## 7.4.2 PIER CIREBON AND SEMARANG SIDE

 $\chi_{i,i}^{(1)} \mapsto e^{-i i \phi_{i,i}}$ 

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Control .

## 1.1. DATA

### 4.1.1.EXISTING SUPERTRUCTURES

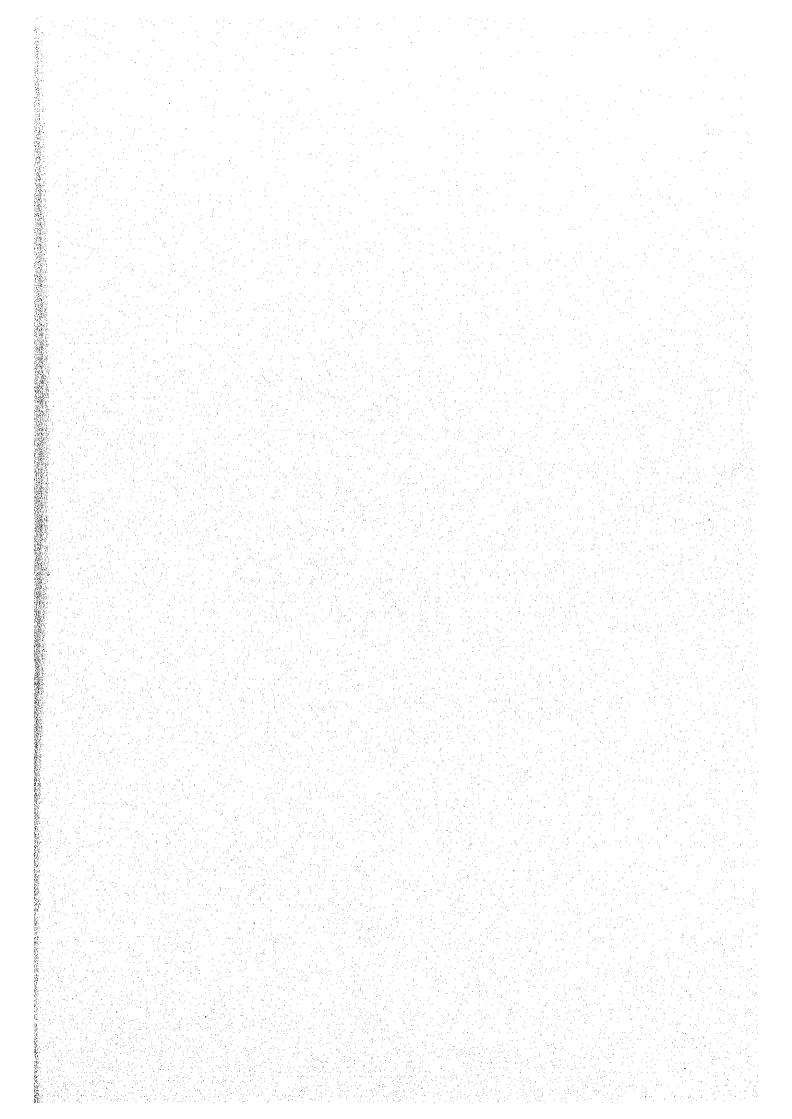
	LEFT SIDE	DIOUT OIDE
		RIGHT SIDE
- Туре	Truss	Truss
- Total Weight	67.00 ton-f	67.00 ton-f
- Effective Span (c.t.c.)	31.20 m	31.20 m
- Total Length of Stringer or Truss Girder	32.16 m	32.16 m
- Center to center of Main Girder	4.60 m	4.60 m
- Construction Depth	1,33 m	1.33 m
- Height of Shoe	0.32 m	0.32 m
- Distance between top of rall up to top of concrete		
bearing	1,65 m	1,65 m
- Distance between top of rall up to elevation of HWL	2.33 m	2.33 m

### 4.1.2.TRACK

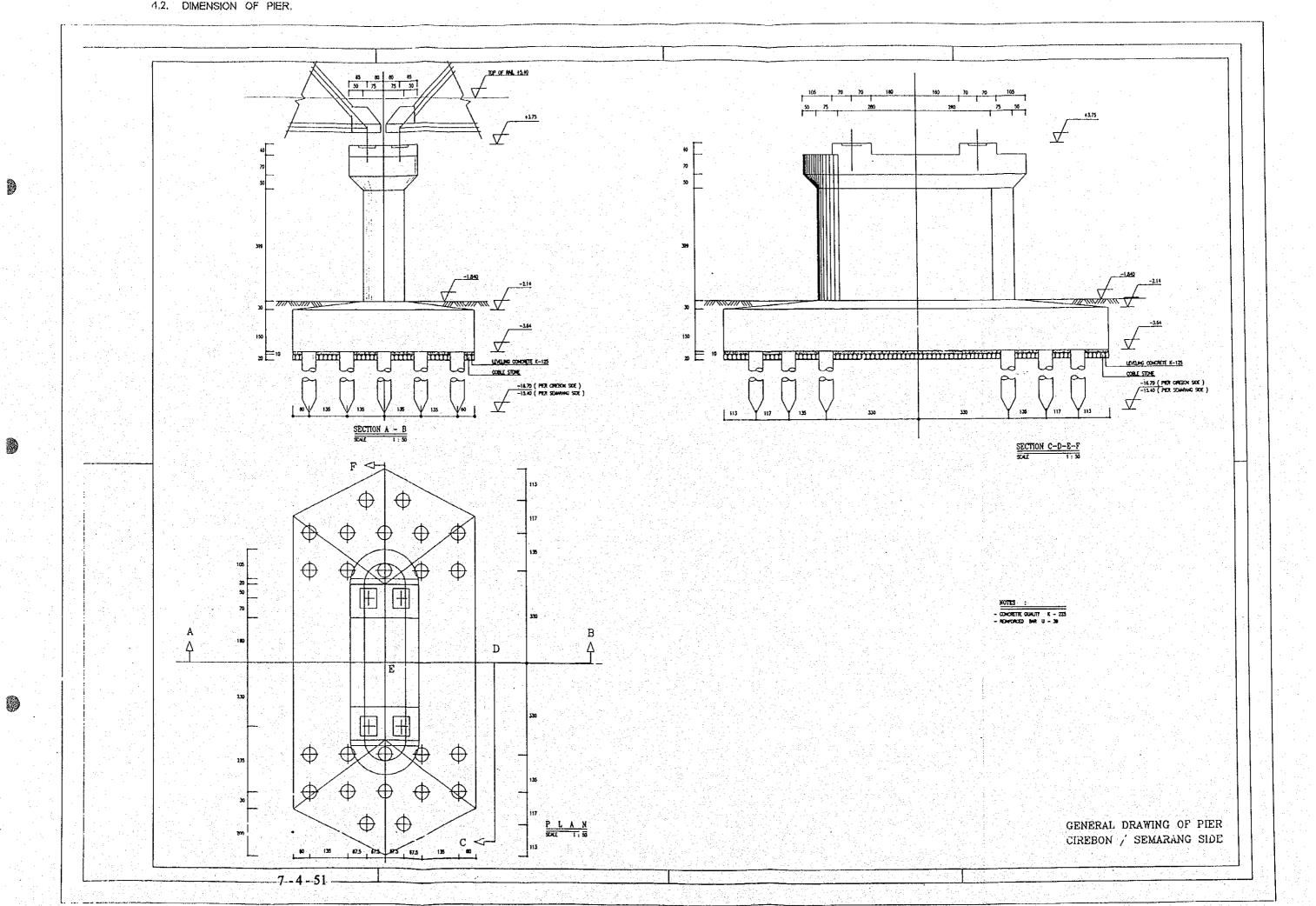
•	Track	Plan	an a	: straight		
-	Track	Elevation		Level		

