§2 PAILLES

1. MATERIAL TABLE

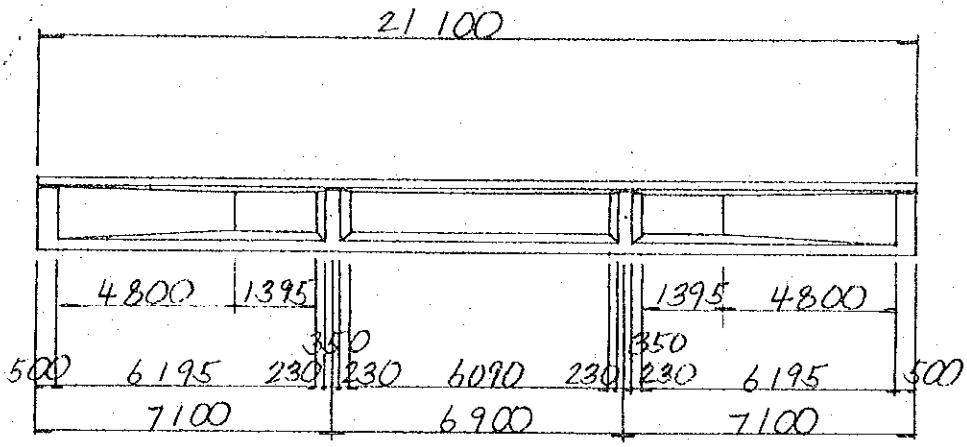
1. GIRDER

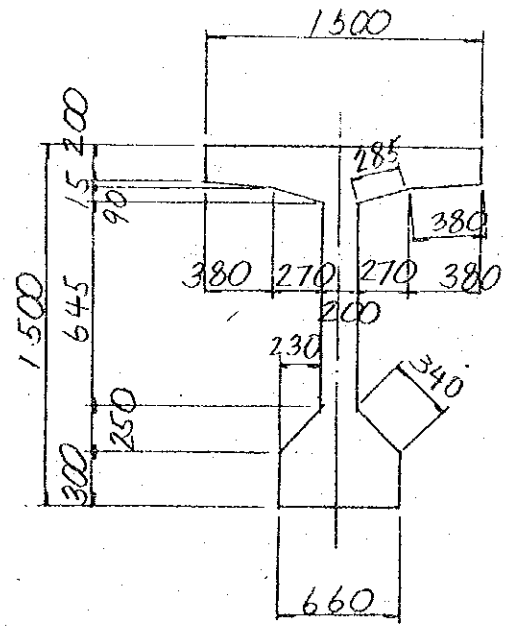
ITEM			UNIT	FOR ONE GIRDER	FOR ONE SPAN	REMARKS
NUMBER			NO	1	5	
CONCRETE			m^3	19.33	96.65	$\sigma_{CK}=40\ N/mm^2$
FORMWORK			m^2	89.58	447.90	
REINFORCEMENT BARS TOTAL	φ12	INNER	kg	1 386	6 809	HIGH YIELD BAR
		EDGE (L)	〃	1 309		
		〃 (R)	〃	1 342		
	φ16	INNER	〃	715	3575	
		EDGE (L)	〃	715		
		〃 (R)	〃	715		
		INNER	〃	2 101	10 384	
		EDGE (L)	〃	2 024		
		〃 (R)	〃	2 057		
PC CABLE			kg	723	3 615	12-φ7 mm
DUCT			m	197.2	986.0	φ45 mm
GROUT			〃	199.6	998.0	
ANCHORAGE			set	20	100	

2. CROSS BEAM , SLAB and SURFACING

ITEM		UNIT	FOR ONE SPAN		REMARKS
CONCRETE	cross beam , slab	m^3	16.32		$\sigma_{ck} = 30 N/mm^2$
	kerb	,	6.58		
	smoothed	,	—		
	total	,	22.90		
FORMWORK	cross beam , slab	m^2	87.36		
	kerb	,	43.27		
	total	,	130.63		
REINFORCEMENT	cross beam , slab	kg	869		HIGH YIELD BAR
	kerb	,	319		(ϕ12)
	total	,	1188		
PC CABLE		kg	1483		12-ϕ7 mm
DUCT		m	398.9		ϕ45 mm
GROUT		,	409.2		
ANCHORAGE		set	86		
ASPHALT PAVEMENT		m^2	151.9		t = 80 mm
FOOT PATH		,	28.1		
PRECAST KERB		m	21.1		

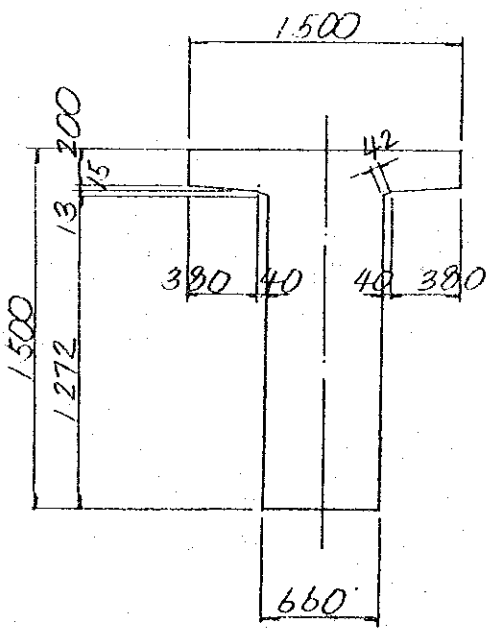
2. GIRDER





CENTER SECTION

$A = 0.7936\ m^2$



SUPPORT SECTION

$A = 1.1654\ m^2$

1. CONCRETE ($\acute{O}_{CK} = 40\ ^{N}/_{mm^2}$)

$V_1 = 0.7936 \times 21.100 = 16.745\ ^{m^3}$

$V_2 = (1.1654 - 0.7936) \times (0.500 + 0.350) \times 2 = 0.632\ ''$ (0.3718)

$V_3 = 1/2 \times 0.3718 \times (4.800 + 0.230 \times 2) \times 2 = 1.956$

$\Sigma V = 19.333\ ^{m^3}$

2. FORMWORK

FORMWORK LENGTH OF CROSS SECTION

CENTER SECTION

$U = 2 \times (0.20 + 0.38 + 0.285 + 0.645 + 0.34 + 0.30)$

$= 4.300\ ^{m}$

SUPPORT SECTION

$U = 2 \times (0.20 + 0.38 + 0.042 + 1.272)$

$= 3.788\ ^{m}$

AREA OF FORMWORK

(BOTTOM FORMWORK ARE NOT INCLUDED)

$A_1 = 4.300 \times (1.395 \times 2 + 6.090) = 38.18\ ^{m^2}$

$A_2 = 3.788 \times (0.50 + 0.35) \times 2 = 6.44\ ''$

$A_3 = 1/2 \times (4.300 + 3.788) \times (4.800 \times 2 + 0.23 \times 4) = 42.54\ ''$

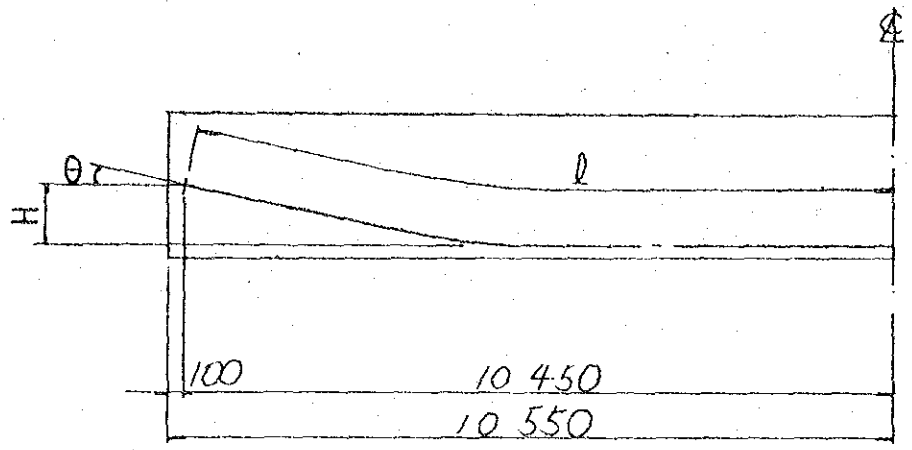
$A_4 = 1.1654^2 \times 2 \div \sin 14°30' = 2.42\ '$

$\Sigma A = 89.58\ ^{m^2}$

BOTTOM FORMWORK

$A = 0.66 \times 21.10 = 13.93\ ^{m^2}$

3. P.C CABLE　　12-φ7 mm



	H	θ	ℓ	2×ℓ×N
C_1	1200	20°	7126	14 252
C_2	1320	20°	8647	17 294
C_3, C_4	980	12°	10545	42 180
C_5, C_6	850	10°	10520	42 080
C_7, C_8	480	8°	10481	41 924
C_9, C_{10}	350	6°	10467	41 868
			TOTAL	199 598

1) CABLE　　12-φ7 mm WIRE

L = 199.598 × 12 = 2395.176 m

W = 2395.176 × 302 kg/km = 723.3 kg

2) DUCT (φ45)

L = 199.598 − (0.12 × 20) = 197.2 m

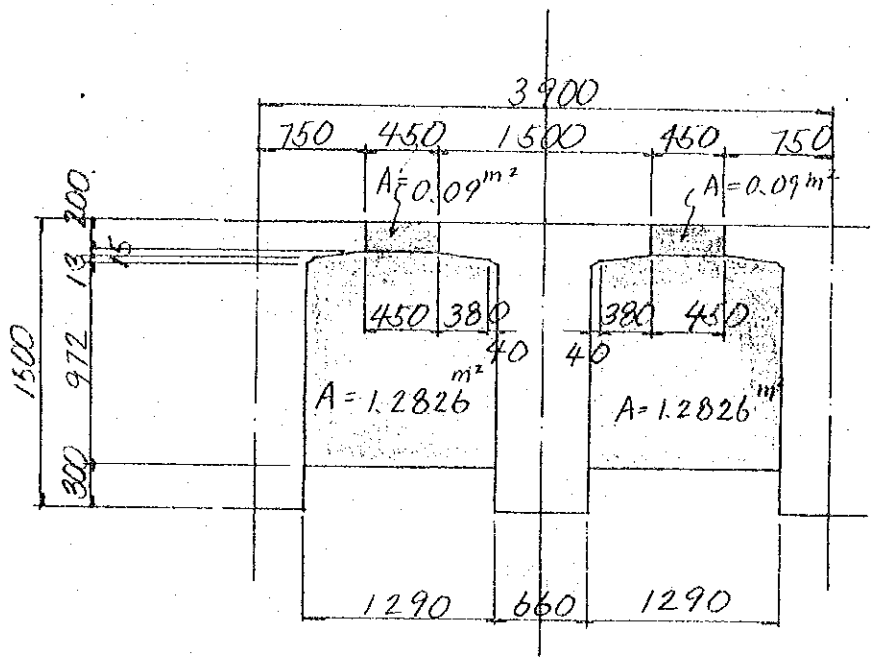
3) GROUT (φ45)

L = 199.6 m

4) ANCHORAGE

N = 20 sets

3. CROSS BEAM and SLAB



1. CONCRETE (σ_{ck} = 30 N/mm²)

V_1 = 1.2826 × (0.50 + 0.35) × 4 × 2 = 8.722 m³

V_2 = 0.09 × 21.10 × 4 = 1.596 "

ΣV = 16.318 m³

2. FORMWORK

A_1 = 1.2826 × 2 × 4 × 4 ÷ sin 74°30′ = 42.54 m²

A_2 = 1.290 × (0.50 + 0.35) × 4 × 2 ÷ sin 74°30′ = 9.10 "

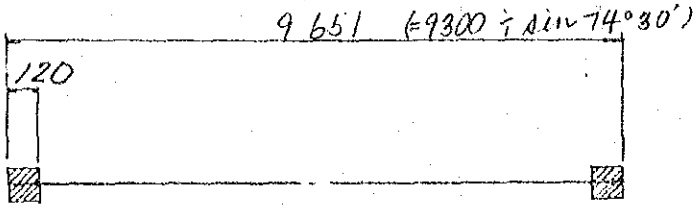
A_3 = 0.450 × (21.10 − 0.50 × 2 − 0.35 × 2) × 4 = 34.92 "

A_4 = 0.090 × 4 × 2 ÷ sin 74°30′ = 0.75 "

ΣA = 87.36 m²

3. P.C CABLE

1) SLAB (12-φ7 mm)



NO. OF CABLE 37

a) CABLE

L = 37 × 9,651 = 357.1 m

W = 357.1 × 3.624 kg/m = 1294.1 kg

b) DUCT (φ45)

L = 357.1 − (0.12 × 37 × 2) = 348.2 m

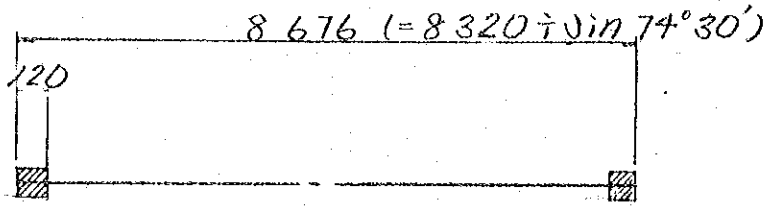
c) GROUT

L = 357.1 m

d) ANCHORAGE

N = 37 × 2 = 74 sets

2) CROSS BEAM (12 - φ 7 mm)



NO. OF CABLE 6

a) CABLE

L = 6 × 8.676 = 52.1 m

W = 52.1 × 3.624 kg/m = 188.8 kg

b) DUCT (φ 45)

L = 52.1 − (0.12 × 6 × 2) = 50.7 m

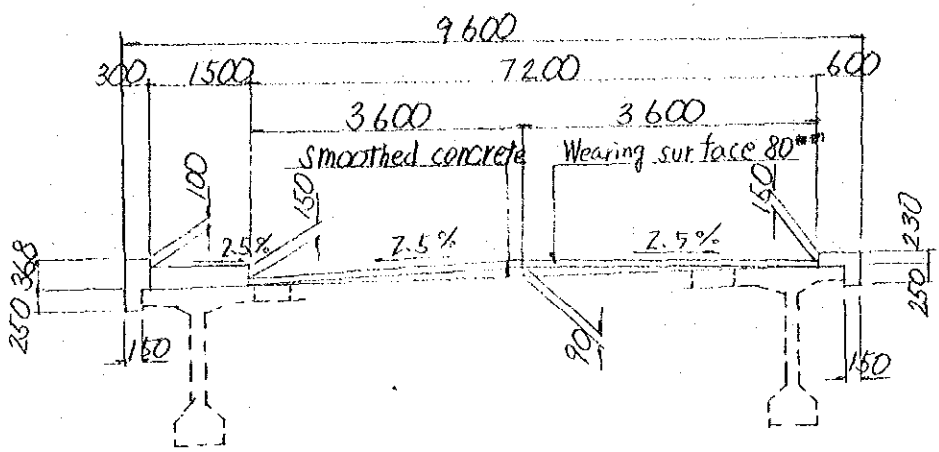
C) GROUT

L = 52.1 m

d) ANCHORAGE

N = 6 × 2 = 12 sets

4. SURFACING



1. KERB

1) CONCRETE

$A = (0.60 \times 0.23 + 0.30 \times 0.368 + 2 \times 0.15 \times 0.25)$

$= 0.323\ m^2$

$V = 0.323 \times 21.10 = 6.815\ m^3$

2) FORMWORK

$A_1 = 2 \times 10.23 + 0.368) \times 21.10 = 25.24\ m^2$

$A_2 = 2 \times (0.250 + 0.150 + 0.05) \times 21.10 = 18.99\ m^2$

$A_3 = 0.323 \times 2 + \text{Arc } 74°30' = 0.67\ m^2$

$\Sigma A = 44.90\ m^2$

2. ASPHALT PAVEMENT (t = 80 mm)

A = 7.20 × 21.10 = 151.92 m^2

3. FOOT PATH

A = 1.33 × 21.10 = 28.06 m^2

4. PRECAST KERB

L = 21.1 m

§3 A1-ROAD

1. MATERIAL TABLE

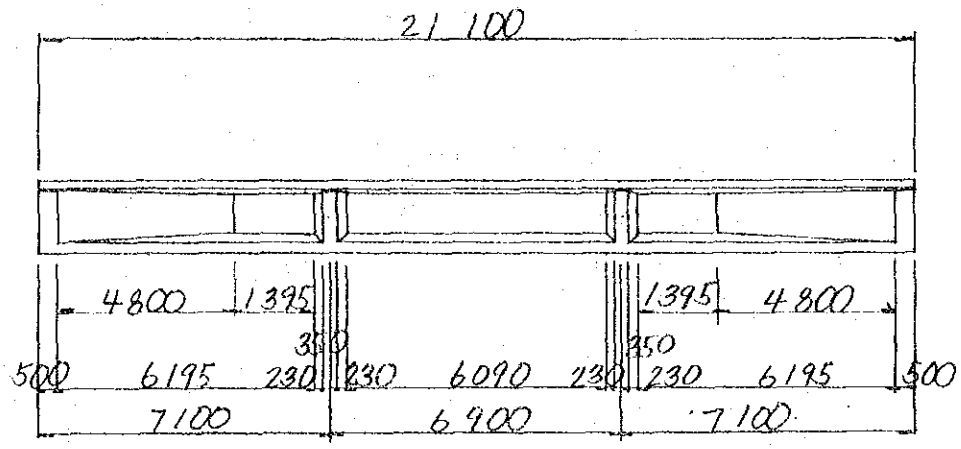
1. GIRDER

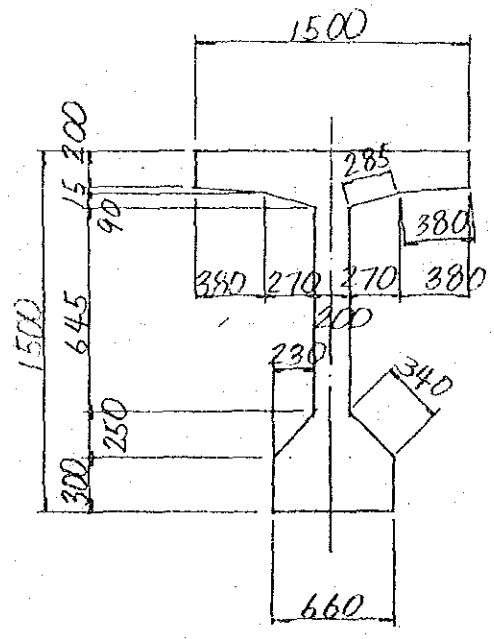
ITEM			UNIT	FOR ONE GIRDER	FOR ONE SPAN	REMARKS
NUMBER			NO	1	7	
CONCRETE			m^3	19.33	135.31	$\sigma_{ck}=40\ N/mm^2$
FORMWORK			m^2	89.54	626.78	
REINFORCEMENT BARS	φ12	INNER	kg	1395	9632	HIGH YIELD BAR
		EDGE (L)	〃	1344		
		〃 (R)	〃	1313		
	φ16	INNER	〃	715	5005	
		EDGE (L)	〃	715		
		〃 (R)	〃	715		
	TOTAL	INNER	〃	2110	14637	
		EDGE (L)	〃	2059		
		〃 (R)	〃	2028		
PC CABLE			kg	723	5061	12-φ7 mm
DUCT			m	197.2	1380.4	φ45 mm
GROUT			〃	199.6	1397.2	
ANCHORAGE			set	20	140	

