

概 要	
路面有効幅員	22 * 72 <sup>mm</sup>
車道有効幅員	16.6 * 54 <sup>mm</sup>
人歩有効幅員	2.0 * 7.0 <sup>mm</sup>
中央支間	100 * 330 <sup>mm</sup>
全上跨間	15 * 0 <sup>mm</sup>
全上跨幅員	4.0 * 43.0 <sup>mm</sup>
各支間	135 * 0 <sup>mm</sup>
各吊鉤折	89 * 0 <sup>mm</sup>
各側支間	47 * 6 <sup>mm</sup>

中央支間桁架荷重	
死 荷 重	
(1) 鋼材	38 <sup>mm</sup>
(2) 鋪裝	162 <sup>mm</sup>
(3) 添加物	0.41 <sup>mm</sup>
計	583 <sup>mm</sup>
活 荷 重	
格差荷重	875 <sup>mm</sup>
格差荷重	32 <sup>mm</sup>

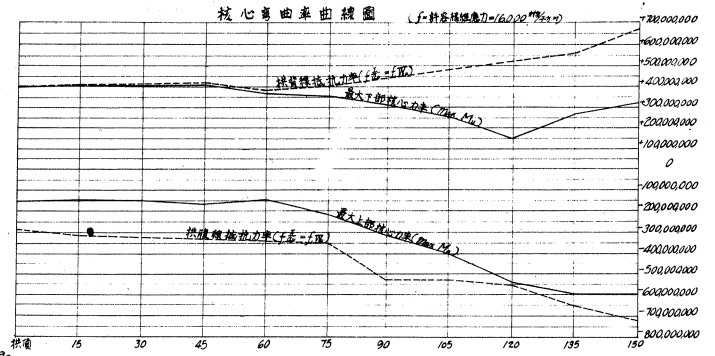
### 断面性質

I = 慣性力矩 (cm<sup>4</sup>)  
 F = 断面面積 (cm<sup>2</sup>)  
 W = 抗彎抵抗係数 (cm<sup>3</sup>)  
 K = 抗彎抵抗係数 (cm<sup>3</sup>)  
 K<sub>0</sub> = 抗彎抵抗係数 (cm<sup>3</sup>)

### 最大縦應力

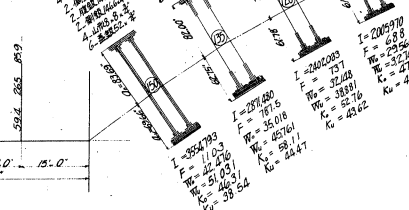
$G = \frac{M}{W}$   
 $G_0 = \frac{M_0}{W_0}$

σ<sub>0</sub> = 死荷重 + 桁架構造應力  
 σ<sub>1</sub> = 活荷重 + 桁架構造應力  
 σ<sub>2</sub> = 桁架構造最大應力  
 σ<sub>3</sub> = 桁架構造 + 桁架構造應力  
 σ<sub>4</sub> = 活荷重 + 桁架構造應力  
 σ<sub>5</sub> = 桁架構造最大應力



