 日 ^{days}
10. 木架張板 Trench support work	$H = 2.40$ $B = 1.30$	m 128.57

River Crossing No2 Steel Bars List
(Transmission Pipeline)

Summary Table	Size (mm)	Total Length (m)	Unit Weight (kg/m)	Total Weight (kg)	Remarks
	D12	2366.530	0.875	2052.12	
		2000.570	0.874	2081.4	
	D16	2561.600	1.56	3996.1	
	Total			6048.3	

Detail List

NO.	Size (mm)	Unit Length (m)	Q'ty Nos.	Length (m)	Shape
	D16	4.000	614	2456.000	<p> $n_1 = 58.05 \div 0.2 = 291$ $n_2 = 21.17 \div 0.2 = 106$ $n_3 = 43.55 \div 0.2 = 218$ $N = 615$ </p>
	D12	131.93	21	2770.530	
Concrete protection for Bend $\phi 800 \times 22 \frac{1}{2}$ - 2 Nos.					<p> 58.05 21.17 43.55 $\frac{0.38}{0.00 \times 1}$ $\frac{0.38}{0.00 \times 5}$ $\frac{0.38}{0.00 \times 8}$ $\frac{7.96}{4.15}$ $\frac{7.80}{1.90}$ $\frac{7.80}{3.68}$ $l = 62.23$ $l = 23.67$ $l = 46.63$ $\Sigma l = 131.93$ </p>
①	D16	4.500	20	90.000	
②	D16	2.600	6	15.600	
③	¹³ D12	2.000	48	96.000	

(Tunnel Crossing Work)

Quantity Calculation Sheet (1)

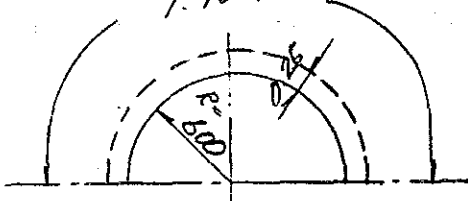
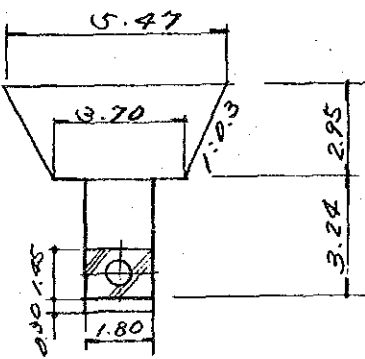
(Transmission Pipeline)

Item	Calculation	Quantity
1. 鉄筋コンクリート Concrete	$C = 210 \text{ kg/cm} \quad l = 14.40 \text{ m}$ $(L = 1829.43 \sim L = 1843.83)$ $1.80 \times 1.95 \times 14.40 = 37.584$ $- 0.82^2 \times \frac{\pi}{4} \times 14.40 = - 7.604$ $1.80 \times 0.30 \times (0.30 + 3.20) = 1.890$ Total 31.870	31.9 m ³
2. 型枠 Formwork	$1.95 \times 14.40 \times 2 = 41.760$ $\frac{3.20 + 3.80}{2} \times 0.30 \times 2 = 0.210$ $1.80 \times 1.60 = 2.880$ $1.80 \times 1.95 \times 2 = 5.220$ $- 0.82^2 \times \frac{\pi}{4} \times 2 = - 1.056$ Total 49.014	49.0 m ²
3. 鉄筋 Steel bars	$\overset{13}{D \#}$ D16	825.9 kg 746.0 kg

(Tunnel crossing work)

Quantity Calculation Sheet (2)

(Transmission Pipeline)

Item	Calculation	Quantity
4. 支保 Support	$1.60^B \times 1.80^W \times 1.80^H$ $= 5.184$	5.2 m ³ 壁
5. トンネル取壊 Demolition of Existing tunnel	<p>Bricks (頭部 2ヶ積)</p> <p>1.90 m</p>  $0.25 \times 1.90 \times 1.80 = 0.855$	0.9 m ³
6. 掘削 Excavation	 $\frac{3.70 + 5.47}{2} \times 2.95 \times 1.4.40$ $= 194.77$	

(Tunnel Crossing Work)

Quantity Calculation Sheet (3)

(Transmission Pipeline)

