APPENDIX C

Structural Assessment calculations for Ap Lei Chau Bridge & Tsing Tsuen Bridge

Environmental Protection Department

Agreement No. CE 95/97

Noise Mitigation Measures on Existing Flyovers
Feasibility Study

Calculation File No. : 93598/C02
Structural Assessment of Existing Flyovers
(Ap Lei Chau & Tsing Tsuen Bridge)

September 1998

MAUNSELL CONSULTANTS ASIA LTD.

Issue 1
September 1998

Design Statement

Design Element : Noise Barrier + foundation.
(Preliminary Design)

Design Code : SDM
BS 5400 Part 3 + 4
BD 37/88.
Pile Design + Construction GCO Pub. No

Materials :

Concrete for foundation to CS1 : 1990
Grade 30/20, Cover = 75 mm

Reinforcement to CS2 : 1995
Grade 460 (f_y = 460 N/mm²)

Structural steel to BS4466
Grade 50C (f_y = 355 N/mm²)

loading

Dead load, unit weight for concrete = 24.5 kN/m³
for steel = 78 kN/m³
Roof = 2.5 kPa

Live load, U.d.l = 0.5 kN/m²
(for maintenance)

Wind load. loaded q_z = 1.2 kPa
unloaded q_z = 3.8 kPa

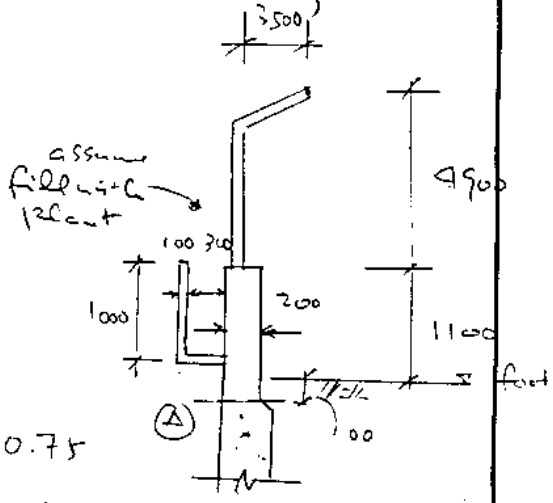
C_D = 1.3 for wall BD 37/88 Table 5 Fig 5.

C_D = 1.4 for deck

C_L = ± 0.75 for deck.

(1) Ap Lei Chau Bridge

Check capacity of upper wall of retaining str. to take additional load from barrier.



(i) Check M at (A)

loading (per m run)

Wind load (unloaded)

$q = 3.8$ kPa

$C_D = 1.3$ approx., $C_L = 0.75$

trans. area $= 6 \times 1 = 6\ m^2$, vert area $= 3.5 \times 1 = 3.5\ m^2$

∴ trans. WL $= 3.8 \times 1.3 \times 6 = 29.7$ kN/m

vertical WL $= 3.8 \times 0.75 \times 3.5 = 10.0$ kN/m

$f_{cu} = 30$
$f_y = 42$
Cover = c

Design $M_{WL} = 29.7 \times 3.1 + 10.0 \times 1.75$
$= 109.6$ kNm/m

Roof DL (ecc) $= 2.5 \times 3.5 = 8.75$ kN/m

Upstand DL (ecc) $= 1 \times 0.4 \times 24.5 = 9.8$ kN/m

Design $M_{DL} = 8.75 \times 1.75 + 9.8 \times (0.2 + 0.1) = 18.3$ kNm

ULS $M = (109.6 \times 1.4 + 18.3 \times 1.15) \times 1.1$ (γ_{fL}, γ_{fL}, γ_{f3})
$= 192$ kNm

Reinforcement provided in dg. 93791/10/2411B, = T12/150

Moment Capacities
$= 0.87 f_y A_s z$
$= 0.87 (425)(753)(142.3 \times 10^{-6})$
$= 40$ kNm
$<< 192$ kNm
failed (380% overstress)

where $d = 200 - 40 - \frac{12}{2} = 154$

$z = (1 - \frac{1.1 f_y A_s}{f_{cu} b d}) d$
$= (1 - \frac{1.1 \times 425 \times 753}{30 \times 1000 \times 154}) d$
$= 0.924\ d$
$= 142.3$ mm

(ii) Check M at base of wall. (i.e. at pile cap top level)

For Type 1 or 2 retaining wall as shown in Dwg No. 93791/10/2402B. (wall th. = 10
with T40/1

depth from (A) to wall base
= 9.4 m.

design ULS horizontal load (wL) = 29.7 × 1.4 × 1.1 (γ_{fL} γ_{fS})
= 45.8 kN/m

∴ total additional moment from noise barrier
= 168 + 45.8 × 9.4 = 599 kNm.
(168 = 109 × 1.4 × 1.1)

existing design moment from cal. file 93791/10/ (sheet 1)
= 3328 kNm

∴ Total design moment
= 3328 + 599 = 3927 kNm

existing moment capacities (from cal. fil
= 3634 kNm < 3951 kNm
failed
(8% overstress)

(ii) Check M at 4 m above base of wall (wall th. = 650
(with T25/10

depth from (A) to (wall base + 2m) = 5.4 m

total additional moment from noise barrier
= 168 + 45.8 × 5.4 = 415 kNm

existing design moment from cal. file
= 849 kNm.

∴ total design moment
= 849 + 415 = 1264 kNm

existing moment capacities
= 946 kNm < 1264 kNm
failed (34% overstress)

(iv) Check M at 8 m above base of wall (wall th. = 300 mm with T16/100

depth from (A) to (wall base + 8 m)
= 1.4 m.

total additional moment from noise barrier
= 168 + 45.8 × 1.4 = 232 kNm

existing design moment from Cl 5.5.1(2)
= 59.2 kNm

∴ total design moment = 232 + 59.2
= 291.2 kNm

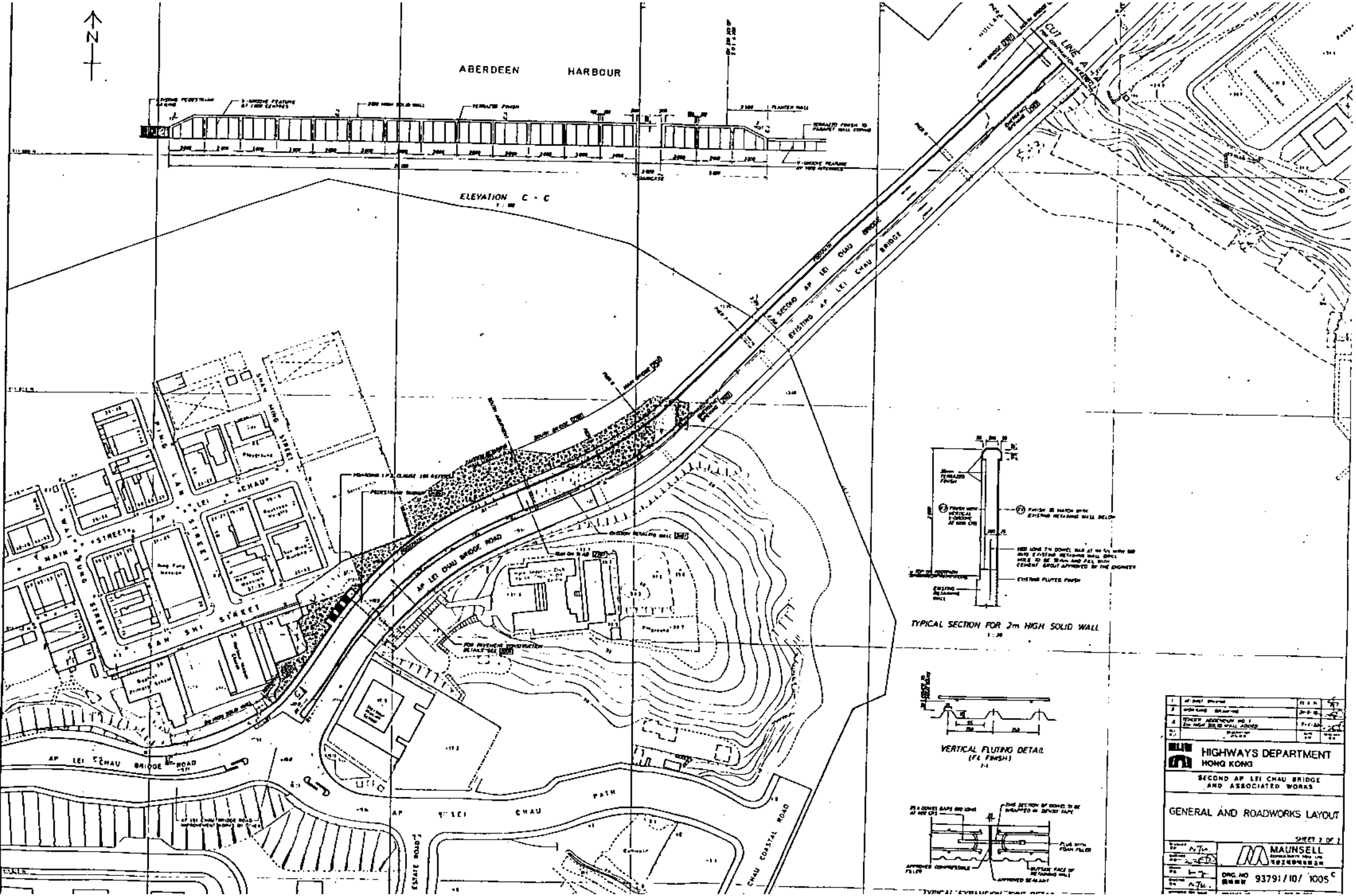
existing moment capacities
= 220.7 kNm < 291.2 kNm