### 梁桁荷重

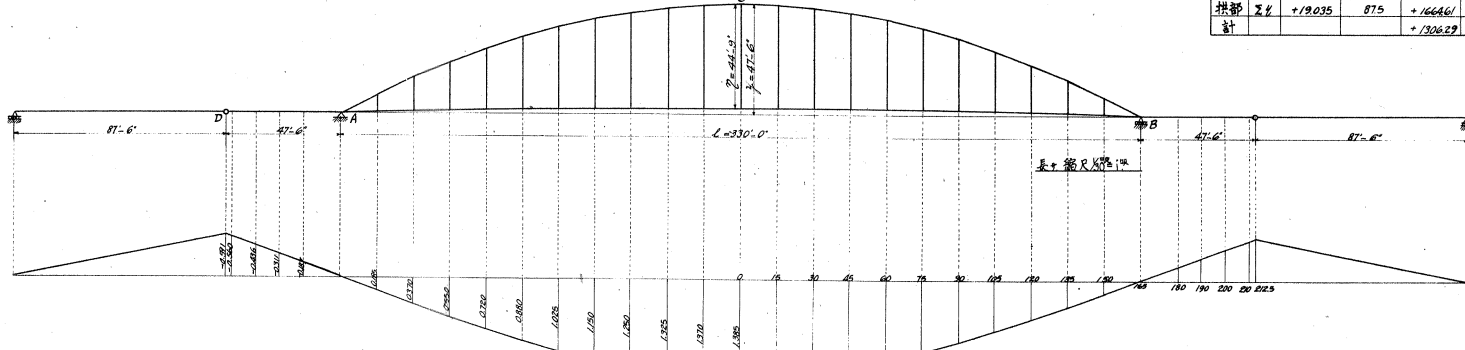
桁架	1.160
鋼材	83
鋼桁	791
鋼材	230
鋼桁	20
下橋橋	115
下橋橋	25
桁架管	2429
鋼 鋼	2174 × 700 = 70
鋼 鋼	1709
總計	2505



### 核心彎曲率及縦應力強度表

距離	0	15	30	45	60	75	90	105	120	135	150
桁架	1714	1714	1714	1714	1714	1714	1714	1714	1714	1714	1714
鋼材	83	83	83	83	83	83	83	83	83	83	83
鋼桁	791	791	791	791	791	791	791	791	791	791	791
鋼材	230	230	230	230	230	230	230	230	230	230	230
鋼桁	20	20	20	20	20	20	20	20	20	20	20
下橋橋	115	115	115	115	115	115	115	115	115	115	115
下橋橋	25	25	25	25	25	25	25	25	25	25	25
桁架管	2429	2429	2429	2429	2429	2429	2429	2429	2429	2429	2429
鋼 鋼	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70
鋼 鋼	1709	1709	1709	1709	1709	1709	1709	1709	1709	1709	1709
總計	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505

### 水平反力影響線



格差	縱距	死荷重 (Q <sub>1</sub> )	活荷重 (Q <sub>2</sub> )
梁桁	(212.5)	0.991	1.96
梁桁	(190)	0.560	2.97
梁桁	(180)	0.311	4.75
梁桁	(180)	0.187	5.94
小計		2.049	10.62
拱部	2.1	1.9035	87.5
拱部	2.1	166.61	32.0
計		130.27	169.12

### 死 荷 重

鋼材重量	
桁架	1.160
鋼材	83
鋼桁	791
鋼材	230
鋼桁	20
下橋橋	115
下橋橋	25
桁架管	2429
鋼 鋼	2174 × 700 = 70
鋼 鋼	1709
總計	2505

### 梁 桁

鋼材重量	
桁架	263.20
鋼材	219.36
鋼桁	113.9
下橋橋	494.45
鋼 鋼	494.45 × 100 = 175
鋼 鋼	511.75
總計	511.75

### 活 荷 重

鋼材重量	
桁架	1.160
鋼材	83
鋼桁	791
鋼材	230
鋼桁	20
下橋橋	115
下橋橋	25
桁架管	2429
鋼 鋼	2174 × 700 = 70
鋼 鋼	1709
總計	2505