2. CROSS BEAM , SLAB and SURFACING

ITEM		UNIT	FOR ONE SPAN		REMARKS
CONCRETE	cross beam , slab	m^3	28.74		$\sigma_{ck}=30\ N/mm^2$
	kerb	,	6.71		
	smoothed	,	—		
	total	,	35.45		
FORMWORK	cross beam , slab	m^2	151.28		
	kerb	,	44.46		
	total	,	195.74		
REINFORCEMENT	cross beam , slab	kg	1 320		HIGH YIELD
	kerb	,	323		(ϕ 12)
	total	,	1 643		
PC CABLE		kg	2 241		12-ϕ7 mm
DUKT		m	659.5		ϕ45 mm
GROUT		,	671.0		
ANCHORAGE		set	96		
ASPHALT PAVEMENT		m^2	249.0		$t=80$ mm
FOOT PATH		,	28.1		
PRECAST KERB			21.1		

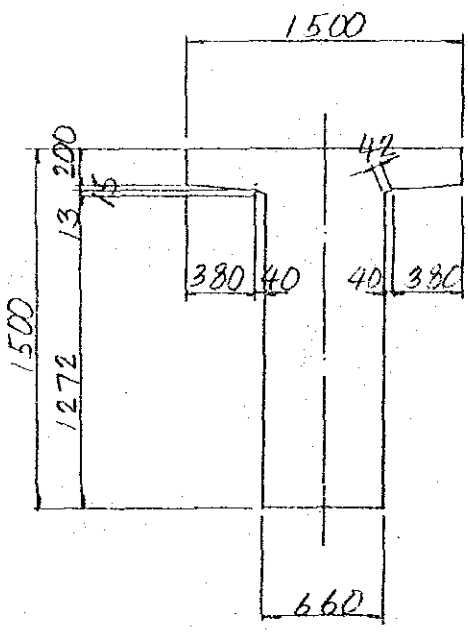
2. GIRDER





CENTER SECTION

A = 0.7936 m^2



SUPPORT SECTION

A = 1.1634 m^2

1. CONCRETE ($\sigma_{ck} = 40\ N/mm^2$)

$V_1 = 0.7936 \times 21.100$ = $16.745\ m^3$

$V_2 = (1.1654 - 0.7936) \times (0.500 + 0.350) \times 2$ = $0.632\ m^3$ (0.3718)

$V_3 = 1/2 \times 0.3718 \times (4.800 + 0.230 \times 2) \times 2$ = $1.956\ m^3$

$\Sigma V = 19.333\ m^3$

2. FORMWORK

FORMWORK LENGTH OF CROSS SECTION

CENTER SECTION

$U = 2 \times (0.20 + 0.38 + 0.285 + 0.645 + 0.34 + 0.30)$

$= 4.300\ m$

SUPPORT SECTION

$U = 2 \times (0.20 + 0.38 + 0.042 + 1.272)$

$= 3.788\ m$

AREA OF FORMWORK

(BOTTOM FORMWORK ARE NOT INCLUDED)

$A_1 = 4.300 \times (1.395 \times 2 + 6.090)$ = $38.18\ m^2$

$A_2 = 3.788 \times (0.50 + 0.35) \times 2$ = $6.44\ m^2$

$A_3 = 1/2 \times (4.300 + 3.788) \times (4.800 \times 2 + 0.23 \times 4)$ = $42.54\ m^2$

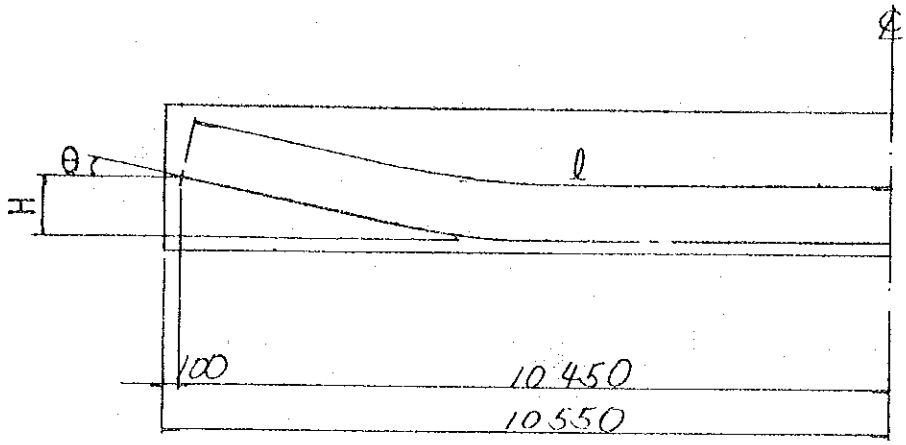
$A_4 = 1.1654 \times 2 \times \sin 78°$ = $2.38\ m^2$

$\Sigma A = 89.54\ m^2$

BOTTOM FORMWORK

$A = 0.66 \times 21.10$ = $13.93\ m^2$

3. P.C CABLE $12-\phi 7^{mm}$



	H	θ	ℓ	2×ℓ×N
C_1	1200	20°	7126	14252
C_2	1320	20°	8647	17294
C_3, C_4	980	12°	10545	42180
C_5, C_6	850	10°	10520	42080
C_7, C_8	480	8°	10481	41924
C_9, C_{10}	350	6°	10467	41868
			TOTAL	199598

1) CABLE $12-\phi 7^{mm}$ WIRE

L = 199.598 × 12 = 2395.176 m

W = 2395.176 × 302 kg/km = 723.3 kg

2) DUCT (φ45)

L = 199.598 − (0.12 × 20) = 197.2 m

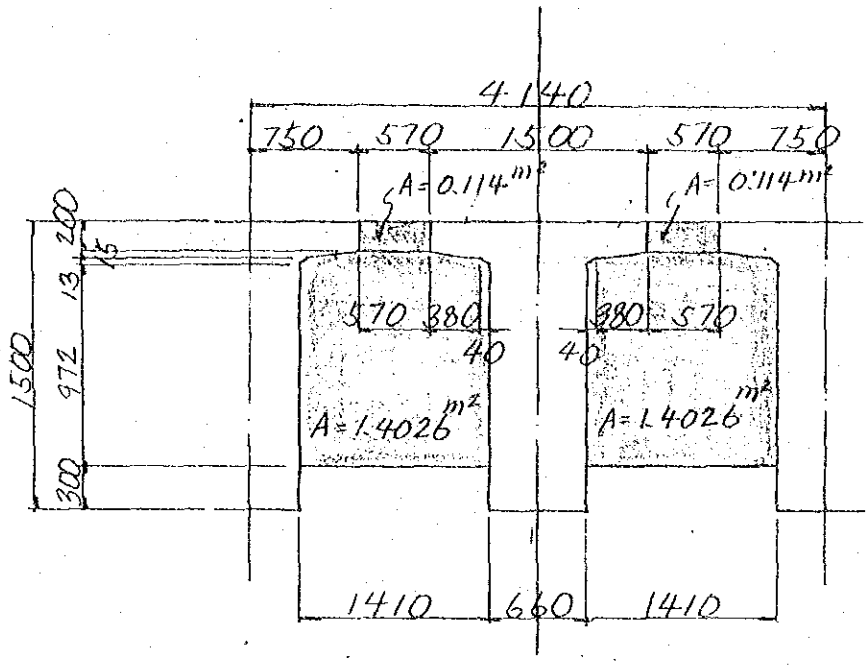
3) GROUT (φ45)

L = 199.6 m

4) ANCHORAGE

N = 20 sets

3. CROSS BEAM and SLAB



1. CONCRETE ($\sigma_{ck} = 30\ N/mm^2$)

$V_1 = 1.4026 \times (0.50 + 0.35) \times 6 \times 2 = 14.307\ m^3$

$V_2 = 0.114 \times 21.10 \times 6 = 14.432\ "$

$\Sigma V = 28.739\ m^3$

2. FORMWORK

$A_1 = 1.4026 \times 2 \times 6 \times 4 \div \sin 78° = 68.83\ m^2$

$A_2 = 1.410 \times (0.50 + 0.35) \times 6 \times 2 \div \sin 78° = 14.70\ "$

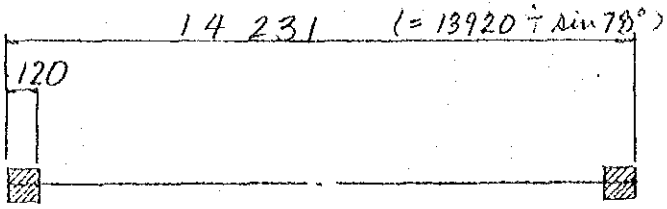
$A_3 = 0.570 \times (21.10 - 0.50 \times 2 - 0.35 \times 2) \times 6 = 66.35$

$A_4 = 0.114 \times 6 \times 2 \div \sin 78° = 1.40\ "$

$\Sigma A = 151.28\ m^2$

3. P.C CABLE

1) SLAB (12-φ7 mm)



NO. OF CABLE 36

a) CABLE

L = 36 × 14.231 = 512.3 m

W = 512.3 × 3.624 kg/m = 1856.6 kg

b) DUCT (φ 45)

L = 512.3 − (0.12 × 36 × 2) = 503.7 m

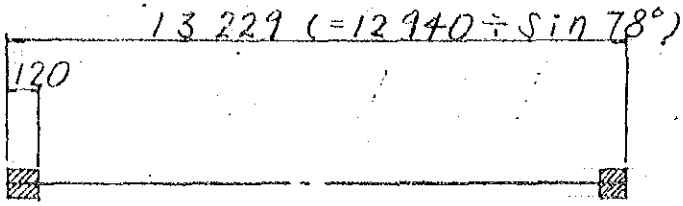
c) GROUT

L = 512.3 m

d) ANCHORAGE

N = 36 × 2 = 72 sets

2) CROSS BEAM (12 - φ7 mm)



NO. OF CABLE 8

a) CABLE

L = 8 × 13.229 = 105.8 m

W = 105.8 × 3.624 kg/m = 383.4 kg

b) DUCT (φ45)

L = 158.7 - (0.12 × 12 × 2) = 155.8 m

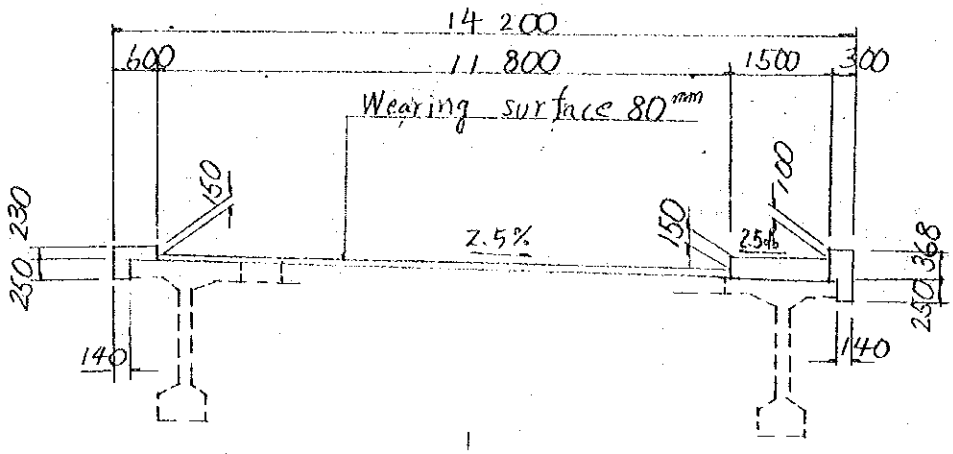
c) GROUT

L = 158.7 m

d) ANCHORAGE

N = 12 × 2 = 24 sets

4. SURFACING



1. KERB

1) CONCRETE

$A = (0.60 \times 0.23 + 0.30 \times 0.368 + 2 \times 0.14 \times 0.25)$

$= 0.318\ m^2$

$V = 0.318 \times 21.10 = \underline{6.710\ m^3}$

2) FORMWORK

$A_1 = 2 \times (0.23 + 0.368) \times 21.10 = 25.24\ m^2$

$A_2 = 2 \times (0.25 + 0.140 + 0.05) \times 21.10 = 18.57\ "$

$A_3 = 0.318 \times 2 \div \sin 78° = 0.65\ "$

$\Sigma A = 44.46\ m^2$

2. ASPHALT PAVEMENT (t = 80 mm)

A = 11.80 × 21.10 = 248.98 m^2

3. FOOT PATH

A = 1.33 × 21.10 = 28.06 m^2

4 PRECAST KERB

L = 21.1 m

§4 C-H-RAMP

1. MATERIAL TABLE

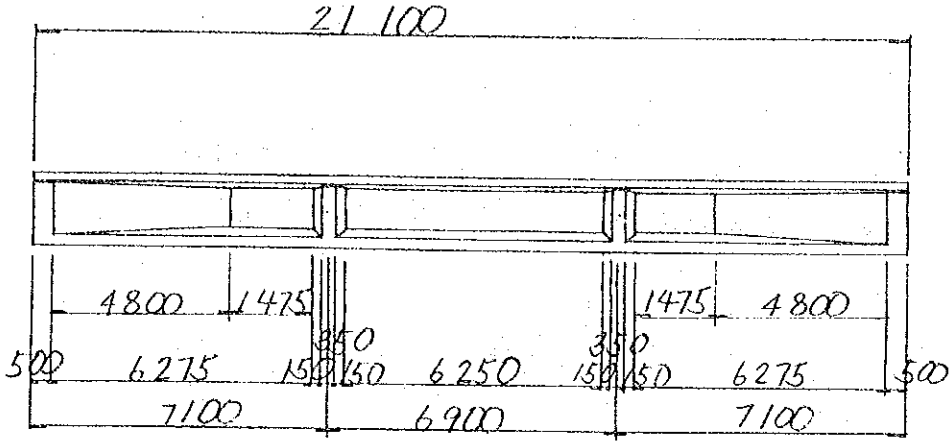
1. GIRDER

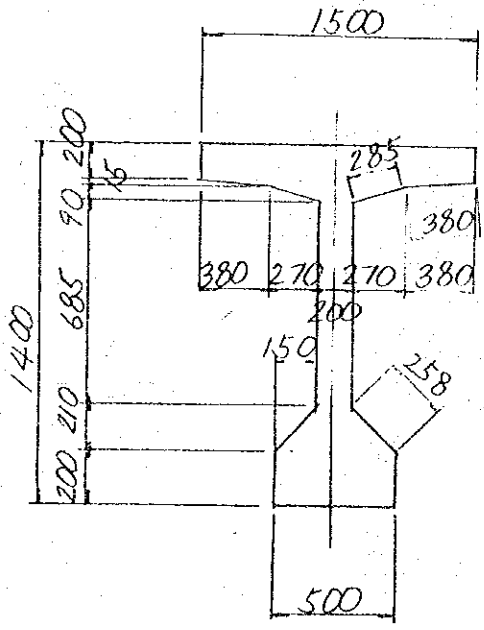
ITEM			UNIT	FOR ONE GIRDER	FOR ONE SPAN	REMARKS
NUMBER			NO	1	4	
CONCRETE			m^3	15.79	63.16	$\sigma_{ck}=40\ N/mm^2$
FORMWORK			m^2	84.43	337.72	
REINFORCEMENT BARS	φ12	INNER	kg	1 508	6 014	HIGH YIELD BAR
		EDGE (L)	〃	1 499		
		〃 (R)	〃	1 499		
	φ16	INNER	〃	—		
		EDGE (L)	〃	—		
		〃 (R)	〃	—		
	TOTAL	INNER	〃	1 508	6 014	
		EDGE (L)	〃	1 499		
		〃 (R)	〃	1 499		
PC CABLE			kg	532	2 128	12-φ7 mm
DUCT			m	145.0	580.0	φ45 mm
GROUT			〃	146.7	586.8	
ANCHORAGE			set	14	56	

2. CROSS BEAM , SLAB and SURFACING

ITEM		UNIT	FOR ONE SPAN		REMARKS
CONCRETE	cross beam , slab	m^3	8.58		$\sigma_{ck} = 30\ N/mm^2$
	kerb	,	6.35		
	smoothed	,	—		
	total	,	14.93		
FORMWORK	cross beam , slab	m^2	46.46		
	kerb	,	34.78		
	total	,	81.24		
REINFORCEMENT	cross beam , slab	kg	493		HIGH YIELD
	kerb	,	228		(Φ12)
	total	,	721		
PC CABLE		kg	687		12 - Φ5 mm
DUKT		m	360.4		Φ35 mm
GROUT		,	371.8		
ANCHORAGE		set	114		
ASPHALT PAVEMENT		m^2	116.1		t = 80 mm
FOOT PATH		,	—		

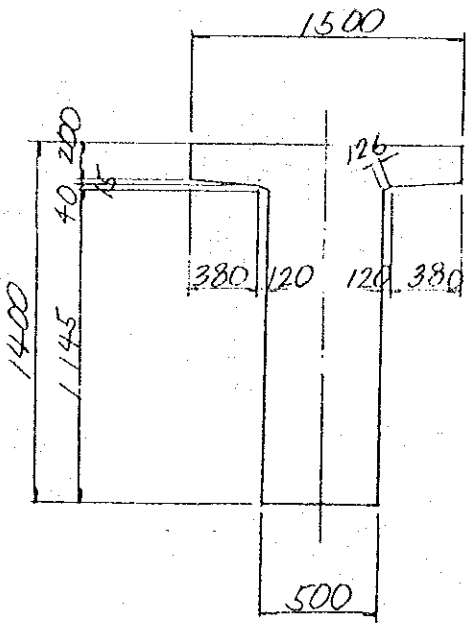
2. GIRDER





CENTER SECTION

$A = 0.6696\ m^2$



SUPPORT SECTION

$A = 0.9141\ m^2$

1. CONCRETE ($\acute{O}_{CK} = 40\ ^{N}/_{mm^2}$)

$V_1 = 0.6696 \times 21.100 = 14.129\ ^{m^3}$

$V_2 = (0.9141 - {}^{0.2445}0.6696) \times (0.50 + 0.35) \times 2 = 0.416\ ''$

$V_3 = 1/2 \times 0.2445 \times (4.80 + 0.15 \times 2) \times 2 = 1.247\ ''$

$\Sigma V = 15.792\ ^{m^3}$

2. FORMWORK

FORMWORK LENGTH OF CROSS SECTION

CENTER SECTION

$U = 2 \times (0.20 + 0.38 + 0.285 + 0.685 + 0.258 + 0.20)$

$= 4.016\ ^{m}$

SUPPORT SECTION

$U = 2 \times (0.20 + 0.38 + 0.126 + 1.145)$

$= 3.702\ ^{m}$

AREA OF FORMWORK

(BOTTOM FORMWORK ARE NOT INCLUDED)