Item	Calculation	Quantity
	$1.80 \times 3.24 \times 14.40 = 83.98$ $1.80 \times 0.30 \times (0.30 + 3.20)$ $= 1.89$ (1.70) $1.70^2 \times \frac{\pi}{4} \times \frac{1}{2} \times 1.80 = 2.09$ Total 278.60	278 m ³
7. 埋 戻 Backfilling	Body 埋戻躯体 = (37.5 ⁰⁹ + 1.890) = 39.474	
	$278.60 - 39.474 = 239.126$	239 m ³
8. 残土処理 Disposal	Same as above body = 39.474	39 m ³
9. 床 均 勻 Ground-Leveling	$(14.40 - 1.60) \times 1.80 = 23.04$	23 m ²
10. 木 板 支 撐 Trench-support work	B = 1.80 H = 3.50	14.4 m

(Tunnel Crossing Work)

Tunnel crossing Steel Bars List
(Transmission Pipeline)

Summary Table	Size (mm)	Total Length (m)	Unit Weight (kg/m)	Total Weight (kg)	Remarks
	13 D12	830.038 828.278	0.895 0.895	825.9 806.2	
	D16	478.200	1.56	746.0	
	Total			1571.9 1572.2	

Detail List

NO.	Size (mm)	Unit Length (m)	Q'ty Nos.	Length (m)	Shape
①	D16	6.300	54	340.200	
②	D16	6.900	20	138.000	
③	13 D12	0.60 15.020	44	662.640 660.880	
④	13 D12	5.250	22	115.500	
⑤	13 D12	4.718	11	51.898	

(Drain Pipe Work)

Quantity Calculation Sheet (1)

(Transmission Pipeline)

Item	Calculation	Quantity
1. Drain Valve Box	<p>Box cover 糸高鋼板製 (エポキシ塗装仕上) Checkered plate (Tar-Epoxy painting) φ800 x 50^H</p> <p>Steel L-50x50x3.2 l=2.51^m g=2.38^{kg/m}</p> <p>Checkered plate 糸高鋼板 t=3.2 s=0.503 g=28.82^{kg/m²}</p> <p>Steel bar φ12 l=1.00^m g=0.888^{kg/m}</p> <p>ΣW = 20.352^{kg}</p> <p>Steel belt (Tar-Epoxy painting) スチールベルト (エポキシ塗装仕上) φ700 x 50^w with chain, hook, Key 鎖錠, ホック付</p> <p>R-50x4.5 l=2.85^m g=1.766^{kg/m}</p> <p>ΣW = 5.033^{kg}</p> <p>Reinforced Concrete Pipe コンクリート管 φ600 x 700^L (R.C.P)</p>	1 NO.
2. Drain Pit	<p>GraTing Cover Tar-Epoxy painting (エポキシ塗装仕上) φ1250 x 50^H</p> <p>Steel L-50x50x3.2 l=3.93^m g=2.38^{kg/m}</p> <p>Steel bar φ12 l=15.20^m g=0.888^{kg/m}</p> <p>ΣW = 22.851^{kg}</p>	1 NO.

(Drain pipe Work)

Quantity Calculation Sheet (2)

(Transmission Pipeline)

Item	Calculation	Quantity
	Reinforced Concrete pipe 15711-1管 $\phi 1000 \times 1.500^2$ (R.C.P)	1 NO

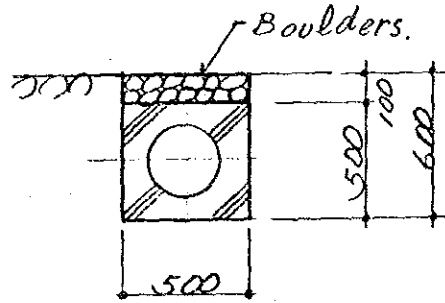
(Drain Pipe Work)

Quantity Calculation Sheet (3)

(Transmission Pipeline)

Item	Calculation	Quantity
3. 金鉄筋のクリート Concrete	$C = 210 \text{ kg/cm}^2$ (本管下) $0.50 \times 0.40 \times 1.00 = 0.200$ (弁) $1.00 \times 0.75 \times 1.10 = 0.825$ (管) $0.50 \times 0.50 \times (1.205 + 23.01)$ $= 5.763$ Total 6.788	6.8 m ³
4. Concrete Breakage (壁板*) and Demolition	$0.50 \times 0.50 \times 1.96 = 0.490$	0.5 m ³
5. 型枠 Formwork	(本管下) $1.00 \times 0.40 \times 2 = 0.800$ (弁) $(0.60 + 0.25 + 0.25 + 1.10 + 1.00)$ $\times 0.75 = 2.400$ (管) $0.50 \times (1.205 + 23.01) \times 2$ $= 24.215$ Total 27.415	27.5 m ²
6. 鉄筋 Steel bars	13 D12 D16	404.7 390.7 kg 21.5 kg