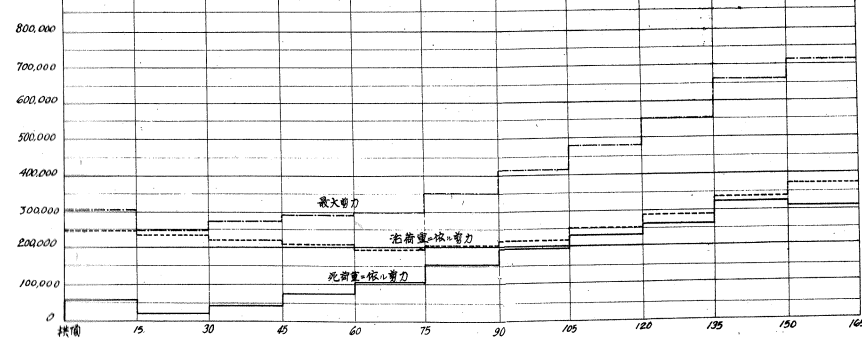
### 鋼材重量

鋼材重量	
桁架	1.160
鋼材	83
鋼桁	791
鋼材	230
鋼桁	20
下橋橋	115
下橋橋	25
桁架管	2429
鋼 鋼	2174 × 700 = 70
鋼 鋼	1709
總計	2505

### 向心剪力及應力強度表

距離	165-150	150-135	135-120	120-105	105-90	90-75	75-60	60-45	45-30	30-15	15-0
桁架	165	150	135	120	105	90	75	60	45	30	15
鋼材	83	83	83	83	83	83	83	83	83	83	83
鋼桁	791	791	791	791	791	791	791	791	791	791	791
鋼材	230	230	230	230	230	230	230	230	230	230	230
鋼桁	20	20	20	20	20	20	20	20	20	20	20
下橋橋	115	115	115	115	115	115	115	115	115	115	115
下橋橋	25	25	25	25	25	25	25	25	25	25	25
桁架管	2429	2429	2429	2429	2429	2429	2429	2429	2429	2429	2429
鋼 鋼	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70	2174 × 700 = 70
鋼 鋼	1709	1709	1709	1709	1709	1709	1709	1709	1709	1709	1709
總計	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505

### 向心剪力曲線圖

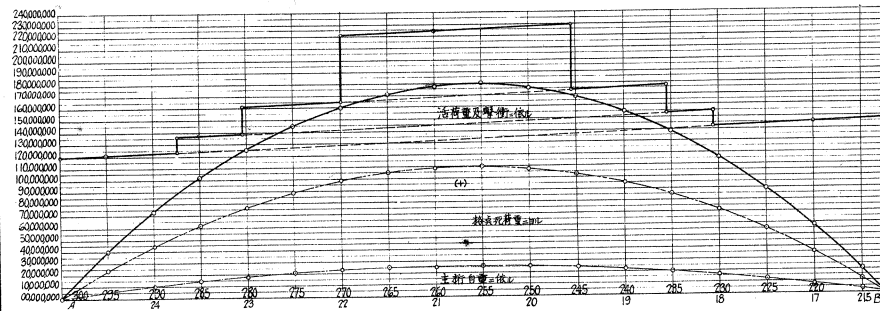


### 總垂直反力

格差	死荷重 (Q <sub>1</sub> )	活荷重 (Q <sub>2</sub> )
梁桁	1.96	9.91
梁桁	2.97	13.3
梁桁	4.75	21.2
梁桁	5.94	26.5
小計	35.6	15.9
拱部	87.5 × 1.1 = 96.25	32 × 1.1 = 35.2
計	137.82	54.92

永代橋  
 繫拱鋼桁應力圖表

吊桁及突桁徑間最大彎曲率圖表



最大彎曲率表

Table with 4 columns: 桁架 (Truss), 主桁自重+依 (Main truss self-weight + support), 活荷重+擊撞+依 (Live load + impact + support), 計 (Total). Rows include various truss types like 295, 285, 270, 260, 205, 200.

最大剪力表

Table with 4 columns: 桁架 (Truss), 主桁自重+依 (Main truss self-weight + support), 活荷重+擊撞+依 (Live load + impact + support), 計 (Total). Rows include various truss types like 295, 285, 270, 260, 205, 200.

實載距表

Table with 6 columns: 桁架 (Truss), 前力S (Front force S), 前距(半) (Front distance (half)), 前力力率I (Front force rate I), 2/A (2/A), 載距D (Load distance D), 前距距 (Front distance). Rows include various truss types like 300, 295, 285, 270, 260, 270, 210, 205, 200, 195, 190, 185, 180, 175, 170.