$A_1 = 4.016 \times (1.475 \times 2 + 6.250) = 36.95\ ^{m^2}$

$A_2 = 3.702 \times (0.50 + 0.35) \times 2 = 6.29\ ''$

$A_3 = 1/2 \times (4.016 + 3.702) \times (4.80 \times 2 + 0.15 \times 4) = 39.36\ ''$

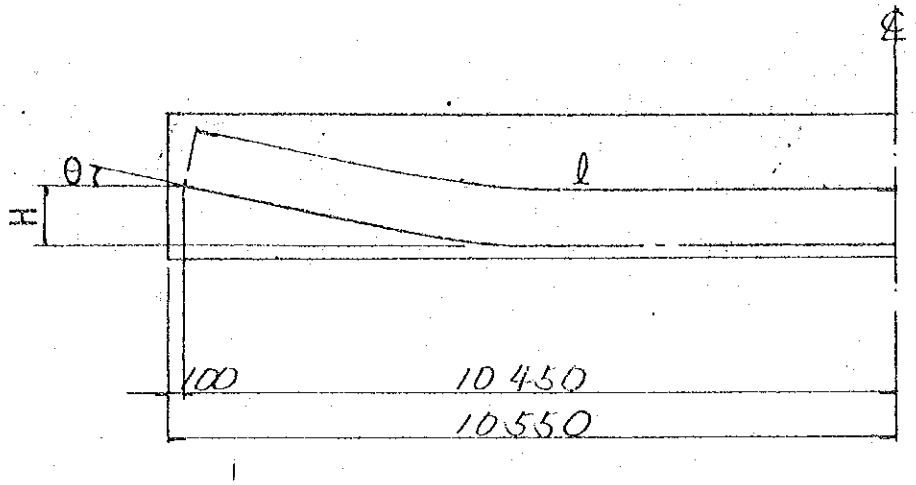
$A_4 = 0.9141 \times 2 = 1.83\ ''$

$\Sigma A = 84.43\ ^{m^2}$

BOTTOM FORMWORK

$A = 0.50 \times 21.10 = 10.55\ ^{m^2}$

3. P.C CABLE 12 - φ7 mm



	H	θ	ℓ	2 × ℓ × N
C_1	1020	7°	10511	21022
C_2, C_3	690	6°	10485	41940
C_4, C_5	520	5°	10472	41888
C_6, C_7	270	4°	10459	41836
			TOTAL	146686

1) CABLE 12 - φ7 mm WIRE

L = 146.686 × 12 = 1760.232 m

W = 1760.232 × 302 kg/km = 531.6 kg

2) DUCT (φ45)

L = 146.686 − (0.12 × 14) = 145.0 m

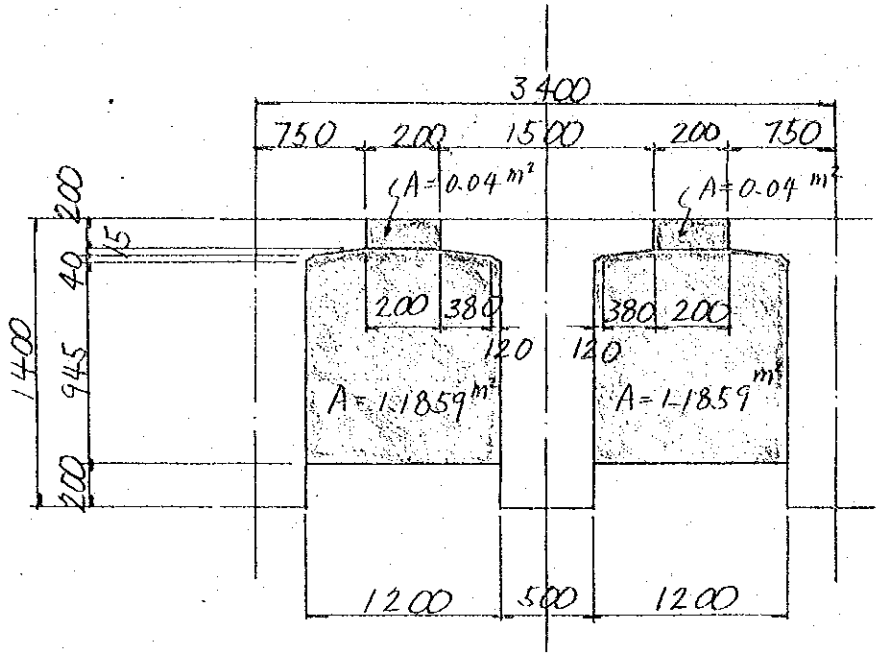
3) GROUT (φ45)

L = 146.7 m

4) ANCHORAGE

N = 14 sets

3. CROSS BEAM and SLAB



1. CONCRETE ($\acute{O}_{CK} = 30\ N/mm^2$)

$\nabla_1 = 1.1859 \times (0.50 + 0.35) \times 3 \times 2 = 6.048\ m^3$

$\nabla_2 = 0.04 \times 21.10 \times 3 = 2.532\ "$

$\Sigma \nabla = 8.580\ m^3$

2. FORMWORK

$A_1 = 1.1859 \times 2 \times 3 \times 4 = 28.46\ m^2$

$A_2 = 1.200 \times (0.50 + 0.35) \times 3 \times 2 = 6.12\ "$

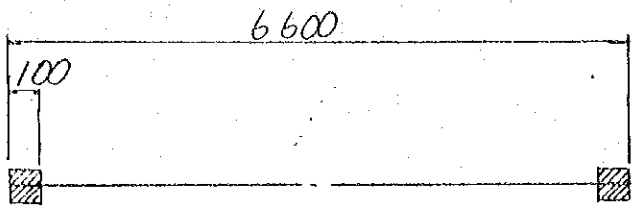
$A_3 = 0.200 \times (21.10 - 0.50 \times 2 - 0.35 \times 2) \times 3 = 11.64\ "$

$A_4 = 0.04 \times 3 \times 2 = 0.24\ "$

$\Sigma A = 46.46\ m^2$

3. P.C CABLE

1) SLAB (12-φ5 mm)



NO. OF CABLE 53

a) CABLE

L = 53 × 6.600 = 349.8 m

W = 349.8 × 1.848 kg/m = 646.4 kg

b) DUCT (φ35)

L = 349.8 − (0.10 × 53 × 2) = 339.2 m

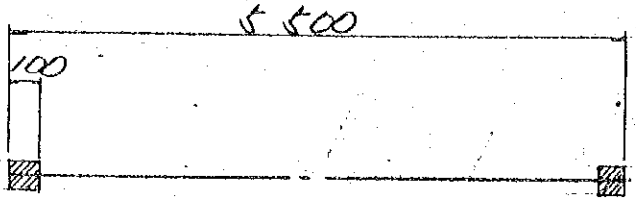
c) GROUT

L = 349.8 m

d) ANCHORAGE

N = 53 × 2 = 106 sets

2) CROSS BEAM



NO. OF CABLE 4

a) CABLE

L = 4 × 5.50 = 22.0 m

W = 22.0 × 1.848 kg/m = 40.7 kg

b) DUCT (φ35)

L = 22.0 − (0.10 × 4 × 2) = 21.2 m

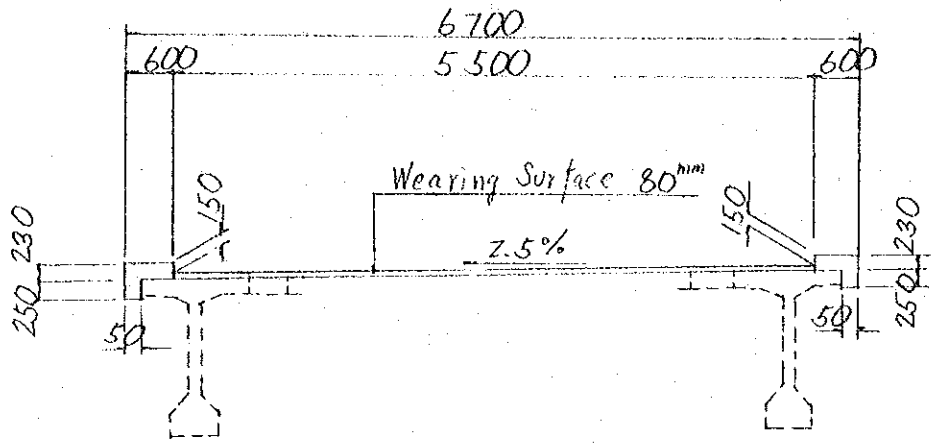
C) GROUT

L = 22.0 m

d) ANCHORAGE

N = 4 × 2 = 8 sets

4. SURFACING



1. KERB

1) CONCRETE

$A = (0.60 \times 0.23 + 0.05 \times 0.25) \times 2 = 0.301\ m^2$

$V = 0.301 \times 21.10 = 6.351\ m^3$

2) FORMWORK

$A_1 = 0.23 \times 4 \times 21.10 = 19.41\ m^2$

$A_2 = 2 \times (0.250 + 0.05 + 0.05) \times 21.10 = 14.77\ m^2$

$A_3 = 0.301 \times 2 = 0.60$

$\Sigma A = 34.78\ m^2$

2.) ASPHALT PAVEMENT (t = 80 mm)

$$A = 5.50 \times 21.10 = 116.05 \text{ m}^2$$

§5 COROMANDEL

1. MATERIAL TABLE

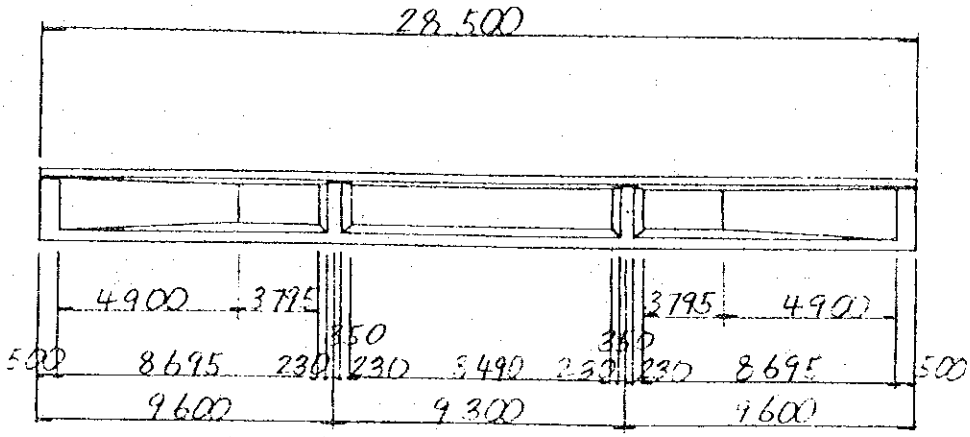
1. GIRDER

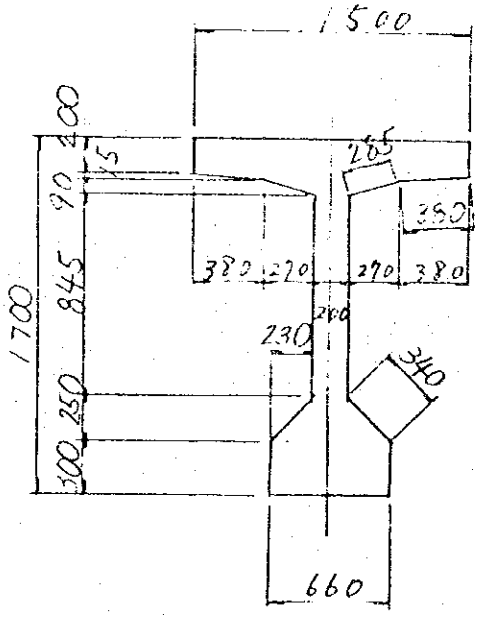
ITEM			UNIT	FOR ONE GIRDER	FOR ONE SPAN	REMARKS
NUMBER			NO	1	4	
CONCRETE			m^3	27.03	108.12	$\sigma_{ck}=40\ N/mm^2$
FORMWORK			m^2	133.13	532.52	
REINFORCEMENT BARS	φ12	INNER	kg	1854	7243	HIGH YIELD BAR
		EDGE (L)	〃	1791		
		〃 (R)	〃	1794		
	φ16	INNER	〃	969	3876	
		EDGE (L)	〃	969		
		〃 (R)	〃	969		
	TOTAL	INNER	〃	2823	11119	
		EDGE (L)	〃	2760		
		〃 (R)	〃	2713		
PC CABLE			kg	1261	5044	12 T12.5 mm
DUCT			m	140.0	560.0	φ65 mm
GROUT			〃	141.3	565.2	
ANCHORAGE			set	10	40	

2. CROSS BEAM , SLAB and SURFACING

ITEM		UNIT	FOR ONE SPAN		REMARKS
CONCRETE	cross beam , slab	m^3	17.87		$\sigma_{ck} = 30 N/mm^2$
	kerb	,	8.55		
	smoothed	,	—		
	total	,	26.42		
FORMWORK	cross beam , slab	m^2	95.38		
	kerb	,	56.79		
	total	,	152.17		
REINFORCEMENT	cross beam , slab	kg	847		HIGH YIELD BAR
	kerb	,	437		(ϕ12)
	total	,	1,284		
PC CABLE		kg	1534		12 - ϕ7 mm
DUKT		m	410.9		ϕ45 mm
GROUT		,	423.4		
ANCHORAGE		set	104		
ASPHALT PAVEMENT		m^2	156.8		t = 80 mm
FOOT PATH		,	37.9		
PRECAST KERB		m	28.5		

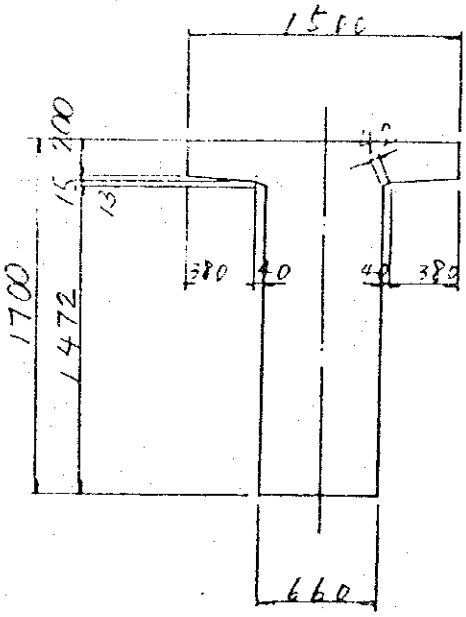
2. GIRDER





CENTER SECTION

A = 0.8336 m^2



SUPPORT SECTION

A = 1.2974 m^2

1. CONCRETE ($\acute{O}_{CK} = 40\ ^{N}/_{mm^2}$)

$V_1 = 0.8336 \times 28.50 = 23.758\ ^{m^3}$

$V_2 = (1.2974 - 0.8336) \times (0.500 + 0.350) \times 2 = 0.788\ ''$ (0.4638)

$V_3 = \frac{1}{2} \times 0.4638 \times (4.900 + 0.230 \times 2) \times 2 = 2.486\ '$

$\Sigma V = 27.032\ ^{m^3}$

2. FORMWORK

1 FORMWORK LENGTH OF CROSS SECTION

CENTER SECTION

$U = 2 \times (0.20 + 0.38 + 0.285 + 0.845 + 0.34 + 0.30)$

$= 4.700\ ^{m}$

SUPPORT SECTION

$U = 2 \times (0.20 + 0.38 + 0.042 + 1.472)$

$= 4.188\ ^{m}$

AREA OF FORMWORK

(BOTTOM FORMWORK ARE NOT INCLUDED)

$A_1 = 4.700 \times (3.795 \times 2 + 8.490) = 75.58\ ^{m^2}$

$A_2 = 4.188 \times (0.50 + 0.35) \times 2 = 7.12\ '$

$A_3 = \frac{1}{2} \times (4.700 + 4.188) \times (4.900 \times 2 + 0.230 \times 4) = 47.64\ '$

$A_4 = 1.2974 \times 2 \div \sin 68°30' = 2.79\ '$

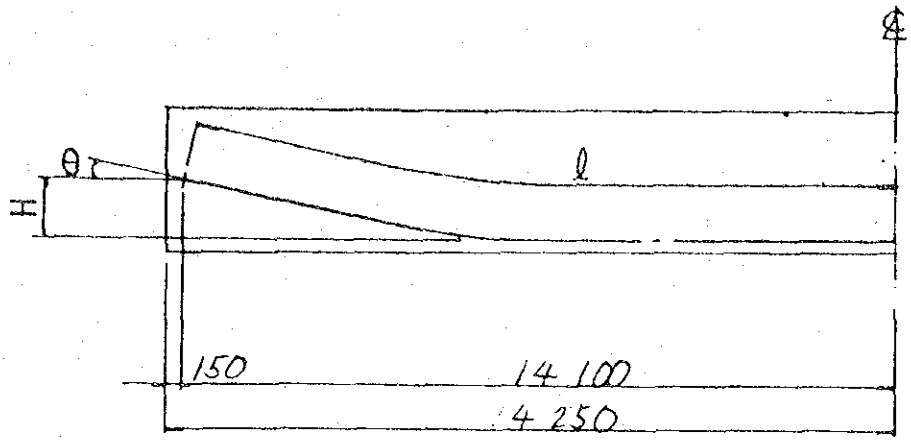
$\Sigma A = 133.12\ ^{m^2}$

BOTTOM FORMWORK

$A = 0.66 \times 28.50 = 18.81\ ^{m^2}$

3. P.C CABLE

STRAND 12 T 12.5 mm



	H	θ	ℓ	2 × ℓ × N
C_1	1050	6°	14 154	28305
C_2	850	5°	14 137	28274
C_3	650	4°	14 122	28244
C_4, C_5	350	4°	14 112	56475
			TOTAL	141274