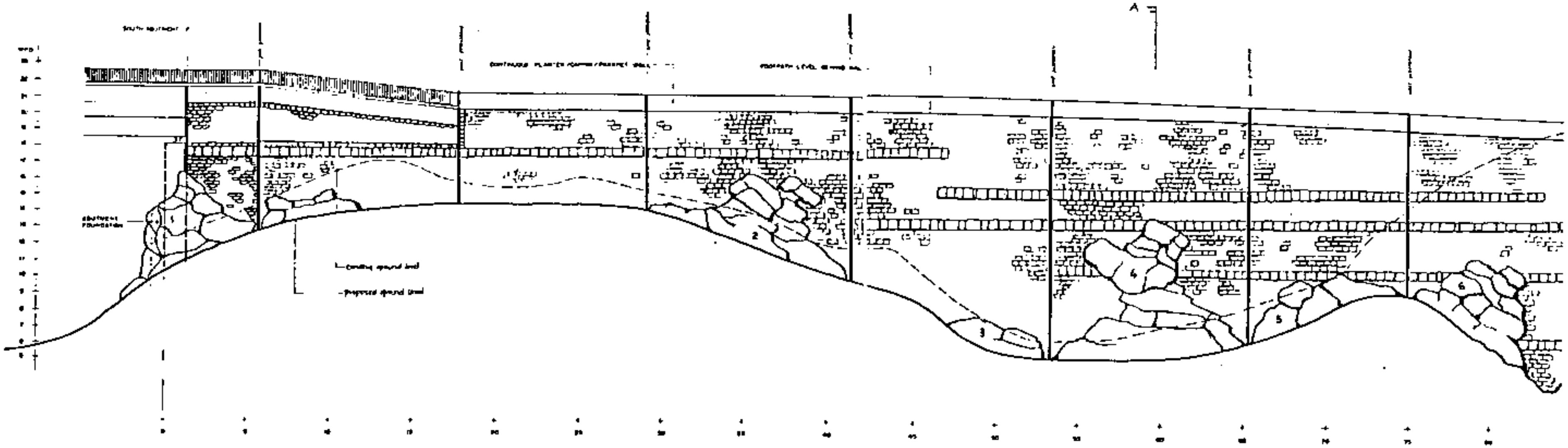
failed
(32% overstress)

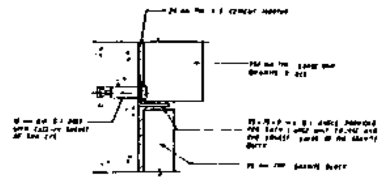
Summary

The proposed barriers would overstress the retaining wall in bending (and shear). Overstress is more serious at the top 2 m parapet wall and generally at about 33% for most part of the wall stem.

To rectify the situation, the top 2 m parapet wall would have to be demolished and rebuilt. Additional thickness of wall would have to be cast against the existing wall from top to bottom. However, strengthening work to founding bored piles would not be practical.

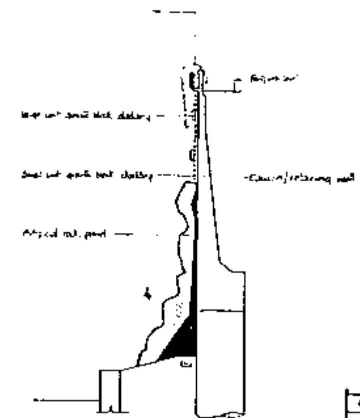

N
ABERDEEN HARBOUR
ELEVATION C - C
CUT LINE A-A
EXISTING AP LEI CHAU BRIDGE
SECOND AP LEI CHAU BRIDGE
AP LEI CHAU BRIDGE ROAD
SAN SHI STREET
AP LEI CHAU ESTATE ROAD
CHAU COASTAL ROAD
TYPICAL SECTION FOR 2m HIGH SOLID WALL
VERTICAL FLUTING DETAIL
(F4 FINISH)
HIGHWAYS DEPARTMENT
HONG KONG
SECOND AP LEI CHAU BRIDGE
AND ASSOCIATED WORKS
GENERAL AND ROADWORKS LAYOUT
SHEET 2 OF 2
MAUNSELL
DRG. NO 93791/10/1005 C

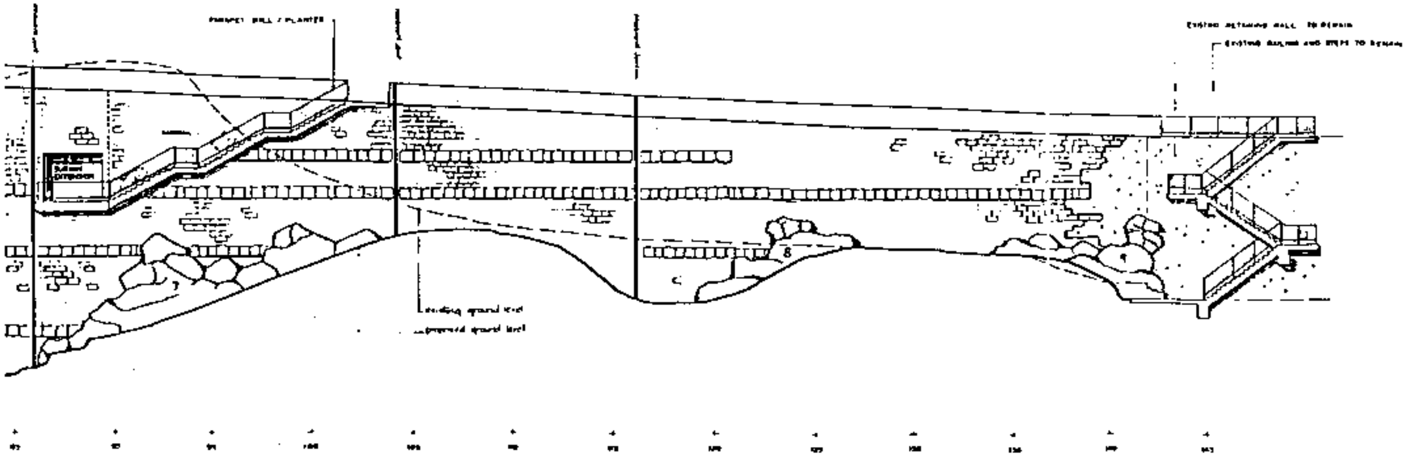




FIXING DETAIL FOR LARGE UNIT STONE

Section A-A (scale 1:10)





Small unit natural granite block cladding

Large unit natural granite block cladding

Artificial rock panels

Notes –

1. All bedding / jointing for natural granite cladding shall be 1:3 cement / sand
2. All jointing in natural granite cladding shall ...