I 死荷重 格架死荷重表

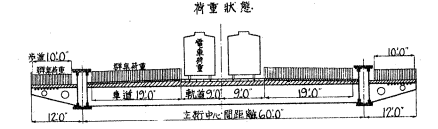
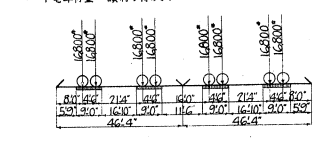
Table with 4 columns: 桁架 (Truss), 格架 (Grid), 活載物 (Live load), 計 (Total). Rows include various truss types like 295, 285, 270, 260, 205, 200.

吊桁及突桁徑間荷重表

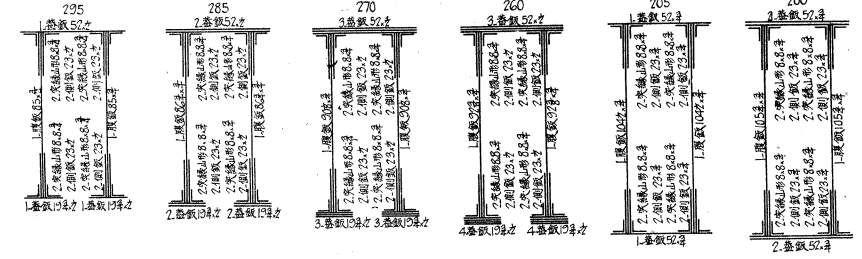
Table with 4 columns: 桁架 (Truss), 吊桁 (Main truss), 突桁 (Cantilever truss), 計 (Total). Rows include various truss types like 295, 285, 270, 260, 205, 200.



II 活荷重

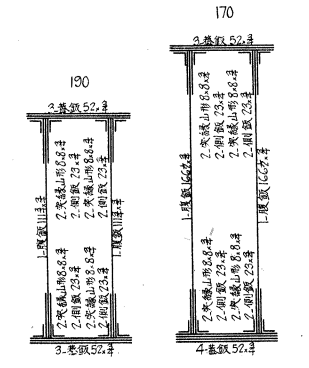


III 擊撞係數 (Impact coefficient) calculation details. It includes formulas for impact coefficient based on truss type and span length.

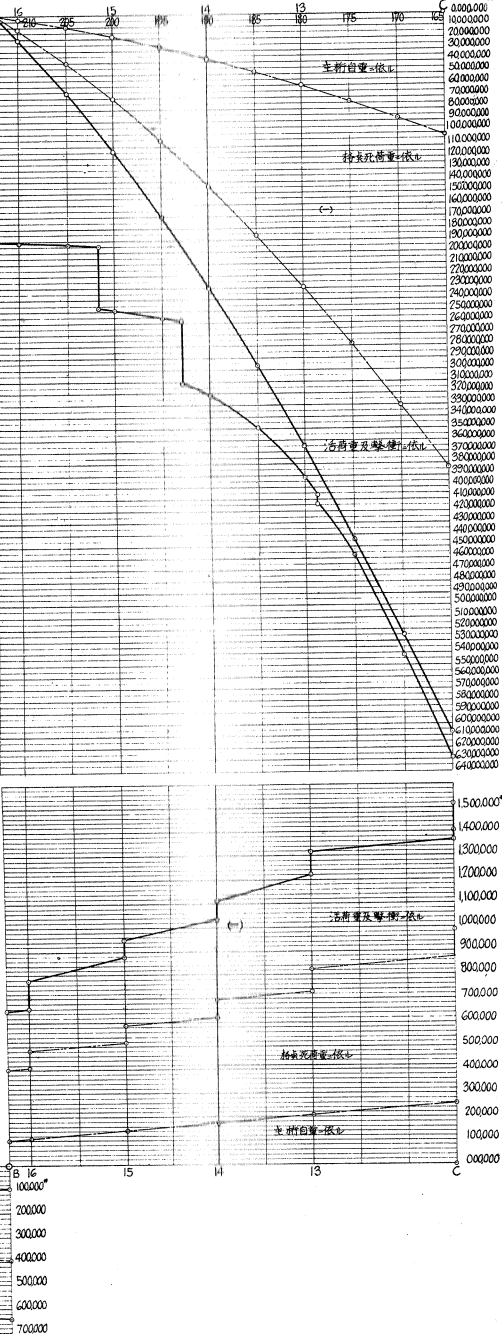
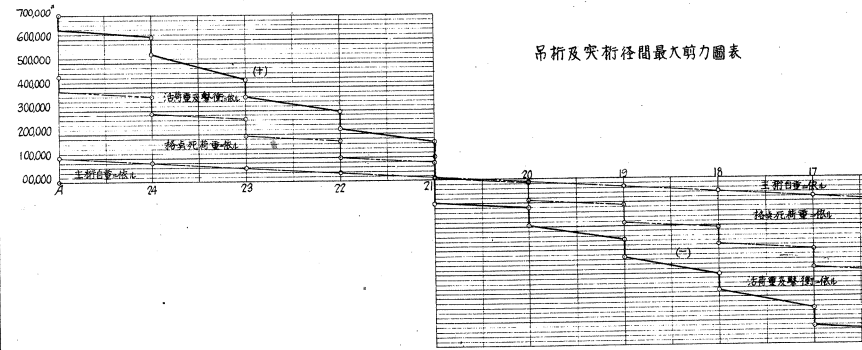