1) CABLE 12 – 7 WIRE – STRAND 12.5 mm

L = 141.274 × 12 = 1695.288 m

W = 1695.288 × 744 kg/km = 1261.3 kg

2) DUCT (φ 65)

L = 141.274 – (0.127 × 10) = 140.0 m

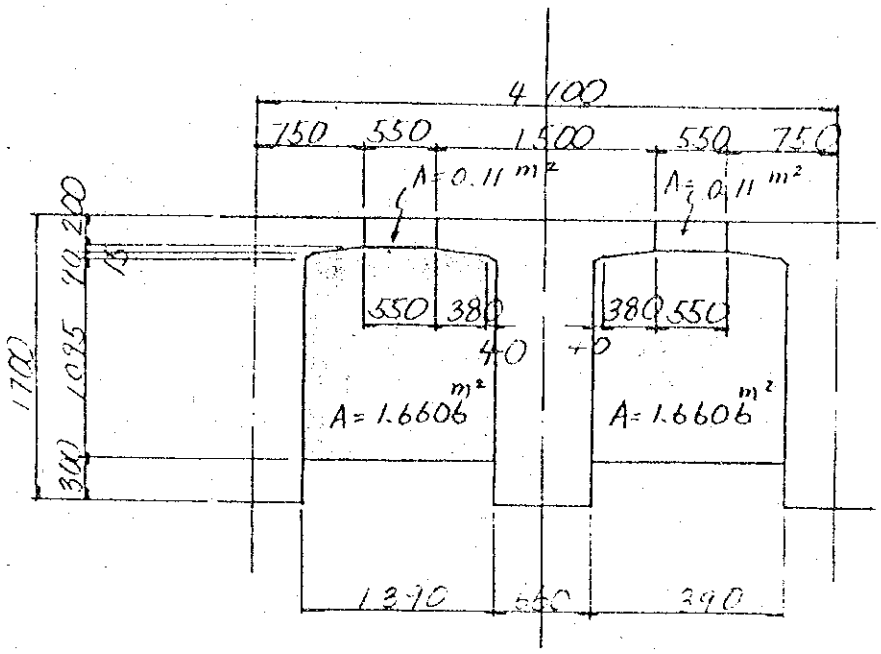
3) GROUT (φ 65)

L = 141.3 m

4) ANCHORAGE

N = 10 sets

3. CROSS BEAM and SLAB



1. CONCRETE (σ_{ck} = 30 N/mm²)

V_1 = 1.6606 × (0.50 + 0.35) × 3 × 2 = 8.459 m³

V_2 = 0.11 × 28.50 × 3 = 9.915 "

ΣV = 17.374 m³

2. FORMWORK

A_1 = 1.6606 × 2 × 3 × 4 ÷ sin 68°30' = 42.83 m²

A_2 = 1.390 × (0.50 + 0.35) × 3 × 2 ÷ sin 68°30' = 7.62 "

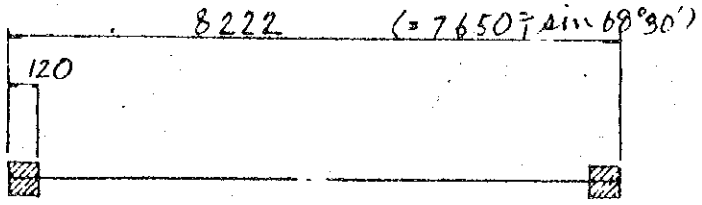
A_3 = 0.550 × (28.50 − 0.50 × 2 − 0.35 × 2) × 3 = 44.22 "

A_4 = 0.110 × 3 × 2 ÷ sin 68°30' = 0.71 "

ΣA = 95.38 m²

3. P.C CABLE

1) SLAB (12-φ7 mm)



NO. OF CABLE 48

a) CABLE

L = 48 × 8.222 = 394.7 m

W = 394.7 × 3.624 kg/m = 1430.4 kg

b) DUCT (φ45)

L = 394.7 − (0.12 × 48 × 2) = 383.2 m

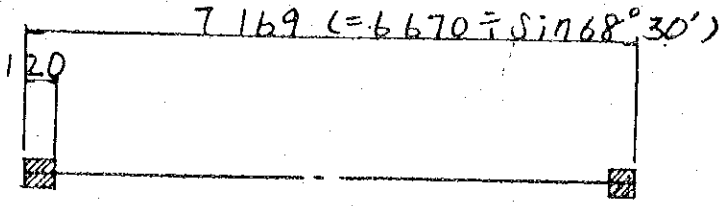
c) GROUT

L = 394.7 m

d) ANCHORAGE

N = 48 × 2 = 96 sets

2) CROSS BEAM (12 - φ7 mm)



NO. OF CABLE 4

a) CABLE

L = 4 × 7.169 = 28.7 m

W = 28.7 × 3.624 kg/m = 104.0 kg

b) DUCT (φ45)

L = 28.7 - (0.12 × 4 × 2) = 27.7 m

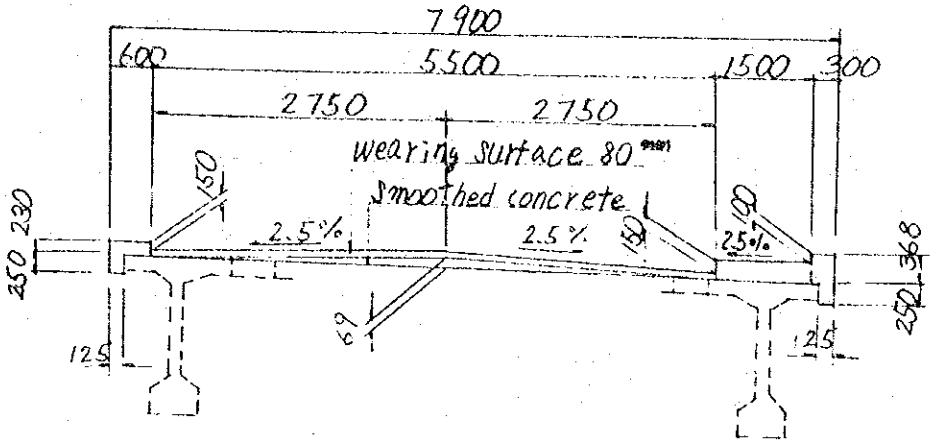
C) GROUT

L = 28.7 m

d) ANCHORAGE

N = 4 × 2 = 8 sets

4. SURFACING



1. KERB

1) CONCRETE

$A = (0.60 \times 0.23 + 0.30 \times 0.368 + 2 \times 0.125 \times 0.25) = 0.311\ m^2$

$V = 0.311 \times 28.50 = \underline{8.864\ m^3}$

2) FORMWORK

$A_1 = 2 \times (0.23 + 0.368) \times 28.50 = 34.09\ m^2$

$A_2 = 2 \times (0.25 + 0.125 + 0.05) \times 28.50 = 24.23\ "$

$A_3 = 0.311 \times 2 \div \sin 68°30' = 0.67\ "$

$\Sigma A = 58.99\ m^2$

2. ASPHALT PAVEMENT (t = 80 mm)

$A = 5.50 \times 28.50 = 156.75\ m^2$

3. FOOT PATH

$A = 1.33 \times 28.50 = 37.91\ m^2$

4. PRECAST KERB

$L = 28.5\ m$

§§2 RC VOIDED SLAB

§1 STA. 22

MATERIAL TABLE

ITEM		UNIT	QUANTITY	REMARK
CONCRETE		m^3	135.6	GRADE 30
FORM WORK		m^2	309.3	
VOID		m	105.6	φ700
REINFOR--CEMENT	φ12~φ16	kg	7 963	H.Y.S.B
	φ20~	"	12 975	"
	TOTAL	"	20 938	"
ASPHALT PAVEMENT		m^2	179.1	t=80 mm

1 CONCRETE

i) SECTION

$0.23 \times 0.60 \times 2 = 0.276\ m^2$

$\frac{1}{2} \times (0.20 + 0.40) \times 1.00 \times 2 = 0.600$ "

$4.700 \times 1.000 = 4.700$ "

5.576 "

ii) VOLUME

$V = 5.576 \times 31.600 - \frac{\pi}{4} \times 0.70^2 \times 6.60 \times 16 = 135.6\ m^3$

2. FORM

i) END AREA

$5.576 \times 2 = 11.152\ m^2$

ii) ELEVATION AND BOTTOM

$(0.23 \times 2 + 0.43 \times 2 + \sqrt{0.20^2 + 1.00^2} \times 2 + 0.60 \times 2 + 4.70) \times 31.661$

$= 293.168\ m^2$

iii) TOTAL

$A = 11.152 + 293.168 = 304.3\ m^2$

3. VOID

$D = 0.700\ m$ $L = 6.600 \times 16 = 105.6\ m$

4. ASPHALT PAVEMENT

$A = 5.500 \times 31.661 = 174.1\ m^2$

§§3 R.C SOLID SLAB

§1 MATERIAL TABLE

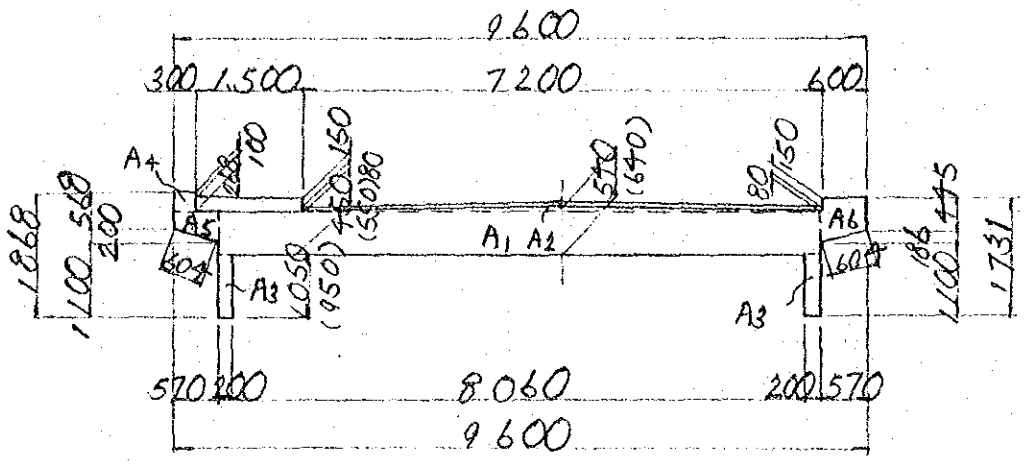
ITEM		UNIT	PAILLES	A1-Rd	Cor	STA22	TOTAL	REMARK
concrete		m^3	76.7	126.6	60.1	51.1	314.5	GRADE 30
FORM WORK		m^2	234.2	329.2	215.2	157.5	936.1	
REINFORCE-MENT	Φ12~Φ16	kg	7650	7625	3667	3326	19765	H.Y.S.S
	Φ20~	"	3355	5979	2529	2493	14336	"
	TOTAL	"	8005	13599	6196	5819	33601	"
ASPHALT PAVEMENT		m^2	98.6	178.2	72.7	80.4	429.9	t=80mm
FOOT PATH		m^2	18.2	20.1	17.5	———	55.8	
PRECAST KERB			13.7	15.1	13.2	———	42.0	

§ 2 PAILLES Ov Br

MATERIAL TABLE

ITEM		UNIT	①	②	TOTAL	REMARK
CONCRETE		m^3	31.4	45.3	76.7	GRADE 30
FORM WORK		m^2	105.3	128.9	234.2	
REINFORCE-MENT	Φ12Φ16	kg	1959	2691	4650	H.Y.S.B
	Φ20~	"	1412	1993	3355	"
	TOTAL	"	3371	4684	8055	"
ASPHALT PAVEMENT		m^2	43.9	54.7	98.6	$t = 80^{mm}$
FOOT PATH		m^2	8.1	10.1	18.2	
PRECAST KERB		m	6.1	7.6	13.7	

PAILLES



1 Concrete ①

$A_1 = 0.45 \times 8.46$ = 3.807 m²

$A_2 = 1/2 \times 7.20 \times 0.09$ = 0.324 "

$A_3 = 0.20 \times 1.05 \times 2$ = 0.420 "

$A_4 = 0.368 \times 0.30$ = 0.110 "

$A_5 = 1/2 \times (0.20 + 0.40) \times 0.57$ = 0.171 "

$A_6 = 1/2 \times (0.445 + 0.613) \times 0.60$ = 0.317 "

$\sum A$ = 5.149 m²

$V = 5.149 \times 6.10^{m}$ = 31.409 m³

2. Form

$\ell = (0.568 + 0.604 \times 2 + 1.10 \times 2 + 1.05 \times 2 + 0.445 + 0.23 + 0.368) + 8.460$ = 15.579 m

$A = 15.579 \times 6.10 + \Sigma A \times 2 = 95.032 + 10.298$ = 105.330 m²

3. Pavement ($t = 80^{mm}$)

$A = 7.20 \times 6.10$ = 43.920 m²

4. Foot Path

A = 1.330 × 6.100 = 8.113 m^2

5. Precast kerb

L = 6.100 m

1. Concrete ②

$A_1 = 0.55 \times 8.46$ = 4.653 m^2

$A_2 = \frac{1}{2} \times 7.20 \times 0.09$ = 0.324 "

$A_3 = 0.20 \times 0.95 \times 2$ = 0.380 "

$A_4 = 0.368 \times 0.30$ = 0.110 "

$A_5 = \frac{1}{2} \times (0.20 + 0.40) \times 0.57$ = 0.171 "

$A_6 = \frac{1}{2} \times (0.445 + 0.613) \times 0.60$ = 0.317 "

$\sum_1^6 A$ = 5.995 m^2

$V = 5.995 \times 7.60 = 45.258\ m^3$

2 Form

$\ell = (0.568 + 0.604 \times 2 + 1.10 \times 2 + 0.95 \times 2 + 0.445 + 0.23 + 0.368) + 8.760 = 15.379$ m

$A = 15.379 \times 7.60 + \Sigma A \times 2 = 116.880 + 11.990 = 128.870\ m^2$

3. Pavement

A = 7.20 × 7.60 = 54.72 m^2

4. Foot Path

A = 1.33 × 7.60 = 10.108 m^2

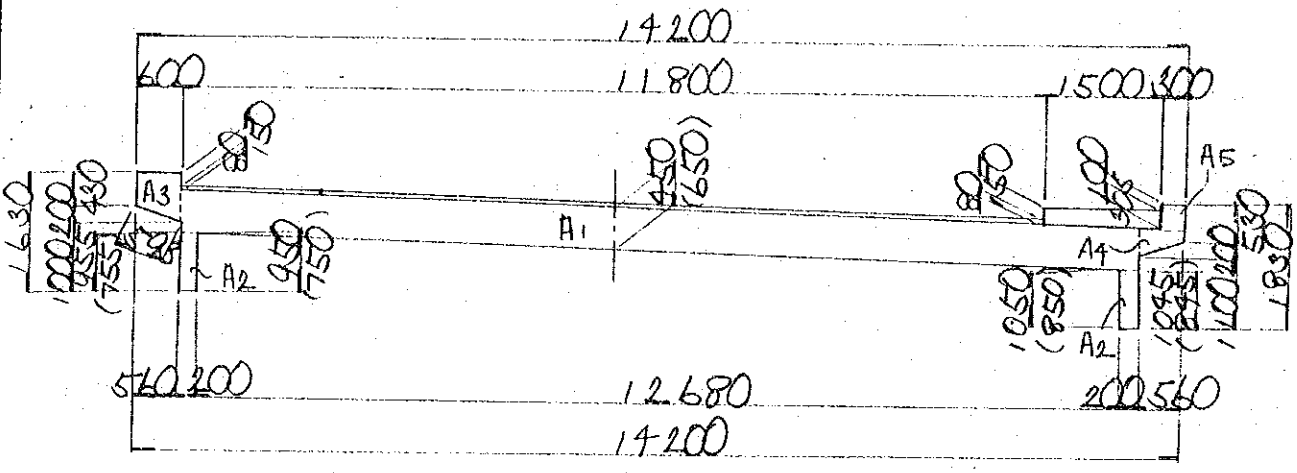
5. Precast kerb

L = 7.60 m

§ 3 A1 – Rd Ov. Br

MATERIAL TABLE

ITEM		UNIT	①	②	TOTAL	REMARK
CONCRETE		m^3	41.9	84.7	126.6	GRADE 30
FORM WORK		m^2	135.0	194.2	329.2	
REINFORCE-MENT	Φ12 Φ16	kg	2 798	4 827	7 625	H.Y.S.B
	Φ20	"	2 153	3 821	5 974	"
	TOTAL	"	4 951	8 648	13 599	"
ASPHALT PAVEMENT		m^2	72.0	106.2	178.2	t = 80 mm
FOOT PATH		m^2	8.1	12.0	20.1	
PRECAST KERB		m	6.1	9.0	15.1	



1 Concrete ①

$A_1 = 0.45 \times 13.08 = 5.886\ m^2$

$A_2 = \frac{1}{2} \times (0.955 + 0.95 + 1.05 + 1.045) \times 0.20 = 0.400\ "$

$A_3 = \frac{1}{2} \times (0.43 + 0.63) \times 0.60 = 0.318\ "$

$A_4 = \frac{1}{2} \times (0.20 + 0.40) \times 0.56 = 0.168\ "$

$A_5 = 0.30 \times 0.33 = 0.099\ "$

$\sum A = 6.871\ m^2$

$V = 6.871 \times 6.10 = 41.913\ m^3$

2. Form

$l = (0.43 + 0.593 \times 2 + 1.00 + 0.95 + 1.05 + 1.10 + 0.53 + 0.33 + 0.23) + 13.080 = 19.886\ m$

$A = 19.886 \times 6.10 + \Sigma A \times 2 = 121.305 + 13.742 = 135.047\ m^2$

3. Pavement

$A = 11.800 \times 6.10 = 71.980\ m^2$

4. Foot Path.

$A = 1.33 \times 6.10 = 8.113\ m^2$

5 Precast kerb

$L = 6.100\ m$

1 Concrete ②

$A_1 = 0.65 \times 13.08 = 8.502\ m^2$

$A_2 = \frac{1}{2} \times (0.755 + 0.75 + 0.85 + 0.845) \times 0.20 = 0.320\ "$

$A_3 = \frac{1}{2} \times (0.43 + 0.63) \times 0.60 = 0.318\ "$

$A_4 = \frac{1}{2} \times (0.20 + 0.40) \times 0.56 = 0.168\ "$

$A_5 = 0.30 \times 0.33 = 0.099\ "$

$\sum A = 9.407\ m^2$

$V = 9.907 \times 9.00 = 84.663\ m^3$

2. Form

$\ell = (0.43 + 0.593 \times 2 + 1.00 + 0.75 + 0.85 + 1.10 + 0.53 + 0.33 + 0.23) + 13.080 = 19.786\ m$