AS-BUILT DRAWING

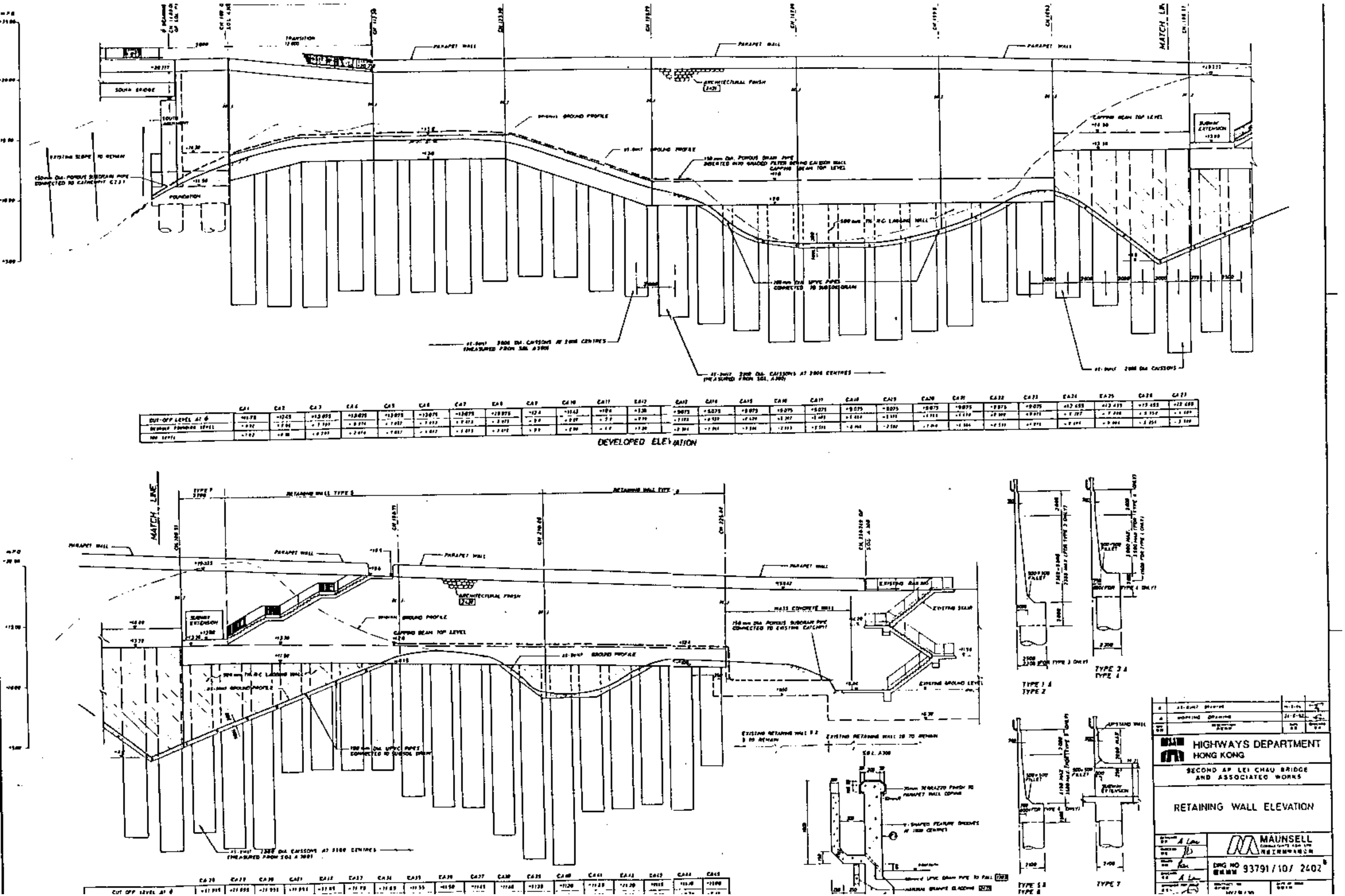
HIGHWAYS DEPARTMENT
HONG KONG

SECOND AP LEI CHAU BRIDGE AND ASSOCIATED WORKS

RETAINING WALL
ARCHITECTURAL FINISHES

MAUNSELL

DRG. NO 93791 / 10 / 2431 B



DEVELOPED ELEVATION

	CA1	CA2	CA3	CA4	CA5	CA6	CA7	CA8	CA9	CA10	CA11	CA12	CA13	CA14	CA15	CA16	CA17	CA18	CA19	CA20	CA21	CA22	CA23	CA24	CA25	CA26	CA27
CUT-OFF LEVEL AT ⌀	[illegible]	[illegible]	+13.075	+13.075	+13.075	+13.075	+13.075	+13.075	[illegible]	[illegible]	[illegible]	[illegible]	+9.075	+9.075	+9.075	+9.075	+9.075	+9.075	+9.075	+9.075	+9.075	[illegible]	+9.075	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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CUT OFF LEVEL AT ⌀ [illegible]