### 4.1.3 LOADINGS

- Train Load (Live Load)	based on 100 % Load Scheme 1921.
- Impact	{0.2 + 25 / (L + 50) } x Train Load
- Longitudinal Load due to Long Rails	1.00 tf/m' (per one track) , but max. 200 tf.
- Brake Load	1/6 Locomotive + 1/10 Wagon
- Lateral Load	1/10 x Train Load
- Wind Load	0.10 tf/m2.
- Earth Pressure	based on Coulomb's Theory
- Stream Flow	based on the velocity of stream on HWL Condition
	based on the equivalent static force and design
	seismic intensity expressed as followings :
	KH = 0.18
	KV = 0.00

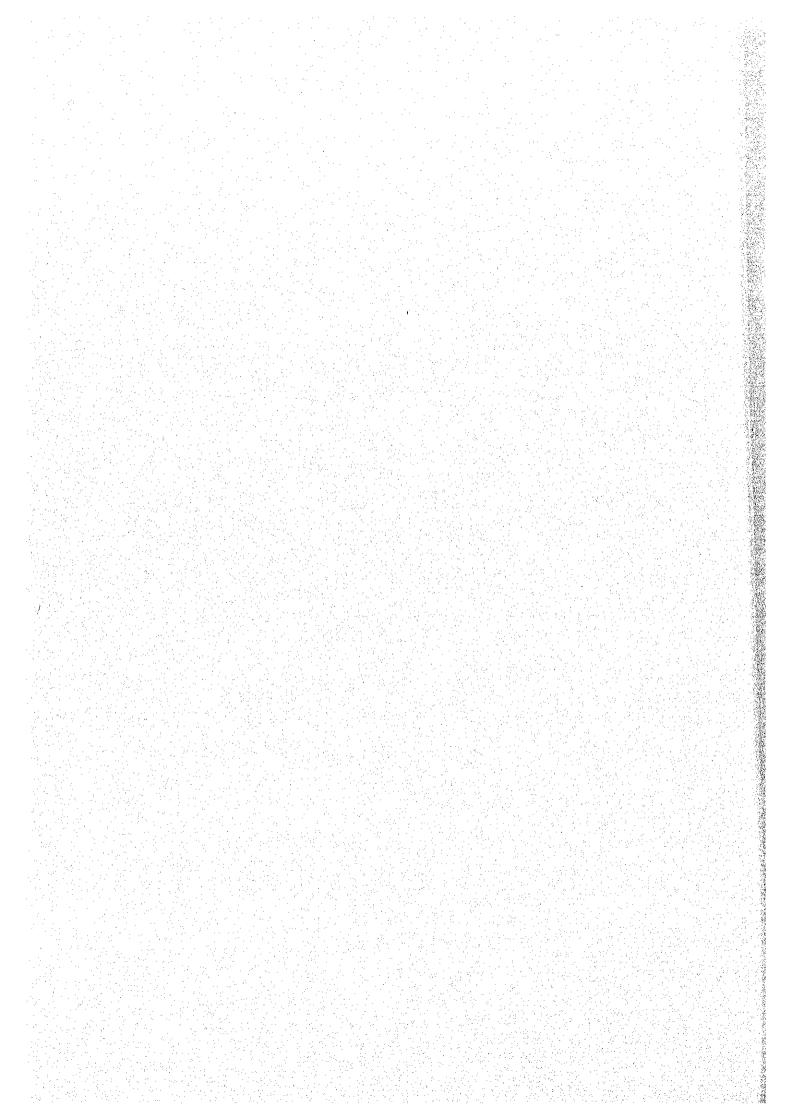


## 4.2. DIMENSION OF PIER,



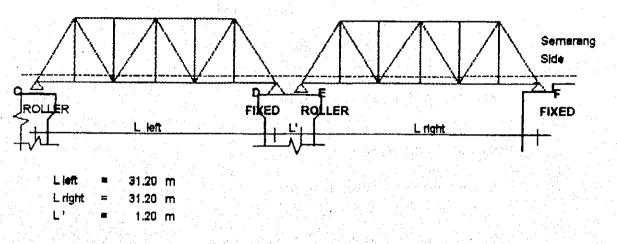
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### 4.3. LOADINGS

## 4.3.1. TRAIN ON BOTH SIDE OF PIER .



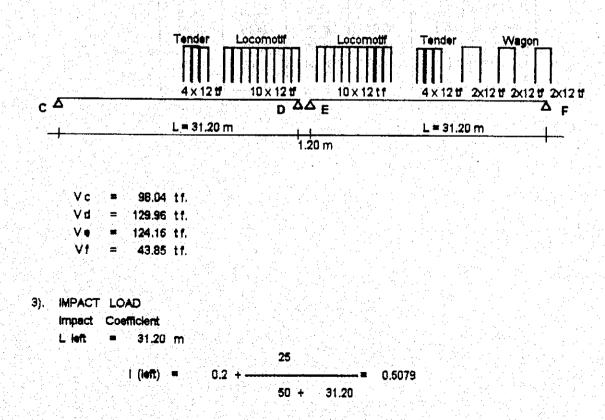
### a) VERTICAL FORCE.