$A = 19.786 \times 9.00 + \Sigma A \times 2 = 175.374 + 18.814 = 194.188\ m^2$

3. Pavement ($t = 80^{mm}$)

$A = 11.80 \times 9.00 = 106.20\ m^2$

4. Foot Path.

$A = 1.33 \times 9.00 = 11.970\ m^2$

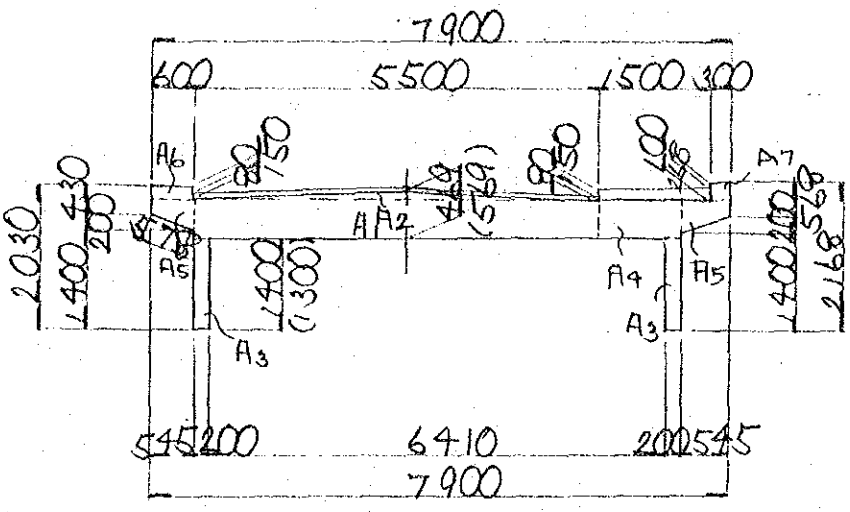
5. Precast kerb

$L = 9.000$

§4 Cor . Ov . Br

MATERIAL TABLE

ITEM		UNIT	①	②	TOTAL	REMARK
CONCRETE		m^3	24.7	35.4	60.1	GRADE 30
FORM WORK		m^2	100.6	114.6	215.2	
REINFORCE-MENT	Φ12 Φ16	kg	1669	1995	3664	H.Y.S.B
	Φ20	"	1179	1350	2529	"
	TOTAL	"	2893	3345	6188	"
ASPHALT PAVEMENT		m^2	33.6	39.1	72.7	$t = 80^{mm}$
FOOT PATH		m^2	8.1	9.4	17.5	
PRECAST KERB		m	6.1	7.1	13.2	



1. Concrete ①

$A_1 = 0.40 \times 5.50 = 2.200\ m^2$

$A_2 = 1/2 \times 5.50 \times 0.069 = 0.190\ "$

$A_3 = 0.20 \times 1.40 \times 2 = 0.560\ "$

$A_4 = 0.40 \times 1.31 = 0.524\ "$

$A_5 = 1/2 \times (0.20+0.40) \times 0.545 \times 2 = 0.327\ "$

$A_6 = 0.23 \times 0.60 = 0.138\ "$

$A_7 = 0.30 \times 0.368 = 0.110\ "$

$\sum A = 4.049\ m^2$

$V = 4.049 \times 6.10 = 24.699\ m^3$

2. Form

$\ell = (0.43 + 0.578 \times 2 + 1.90 \times 4 + 0.668 + 0.230 + 0.368) + 6.810 = 15.162\ m$

$A = 15.162 \times 6.10 + \sum A \times 2 = 92.488 + 8.098 = 100.586\ m^2$

3. Pavement

$A = 5.50 \times 6.10 = 33.55\ m^2$

4. Foot Path

A = 1.33 × 6.10 = 8.113 m^2

5. Precast kerb L = 6.10 "

1 Concrete ②

A_1 = 0.50 × 5.50 = 3.050 m^2

A_2 = ½ × 5.50 × 0.069 = 0.190 "

A_3 = 0.20 × 1.30 × 2 = 0.520 "

A_4 = 0.50 × 1.310 = 0.655

A_5 = ½ × (0.20+0.40) × 0.545 × 2 = 0.327 "

A_6 = 0.23 × 0.60 = 0.138 "

A_7 = 0.30 × 0.368 = 0.110 "

ΣA = 4.990 m^2

V = 4.990 × 7.10 = 35.429 m^3

2 Form

ℓ = (0.43 + 0.578 × 2 + 1.40 × 2 + 1.30 × 2 + 0.568 + 0.368 + 0.230) + 6.810 = 14.732 m

A = 14.732 × 7.10 + ΣA × 2 = 104.597 + 9.980 = 114.577 m^2

3. Pavement

A = 5.50 × 7.10 = 39.050 m^2

4. Foot Path.

A = 1.330 × 7.10 = 9.443 m^2

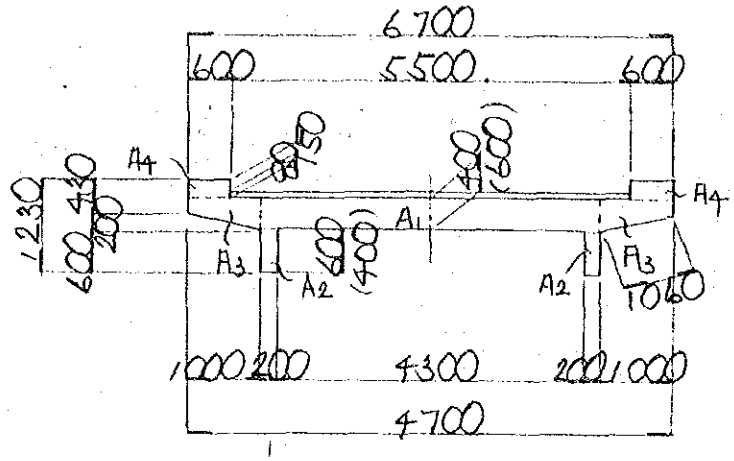
5. Precast kerb

L = 7.100 m

§5 STA. 22 . Ov. Br

MATERIAL TABLE

ITEM		UNIT	①	②	TOTAL	REMARK
CONCRETE		m^3	18.3	32.8	51.1	GRADE 30
FORM WORK		m^2	67.5	90.0	157.5	
REINFORCE-MENT	Φ12~Φ16	kg	1312	2017	3326	H.Y.S.B
	Φ20~	"	954	1529	2483	"
	TOTAL	"	2266	3543	5809	"
ASPHALT PAVEMENT		m^2	33.6	48.3	80.9	$t = 80^{mm}$



Concrete ①

$A_1 = 0.40 \times 4.70 = 1.880\ m^2$

$A_2 = 0.20 \times 0.60 \times 2 = 0.240\ "$

$A_3 = \frac{1}{2} \times (0.20 + 0.40) \times 1.00 \times 2 = 0.600\ "$

$A_4 = 0.60 \times 0.23 \times 2 = 0.276\ "$

$\Sigma A = 2.996\ m^2$

$V = 2.996 \times 6.10^m = 18.276\ m^3$

Form

$l = (0.43 \times 2 + 1.06 \times 2 + 0.60 \times 4) + 4.700 = 10.080^m$

$A = 10.080 \times 6.10 + \Sigma A \times 2 = 61.488 + 5.992 = 67.480\ m^2$

Pavement ($t = 80^{mm}$)

$A = 5.50 \times 6.10 = 33.550\ m^2$

Concrete ②

$A_1 = 0.60 \times 7.70 = 2.820\ m^2$

$A_2 = 0.20 \times 0.40 \times 2 = 0.160\ "$

$A_3 = 1/2 \times (0.20 + 0.40) \times 1.00 \times 2 = 0.600\ "$

$A_4 = 0.60 \times 0.23 \times 2 = 0.276\ "$

$\Sigma A = 3.856\ m^2$

$V = 3.856 \times 8.50^{m} = 32.776\ m^3$

Form

$\ell = (0.43 \times 2 + 1.06 \times 2 + 0.60 \times 2 + 0.40 \times 2) + 7.70 = 9.680^{m}$

$A = 9.680 \times 8.50 + \Sigma A \times 2 = 82.28 + 7.712 = 89.992\ m^2$

Pavement ($t = 80^{mm}$)

$A_1 = 5.50 \times 8.50 = 46.750\ m^2$

4. Link Road (P.C. T Girder Bridge)

CONTENTS

LINK LOAD PC T GIRDER MATERIAL TABLE

bridge name			unit	G.R.N.W – A-Le	G.R.N.W – B-Le	S.L.R – A-Le	S.L.R – B-Le	TOTAL
number of span				7	7	1	3	
girder	concrete	GRADE 40	m^3	914.2	914.2	130.6	391.8	2350.8
	formwork		m^2	4491.9	4491.9	641.7	1925.1	11550.6
	reinforcement 12	HIGH YIELD	kg	74 998	74 998	10 719	32 192	192 852
	reinforcement 16	"	kg	—	—	—	—	—
	reinforcement total	"	kg	74 998	74 998	10 719	32 192	192 852
	pc cable	12T12.5	kg	42 630	42 630	6 090	18 270	109 620
	duct	Φ65	m	4 796.0	4 796.0	673.0	2 039.0	12 204.0
	grout		m^3	4 779.0	4 779.0	682.0	2 046.0	12 276.0
	anchorage		set	350	350	50	150	900
cross beam slab surfacing	concrete	GRAD 30	m^3	239.4	239.4	34.2	102.6	615.6
	formwork		m^2	1 500.1	1 500.1	214.3	642.9	3 857.4
	reinforcement	HIGH YIELD	kg	10 766.	10 766.	1 538.	4 619.	27 689.
	pc cable	12-Φ7mm	kg	13 937.	13 937.	1 991.	5 973.	35 838.
	duct		m	3 756.2	3 756.2	536.6	1 609.8	9 658.8
	grout		m^3	3 846.5	3 846.5	549.5	1 648.5	9 891.0
	anchorage		set	756.	756.	108.	329.	1 949.
	asphalt pave.		m^2	1 578.5	1 578.5	225.5	676.5	4 059.
	foot path		m^2	256.2	256.2	36.6	109.8	658.8
	Precast kerb		m	192.5	192.5	27.5	82.5	495.0

§1. MATERIAL TABLE

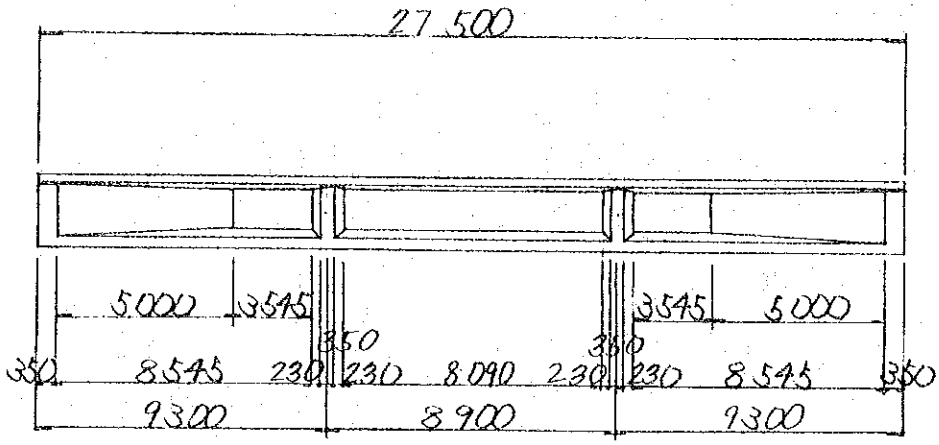
1. GIRDER

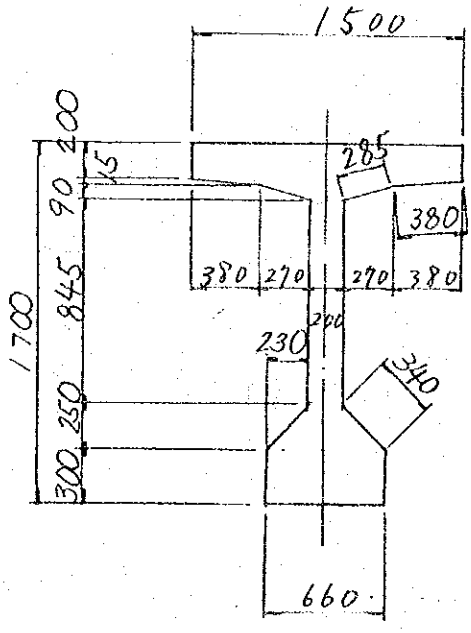
ITEM			UNIT	FOR ONE GIRDER	FOR ONE SPAN	REMARKS
NUMBER			NO	1	5	
CONCRETE			m^3	26.11	130.55	$\sigma_{ck}=40\ N/mm^2$
FORMWORK			m^2	128.33	641.65	
REINFORCEMENT BARS	φ12	INNER	kg	2 777	10 717	HIGH YIELD BAR
		EDGE (L)	〃	2 113		
		〃 (R)	〃	2 070		
	φ16	INNER	〃			
		EDGE (L)	〃			
		〃 (R)	〃			
	TOTAL	INNER	〃	2 228	10 967	
		EDGE (L)	〃	2 169		
		〃 (R)	〃	2 121		
PC CABLE			kg	1218	6 090	12 T12.5 $^{mm\phi}$
DUCT			m	135.6	678	φ65 mm
GROUT			〃	136.4	682	
ANCHORAGE			set	10	50	

2. CROSS BEAM , SLAB and SURFACING

ITEM		UNIT	FOR ONE SPAN		REMARKS
CONCRETE	cross beam , slab	m^3	25.69		$\sigma_{ck} = 30\ N/mm^2$
	kerb	,	8.55		
	smoothed	,			
	total	,	34.24		
FORMWORK	cross beam , slab	m^2	157.90		
	kerb	,	56.39		
	total	,	214.29		
REINFORCEMENT	cross beam , slab	kg	1115		Φ12 HIGH YIELD BAR
	kerb	,	423		"
	total	,	1538		"
PC CABLE		kg	1991		$12-\Phi 7^{mm}$
DUKT		m	536.6		$\Phi 45^{mm}$
GROUT		,	549.5		
ANCHORAGE		set	108.		
ASPHALT PAVEMENT		m^2	222.5		$t = 30^{mm}$
FOOT PATH		,	36.6		
PRECAST KERB		m	27.5		

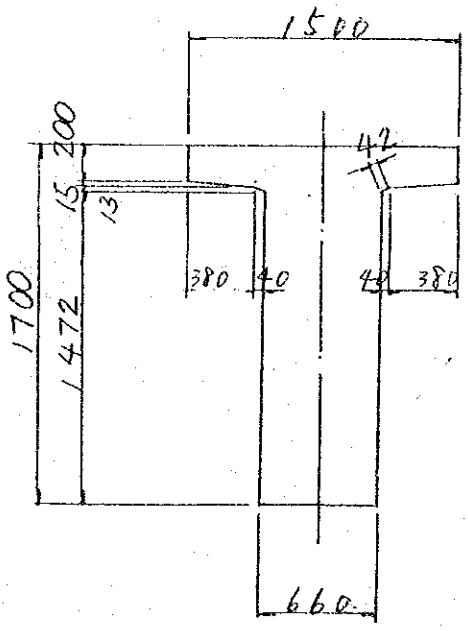
§ 2. GIRDER





CENTER SECTION

A = 0.8336 m^2



SUPPORT SECTION

A = 1.2974 m^2

1. CONCRETE ($\sigma_{ck} = 40\ N/mm^2$)

$V_1 = 0.8336 \times 27.50 = 22.924\ m^3$

$V_2 = (1.2974 - 0.8336) \times 0.350 \times 4 = 0.4638 \times 0.350 \times 4 = 0.649\ m^3$

$V_3 = \frac{1}{2} \times 0.4638 \times (5.000 + 0.230 \times 2) \times 2 = 2.532\ m^3$

$\Sigma V = 26.105\ m^3$

2. FORMWORK

FORMWORK LENGTH OF CROSS SECTION

CENTER SECTION

$U = 2 \times (0.20 + 0.38 + 0.285 + 0.845 + 0.34 + 0.30)$

$= 4.700\ m$

SUPPORT SECTION

$U = 2 \times (0.20 + 0.38 + 0.042 + 1.472)$

$= 4.188\ m$

AREA OF FORMWORK

(BOTTOM FORMWORK ARE NOT INCLUDED)

$A_1 = 4.700 \times (3.545 \times 2 + 8.090) = 71.35\ m^2$

$A_2 = 4.188 \times 0.35 \times 4 = 5.86\ m^2$

$A_3 = \frac{1}{2} \times (4.700 + 4.188) \times (5.000 \times 2 + 0.230 \times 4) = 48.53\ m^2$

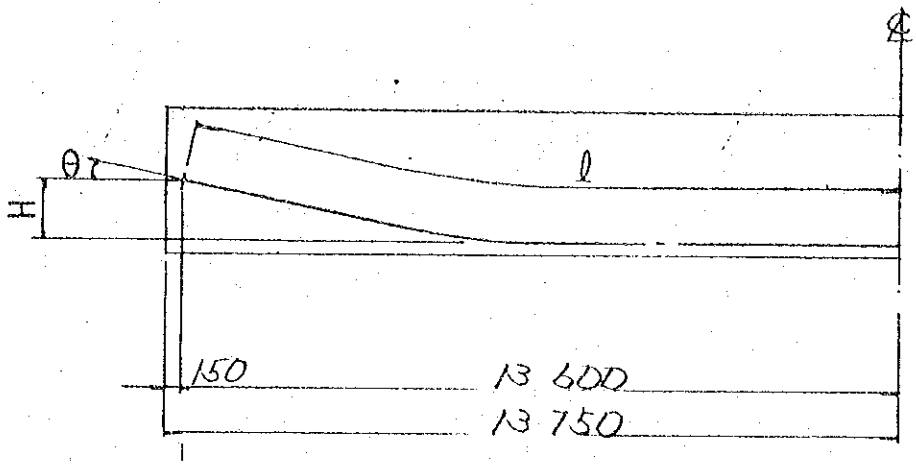
$A_4 = 1.2974 \times 2 = 2.59\ m^2$

$\Sigma A = 128.33\ m^2$

BOTTOM FORMWORK

$A = 0.66 \times 27.50 = 18.15\ m^2$

3. P.C CABLE STRAND 12 T 12.5 mm



	H	θ	ℓ	2 × ℓ × N
C_1	1350	6°30′	13 677	27 354
C_2	1050	5°30′	13 650	27 300
C_3	750	4°30′	13 629	27 258
C_4, C_5	450	4°30′	13 618	54 472
			TOTAL	136 384