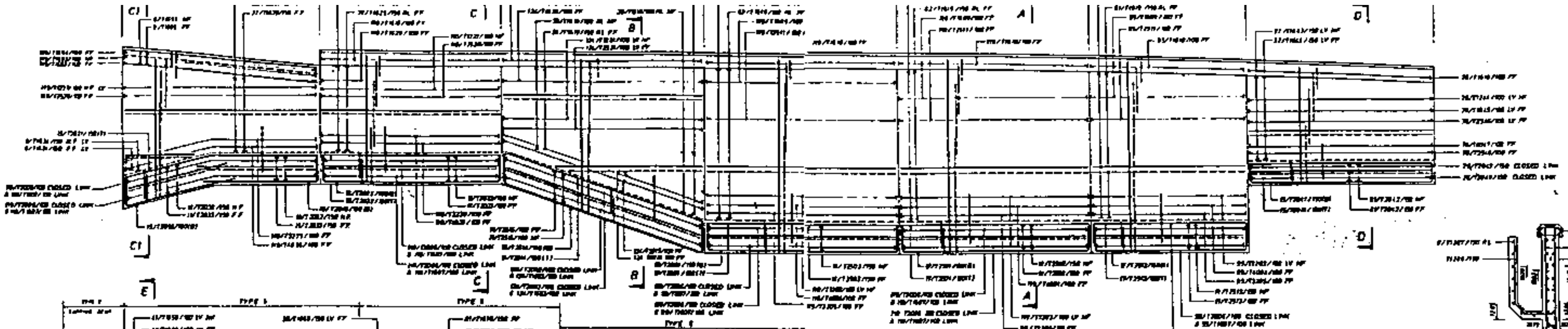
HIGHWAYS DEPARTMENT
HONG KONG

SECOND AP LEI CHAU BRIDGE AND ASSOCIATED WORKS

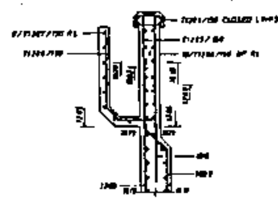
RETAINING WALL ELEVATION

MAUNSELL

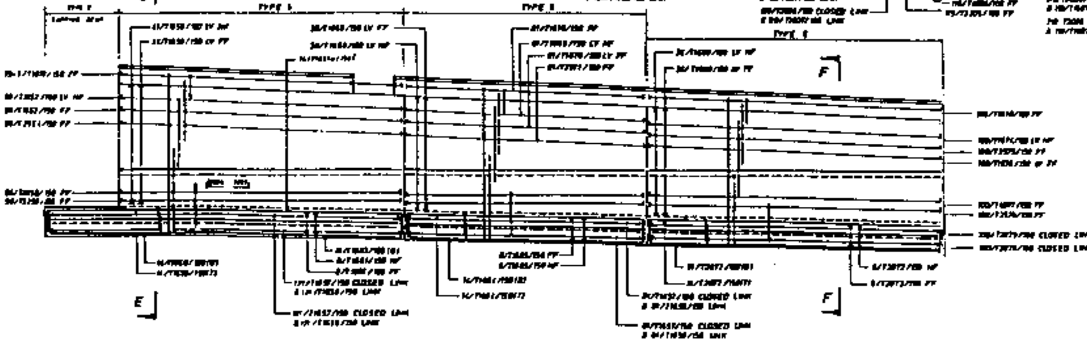
DRG NO 93791/10/2402

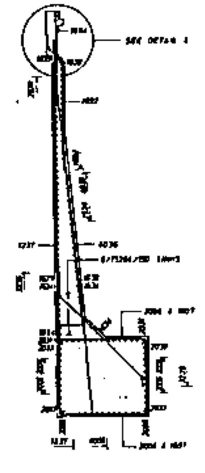


ELEVATION OF RETAINING WALL

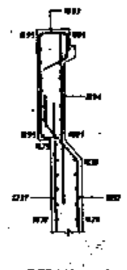


DETAIL K

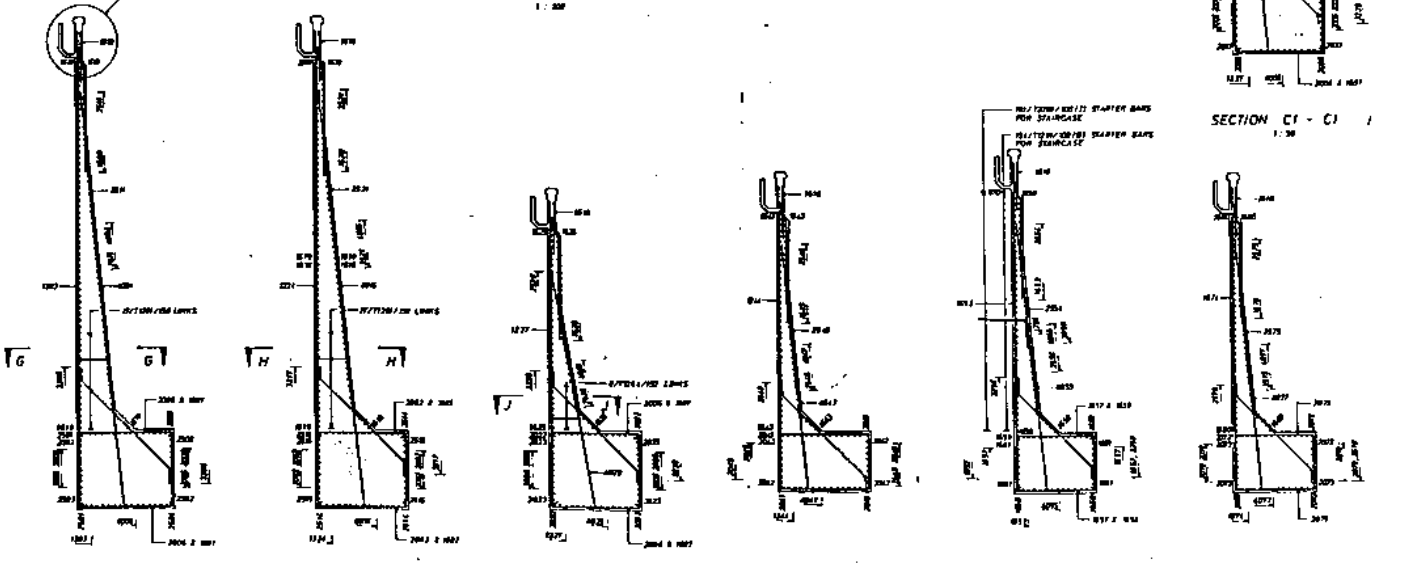




SECTION C1 - C1



DETAIL L



SECTION A - A

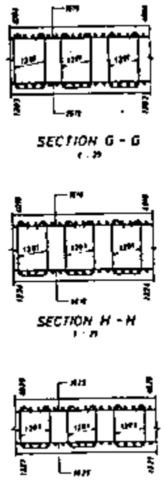
SECTION B - B

SECTION C - C

SECTION D - D

SECTION E - E

SECTION F - F



SECTION G - G

SECTION H - H

SECTION J - J

NOTES :-

1. THIS DRAWING IS BE READ IN CONJUNCTION WITH RELEVANT GENERAL ARRANGEMENT DRAWING DRG No. 93791/10/2401 TO 2403
2. CONCRETE GRADE TO BE 30/20
3. COVER TO REINFORCEMENT TO BE 40 mm UNLESS OTHERWISE STATED
4. REINFORCEMENT NOTATION -

   37 / T 20 03 / 200 (NF)
   - NO OFF
   - BAR CLASS
   - DIAMETER
   - BAR MARK
   - SPACING
   - SUFFIX

   BAR CLASS — T = HIGH YIELD DEFORMED TYPE 2
   R = MILD STEEL PLAIN ROUND

   SUFFIX — T = TOP
   B = BOTTOM
   NF = NEAR FACE
   FF = FAR FACE
   BF = BOTH FACE
   ABR = ALTERNATE BARS REVERSED
   LV = LENGTH VARIES
   RL = RANDOM LENGTH

5. MINIMUM LAP LENGTH
   40.25 x DIA OF BAR FOR HIGH YIELD DEFORMED TYPE 2
   50.75 x DIA OF BAR FOR MILD STEEL PLAIN ROUND

HIGHWAYS DEPARTMENT
HONG KONG

SECOND AP LEI CHAU BRIDGE
AND ASSOCIATED WORKS

RETAINING WALL R C. DETAILS

MAUNSELL

DRG. NO. 93791 / 10 / 2411 B

(II) Tsing Tsuen Bridge

(A) Assessment of bearing loads.

Additional Wind load from noise barriers :

barrier height = 6 m approx.

$\bar{q}$ = 3.8 kPa (unloaded)

C_D = 1.4 approx.

Transverse Wind Area. = 45 (span length of deck) × (6 + 2.3) (Str. depth of deck)
= 374 m²

∴ transverse wind force
= 3.8 × 1.4 × 374
= 1990 kN.

From observation in as-built dwgs
73807/14TW/0660R
0440R
0441R
} Select 0660R eastern app

∴ max. (wind load + 120km. load) case, trans. load on bear
= 730 kN approx

new (wind load + 120km load) case, trans. load on bearin
= 1990 kN >> 803 kN Critical (Seismic) Case — 1739. (Overstress

This is a significant increase in transverse load.

∴ Any direct installation of barriers on bridge deck will not be feasible.

Note ① bearing replacement would seriously disrupt traffic flow & pedestrian flow.
② Bridge was designed before August 1993

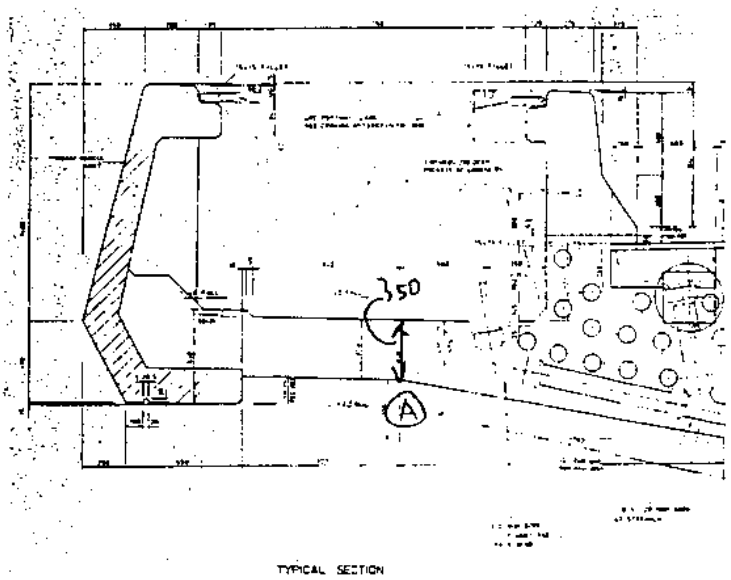
(B) Edge Barrier

Check bending capacity at (A)

Assume barrier post at 1 m c/c

Wind area (trans.)
= 1 x 6 m
= 6 m²

trans. wind force
= 3.8 x 1.4 x C
= 32 kN/m.



TYPICAL SECTION

Note : f_{cu} = 45 N/mm²
f_y = 250 N/mm²
Y20/150 rein. for
(effective width =

additional moment at (A) due to transverse wind force

$= 32 \times (\frac{6}{2} + 1.35 + 0.\frac{35}{2}) = 145$ kNm/m (char.)

$= 145 \times 1.4 \times 1.1$ (ULS)
(γ_{fL} γ_{fS})

= 224 kNm/m

existing design ULS moment = 87 kNm/m

∴ Total design ULS moment = 224 + 87
= 311 kNm/m

existing moment capacities = 172 kNm/m < 31
(73807/W1 - P.C23 of original cals.)

failed !
(81 % overstress

Strengthening may not be feasible as there were prestress cables within the box section and the overstress % is significant.

(C) Prestressed Bridge Deck

Survey of existing SLS Stresses Condition

Stage 3 deck (cal. file 73807/vol.13)

minimum stresses (SLS) = 0.034 N/mm² (web 1) – P. 6.1/3/1
= 0.051 N/mm² (web 3) – P. 6.1/3/1

Stage 4 deck (cal. file 73807/vol. 7)

minimum stresses = 0.102 N/mm² (web 1) – P. 6.1/4/1

Stage 6 deck

minimum stresses = 0.02 N/mm² (web 3) – P. 6.1/6/1

Stage 11 deck

minimum stresses = 0.044 N/mm² (web 1) – P. 6.1/11/1

Note : the above min. stresses were very close to the stress limit of 0 N/mm².

Any additional load from noise barriers and strengthening work (i.e. thickening of structural member) would certainly overstress the prestressed member

Strengthening of prestressed member may require the use of external prestressing, the scale of which would be significant and costly.

(D) Deck Torsion.

assume torsional restraint is provided at piers

∴ torsional span = 45 m, height of barrier = 6 m

Add'l wind area = 45 × 6
= 270 m²

wind force (uniformly dist'd)
= 3.8 × 1.4 × 270
= 1437 kN (nom.)
= 1437 × γ_{f1} × γ_{f3} = 1437 × 1.4 × 1.1 = 2213 kN.

∴ Add'l. wind torsion at support (ULS)
= 2213 × ($\frac{6}{2}$ + $\frac{2.3}{2}$) × $\frac{1}{2}$
= 4592 kNm

↑ half of total torsion received by piers at each end of the span

Existing design torsion on deck
= 4645 kNm. max.
(at section 108 of cal. file 73807/vol. 11 P. 7.1/19a)

Note: Generally torsion on deck is only in the order of 3500 kNm and the assessment result would be even worse.