1

3

). 👘	DE	Ð.	LOAD		
	١	/ c	=	33.50	tf.
	1	/d	=	33.50	tt.
÷.	۱ () ۱	0	=	33.50	tf.
499 B N	۱. ۱	V† .	#	33.50	tt. <sup>1</sup>
				1 N N	

## 2). TRIAN LOAD (LIVE LOAD)



Linght ≍ 31.20 m	L	right	×	31.20	m
------------------	---	-------	---	-------	---

•		l (right) =	0.2 + •	25			na Marat
		s (ngin) -	U, <u> </u>	50	+	31.20	0.5079
					<u>.</u>		
Vc	₽.	98.04 x	0.5079 =	49.79	tf.		
Vđ	. =	129.96 x	0.5079 =	66.00	tf.		
Ve	=	124.15 x	0.5079 =	63.05	ŧť.	n an Arran an Arran Arran an Arran	
Vf_	=	43.85 x	0.5079 =	22.27	- 14 C - 1		

#### 4). TRAIN LOAD FOR SEISMIC

	12.00			•	
<b>q</b> (	#	5.00 tf/	m'		
	2.40	•			1
٧c	= 5.00 (	31.20 +	1.20) x	0.5 = 81 t	•
Vd	= 5.00 (	31.20 +	1.20 ) x	0.5 = 81 t	
Ve	= 5.00 (	31.20 +	1.20) x	0.5 = 81.00 t	
Vt	= 5.00 (	<b>31.20</b> +	1.20)x	0.5 = 81.00 t	

SUMMARY DUE TO VERTICAL FORCE.

ITEMS	Vc [ton-f]	Vd [ton-f]	Ve [ton-f]	Vī [ton-ī]
Dead Loed [DL]	33.50	33.50	00.50	
Train Load [LL]	98.04	129.96	33.50 124.15	33.50 43.85
Impact []] Train Seismic [LL]	49,79 91.00	66.00 81.00	63.05 81.00	22.27 01.00
				01,00

32.16

```
b) LONGITUDINAL HORIZONTAL FORCE
   1). DEAD LOAD + LONG RAIL LOAD
       1) SPAN C-D
         TOTAL HORIZONTAL FORCE
              ΣH
                          32.16 X
                                 1.00 = 32.16 tf
                       .
         HORIZONTAL FORCE ON SUPPORTING D
              Ηđ
                          ΣH - 1/2 x μ x Vc
                       .
                           32.16 -
                       =
                                    0.5 x 0.10 x
                                                     33.50
                          30.49 tf
                                    5
                                            1/2 X
                                                     32.16 = 16.08 tf
              therefore
              Ηđ
                          30.49 tf
         VERTICAL FORCE ON SUPPORTING D
                          -32.16 x
                                    1.65
              Vđ
                                                     -1.70 tf
                                   31.20
       2) SPAN E-F
        TOTAL HORIZONTAL FORCE
             ΣН
                          32.16 x 1.00 = 32.15 tf
        HORIZONTAL FORCE ON SUPPORTING E
              Нe
                      æ
                           Ve
                           0.10 X
                                   33.50
                           3.35 tf
                                   <
                                            1/2
                                                    32.16 =
                                                             16.08 tf
                                                 ¥
             therefore
              Η•
                           3.35 tf
                      .
        VERTICAL FORCE ON SUPPORTING E
                          32.16 x
                                    1.65
             Ý. •
                                                     1.70 .tf
                                   31.20
  2). LONG RAIL LOAD + BRAKE LOAD
      1) SPAN C-D
        TOTAL HORIZONTAL FORCE
             ΣН
                                   12.00 x 0.1000 + 14 x 12.00 x 0.1667 +
                      ×
                             5 X
                          66.16 tf
                      =
        HORIZONTAL FORCE ON SUPPORTING D
```

(

```
Hd
            ΣH - 1/2 × μ × Vc
         .
            66.16 + 0.5 x 0.10 x (
         =
                                       33.50 +
                                                98.04
                            1/2 X
                    ° 🗲 💡
        -
            59.58 tf
                                       66.16 =
                                                33.08 tf
therefore
Ηđ
        = 59,583 tf
```

(

```
VERTICAL FORCE ON SUPPORTING D.
                      -66.16 x
                               1.65
          ٧đ
                                                -3.50 tf
                   .
                               31.20
   2) SPAN E-F
     TOTAL HORIZONTAL FORCE
                       14 x
                               12.00 x 0.1667 + 32.16 = 60.16 tf
          ΣН
                  Ξ
     HORIZONTAL FORCE ON SUPPORTING E
          Нe
                  E
                       µ X Vé
                     0.10 \times (33.50 + 124.15)
                      15.77 tf < 1/2 x 60.16 = 30.08 tf
          therefore
                 = 15.77 tf
          Ηø
     VERTICAL FORCE ON SUPPORTING E
                      60.16 x
                               1.65
          V.
                                           = 3.17 tf
                   ≠.
                               31.20
3). TRAIN LOAD + LONG RAIL LOAD
    1) SPAN C-D
     TOTAL HORIZONTAL FORCE
          ΣН
                   = 32.16 x 1.00 = 32.16 tf
     HORIZONTAL FORCE ON SUPPORTING D
                   = ΣH - 1/2 x μ x Vc
          Ηď
                               0.5 x 0.10 x ( 33.50 + 98.04 )
                      32.16 -
                   =
                                     1/2 X
                      25,58 tf >
                                                32.16 = 16.08 tf
          therefore
          Ηđ
                      25,58 tf
                  =
     VERTICAL FORCE ON SUPPORTING D
                              1.65
                      -32.16° ×°
          ٧d
                                                -1.70 tf
                   2
                               31.20
   2) SPAN E-F
     TOTAL HORIZONTAL FORCE
          ΣH
                  = 32.16 x 1.00 = 32.16 tf
     HORIZONTAL FORCE ON SUPPORTING E
          Hŧ
                       μ
                           X ∵V∎
                       0.10 x ( 33.50 + 124.15 )
                      15.77 tf
                              <
                                      1/2 × 32.16 = 16.08 tf
          therefore
          H♦
                      15.77 tf
```