抵抗力率及線維應力表

Table with 7 columns: 桁架 (Truss), 彎曲力率 (Bending rate), 抵抗力率 (Resistance rate), 慣性原率 (Inertia rate), 最大線維壓力 (Maximum fiber stress), 最大線維壓力 (Maximum fiber stress). Rows include various truss types like 295, 285, 270, 260, 205, 200.



吊桁及突桁徑間最大剪力圖表



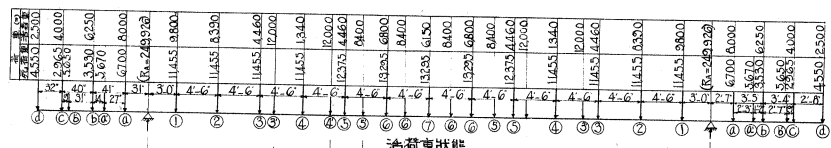
永代橋 吊桁及突桁徑間 主桁應力圖表

拱徑間床桁應力表圖

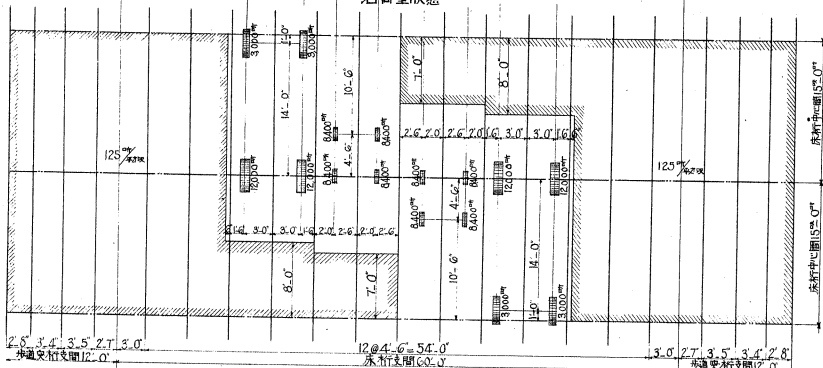
拱軸中心間 60°0' 路面橋高 32°0' 床桁支間 60°0'  
 床桁中心間 15°0' 車道橋高 15°0' 橋桁支間 15°0'  
 橋桁中心間 3°0' 步道橋高 (214°) 橋桁支間 4°0'  
 突桁中心間 15°0' 拱蓋鋼樑 4°0' 突桁支間 12°0'