∴ torsion will be increased by $\frac{4592}{4645}$ = 99%

Note: To tackle such a magnitude of additional torsion would be a major problem as web links and flange reinforcement would have to be increased.

Also the effect on shear have not been included yet and design code requires to design reinforcement for combined shear and torsion effects. The overstress condition would be even worse.

Pier :

For Column at Grid E2, E3 & E4
of Eastern Approach Bridge.

Size = 4500 × 1500

existing design (ULS)
Case (I)
$N = 25940$ kN
$M_T = 7560$ kNm
$M_L = 43400$ kNm.
(bearing friction case)

((cal. file 73807/vol P. 7.1/4 –

Case (II)
$N = 26614$ kN
$M_T = 27525$ kNm
$M_L = 9712$ kNm
(wind case)

(ie with horizontal = 5% of perm. load)

Additional wind moment from barrier :

wind area = 45 × 6 = 270 m^2

Wind force (ULS) = 3.8 × 1.4 × 270 × 1.4 × 1.1
= 2212 kN.

additional wind moment in M_T = 2212 × (19.5 + 2.3 + 3)
(pier height, deck depth, barrier)
= 54860 kNm

existing Capacity

$M_{TU} = 3.9 \times 4.5^2 \times 1.5 \times 10^3 = 118463$ kN

$M_{LU} = 4.9 \times 4.5 \times 1.5^2 \times 10^3 = 49613$ kN

existing interaction check of moment in both dir.
$\frac{M_T}{M_{TU}} + \frac{M_L}{M_{LU}} = 0.064 + 0.875$ ((case I
= 0.939 < 1.0
(marginal to limit)

= 0.23 + 0.2 ((case II
= 0.43 < 1.0
(ok)

with additional moment = 54860

$\frac{M_T}{M_{TU}} + \frac{M_L}{M_{LU}} = 0.43 + \frac{54860}{118463} = 0.89 < 1.$

(still o.k)

Foundation Bored Piles (Dia. 120cm)

Axial capacity = 5000 × π × $\frac{1.2^2}{4}$ = 5655 kN.

(with rock bearing capacity = 5000 kPa)

For piles at Grid E2 of Eastern Approach.

existing max. pile load = 3548 kN (P.7.11/-)
existing min pile load = 888 kN.

Ref dwg no. 061R.

I_t (trans.) = (1.4² + 4.2²) × 3 × 2 = 117.6 m⁴

Additional moment from wind (non.) = 54860/(1.4 × 1.1)

= 35623 kNm

Additional pile load = ± $\frac{35623}{117.6}$ × 4.2

= ± 1273 kN

∴ resulting max. pile load = 3548 + 1273

= 4821 kN

resulting min. pile load = 888 − 1273

= −385 kN.

(uplift on piles)

Underpass Structure

At the support edge of wing wall, Cross section = 6500 x 700 mm

q = 3.8 kN/m² Cantilever Span = 10m

C_0 = 1.4 appx

Wind area = 6 x 10 = 60 m²

Wind force = 3.8 x 1.4 x 60
= 320 kN

lever arm = $\frac{10}{2}$ = 5m

∴ additional wind moment
= 320 x 5 = 1600 kNm (nominal)
= 1600 x 1.4 x 1.1 = 2464 kNm (ULS)

existing design M = 12994 kNm.

existing moment capacity:

$$z = \left(1 - \frac{1.1 \times 425 \times 73986}{40 \times 6500 \times 602}\right) d$$

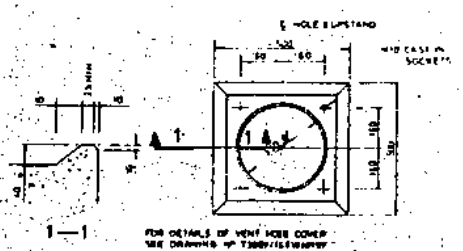
$$= 0.789\, d$$

$$M_{capacity} = 0.87 (425)(0.789 \times 602)(73986) \times 10^{-6}$$
$$= 12994 \text{ kNm}$$

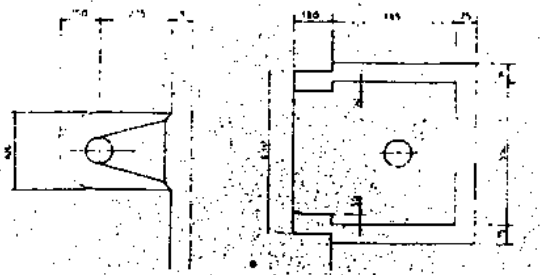
< $M_{ex.} + M_{add}$
= 12494 + 2464
= 14958 kNm
(15% overstress)

Torsional moment from noise barrier loading would be significant to the wing wall section as well.

Note
f_{cu} = 40
f_y = 42
d = 60
A_s = 2Y
= 735

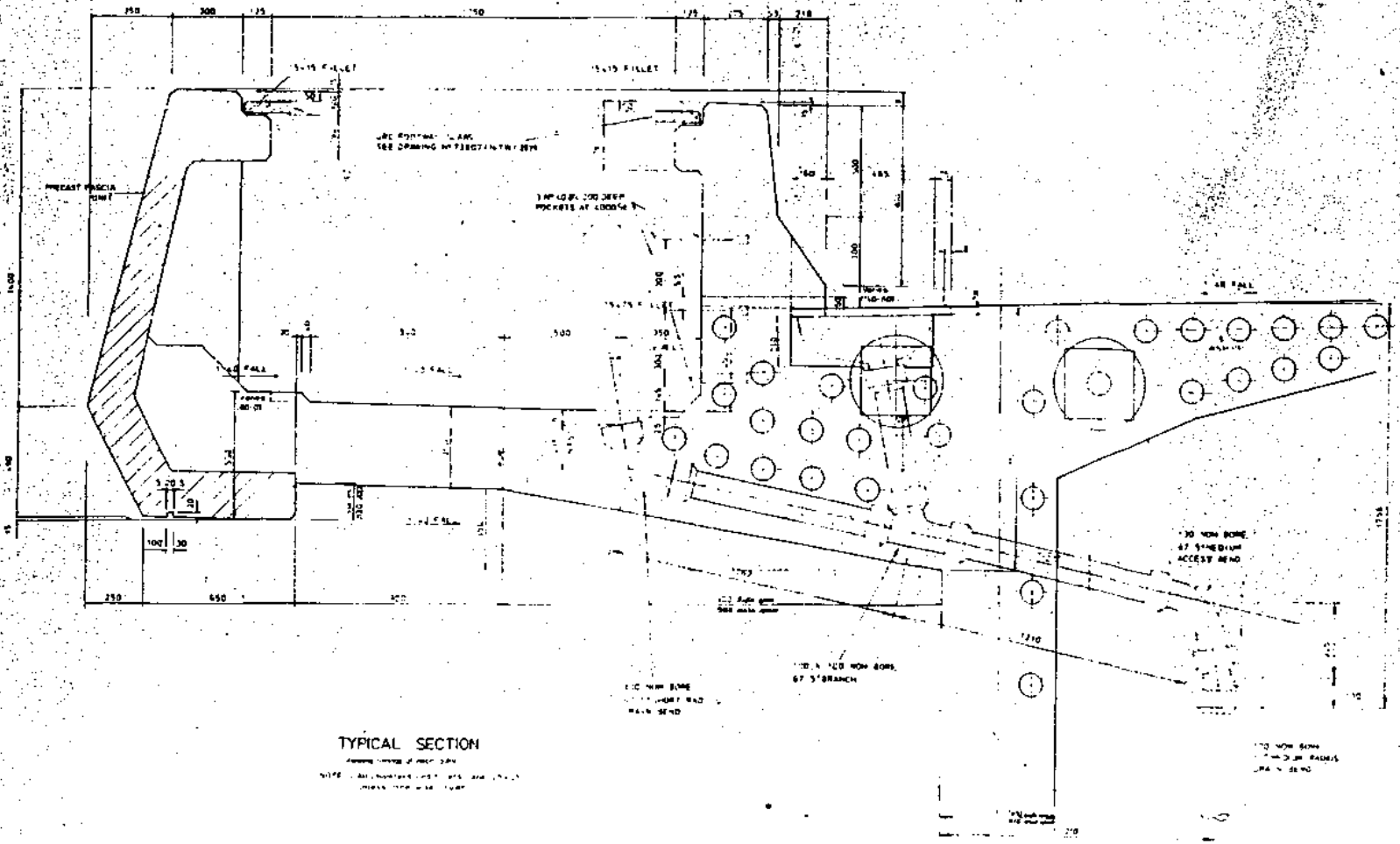


PLAN ON VENT HOLE



PLAN ON SERVICE BAY GULLY

PLAN ON ROAD GULLY



TYPICAL SECTION

NOTES

1. Copyright reserved.
2. Dimensions are in millimetres unless otherwise shown.

MAEDA ORIENTEX (H.K.) LTD.