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VERTICAL FORCE ON SUPPORTING E 32.16 x 1.65 1.70 tf ٧ŧ 31.20 4). DEAD LOAD FOR SEISMIC LOAD 1) SPAN C-D TOTAL HORIZONTAL FORCE ΣН = 33.50 x 2 x 0.18 = 12.06 tf HORIZONTAL FORCE ON SUPPORTING D  $= \Sigma H - 1/2 \times \mu \times Vc$ Нd 12.06 - 0.5 x 0.10 x . 33.50 10.39 tf > 1/2 x 12.06 = 6.03 tf = therefore = 10.39 tf Ηđ VERTICAL FORCE ON SUPPORTING D -12.06 X 1.65 ٧d = -0.64 tf 31.20 2) SPAN E-F TOTAL HORIZONTAL FORCE  $\Sigma$  H = 33.50 x 2 x 0.18 = 12.06 tf HORIZONTAL FORCE ON SUPPORTING E і <u>µ</u> (Х. V. H€ . 0.10 × 33.50 . = 3,35 tf < 1/2 x 12.06 = 6.03 tf therefore = 3.35 tf Hbe VERTICAL FORCE ON SUPPORTING E 12.06 x 1.65 Ve = 0.64 tf **=** . 31.20 5). DEAD LOAD + TRAIN LOAD FOR SEISMIC LOAD 1) SPAN C-D TOTAL HORIZONTAL FORCE ΣH = ( 33.50 + 81 )x 2 x 0.18 = 41.22 tf HORIZONTAL FORCE ON SUPPORTING D Hď = ΣH = 1/2 x μ x Vc -41.22 - 0.5 × 0.10 × ( 33.50 + 81 ) **≖**⊳\_\_} 1/2 x 41.22 = 20.61 tf 35.50 tf > therefore Hb d = 35.50 tf

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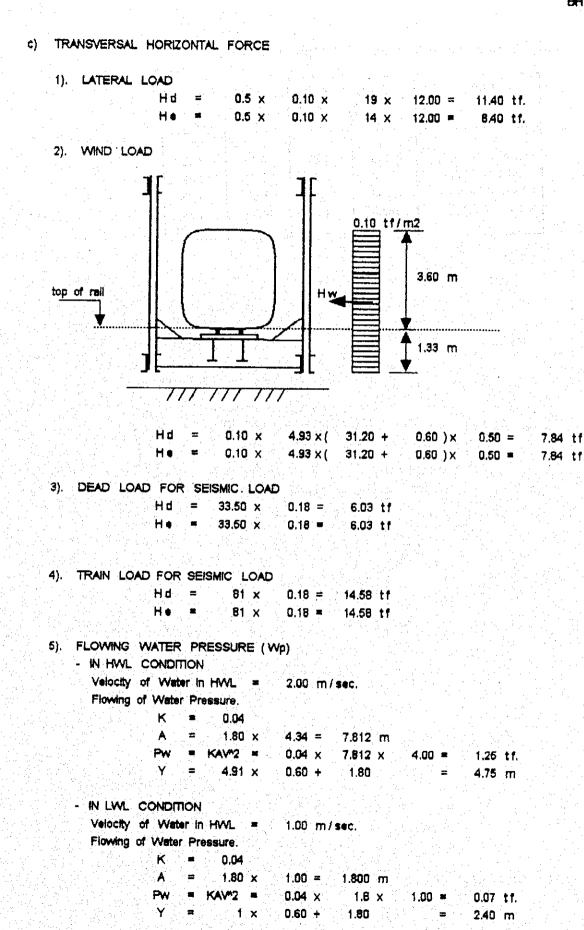
Vd	· =				-2.18 tf	· · · ·
			31.20			
SPAN E-F				e finanzi a		
TOTAL HORIZ	ONTAL	FORCE	n an	ан 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 - 1911 -		
ΣH	<b>=</b> ( 1	33,50 +	81.00)x	2 x	0.18 =	41.22 t
HORIZONTAL   H e	. <b></b> v	μχ	and the second			
therefore		11.45 tf		1/2 x	41.22 =	20.61 t
de la seconda de la second	,			1/2 ×	41.22 =	20.61 t

31.20

2.17 tf

ITEMS	Supp	ort D	Support E		
	H [ton-f]	V [ton-f]	H [ton-f]	V [ton-f]	
Long Rail [DL]	30.49	-1.70	3,35	1.70	
Long [DL] + Brake [B]	59.68	-3.50	16.77	3,17	
Long Rail [LL]	25.58	-1.70	15.77	1.70	
Seismic [DL]	10.39	-0.64	3.35	0.64	
Seismic [DL+LL]	35.50	-2.18	11.45	2.17	

SUMMARY DUE TO LONGITUDINAL HORIZONTAL FORCE



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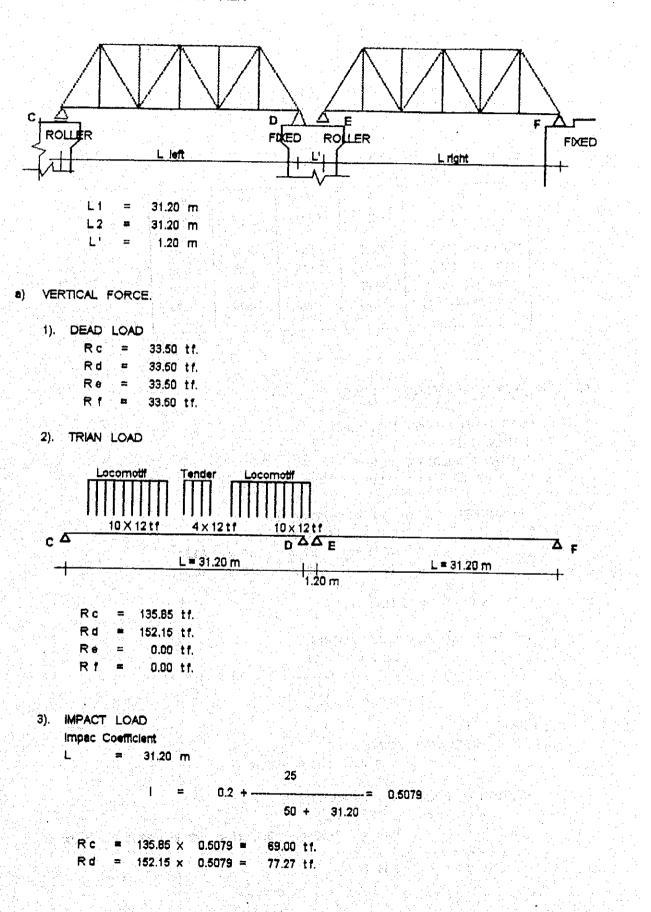
SUMMARY DUE	то	TRANS	ERSAL	HORI	ZONT	NL.	FOR	CE	
	· · · · ·					:			•