1) CABLE 12 – 7 WIRE – STRAND 12.5 mm

L = 136.384 × 12 = 1636.608 m

W = 1.636608 × 744 kg/km = 1217.6 kg

2) DUCT (φ 65)

L = 136.384 − 0.075 × 10 = 135.6 m

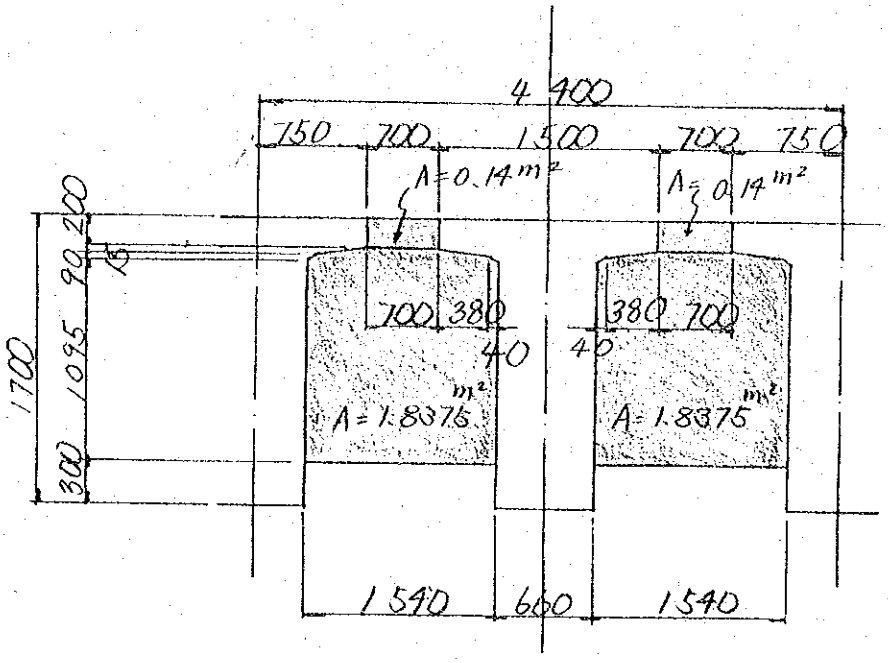
3) GROUT (φ 65)

L = 136.4 m

4) ANCHORAGE

N = 10 sets

§ 3. CROSS BEAM and SLAB



1. CONCRETE ($\sigma_{ck} = 30\ N/mm^2$)

$V_1 = 1.8375 \times 0.35 \times 4 \times 4 = 10.290\ m^3$

$V_2 = 0.14 \times 27.5 \times 4 = 15.400\ "$

$\Sigma V = 25.690\ m^3$

2. FORMWORK

$A_1 = 1.8375 \times 2 \times 4 \times 4 = 58.80\ m^2$

$A_2 = 1.540 \times 4 \times 4 = 24.64\ "$

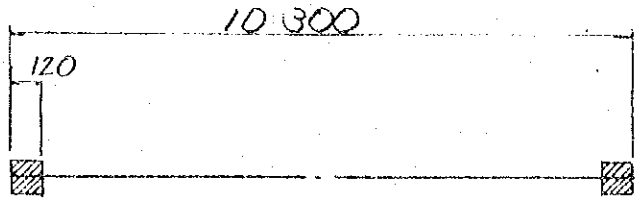
$A_3 = 0.700 \times (27.500 - 0.35 \times 4) \times 4 = 78.08\ "$

$A_4 = 0.110 \times 4 \times 2 = 0.88\ "$

$\Sigma A = 157.40\ m^2$

3. P.C CABLE

1) SLAB (12-φ7 mm)



NO. OF CABLE 46

a) CABLE

L = 46 × 10.300 = 473.8 m

W = 473.8 × 3.624 kg/m = 1.717.1 kg

(3.624 kg/m Japanese standerd)

b) DUCT (φ45)

L = 473.8 - (0.12 × 2 × 46) = 462.8 m

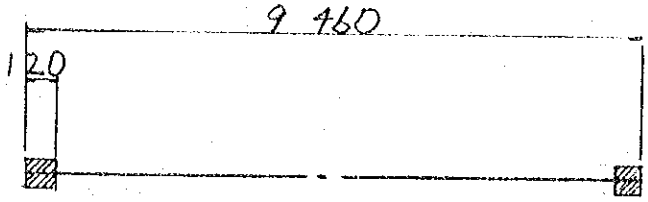
c) GROUT

L = 473.8 m

d) ANCHORAGE

N = 46 × 2 = 92 sets

2) CROSS BEAM (12 - φ7 mm)



NO. OF CABLE 4

a) CABLE

L = 8 × 9.460 = 75.7 m

W = 75.7 × 3.624 kg/m = 274.3 kg

(3.624 kg/m Japanese standerd)

b) DUCT (φ45)

L = 75.7 - (0.12 × 2 × 8) = 73.8 m

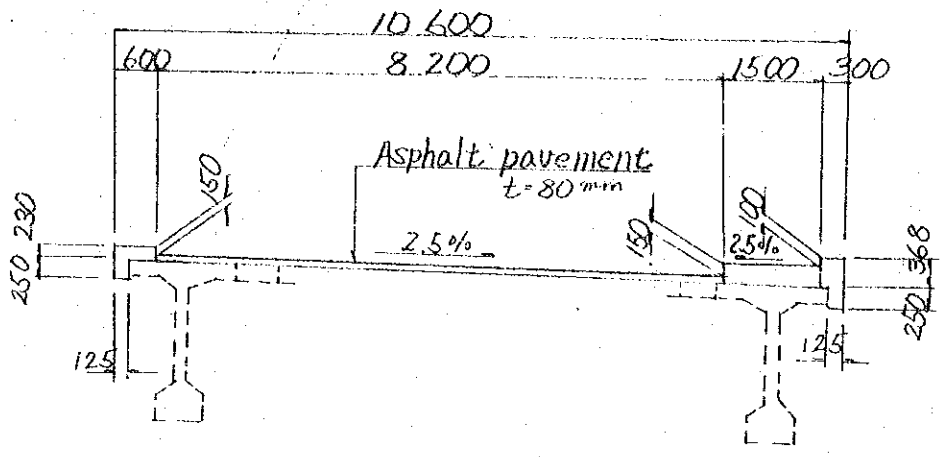
c) GROUT

L = 75.7 m

d) ANCHORAGE

N = 8 × 2 = 16 sets.

§ 4. SURFACING



1. KERB

1) CONCRETE

$A = (0.60 \times 0.23 + 0.30 \times 0.368 + 2 \times 0.125 \times 0.25) = 0.311\ m^2$

$V = 0.311 \times 27.500 = 8.553\ m^3$

2) FORMWORK

$A_1 = 2 \times (0.23 + 0.368) \times 27.5 = 32.89\ m^2$

$A_2 = 2 \times (0.25 + 0.125 + 0.05) \times 27.5 = 23.08\ "$

$A_3 = 0.311 \times 2 = 0.62\ "$

$\Sigma A = 56.89\ "$

2. ASPHALT PAVEMENT (t = mm)

$A = 8.20 \times 27.50 = 225.5\ m^2$

3. FOOT PATH

$A = 1.33 \times 27.50 = 36.58\ m^2$

4. PRECAST KERB

$L = 27.5\ m$

5. Pedestrian Bridge

CONTENTS

§1 PEDESTRIAN BRIDGE MATERIAL TABLE

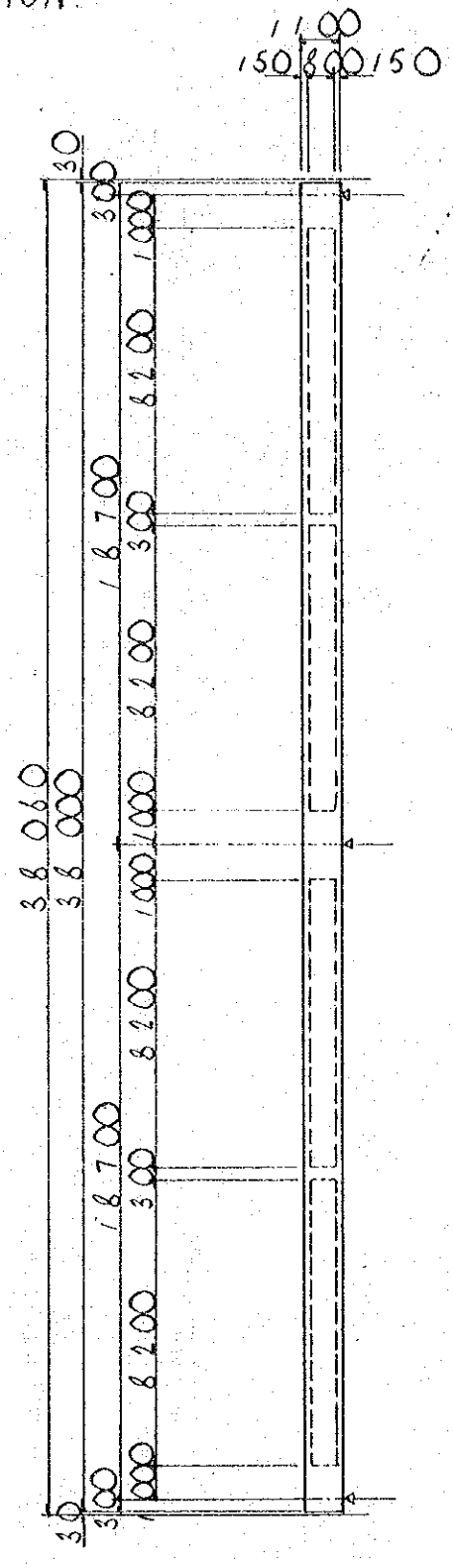
ITEM		UNIT	Hin.TEMPLE	B. B	TOTAL	REMARK.
CONCRETE	BEAM	m^3	57.2	28.5	85.7	GRADE 30
	SCREED	〃	3.6	2.4	6.0	〃
	TOTAL	〃	60.8	30.9	91.7	
FORM WORKS		m^2	290.5	146.6	437.1	
REINFORCE-MENT	Φ12~Φ16	kg	3764	1773	5537	HIGH YIELD BAR
	Φ20~	〃	4250	2161	6411	〃
	TOTAL	〃	8014	3934	11948	
ASPHALT PAVEMENT			91.2	45.6	136.8	$t = 30^{mm}$

§2 Hin TEMPLE Ped Br

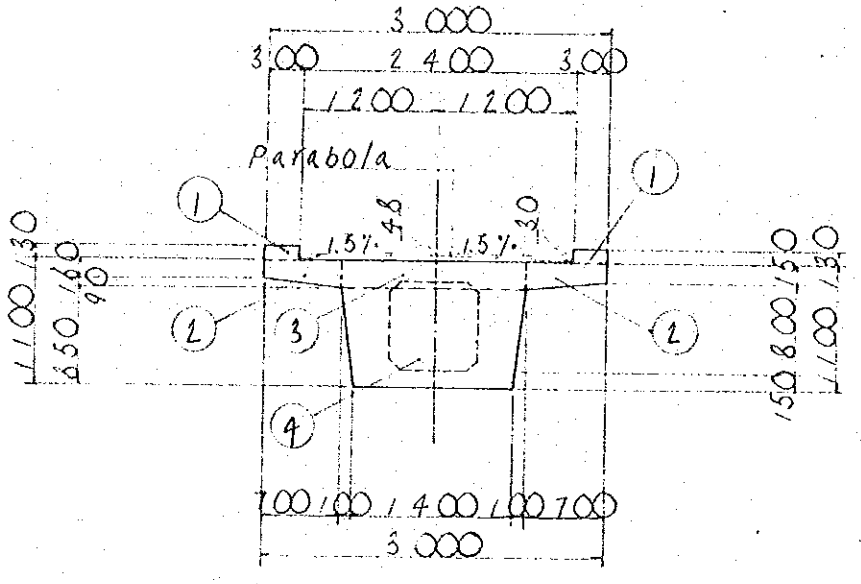
MATERIAL TABLE

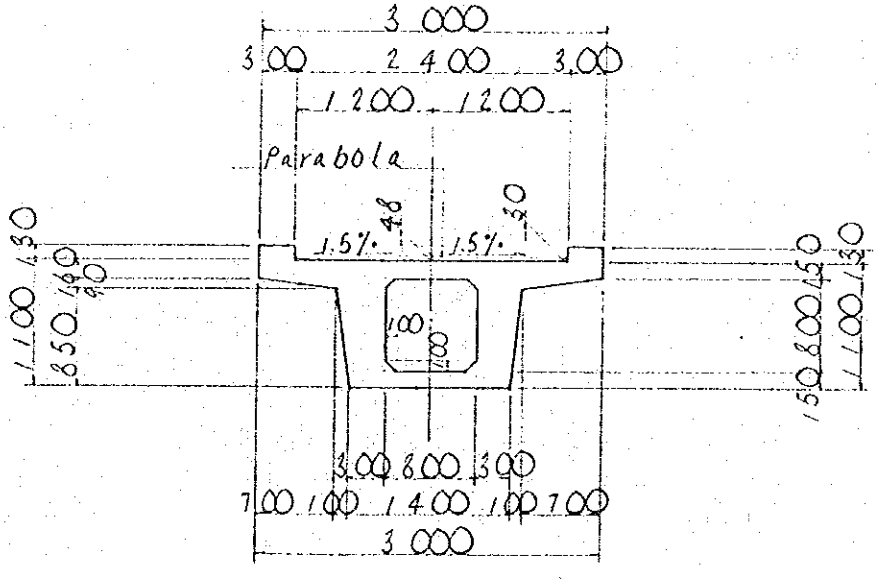
ITEM		UNIT	QUANTITY	REMARKS
CONCRETE	BEAM	m^3	57.2	GRADE 30
	SCREED	〃	3.6	〃
	TOTAL	〃	60.8	
FORM WORK		m^2	290.5	
REINFORCE-MENT	Φ12~Φ16	kg	3.76t	HIGH YIELD BAR
	Φ20~	〃	4.25Ø	〃
	TOTAL	〃	8.01t	〃
ASPHALT PAVEMENT		m^2	91.2	$t = 30^{mm}$

DIMENSION.



ELEVATION





CROSS SECTION

1. CONCRETE.

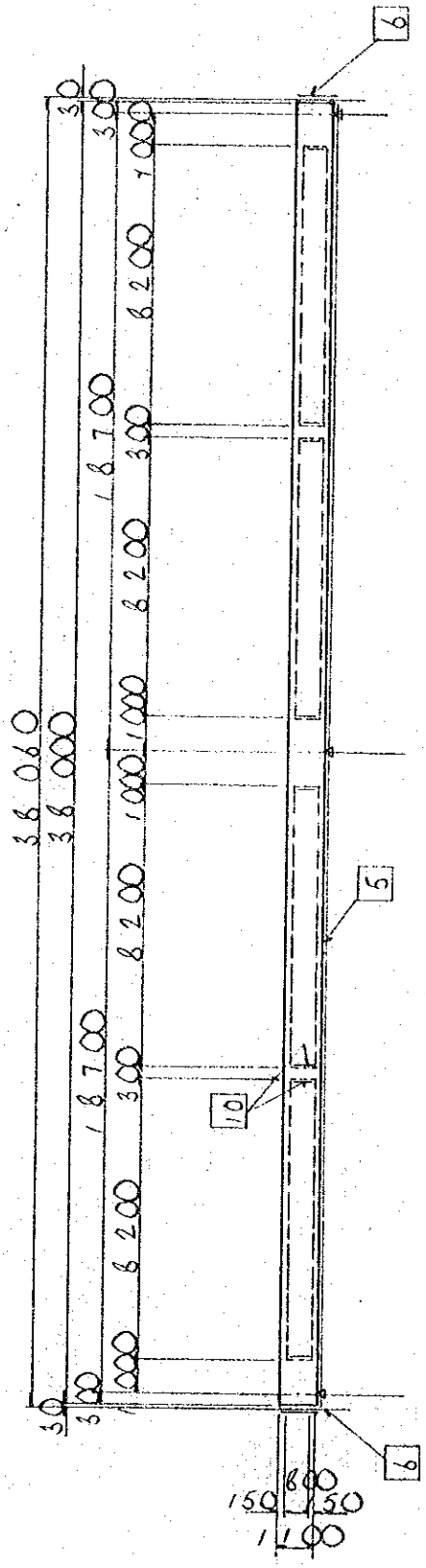
1) BEAM

①	0.30 × 0.13 × 38.00 × 2	=	2.964 m³
②	1/2 × (0.16 + 0.25) × 0.70 × 38.00 × 2	=	10.906 "
③	0.25 × 1.60 × 38.00	=	15.200 "
④	1/2 × (1.60 + 1.40) × 0.85 × 38.00	=	48.450 "
	控除		
	− (0.80 × 0.80 − 1/2 × 0.10 × 0.10 × 4)		
	× 8.20 × 4	=	−20.336 "
	TOTAL		57.184 m³