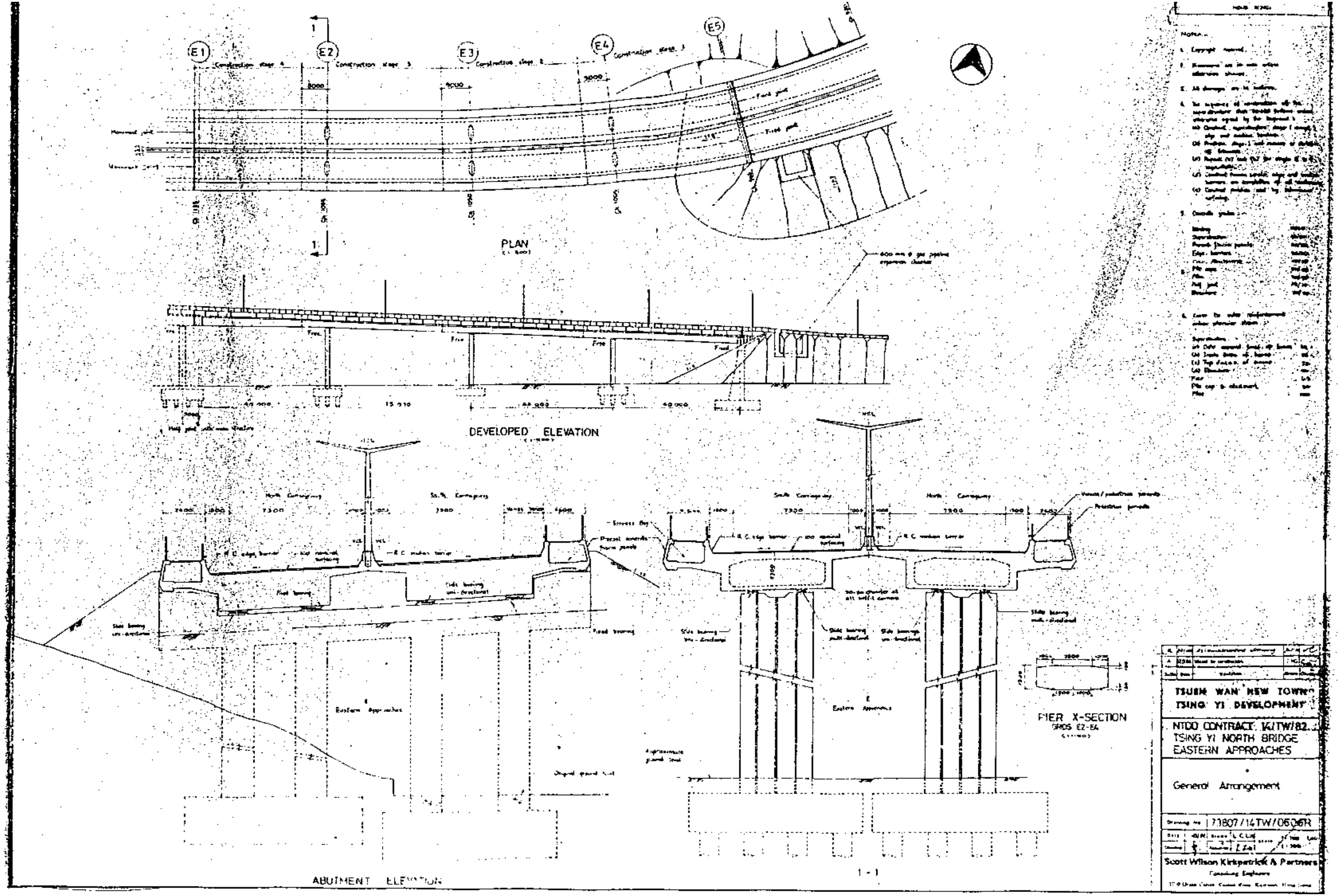
TSUEN WAN NEW TOWN
TSING YI DEVELOPMENT

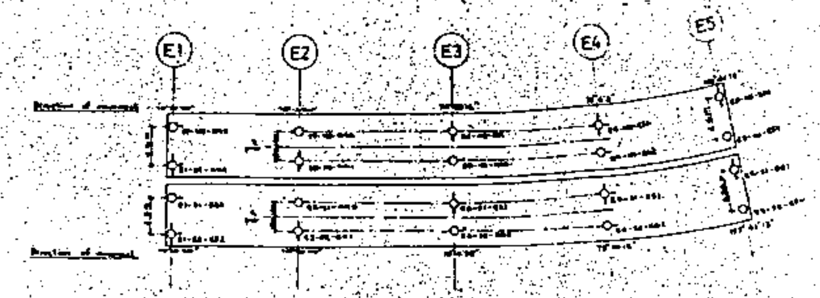
NTDD CONTRACT 14/TW/82
TSING YI NORTH BRIDGE
MAIN CROSSING

FINISHINGS

SERVICE BAY CONCRETE PLINTHS AND DRAINAGE DETAILS (1)

Drawing No. 73807/14TW/2018


E1
E2
E3
E4
E5
PLAN
DEVELOPED ELEVATION
North Carriageway
South Carriageway
R.C. edge barrier
R.C. median barrier
Precast concrete fascia panels
Fixed bearing
Slide bearing uni-directional
Slide bearing multi-directional
Pedestrian parapets
Eastern Approaches
Original ground level
Approximate ground level
PIER X-SECTION
ABUTMENT ELEVATION
1 - 1
TSUEN WAN NEW TOWN
TSING YI DEVELOPMENT
NTDO CONTRACT 14/TW/82
TSING YI NORTH BRIDGE
EASTERN APPROACHES
General Arrangement
73807/14TW/0506R
Scott Wilson Kirkpatrick & Partners
Consulting Engineers



ARTICULATION AND
SETTING OUT PLAN

Effect number	Horizontal movement (long.) in mm due to:	E1		E2		E3		E4		E5	
1	Temperature variation	115	165	36	50	29	33	11	15	-	-
2	Shrinkage and creep	0	115	0	74	0	56	0	36	-	-
3	Friction	0	8	0	10	0	9	0	10	-	-
4	Longitudinal braking force	3	3	1	1	1	1	1	1	-	-
5	Wind forces	0	0	2	2	2	2	2	2	-	-
6	Seismic forces	45	45	26	26	26	26	26	26	-	-
	Worst combination	150	441	62	164	49	144	37	51	-	-

TABLE OF LONGITUDINAL BEARING MOVEMENTS

Type	Unit	EF1			EG1			EG2			EG3			EH1			ES2		
Number required		2			2			4			3			6			2		
Specification		Vertical	Horizontal Longitudinal	Horizontal Transverse	Vertical	Horizontal Longitudinal	Horizontal Transverse	Vertical	Horizontal Longitudinal	Horizontal Transverse	Vertical	Horizontal Longitudinal	Horizontal Transverse	Vertical	Horizontal Longitudinal	Horizontal Transverse	Vertical	Horizontal Longitudinal	Horizontal Transverse
Vertical loading	kN																		
(i) permanent loads only		2449			3645			9685			4271			9655			4271		
(ii) permanent loads plus HA load		4647			4640			11639			5611			11636			6617		
(iii) permanent loads plus HA load & wind load		4866			4863			12116			5706			12816			5709		
(iv) permanent loads plus HB load		5540			5346			12545			4771			13646			6271		
(v) permanent loads plus HB load & wind load		5750			5757			13122			6445			13122			6445		
Horizontal loading & associated min. vertical load	kN																		
(i) braking or traction ... plus associated loads		2582	870	250	2597	475	Free	5515	Free	250	7031	Free	250		Free	Free		Free	Free
(ii) wind plus permanent loads		2336	703	343	7234	506		4441		792	3767		418						
(iii) seismic plus permanent loads & ½ HA		2612	1016	307	3415	1615		4416		843	1601		350						
(iv) each ... plus permanent loads		3649	1643	199	3649	1535		4600		876	5102		778						
Rotation due to	rad																		
(i) permanent loads			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]	
(ii) permanent loads plus HB load			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]	
Maximum bearing size	mm	[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]		

SCHEDULE OF BEARINGS

NOTES

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TSUEN WAN NEW TOWN
TSING YI DEVELOPMENT

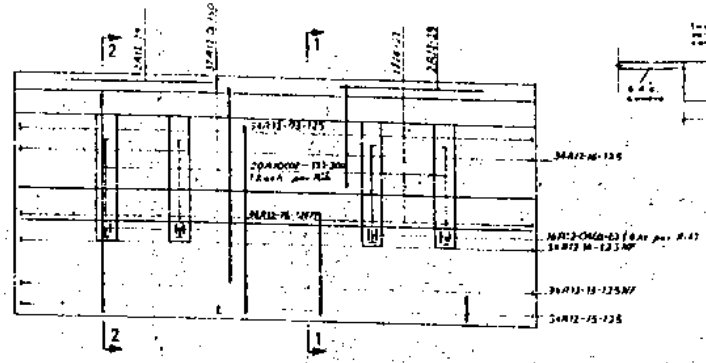
KTDD CONTRACT 14/TW/82
TSING YI NORTH BRIDGE
EASTERN APPROACHES

Superstructure
Bearing Schedule &
Setting Out Details

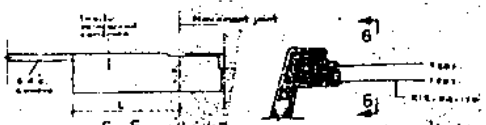
Drawing no. 73807/14TW/0680R

Scale N.T.S.