ITEMS	Support D		Support E		
	н	Y	Н	V	
	[ton-f]	[m]	[ton-f]	[m]	
Lateral Load [L1]	11.40	1.65	8.40	1.65	
Wind Load [W]	7.84	2.79	7.84	2.79	
Selamic [DL]	6.03	1.65	6.03	1.65	
Seismic [LL]	14.58	1.65	14.58	1.65	
			e e Victoria de la composición de la co		

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## 4.3.2. TRAIN ON THE LEFT SIDE OF PIER



## 4). TRAIN LOAD FOR SEISMIC

	12.00			÷	
9	2	5.00 tf/m'		·	
- 19 - 19 - 19 - 19 - 19 - 19 - 19 - 19	2.40			a a grain Airtíochta	
e fa fa					
Ra	= 5.00 (	31.20 +	1.2)x 0.5	≊ (4. 5 28 - 204	tf.
Rb		and the second se	1.2)x 0.5		tf.
· · · ·					

SUMMARY DUE TO VERTICAL FORCE.

ITEMS	Vc [ton-f]	Vd [ton-f]	Ve [ton-f]	Vf [ton-f]
Dead Load [DL]	33.50	33.50	33.50	33,50
Train Load [11]	135,85	152.15	0.00	0.00
Impact [1]	69.00	77.27	0.00	0.00
Train Seismic [LL]	81.00	81.00	0.00	0.00
				-194

b). LONGITUDINAL HORIZONTAL FORCE

```
1). DEAD LOAD + LONG RAIL LOAD

2) SPAN C - D

TOTAL HORIZONTAL FORCE

\Sigma H = 32.16 x 1.00 = 32.16 tf

HORIZONTAL FORCE ON SUPPORTING D

Hd = \Sigma H = 1/2 x H \times Pe
```

```
He = \Sigma H - 1/2 x \mu x Rc
= 32.16 - 0.5 x 0.10 x 33.50
= 30.43 tf > 1/2 x 32.16 = 16.08 tf
therefore
He = 30.49 tf
```

```
VERTICAL FORCE ON SUPPORTING D
-32.16 x 1.65
```

```
31.20
```

```
*) SPAN E-F
```

```
TOTAL HORIZONTAL FORCE
```

 $\Sigma$  H = 32.16 x 1.00 = 32.16 tf

```
HORIZONTAL FORCE ON SUPPORTING E
```

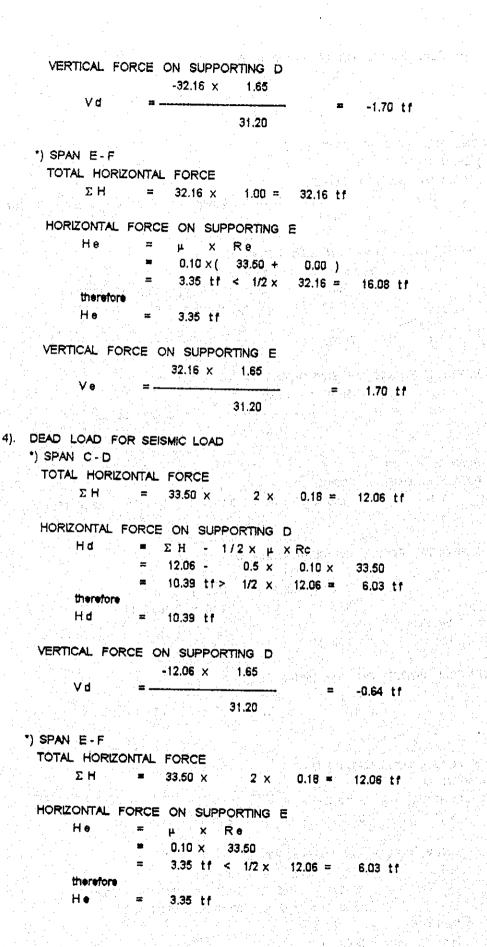
```
H♦ () = µ X R♦
```

```
= 0.10 \times 33.50 = 3.35 \text{ tf} < 1/2 \times 32.16 = 16.08 \text{ tf}
therefore
H = 3.35 \text{ tf}
```

-1.70 ťť

VERTICAL FORCE ON SUPPORTING E 32.16 x 1.65 V. 1.70 tf 31.20 2). LONG RAIL LOAD + BRAKE LOAD \*) SPAN C-D TOTAL HORIZONTAL FORCE ΣН = 0 x 12.00 x 0.1000 + 24 x 12.00 x 0.1667 + 32.16 ₽ 80.16 tr HORIZONTAL FORCE ON SUPPORTING D =  $\Sigma H - 1/2 \times \mu \times Rc$ = 80.16 - 0.5 × 0.10 × ( 33.50 + 135.85 ) Ηd 71.69 tf > 1/2 x 80.16 = 40.08 tf therefore Нd = 71.693 tf VERTICAL FORCE ON SUPPORTING D -80.16 × 1.65 Vd. Ξ. = -4.24 tf 31.20 \*) SPAN E-F TOTAL HORIZONTAL FORCE  $\Sigma$  H = 0.00 x 0.00 x 0.1667 + 32.16 = 32.16 tf HORIZONTAL FORCE ON SUPPORTING E H• **x** 2.1 µ X R● 0.10 × ( 33.60 + 0.00 ) 3.35 tf < 1/2 x 32.16 = 16.08 tf therefore He 3.35 tf = VERTICAL FORCE ON SUPPORTING E 32.16 x 1,65 Ve = \_\_\_\_ 1.70 tf = 31.20 3). TRAIN LOAD + LONG RAIL LOAD \*) SPAN C-D TOTAL HORIZONTAL FORCE ΣΗ = 32.16 x 1.00 = 32.16 tf HORIZONTAL FORCE ON SUPPORTING D = ΣH - 1/2 X μ X Rc Ηđ = 32.16 -0.5 x 0.10 x ( 33.50 + 135.85 ) = 23.65 tf > 1/2 x 32.16 = 16.08 tf therefore Hd = 23.69 tf