死荷重	車道	橋蓋鋼樑	步道	a	b	c	d	e	f
現澆土	70%	4.725	30%	3.200	2.500	2.350	1.000		
鋼筋大塊	17%	1.750	200%	3.100	630	215	3000		
凹殼	15%	0.750		400	400	400	400		
床桁鋼材	(493%)	1.300	378%						
橋桁鋼材		2.000	310%						
橋蓋鋼材	51%	2.000	66.2%						
鋼筋	23%	0.230							
鋼筋	60%	3.600							
合計		11.445		6.700	3.330	2.650	4.550	3.670	5.650

\*11.445 (±13.295)



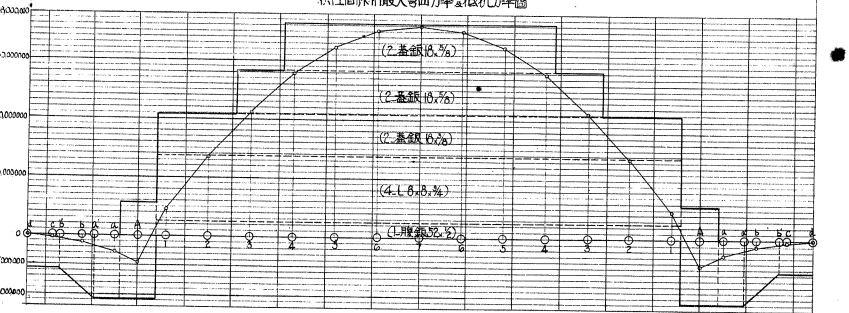
活荷重狀態



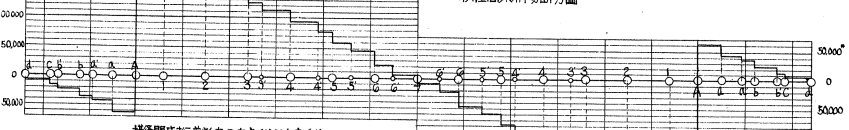
拱徑間床桁側面圖



拱徑間床桁最大彎曲力率、抵抗力率圖



拱徑間床桁剪斷力圖



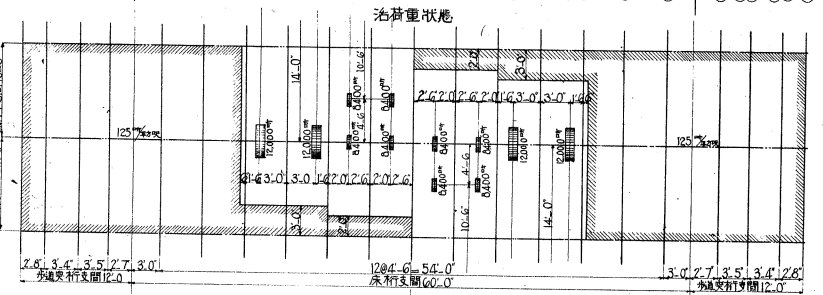
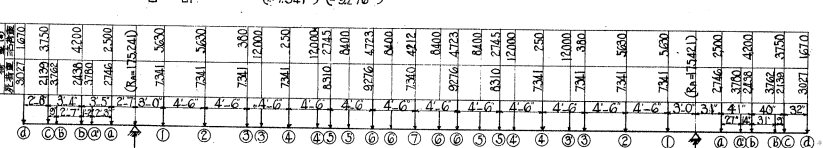
站號	死荷重	活荷重	鋼筋	鋼筋	合計
d	4.350	2.500	1.200		8.050
c	3.150	3.100	1.810		8.060
b	1.165	6.500	3.150		10.815
a	12.695	12.750	6.120		31.565
A	2.365	12.750	6.120		31.235
A	2.365	20.750	9.350		32.465
A	(10.720)	(9.875)	(4.285)		(24.880)
1	7.813	7.915	3.290		19.018
2	6.683	6.375	2.890		15.948
3	5.528	6.005	2.540		14.073
4	4.377	5.647	2.350		12.374
5	4.377	4.447	1.850		10.674
6	3.218	4.315	1.950		9.483
7	3.218	3.125	1.290		7.633
8	1.923	2.675	1.150		5.748
9	1.923	1.875	0.720		4.518
10	0.648	1.345	0.870		2.863
11	0.648	3.075	1.280		4.903