Scott Wilson Kirkpatrick & Partners
Consulting Engineers

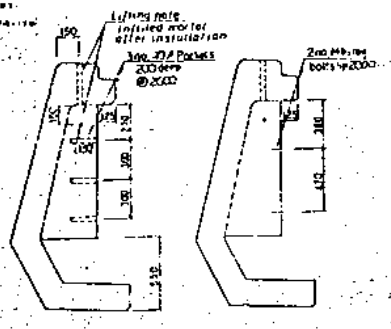


REINFORCEMENT DETAILS OF TYPICAL UNIT



6 - 6

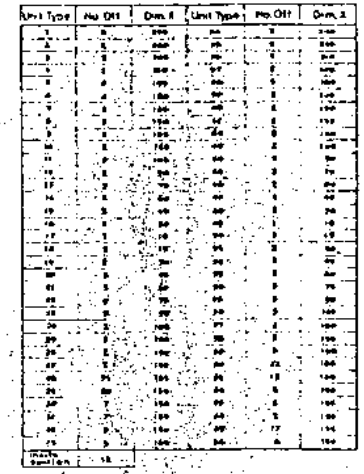
DETAILS AT INSITU SECTIONS

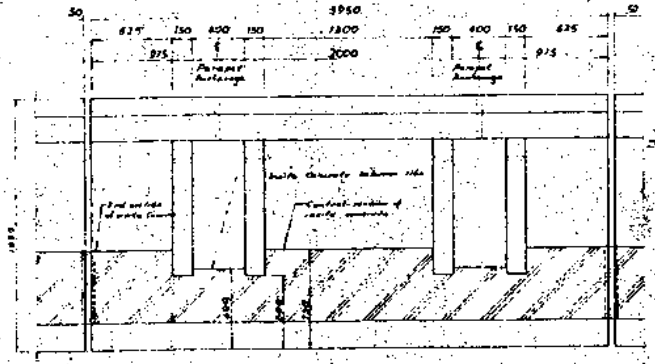


North CWY

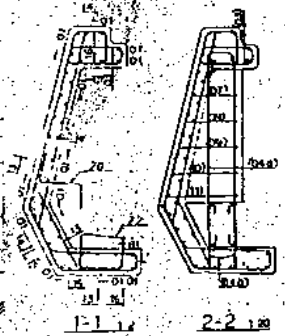
South CWY

RIB SECTION





PROFILE



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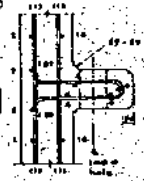
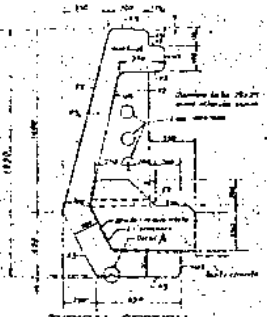
2 - 2

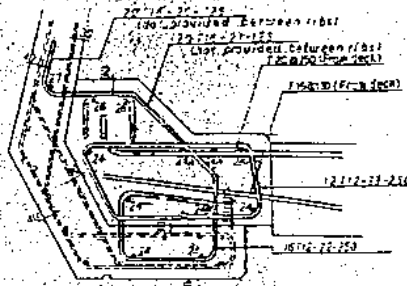


3 - 3

RIB DETAILS



TYPICAL SECTION



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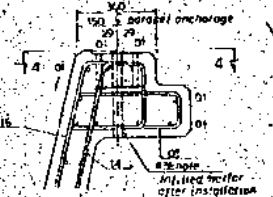
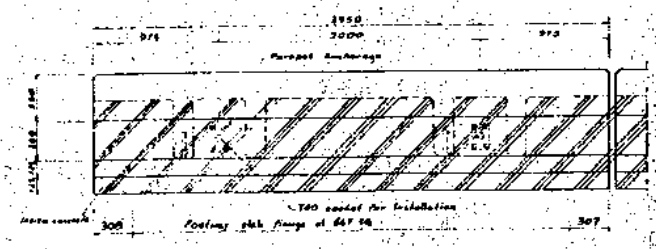
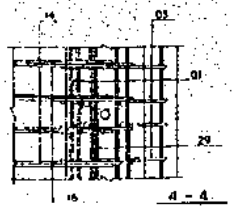


Detail of Parapet anchorage

DETAIL A





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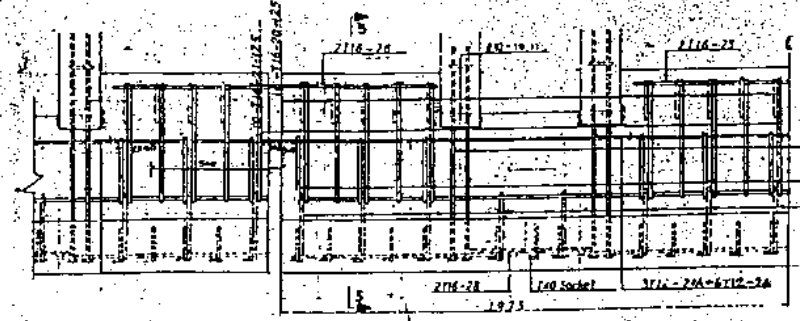
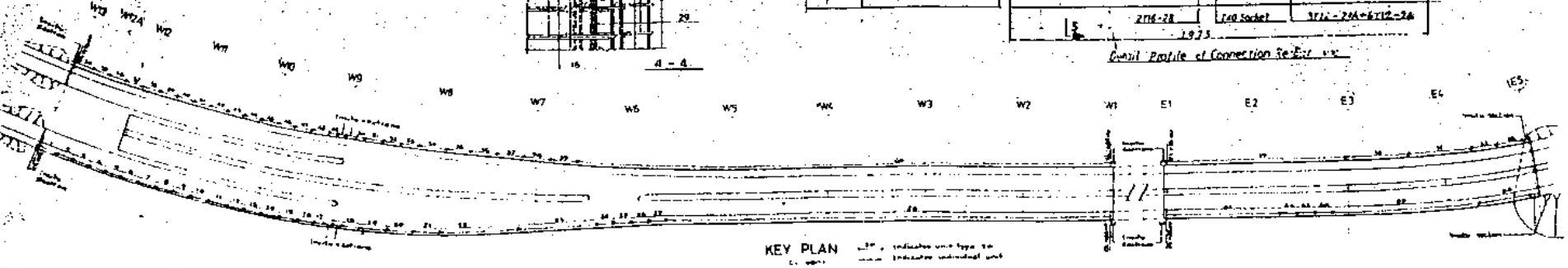