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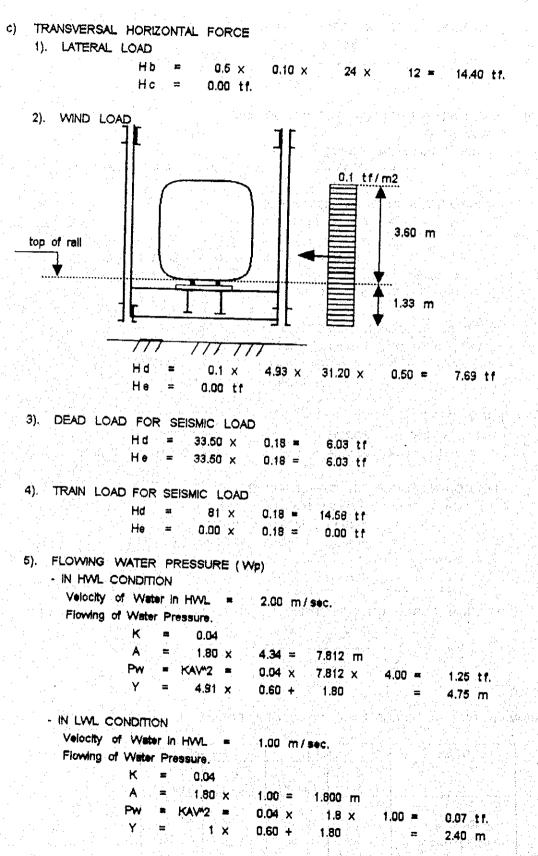
VERTICAL FORCE ON SUPPORTING E 12.06 x 1.65 ٧ŧ 0.64 tf 31.20 DEAD LOAD + TRAIN LOAD FOR SEISMIC LOAD \*) SPAN C-D TOTAL HORIZONTAL FORCE  $\Sigma H = (33.50 + 81) \times 2 \times 0.18 = 41.22 \text{ tf}$ HORIZONTAL FORCE ON SUPPORTING D Hd = ΣH - 1/2 X μ X Rc = 41.22 - 0.5 x 0.10 x ( 33.50 + 81) 35.50 tf > 1/2 × 41.22 = 20.61 tf therefore = 35.50 tf Hd Star VERTICAL FORCE ON SUPPORTING D -41.22 x 1.65 V d 🔅 = -2.18 tf 31.20 \*) SPAN E-F TOTAL HORIZONTAL FORCE  $\Sigma$  H =( 33.50 + 0.00) × 2 × 0.18 = 12.06 tf HORIZONTAL FORCE ON SUPPORTING E H∎≐ . µ X R€ 0.10 x ( 33.50 + 0.00 ) 3.35 tf < 1/2 x 12.06 = 6.03 tf meretore = 3.35 ff He VERTICAL FORCE ON SUPPORTING E 12.06 X 1,65 Ve :: = 0.64 tf 31.20

5).

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SUMMARY DUE TO LONGITUDINAL HORIZONTAL FORCE

ITEMS	Supp	ort D	Support E		
	H [ton-f]	V [ton-f]	H [ton-f]	(ton-f)	
Long Rell [DL]	30.49	-1.70	3.35	1.70	
Long [DL] + Brake [B]	71,69	-4.24	3,35	1,70	
Long Rell [LL]	23.69	-1.70	3.35	1.70	
Seismic [DL]	10.39	-0.64	3.35	0.64	
Seismic [DL+LL]	35,50	-2.18	3.35	0.64	



#### ITEMS Support D Support E Н Н y У [ton-f] [m] [ton-f] [m] Lateral Load [Lf] 14.40 1.65 0.00 1.65 Wind Load [W] 7.69 2.79 0.00 2.79 Selamic [DL] 6.03 1.65 6.03 1.65 Selsmic [LL] 14.58 1.65 0.00 1.65

# SUMMARY DUE TO TRANSVERSAL HORIZONTAL FORCE

STABILITY CALCULATION.

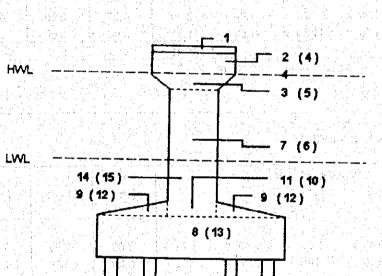
4.4.1. SKETCH

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## 4.4.1. WEIGHT OF PIER IN LWL CONDITION

item		W	light of f	Pier		×	MX	° ∦y	My
			[11]			[m]	[tf-m]	[m]	[tf-m]
	Concrete							and the second second	<u> </u>
- 1	2.50 x	0.40 x	2.80	x 2.40	= 6.72	0.00	0.00	7.19	48.32
2	2.50 x	0.70 x	5.60	x 2.40	= 23.52	0.00	0.00	6.64	156.17
3	2.00 ×	0.50 x	5.60	x 2.40	= 13.44	0.00	0.00	6.04	81.18
4	0.79 x	6.25 X	0.70	x 2.40	= 8.25	0.00	0.00	6.64	54.78
5	0.79 x	4.00 x	0.50	× 2.40	= 3.77	0,00	0.00	6.04	22.78
6	0.79 ×	2.25 x	4.29	× 2,40	= 18,20	0.00	0.00	3.65	66.35
7	1,50 x	4.29 x	5.60	x 2.40	= 86.49	0.00	0.00	4.65	401.73
8	6.60 x	1.50 x	11.30	x 2.40	= 268.49	0.00	0.00	0.75	201.37
9	2.55 x	0.30 x	8.25	× 2.40	= 15.15	0.00	0.00	1.65	24.99
10	6.60 x	0.30 x	3.35.)	x 2.40	= 15.92	0.80	0.00	1.65	26.27
	Load caused	i by buoya	ncy						
-11	6.60 ×	0.30 x	3.35 >	< -1.00	-6,63	0.00	0.00	1.65	-10.94
12	2,55 ×	0.30 x	8.25 >	< -1.00	-6.31	0.00	0.00	1.65	-10.41
13	1.50 X	1.30 x	5.60 >	< -1.00	-10.92	0.00	0.00	2.15	-23,48
14	0.79 x	1.30 x	2.25 >	< -1.00	-2.30	0.00	0.00	2.15	-4.94
15	6.60 X	1.50 x	11.30 >	< -1.00	-111.87	0.00	0.00	0.75	-83,90
	Total				321.91		0.00		950.25
ан. Алар			X ª	0.00		· · · · · · · · · · · · · ·		Sec. 1	
			Y =	2.95	9				