2) SCREED

	1/2 × (0.03 + 0.048) × 1.20 × 38.00 × 2	=	3.557 m³

2. FORM WORK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300
1000
8200
1870
300
8200
1000
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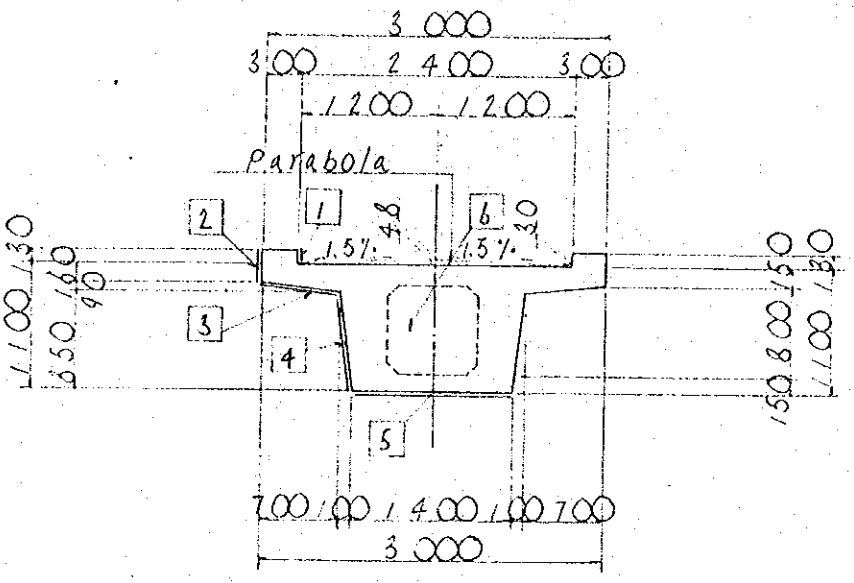
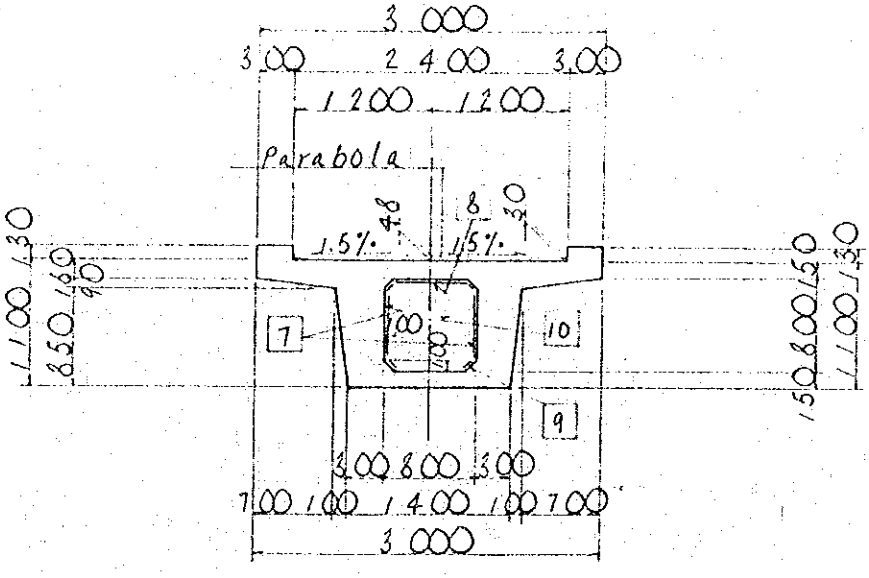
36060
36000
8200
1870
300
8200
300
300
5
10
6
600
150
150
100


3 000
3 00
2 400
3 00
1 200
1 200
Parabola
1
2
3
4
5
6
1.5%
48
1.5%
30
1 100
130
160
90
850
150
800
150
1 100
130
700
100
1 400
100
700
3 000


3 000
3 00
2 400
3 00
1 200
1 200
Parabola
7
8
9
10
1.5%
48
1.5%
30
1 100
130
160
90
850
150
800
150
1 100
130
300
800
300
700
100
100
1 400
100
700
3 000

1) OUT SIDE

1	$0.13 \times 38.00 \times 2$	=	$9.880\ m^2$
2	$0.29 \times 38.00 \times 2$	=	22.040 "
3	$\sqrt{0.09^2 + 0.70^2} \times 38.00 \times 2$	=	53.638 "
4	$\sqrt{0.10^2 + 0.85^2} \times 38.00 \times 2$	=	65.046 "
5	1.40×38.00	=	53.200 "
6	$0.13 \times 0.30 \times 2 \times 2$	=	0.156 "
	$1/2 \times (0.16 + 0.25) \times 0.70 \times 2 \times 2$	=	0.574 "
	$0.25 \times 1.60 \times 2$	=	0.800 "
	$1/2 \times (1.60 + 1.40) \times 0.85 \times 2$	=	2.550 "
	TOTAL		$207.884\ m^3$

2). INSIDE

7	$0.60 \times 8.20 \times 2 \times 4$	=	$39.360\ m^2$
8	$0.60 \times 8.20 \times 2 \times 2$	=	$19.680\ "$
9	$\sqrt{0.10^2 + 0.10^2} \times 8.20 \times 4 \times 4$	=	$18.554\ "$
10	$(0.80 \times 0.80 - 1/2 \times 0.10 \times 0.10 \times 4) \times 8$	=	$4.960\ "$
		TOTAL	$82.554\ m^2$

3. Asphalt wearing course

$t = 30\ mm$

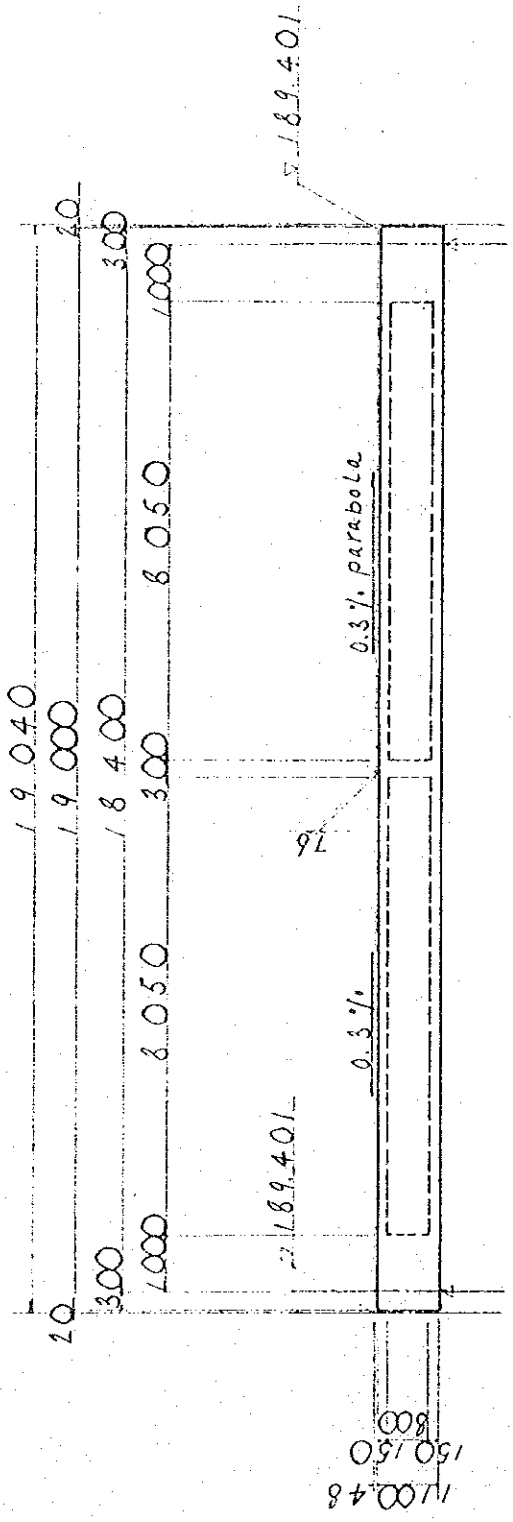
$A = 2.400^m \times 38.00^m = 91.20\ m^2$

§3 B.B. Ped. Br

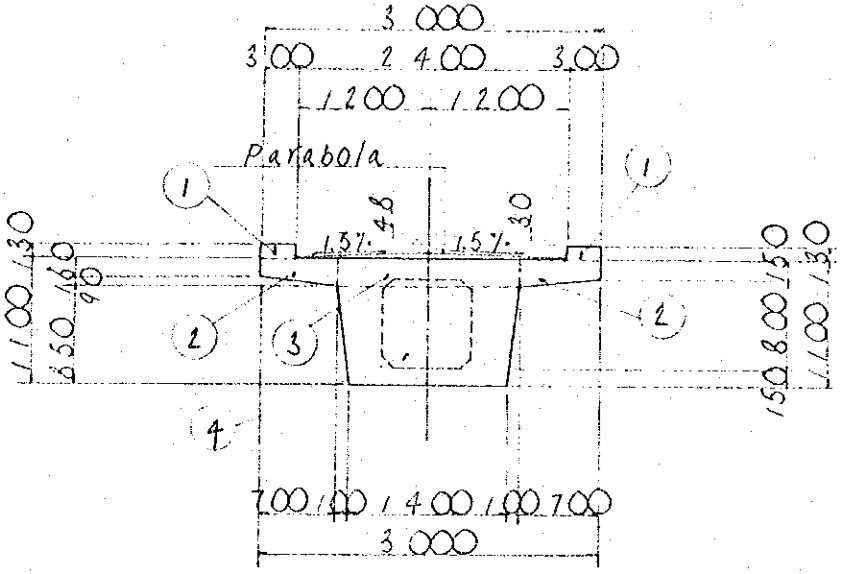
MATERIAL TABLE

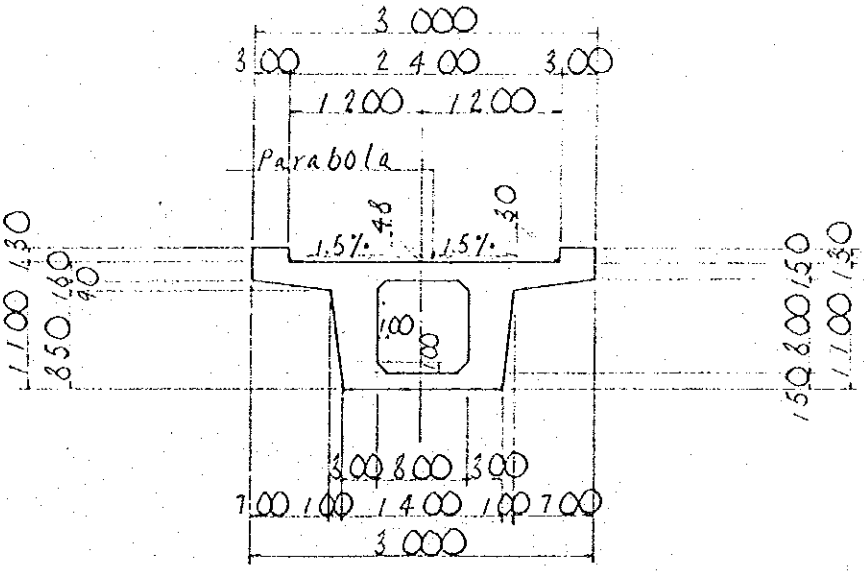
ITEM		UNIT	QUANTITY	REMARKS
CONCRETE	BEAM	m^3	28.5	GRADE 30
	SCREED	〃	2.4	〃
	TOTAL	〃	30.9	〃
FORM WORK		m^2	196.6	
REINFORCE-MENT	Φ12~Φ16	kg	1 773	HIGH YIELD BAR
	Φ20~	〃	2 161	〃
	TOTAL	〃	3 934	〃
ASPHALT PAVEMENT		m^2	45.6	t = 30 mm

DIMENSION



ELEVATION





CROSS SECTION

1. CONCRETE

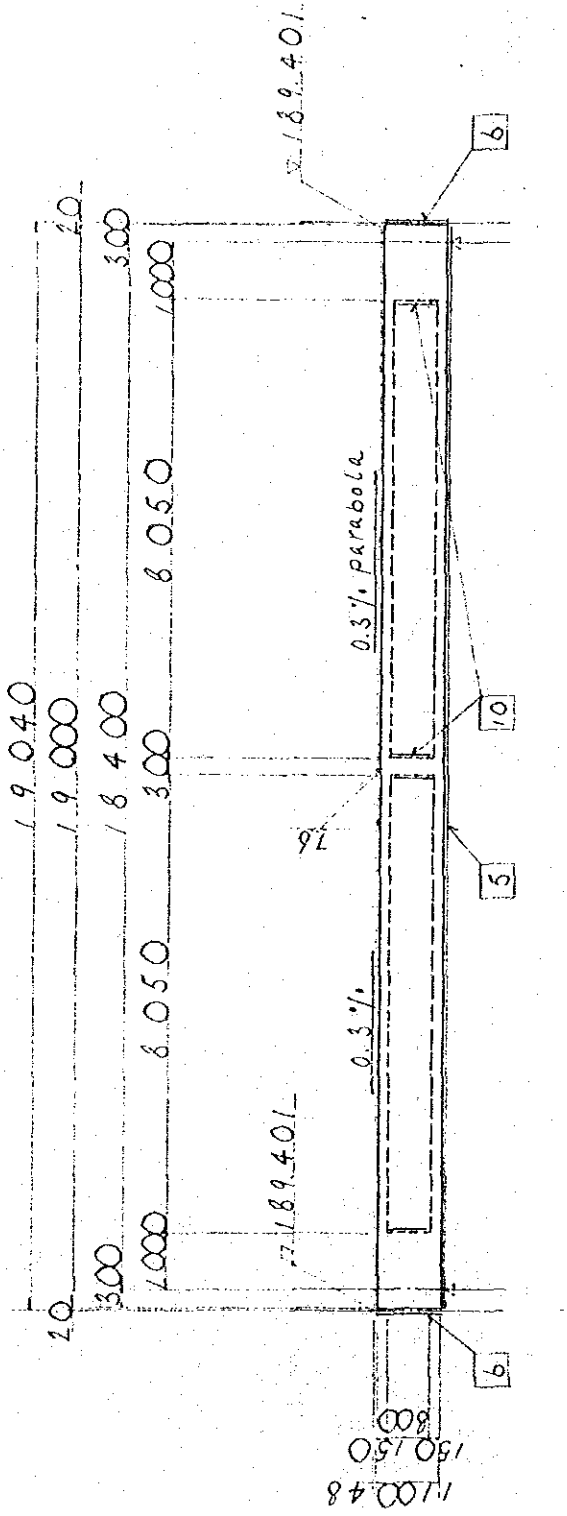
1) BEAM

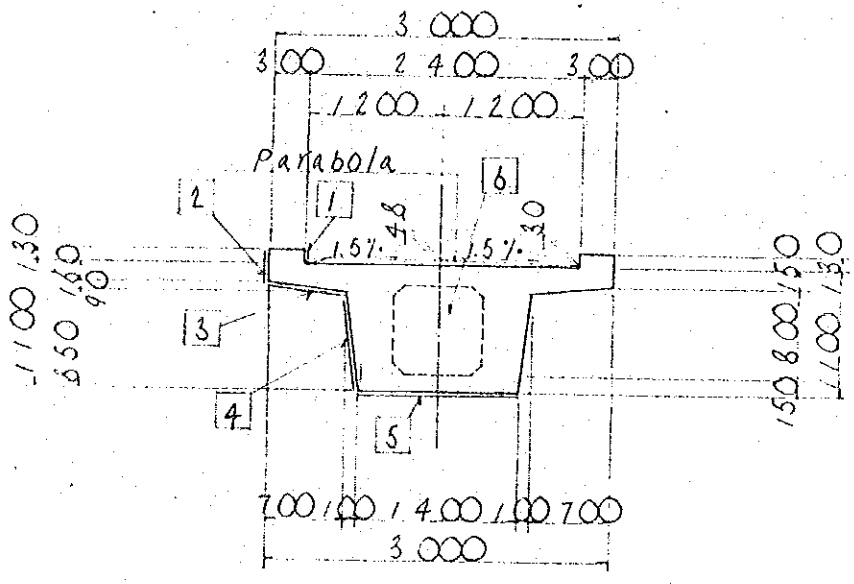
①	0.30 × 0.13 × 19.00 × 2	=	1.482 m³
②	1/2 × (0.16 + 0.25) × 0.70 × 19.00 × 2	=	5.453 "
③	0.25 × 1.60 × 19.00	=	7.600 "
④	1/2 × (1.60 + 1.40) × 0.85 × 19.00	=	24.225 "
	控除、		
	− (0.80 × 0.80 − 1/2 × 0.10 × 0.10 × 4) × 8.05 × 2	=	−10.224 "
	TOTAL		28.536 m³

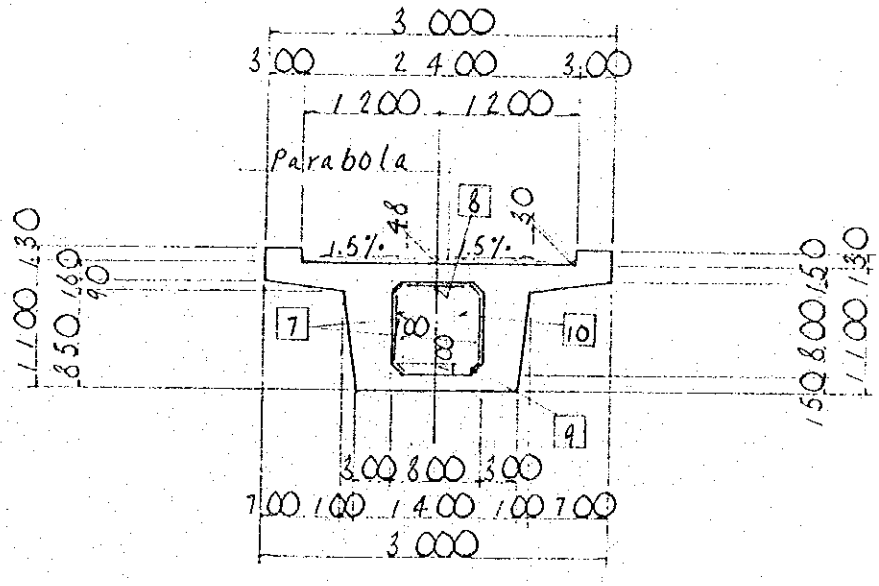
2) SCREED

	1/2 × (0.044 + 0.062) × 1.20 × 19.00 × 2	=	2.417 m³

FORM WORK


189401
6
20
3000
7000
8050
19040
19000
18400
3000
8050
7000
3000
20
0.3% parabola
10
5
6
189401
0.3%
7.6
6
1100 48
150 150
800


3 000
300
2 400
300
1 200
1 200
Parabola
1
2
3
4
5
6
1.5%
48
1.5%
30
1 100
130
850
160
90
150
800
150
1 100
130
700
100
1 400
100
700
3 000


3 000
300
2 400
300
1 200
1 200
Parabola
7
8
9
10
1.5%
48
1.5%
30
1 100
130
850
160
90
150
800
150
1 100
130
300
800
300
700
100
1 400
100
700
3 000

2. FORM WORK

1) OUT SIDE

1	$0.13 \times 19.00 \times 2$	=	$4.940\ m^2$
2	$0.29 \times 19.00 \times 2$	=	11.020 "
3	$\sqrt{0.09^2 + 0.70^2} \times 19.00 \times 2$	=	26.819 "
4	$\sqrt{0.10^2 + 0.85^2} \times 19.00 \times 2$	=	32.523 "
5	1.40×19.00	=	26.600 "
6	$0.13 \times 0.30 \times 2 \times 2$	=	0.156 "
	$1/2 \times (0.16 + 0.25) \times 0.70 \times 2 \times 2$	=	0.574 "
	$0.25 \times 1.60 \times 2$	=	0.800 "
	$1/2 \times (1.60 + 1.40) \times 0.85 \times 2$	=	2.550 "
		TOTAL	$105.982\ m^2$