Detail Profile at Connection Section



KEY PLAN

TSUEN WAN - NEW TOWN TSING YI DEVELOPMENT

NTDD CONTRACT NO.TW/02 TSING YI NORTH BRIDGE APPROACHES - GENERAL

Superstructure
R.C. Details
Precast Fascia Units

Drawing No. 738071/14TW/0710R

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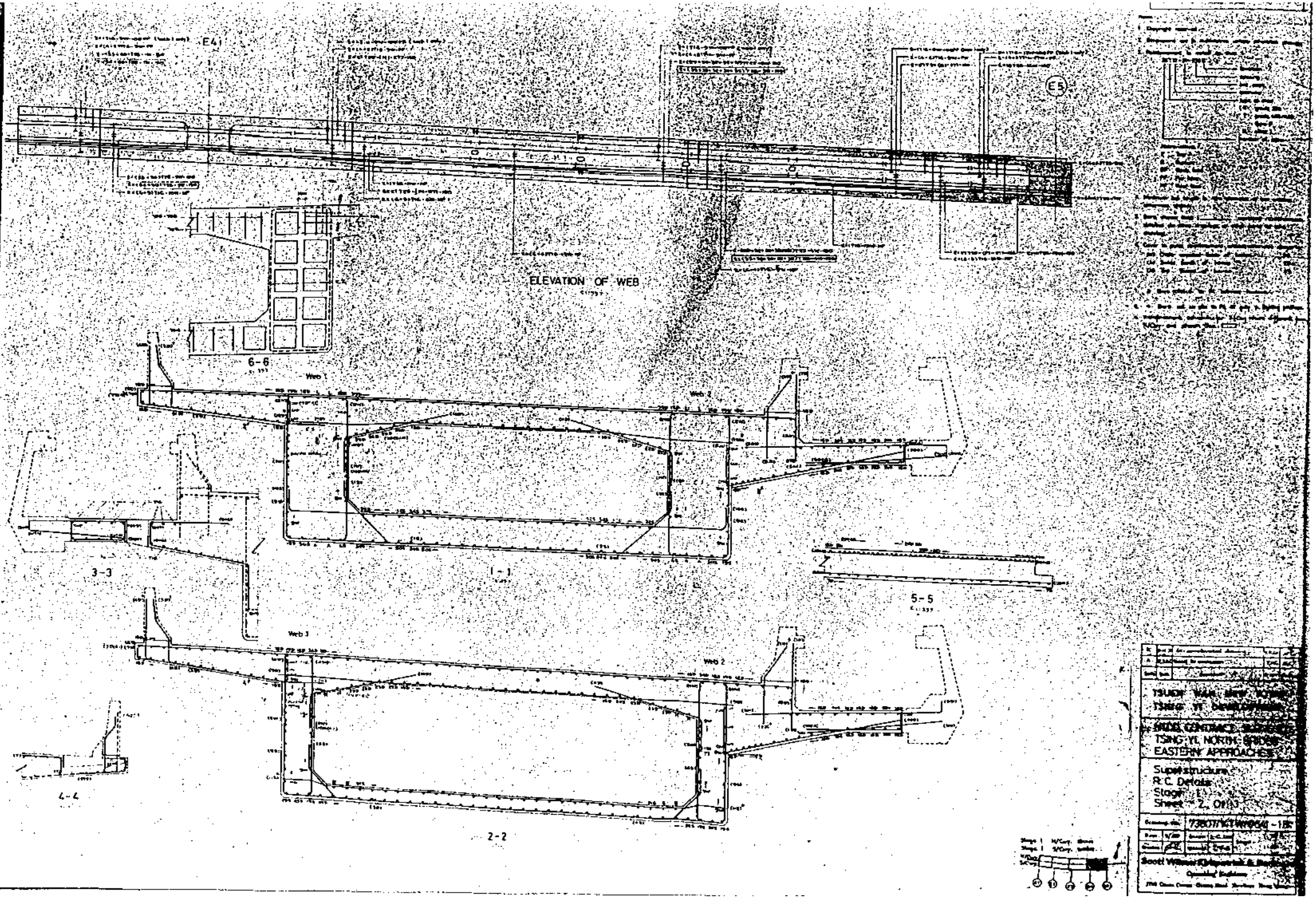
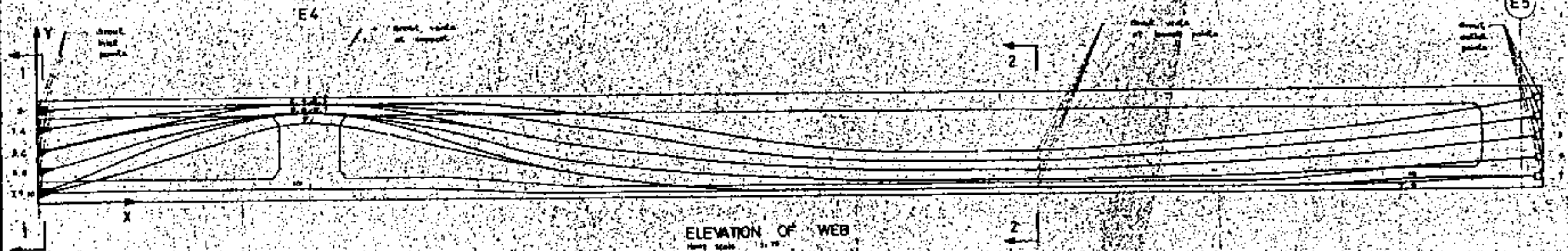

E4
E5
ELEVATION OF WEB
6-6
Web 1
Web 2
3-3
1-1
5-5
Web 3
Web 2
4-4
2-2

E4

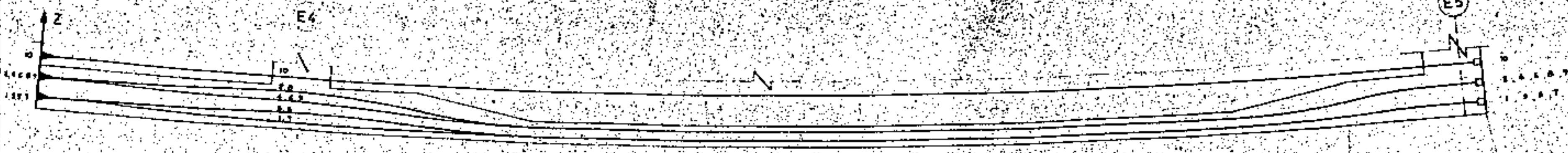
E5



ELEVATION OF WEB

X	0	2 250	4 500	6 750	9 000	11250	13500	15 000	17250	19500	21 000	23250	25500
Y2	2040	2160	2168	2165	2165	2165	2163	2120	1948	1745	1590	1310	1100
Y1, Y4	1995	1858	1990	2100	2165	2168	1966	1840	1665	1426	1260	1010	851
Y3	1150	1650	1800	2080	2169	2038	1783	1580	1287	1248	926	747	696
Y6	1150	1440	1750	1880	1955	1877	1718	1350	1278	1047	926	741	634
Y5, Y8	700	915	1325	1850	1958	1814	1537	1290	886	686	600	417	389
Y7	260	873	840	1778	1935	1768	1544	1010	635	586	370	153	155
Y9	240	975	840	1460	1745	1511	1138	900	831	981	270	152	135
Y10	250	250	250	250	250	256	229	165	125	125	125	125	125

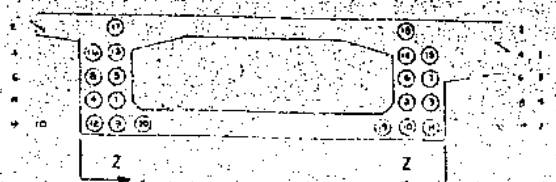
X	27 000	29250	31500	33 000	35250	37500	39 000	41250	43500	45 000	47250	49500	49 750
Y2	1020	979	990	910	1068	1142	1250	1344	1486	1510	1777	1990	2040
Y1, Y4	790	769	766	760	827	889	960	1162	1176	1160	1421	1600	1950
Y3	595	566	951	548	574	638	660	787	818	809	1229	1148	1190
Y6	555	564	691	549	574	638	660	737	818	809	1029	1162	1190
Y5, Y8	360	550	349	340	348	392	360	384	448	500	784	471	500
Y7	155	135	175	155	155	165	165	129	136	150	209	257	260
Y9	195	135	135	135	156	155	155	134	156	150	209	257	260
Y10	125	125	125	125	125	125	125	126	166	240	250	250	250



PLAN OF WEB

X	0	2 250	4 500	6 750	9 000	11 250	13 500	15 000	17 250	19 500	21 000	23 250	25 500
Z2, Z8	730	746	773	834	855	775	552	477	355	359	395	365	355
Z4, Z6, Z9	730	746	675	634	620	678	499	388	395	355	355	359	359
Z3, Z5	270	784	925	766	599	345	278	174	149	145	151	145	149
Z1, Z7	270	254	257	121	149	143	145	145	144	145	145	145	149
Z10	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190

X	27 000	29 250	31 500	33 000	35 250	37 500	39 000	41 250	43 500	45 000	47250	49500	49 750
Z2, Z8	395	355	355	351	355	355	355	356	451	543	696	750	780
Z4, Z6, Z9	395	355	355	355	305	399	359	356	431	549	696	738	770
Z3, Z5	145	149	145	145	149	145	148	149	171	208	258	278	270
Z1, Z7	145	145	145	145	149	145	145	149	171	208	258	278	270
Z10	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190



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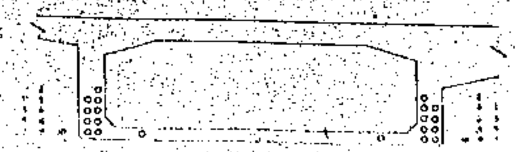

2 - 2

TSUEN WAN NEW TOWN
TSING YI DEVELOPMENT

NTDO CONTRACT 14/TW/82
TSING YI NORTH BRIDGE
EASTERN APPROACHES

Superstructure
Prestressing Tendon Profiles
Stage I

Drawing No. 73807/14TW/0630R

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