4.4.2. WEIGHT OF PIER IN HWL CONDITION

item .			a Norden ann an Airtíne An Airtíne	Wel	ght of	Pier	t in the			ulie <b>x</b> aejej	Mx	<b>y</b> 14	My
					[tf]			: (		[m]	[tf-m]	[m]	[tf-m]
				1.1									
1	2.50	×	0.40	x	2.80	×	2.40	=	6.72	0.00	0.00	7.19	48.32
2	2.50	×	0.70	X	5.60	X	2.40	×	23.52	0.00	0.00	6.64	156.17
3	2.00	Χ.	0.50	X	5.60	X.	1.40	=	7.84	0.00	0.00	6.04	47.35
4	0,79	X	6.25	X	0.70	x	1.40	#	4.81	0.00	0.00	6.64	31.96
5	0.79	x	4.00	X	0.50	×	1.40	×	2.20	0.00	0.00	6.04	13.29
5	0.79	X	2.25	X	4.29	×.	1.40		18.62	0.00	0.00	3.65	38.70
7	1.50	X	4.29	X	5.60	×	1.40	=	50.45	0.00	0.00	4,65	234.34
8	6.60	X	1.50	X	11.30	×	1.40	Ħ	156.62	0.00	0.00	0.75	117.46
9	2.55	X	0.30	X	8.25	X	1.40	=	8.84	0.00	0.00	1.65	14.58
10	6.60	X	0.30	X	3,35	X	1.40	3	9.29	0.00	0.00	1.65	15.32
		· · ·			t ke		e l'agente.						
:	Total				<u>at di site</u>	:			280.90		0.00		717.49
		Ż											
<sup>1</sup> .	la da ser	ан 1997 - Эл			X	<b>#</b>	0.00	m					

2.55 m

## 4.4.3. LOAD COMBINATION

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## A. IN LWL CONDITION

## A.1. TRAIN ON BOTH SIDE OF PIER

- a). IN LONGITUDINAL DIRECTION
  - 1) Dead Load + Train Load + Earth Pressure

ITEMS	Tv		1 14	- <u>r</u>	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	ι.
		×	M	H	E Y	M
	[tf]	[m]	[ <b>#</b> -m]	[t]	[m]	[#-m]
					ļ	
Vd [DL]	33.50	0.60	20.10			
Vd [LL]	129.96	0.60	77.98		× 1 1	
Ve [DL]	33.50	-0.60	-20,10			
V•[LL]	124.15	-0.60	-74.49			
He				0.00	7.39	0.00
He				0.00	7.39	0.00
Sub- total	321.11		3.49	0.00	- 7,03	0.00
W [pier]	321.91	<u>8 00</u>	0.00			0.00
TOTAL	643.02		3.49			
			n an Air An			
	Σ	M =	3.49 tf-	m		
	Σ	¥ =	643.02 tf			
	Σ	Η =	0.00 tf			
		ð	MINE	0.01 m		

2) Dead Load + Train Load + Impact + Earth Pressure

ITEMS	(t†)	x [m]	M [tf-m]	H [t]	y [m]	M [#-m]
Vd [DL]	33.50	0.60	20,10			
ля [Π] р.	129.96	0.60	77.98			
A4[1]	66.00	0.60	39.60			
/e [DL]	33.50	-0.60	-20.10			
/•[止]	124.15	-0.60	-74,49			
/e[[]]	63.05	-0.60	-37,83			
Hđ				0.00	7.39	0.00
He				0.00	7.39	0.00
Sub-total	450.17		5.26	0.00		0.00
∧ [pier]	321.91	0.00	0.00			0.00
otel	772.08		5.26			
						<u> </u>
	Σ	M =	5.26 tf	• m <sup>ala</sup>		
· · · · · · · · · · · · · · · · · · ·	Σ	¥=	772.08 tf			
	Σ	H =	0.00 tf			
		8 =	M/N =	0.01 m		
				an a		

3) Dead Load + Earth Pressure + Long Rall Load [ DL]

F	· · · · · · · · · · · · · · · · · · ·				e de la composition de	
ITEMS	V [tf]	x [m]	M [#-m]	H [t]	<b>y</b> [m]	M [#-m]
Vd [DL] Vd [LL] Ve [DL] Ve [LL] Vd [Lr] Vd [Lr] Hd [Lr] He [Lr]	33.50 0.00 33.50 0.00 -1.70 1.70	0.60 0.60 -0.60 -0.60 0.60 -0.60	20.10 0.00 -20.10 0.00 -1.02 -1.02	30.49 3.35	7.39 7.39	225.28 24.76
Sub- total W [pier] TOTAL	66.99 321.91 389.91	0.00	-2.04 0.00 -2.04	33.84		250.04
	Σ	M =	248.00 tf- 388.91 tf	m		

= M/N = 0.64 m

33,84 tf

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	۰,	- 1		1911	

4) Dead Load + Train Load + Earth Pressure + Long Rall Load [LL]

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ITEMS	V	X	1 14	1		
and the second sec			M	H	y i	M
	[[1]]	[m]	[ <b>ʊ</b> -m]	[t]	[m]	[ <b>tf-</b> m]
Vd [DL]	33.60	0.00			المراجعة المراجعين ا مراجع المراجع ال	
Vd [LL]	129.96	0.60	20.10			
V• [DL]	33.50	0.60	77.98			
Ve [LL]	124.15	-0.60	-20.10	3		
Vd [Lr]	-1.70	-0.60	-74.49			
Ve [۲]	1.70	0.60	-1.02			
Holuj		-0.60	-1.02			
Hall				25,58	7.39	189.06
	321.10		4.40	15.77	7.39	116.50
	321.91	0.00	1.45	41.35		305,56
	543.02	0.00	0.00			
			1.45			
	Σ	м "	307.01 tf-			
	1 (A. 4)	V 2 =	643.02 tf			
	Σ	1	41.35 tf			
			M/N =	0.48 m		