站號	死荷重	活荷重	鋼筋	鋼筋	合計
d	0	0	0		0
c	-14.600	-299.50	30.00		-384.10
b	-62.100	-339.70	-16.400		-418.20
a	-145.400	-664.00	-41.300		-850.70
A	-235.400	-1,306.00	-723.00		-1,364.40
A	-451.000	-2,848.50	-1,186.00		-2,985.50
1	4,037.000	6,892.20	2,750.00		13,679.20
2	7,037.000	9,882.30	4,120.00		21,039.30
3	9,040.000	12,503.20	5,290.00		26,833.20
4	11,145.000	14,613.50	6,025.00		31,783.50
5	12,222.000	15,802.00	6,520.00		34,544.00
6	12,565.000	16,170.00	6,680.00		35,415.00

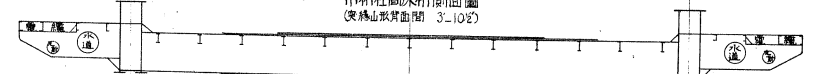
吊桁徑間床桁應力表圖

主桁中心間 60°0' 路面橋高 82°0' 床桁支間 60°0'  
 床桁中心間 10°0' 車道橋高 15°0' 橋桁支間 10°0'  
 橋桁中心間 5°0' 步道橋高 2.910' 橋桁支間 4°0'  
 突桁中心間 10°0' 主桁鋼樑 4°0' 突桁支間 12°0'

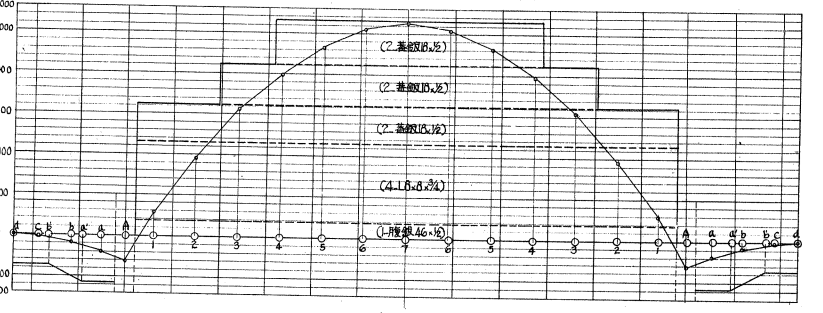
死荷重	車道	橋蓋鋼樑	步道	a	b	c	d	e	f
現澆土	70%	3.150	30%	2.450	1.690	1.500	665		
鋼筋大塊	17%	76.5	200%	223	373	416	2000		
凹殼	15%	76.5		223	373	223	223		
床桁鋼材	(450%)	2,060	378%						
橋桁鋼材		5,670	310%						
橋蓋鋼材	51%	5,070	66.2%						
鋼筋	23%	1,000							
鋼筋	60%	2,700							
合計		17,345		2,740	3,780	2,430	3,760	2,130	3,027