2) INSIDE

7	$0.60 \times 8.05 \times 4$	=	19.320^{m^2}
8	$0.60 \times 8.05 \times 2$	=	$9.660^{"}$
9	$\sqrt{0.10^2 + 0.10^2} \times 8.05 \times 4 \times 2$	=	$9.107^{"}$
10	$(0.80 \times 0.80 - 1/2 \times 0.10 \times 0.10 \times 4) \times 4$	=	$2.480^{"}$
		TOTAL	40.567^{m^2}

3. Asphalt wearing course

$t = 30\ mm$

$A = 2.400^{m} \times 19.00^{m} = 45.6\ m^2$

6. Aquaduct

CONTENTS

§1 P.C AQUEDUCT MATERIAL TABLE

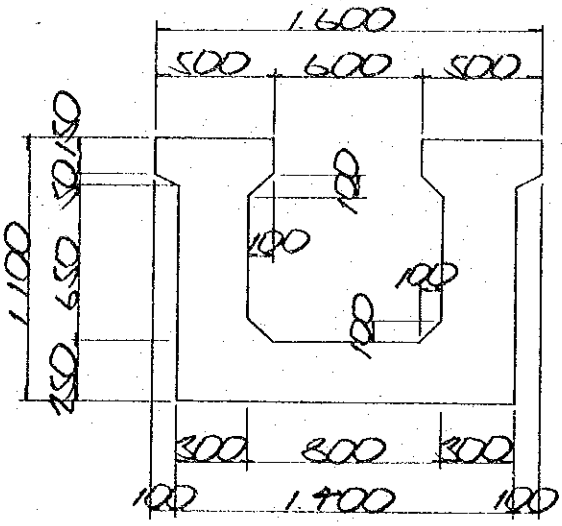
ITEM	UNIT	STA 22	STA 57	TOTAL	REMARK
CONCRETE	m^3	42.8	64.5	107.3	GRADE 30
FORM WORK	m^2	295.8	475.6	771.4	
REINFORCEMENT	kg	3 997	5 937	9 934	Φ12 H.Y.S.B
P.C. CABLE	〃	1 398	3 198	4 596	12-Φ7
DUCT	m	370.0	879.0	1 249.0	Φ95
GROUT	〃	371.9	882.3	1 254.2	
ANCHORAGE	SETS	16	28	44	
WATER PROOF	m^2	96.5	179.3	270.8	MORTOR t = 20 mm
WATER STOP	m	3.1	3.9	7.0	

§2 STA 22

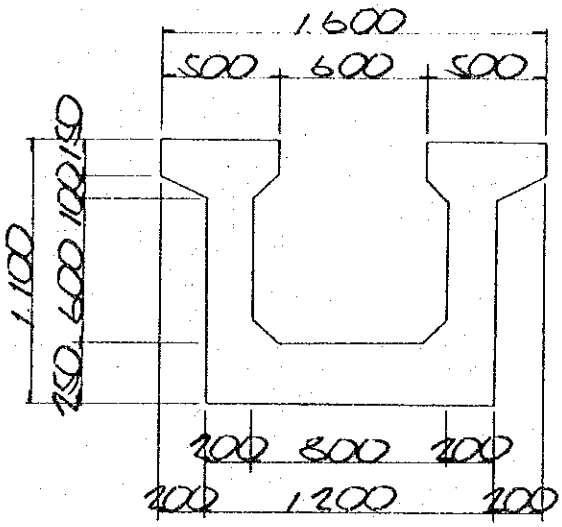
MATERIAL TABLE

ITEM	UNIT	QUANTITY	REMARK
CONCRETE	m^3	72.8	GRADE 30
FORM WORK	m^2	295.8	
REINFORCEMENT	kg	3997.	φ12 H.Y.S.B
P C CABLE	〃	1398.	12-φ7mm
DUCT	m	370.0	φ95
GROUT	〃	371.9	
ANCHORAGE	SET	16.	
WATER PROOF	m^2	96.5	MORTOR t=20mm
WATER STOP	m	3.1	

1 Concrete



Ⓐ



Ⓑ

area Ⓐ

$A_1 = 1/2 \times (0.15 + 0.20) \times 0.10 \times 2 = 0.035\ m^2$

$A_2 = 1/2 \times (0.15 + 0.25) \times 0.10 \times 2 = 0.040\ "$

$A_3 = 1/2 \times 0.10 \times 0.10 \times 2 = 0.010\ "$

$A_4 = 0.80 \times 1.10 \times 2 = 0.660\ "$

$A_5 = 0.80 \times 0.25 = 0.200\ "$

Total = $0.945\ m^2$

area (B)

$A_1 = 1/2 \times (0.15 + 0.25) \times 0.20 \times 2 = 0.080\ m^2$

$A_2 = 1/2 \times (0.15 + 0.25) \times 0.10 \times 2 = 0.040\ "$

$A_3 = 1/2 \times 0.10 \times 0.10 \times 2 = 0.010\ "$

$A_4 = 0.20 \times 1.10 \times 2 = 0.440\ "$

$A_5 = 0.80 \times 0.25 = 0.200\ "$

Total = $0.770\ m^2$

Length

$\ell_1 = 3.80 \times 2 + 1.00 = 8.600\ m$

$\ell_2 = 3.00 \times 4 = 12.000\ "$

$\ell_3 = 14.15 + 16.55 = 30.700\ "$

Volume

$V_1 = 0.995 \times 8.600 = 8.127\ m^3$

$V_2 = 1/2 \times (0.995 + 0.770) \times 12.000 = 10.290\ "$

$V_3 = 0.770 \times 30.700 = 23.639\ "$

(STRAD)

$V_4 = 0.600 \times 0.150 \times (0.300 \times 27 + 0.600 + 1.000) = 0.792\ "$

$\Sigma = 42.848\ m^3$

2 Form

$l_1 = (0.90 + \sqrt{0.10^2+0.05^2} + 0.15 + \sqrt{0.10^2+0.10^2} \times 2 + 0.50 + 0.15) \times 2 + 1.40 = 5.589\ m$

$l_2 = (0.85 + \sqrt{0.20^2+0.10^2} + 0.15 + \sqrt{0.10^2+0.10^2} \times 2 + 0.50 + 0.15) \times 2 + 1.20 = 5.513\ "$

$A_1 = 5.589 \times 8.60 = 48.07\ m^2$

$A_2 = 1/2 \times (5.589 + 5.513) \times 12.00 = 66.61\ "$

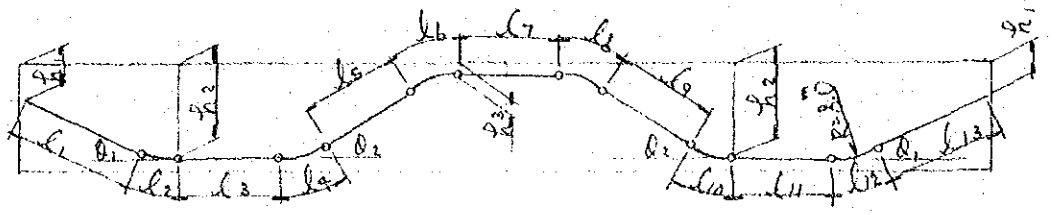
$A_3 = 5.513 \times 30.70 = 169.25\ "$

$A_4 = 0.945 \times 2 = 1.89\ "$

$A_5 = 0.600 \times (0.150 \times 2 + 0.300) \times 24 + 0.600 \times (0.150 \times 4 + 1.600 + 1.000) = 9.96\ "$

$\Sigma = 295.78\ m^2$

3. PC CABLE



(m)

	CABLE 1	CABLE 2	CABLE 3	CABLE 4
h_1	0.200	0.400	0.600	0.800
h_2	0.770	0.850	0.930	1.010
h_3	0.090	0.090	0.170	0.250
θ_1 °	6°	6°	6°	6°
θ_2 °	15°	15°	15°	15°
ℓ_1	5.039	3.885	2.738	1.590
ℓ_2	0.838	0.838	0.838	0.838
ℓ_3	7.717	9.861	12.002	14.144
ℓ_4	2.099	2.099	2.099	2.099
ℓ_5	0.521	0.830	0.830	0.830
ℓ_6	2.099	2.099	2.099	2.099
ℓ_7	7.999	9.899	2.899	0.899
ℓ_8	2.099	2.099	2.099	2.099
ℓ_9	0.521	0.830	0.830	0.830
ℓ_{10}	2.099	2.099	2.099	2.099
ℓ_{11}	10.117	12.261	14.402	16.544
ℓ_{12}	0.838	0.838	0.838	0.838
ℓ_{13}	5.039	3.885	2.738	1.590
$\Sigma \ell$	46.489	46.498	46.485	46.472

TOTAL LENGTH

$L = 2 \times (46.489 + 46.498 + 46.485 + 46.472) = 371.888$ m

1) CABLE. (12-φ7" WIRE)

$W = 371.888 \times 12 \times 302^{kg/km} = 1347.7^{kg}$

2) DUCT (φ95)

$L = 371.888 - (0.12 \times 8 \times 2) = 370.0^{m}$

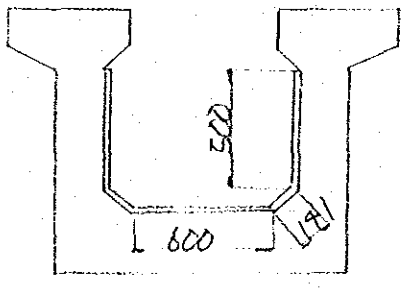
4) GROUT (φ95)

$L = 371.9^{m}$

5) ANCHORAGE.

$N = 2 \times 8 = 16^{sets}$

4. WATER PROOF



$A = \{(0.500 + 0.171) \times 2 + 0.600\} \times 51.300 = 96.5^{m^2}$

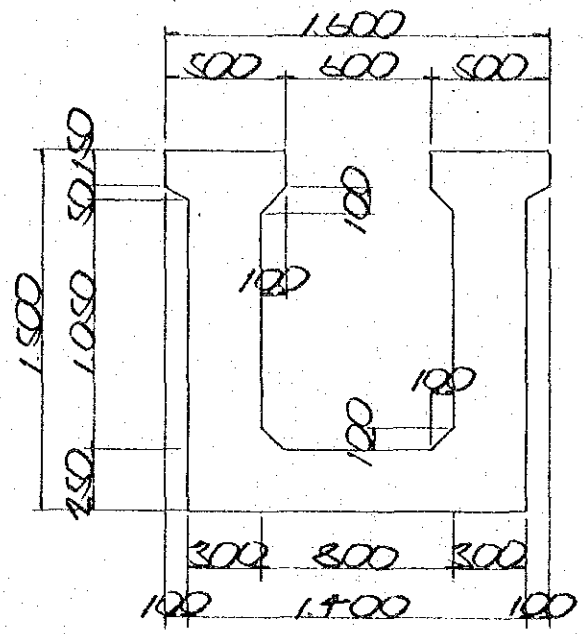
5. WATER STOP

$L = 0.975 \times 2 + 1.1 = 3.050^{m}$

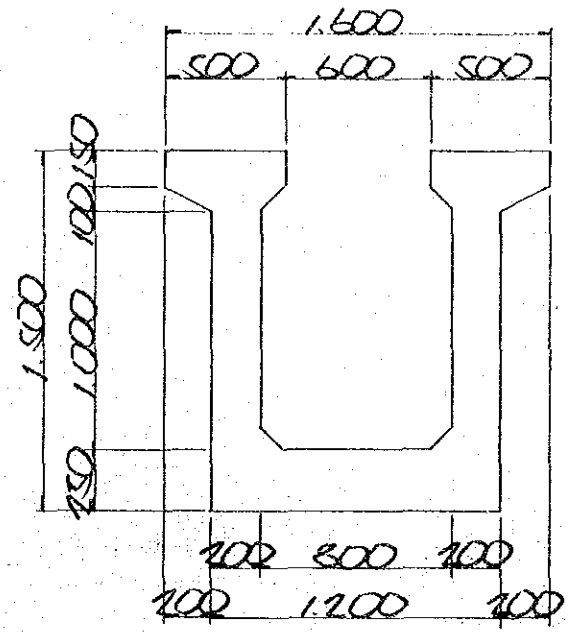
§3 STA 57

MATERIAL TABLE

ITEM	UNIT	QUANTITY	REMARK
CONCRETE	m^3	63.5	GRADE 30
FORM WORK	m^2	463.3	
REINFORCEMENT	kg	5937	φ12 H.Y.S.B
PC CABLE	〃	3198	12-φ7^{mm}
DUCT	m	879.0	φ95
GROUT	〃	882.3	
ANCHORAGE	SET	28	
WATAR PROOF	m^2	174.3	t=2^{cm} MORTOR
WATER STOP	m	3.9	


1.600
500
600
500
150
100
100
100
1.500
1.050
150
300
600
300
100
1.400
100

(A)


1.600
500
600
500
150
100
1.500
1.000
150
200
600
200
200
1.200
200

(B)

area (A)

$A_1 = 1/2 \times (0.15 + 0.20) \times 0.10 \times 2 = 0.035\ m^2$

$A_2 = 1/2 \times (0.15 + 0.25) \times 0.10 \times 2 = 0.040$ "

$A_3 = 1/2 \times 0.10 \times 0.10 \times 2 = 0.010$ "

$A_4 = 0.30 \times 1.50 \times 2 = 0.900$ "

$A_5 = 0.80 \times 0.25 = 0.200$ "

Total = 1.185 m^2

area (B)

$A_1 = 1/2 \times (0.15 + 0.25) \times 0.20 \times 2 = 0.080\ m^2$

$A_2 = 1/2 \times (0.15 + 0.25) \times 0.10 \times 2 = 0.040$ "

$A_3 = 1/2 \times 0.10 \times 0.10 \times 2 = 0.010$ "

$A_4 = 0.20 \times 1.50 \times 2 = 0.600$ "

$A_5 = 0.80 \times 0.25 = 0.200$ "

Total = 0.930 m^2

Length

$l_1 = 2.50 \times 2 + 1.00 = 6.000\ m$

$l_2 = 3.00 \times 4 = 12.000$ "

$l_3 = 23.50 \times 2 = 47.000$ "

Volume

$V_1 = 1.185 \times 6.00 = 7.11\ m^2$

$V_2 = 1/2 \times (1.185 + 0.937) \times 12.00 = 12.69$ "

$V_3 = 0.93 \times 47.00 = 43.71$ "

(STRAP) $V_4 = 0.600 \times 0.150 \times (0.300 \times 31 + 0.65 \times 2) = 0.95$ "

TOTAL = 64.44

2 Form

$l_1 = (1.30 + \sqrt{0.10^2+0.05^2} + 0.15 + \sqrt{0.10^2+0.10^2} \times 2$
$+ 0.90 + 0.15) \times 2 + 1.40 = 7.189$ m

$l_2 = (1.25 + \sqrt{0.20^2+0.10^2} + 0.15 + \sqrt{0.10^2+0.10^2} \times 2$
$+ 0.90 + 0.15) \times 2 + 1.20 = 7.113$ "

$A_1 = 7.189 \times 6.00 = 43.13$ m²

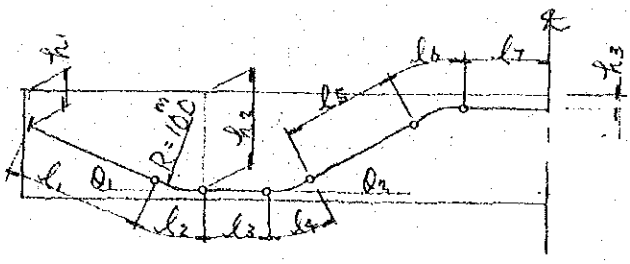
$A_2 = 1/2 \times (7.189 + 7.113) \times 12.00 = 85.81$ "

$A_3 = 7.113 \times 47.00 = 334.31$ "

16TRAD
$A_T = 0.600 \times (0.150 \times 2 + 0.300) \times 31$
$0.600 \times (0.150 \times 2 + 0.650) \times 2 = 12.30$

$\Sigma = 475.55$ m²

3. P.C CABLE



(m)

	CABLE 1	CABLE 2	CABLE 3	CABLE 4	CABLE 5	CABLE 6	CABLE 7
h_1	0.180	0.360	0.540	0.720	0.900	1.080	1.260
h_2	0.930	1.010	1.090	1.170	1.250	1.330	1.410
h_3	0.090	0.090	0.170	0.250	0.330	0.410	0.490
θ_1 °	6°	6°	6°	6°	6°	6°	6°
θ_2 °	15°	15°	15°	15°	15°	15°	15°
l_1	6.651	5.699	4.738	3.781	2.819	1.868	0.911
l_2	1.047	1.047	1.047	1.047	1.047	1.047	1.047
l_3	12.988	14.692	16.393	18.095	19.796	21.497	23.199
l_4	2.618	2.618	2.618	2.618	2.618	2.618	2.618
l_5	0.613	0.921	0.921	0.921	0.921	0.921	0.921
l_6	2.618	2.618	2.618	2.618	2.618	2.618	2.618
l_7	4.984	3.939	3.189	2.939	1.689	0.939	0.189
Σl	31.519	31.529	31.519	31.519	31.509	31.503	31.998
$2\Sigma l$	63.038	63.098	63.038	63.028	63.018	63.006	62.996

TOTAL LENGTH

$L = 2 \times (63.038 + 63.098 + 63.038 + 63.028 + 63.018 + 63.006 + 62.996) = 882.394$ m

1). CABLE (12-Φ7 WIRE)

$W = 882.394 \times 12 \times 302^{kg/km} = 3\,197.6^{kg}$

2) DUCT (Φ75)

$L = 882.394 - (0.12 \times 19 \times 2) = 879.0^{m}$

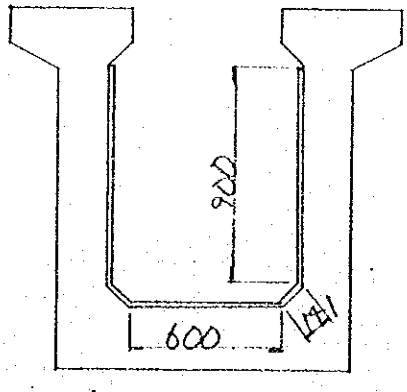
3) GROUT (Φ75)

$L = 882.3.$

4) ANCHORAGE

$N = 2 \times 19 = 28^{sets.}$

4. WATER PROOF ($t = 2^{cm}$ MORTOR)



$A = \{(0.900 + 0.191) \times 2 + 0.600\} \times 65.000 = 179.3^{m^2}$

5 WATER STOP

$L = 1.375 \times 2 + 1.100 = 3.850^{m}$