(Drain pipe Work)
Quantity Calculation Sheet (4)
 (Transmission Pipeline)

Item	Calculation	Quantity
7. コンクリート破損 Breakage of concrete	$0.50 \times 0.50 \times 1.96 = 0.490$	0.5 m ³
8. 掘削 Excavation	<div style="text-align: center;">  <p style="text-align: center;">Boulders.</p> </div> <p>pipe distance</p> $l = (2.355 + 25.72) - (0.85 + 1.96 + 0.25)$ $= 25.015 \text{ m}$ $0.50 \times 0.60 \times 25.015 = 7.50$ <p>(弁) $1.00 \times 0.60 \times 1.10 = 0.66$</p> <p>(隅付) $1.18^2 \times \frac{\pi}{4} \times 1.00 = 1.09$</p> <p style="text-align: right;">Total 9.25</p>	9.3 m ³

(Drain pipe Work)

Quantity Calculation Sheet (5)

(Transmission Pipeline)

Item	Calculation	Quantity
9. 盛土 Banking	$\frac{2.40^2 \frac{\pi}{4} + 3.40^2 \frac{\pi}{4}}{2} \times 0.50 = 2.28$ $- 1.18^2 \frac{\pi}{4} \times 0.50 = \ominus 0.55$ <p style="text-align: right;">Total 1.73</p>	1.7 m ³
10. 埋戻 Backfilling	$0.50 \times 0.10 \times 25.015 = 1.25$	1.3 m ³
11. 残土処理 Disposal	$9.3 - (1.7 + 1.3) = 6.3$	6.3 m ³
12. 床均し Ground-leveling work	$0.50 \times 25.015 = 12.51$ $1.00 \times 1.10 = 1.10$ <p style="text-align: right;">Total 13.61</p>	13.6 m ²

(Drain pipe work)

Drain pipe Steel Bars List
(Transmission Pipeline)

Summary Table	Size (mm)	Total Length (m)	Unit Weight (kg/m)	Total Weight (kg)	Remarks
	13 D12	406.735 405.895	0.995 0.974	404.7 395.8	
	D16	13.800	1.56	21.5	
	Total			426.2 416.8	

Detail List

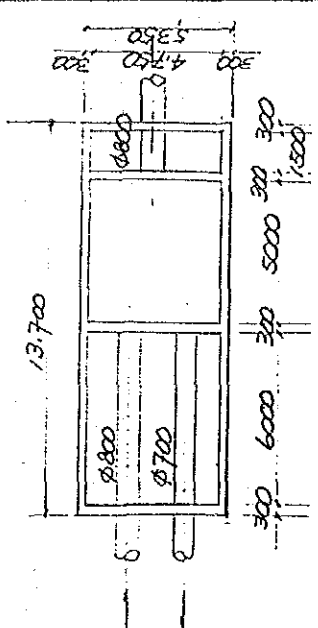
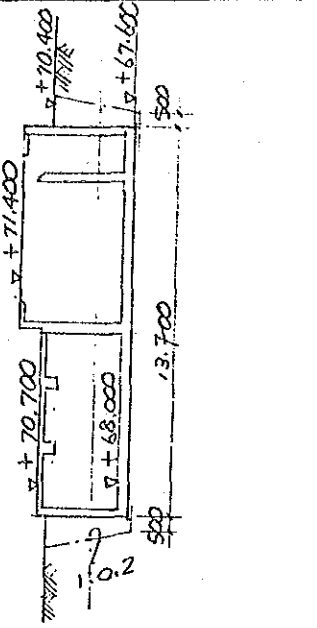
NO.	Size (mm)	Unit Length (m)	Q'ty Nos.	Length (m)	Shape
<i>(Air Valve)</i>					
	D16	2.300	6	13.800	
	13 D12	1.000	14	14.000	
<i>(Concrete protection)</i>					
	13 D12	1.400	135	189.000	<p> $\eta_1 = 1.855 \div 0.20 = 10$ $\eta_2 = 24.97 \div 0.20 = 125$ $N = 135$ </p>
	13 D12	29.105 28.985	7	203.735 202.895	
					$\frac{1.855}{0.38} = 4.88$ $0.38 \times 1 = 0.38$ $0.36 \times 0.38 = 0.1368$ $l = 2.215$ 2.235
					$\frac{24.970}{0.38} = 65.71$ $0.38 \times 5 = 1.90$ $1.90 \times 1.90 = 3.61$ $l = 26.77$ 26.87 $\Sigma L = 28.985$ 29.105