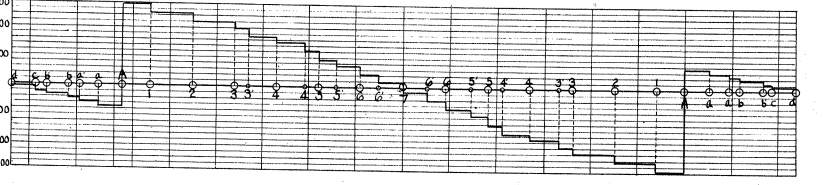
吊桁徑間床桁側面圖



吊桁徑間床桁最大彎曲力率、抵抗力率圖

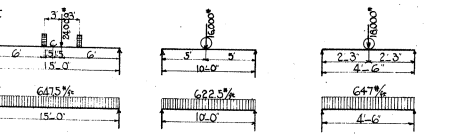
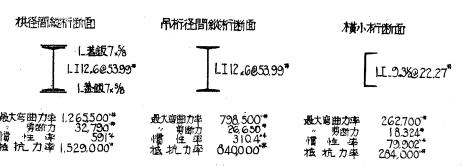
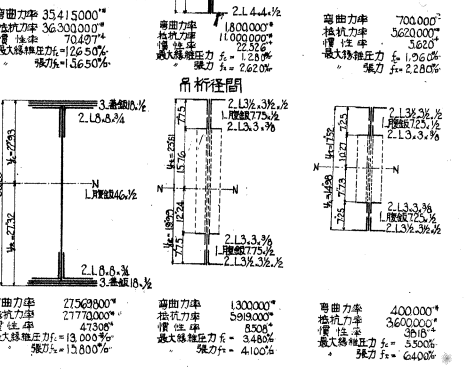
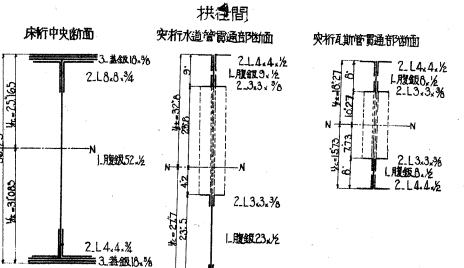


剪斷力圖

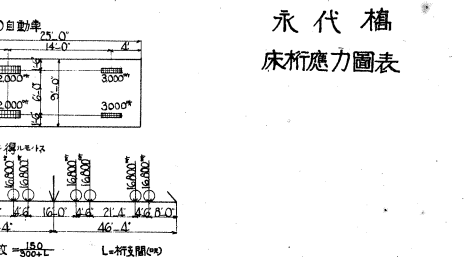


站號	死荷重	活荷重	鋼筋	鋼筋	合計
d	3.027	1.670	803		5,500
c	5.166	3,420	2,670		13,256
b	8.928	5,120	2,670		16,718
a	11.366	9,620	4,620		25,606
A	15.146	9,620	4,620		29,386
A	17.892	12,120	5,820		35,832
A	(68.512)	(74,840)	(31,750)		(174,602)
1	30.620	62,264	25,230		118,114
2	43.729	56,634	23,150		123,513
3	55,836	51,004	21,250		128,090
4	29,397	30,624	21,080		101,101
5	25,597	30,624	16,000		88,221
6	21,256	30,624	16,000		78,880
7	12,346	24,628	8,850		45,824
8	12,346	15,726	6,330		34,505
9	3,670	10,506	4,375		18,551
10	3,670	2,106	878		6,654

站號	死荷重	活荷重	鋼筋	鋼筋	合計
d	0	0	0		0
c	-68.800	-53.500	-25.700		-148.000
b	-419.700	-270.000	-129.600		-819.300
a	-865.500	-663.400	-318.400		-1,847.300
A	-1,546.800	-1,040.600	-493.500		-3,080.900
1	275.000	2,060.000	856.000		3,191.000
2	2,612.600	5,064.000	2,106.600		9,783.200
3	4,549.000	6,052.000	3,346.600		13,947.600
4	6,087.000	10,356.000	4,300.000		20,743.000
5	7,235.400	12,216.000	5,001.600		24,453.000
6	7,996.600	13,296.000	5,506.000		26,798.600
7	8,351.800	13,572.000	5,646.000		27,569.800



項目	數量	單位	價格	總計
水櫃	1	個	182.5	182.5
水櫃	1	個	66.24	66.24
水櫃	14	個	20.65	289.10
合計				734.24



永代橋 床桁應力圖表