2. RECEIVING TANK

RECEIVING TANK

Working Division: Concrete, class A

KT-1

Description	Calculation Details	Unit	Quantity	Remarks
(1) Base slab	$V_1 = 13.7 \times 5.35 \times 0.4 + 1.2 \times 1.2 \times 0.4$ $= 27.32 + 0.58 = 29.90$	m ³	29.90	
(2) Wall	$V_2 = (5.35 + 2 \times 6.8) \times 0.3 \times 3.4$ $+ 4.75 \times 2.95 \times 0.3 + 2.58 \times 5.35 \times 0.3$ $+ (5.35 + 2 \times 6.8) \times 0.3 \times 2.7$ $+ 0.82 \times 5.35 \times 0.2$ $= 19.33 + 4.20 + 4.14 + 14.05 + 0.88$ $= 42.60$	m ³	42.60	
(3) Beam	$V_3 = 0.4 \times 0.3 \times 4.75 \times 2$ $= 1.14$	m ³	1.14	
(4) Slab	$V_4 = 6.0 \times 4.75 \times 0.2 - 1.5 \times 1.225 \times 0.2$ $+ 0.7 \times 0.15 \times (6.8 \times 2 + 4.75 - 1.4)$ $+ 0.8 \times 0.15 \times 3.35 - 0.7 \times 0.6 \times 0.15 \times 3$ $- 0.6^2 \times 0.785 \times 0.2 \times 2$ $= 5.7 - 0.37 + 1.78 + 0.40 - 0.19 - 0.11$ $= 7.21$	m ³	7.21	
(5) Staircase	$V_5 = (0.25 \times 1.00 + \frac{1}{2} \times 1.29 \times 1.00 + 0.20 \times 0.25$ $+ 0.59 \times 0.15 - \frac{1}{2} \times 0.80 \times 1.00 -$ $\frac{1}{2} \times 0.25 \times 0.20 \times 4) \times 1.00$			

RECEIVING TANK
 Working Division: Concrete, class A RT - 2

Description	Calculation Details	Unit	Quantity	Remarks
	= 0.53	m ³	0.53	
(6) Pipe in wall	$-V_6 = (0.842^2 \times 0.785 \times 4 + 0.738^2 \times 0.785 \times 2) \times 0.30$			
	= -0.93	m ³	- 0.93	
(7) Sump pit	$-V_7 = 0.60^2 \times 0.40$			
	= -0.14	m ³	- 0.14	
Total		m ³	80.31	

3. RAPID MIXING TANK

RAPID MIXING TANK
 Working Division: Concrete, class A

MT-1

Description	Calculation Details	Unit	Quantity	Remarks
(1) Base slab	$V_1 = (5.70 \times 4.00 + 4.75 \times 3.05) \times 0.4$ $+ 1.00 \times 0.20 \times 3.20 + 1.20 \times 0.20 \times 1.49$ $= 15.91$	m ³	15.91	
(2) Wall	$V_2 = 5.25^h \times (4.00 + 4.90 \times 2) \times 0.4$ $+ 3.20^h \times 4.00 \times 0.40 + 1.15^h \times 1.20 \times 0.40$ $\times 2 + 3.20^h \times 3.20 \times 0.20 + 1.35^h \times 1.49$ $\times 0.20 \times 2 + 1.25^h \times 3.20 \times 0.20$ $+ 4.25^h \times 3.20 \times 0.20 + 3.45^h \times 3.20$ $\times 0.20 + 2.55^h \times (3.05 + 4.50 \times 2) \times 0.25$ $= 28.98 + 5.12 + 1.10 + 2.05 + 0.80$ $+ 0.80 + 2.72 + 2.21 + 7.68$ $= 51.46$	m ³	51.46	
(3) Beam	$V_3 = 0.40 \times 0.30 \times 2.55$ $= 0.31$	m ³	0.31	
(4) Slab	$V_4 = 0.40 \times 0.15 \times (4.80 + 7.40 \times 2 + 3.20$ $+ 2.80 \times 2 + 2.90 \times 2) + 0.50 \times 0.15$ $\times (2.40 \times 3 + 4.00) - 0.60 \times 0.40 \times 0.15$ $\times 2 + 2.55 \times 4.50 \times 0.20 - 1.50 \times 1.53$ $\times 0.20 - 0.60^2 \times 0.785 \times 0.20 + 1.20$ $\times 1.49 \times 0.20$ $= 2.05 + 0.84 - 0.07 + 2.30 - 0.46$ $- 0.06 + 0.36$	m ³		