M/N =

0.87 m

= 556.31 tf-m = 642.69 tf = 75.35 tf

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		[m]	[ <b>t</b> -m]	[t]	[m]	[#-m]
	an a					
Vd [DL]	33.50	0.60	20.10			
Aq [TT]	129.96	0,60	77,98			
Ve [DL]	33.50	-0,60	-20.10		an a	
V• [LL]	124.15	-0,60	-74.49			
Vq [L +8]	-3.50	0.60	-2.10			
V • [Lr + B]	3.17	-0.60	-1.90			
Hd [Lr + 8 ]				59.58	7.39	440.32
H + [Lr + B ]	gen an An Grand			15.77	7.39	116.50
Sub-total	320.78		-0.52	75.35		556.82
W [pier]	321,91	0.00	0.00			000.02
TOTAL	642.69		-0.52			

6) Dead Load + Train Load + Brake Load + Long Rail Load + Earth Pressure

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M

ITEMS	V	X	M	н	y	M
	[t1]	[m]	[ <b>U</b> -m]	[t]	[m]	[₩-m]
						1
Vd [DL]	33.50	0.60	20.10	and the second		
Vq [LT]	129.96	0.60	77.98			
Aq [1]	66.00	0.60	39.60			
V• [DL]	33.50	-0.60	-20.10			
Vө [Ц]	124.15	-0,60	-74.49			
V•[[]]	63.05	-0.60	-37.83			
Vd [L <sup>-</sup> ]	-1.70	0.60	-1.02			
Ver[Lin]	1,70	-0.60	-1.02			
на [г. ј 🔤			1,	25.58	7 30	400.00
Н• [Lr.]					7.39	189.06
Sub- total	450.16		3.22	16.77	7.39	116.50
W [pier]	321.91	0.00	0.00	41.35		305.56
TOTAL	772.07	0.00	······································			
101/12	112.01		3.22			
	~					
	and a second second	M =		<b>m</b>		
	Σ	1	772.07 tf		an an an an an an Agustaí an an	en e
	Σ	H =	41.35 tf			
			ann an seachtair An Staith Mis			
		⊜ =	M/N =	0.40 m	anta anta da seria. Ata de la contra de	

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5) Dead Load + Train Load + Impact + Earth Pressure + Long Rail Load [LL]

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7) Dead Load + Train Load + Impact + Brake Load + Long Rall Load + Earth Pressure

ITEMS	V	×	M	н	y y	M
	[tf]	[m]	[世-m]	[t]	[m]	[#-m]
			+	<u> </u>		
Aq [DF]	33,50	0.60	20.10			
Vd [LL]	129.96	0.60	77.98			
∨₫[[[]]::::	66.00	0.60	39.60			
Ve [DL]	33.50	-0.60	-20.10			
Ve[∐]	124.15	-0.60	-74.49			
V • [ [ ] ]	63.05	-0.60	-37.83			
Vd [Lr +B]	-3.50	0.60	-2.10			
Ve [Lr +B]	3.17	-0.60	-1.90			
Hq [[t +B]				59.58	7.39	440.32
He[L+B]				15.77	7.39	116.50
Sub-total	449.84		1.25	75.35		556.82
N [pler]	321.91	0.00	0.00			
TOTAL	771.75		1.25		an a tha a tha sta tha an tha sta	
	Σ	M ( =	558.08 tf	- <b>m</b>		
	Σ	V	771.75 tt			
	Σ	H =	75.35 tf			
		θ **** ₩	M/N =	0.72 m		

8) Dead Load + Earth Pressure + Selsmic [DL]

ITEMS	V [t†]	x [m]	M [t/m]	H [t]	y [m]	M [#-m]
Vd [DL]	33.50	0.60	20.10			
Vd [LL]	0.00	0.60	0.00			
Ve [DL]	33.50	-0.60	-20.10			
V● [Щ]	0.00	-0.60	0.00			
Vd [Eq ]	-0.64	0.60	-0.38			
V● [Eq ]	8.64	-0.60	-0.38			
Hd [Eq]				10.39	7.39	70 78
H 🛊 [Eq ]				3.35	7.39	76.75
Sub- total	67.00		-0.76	13.74	1.99	24.76
W [pler]	321.91	0.00	0.00	57.94	1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 -	101.50
TOTAL	388.91		-0.76	71.68	2.95	171.04
			<u> </u>		L	272.55
	Σ	M =	271.78 tf-	m		
	Σ	V at s	388.91 tt			
	Σ	H =	71.68 tf	44 위 41 년 1987년 - 1987년 1987년 - 1987년 - 1987년 - 1987년 1987년 - 1987년 - 1987년 1987년 - 1987년 - 1987년 - 1987년 - 1987년 1987년 - 1987년 - 1987년 - 1987년 - 1987년 1987년 - 1987년 - 1987년 - 1987년 - 1987년 - 1987년 - 1987년 1987년 - 1987년		
		ê =	M/N =	0.70 m		
dha sha berdan		later of p			an an State and State State and State and St	

9) Dead Load + Earth Pressure + Seismic [LL]

ITEMS	V	×	M	н	y y	÷ M
	[tf]	[m]	[#-m]	[t]	[ <b>m</b> ]	[#-m]
				1	· · · · · · · · · · · · · · · · · · ·	
Vd [DL]	33.50	0.60	20.10			i
Va [LL]	81.00	0.60	48.60			
Ve [DL]	33.50	-0.60	-20.10			
V ө [Ц]]	81.00	-0.60	-48.60			
Vd [Eq ]	-2.18	0.60	-1.31		1.00	
V • [Eq ]	2.17	-0,60	-1,30			
Hd [Eq. ]				35.50	7.39	262.31
He [Eq ]				11.45	7,39	84.62
Sub-total	228.99		-2.61	46.95		346.92
N [pler]	321.91	0.00	0.00	57.94	2.95	171.04
TOTAL	550.90		-2.61	104.89	2.30	517.97
	Σ	M 👘 💻	515.36 tr	- m		
	Σ	V =	550.90 tf			
	Σ	H =	104.89 tf			
	en e	8 =	M/N =	0.94 m	an a	

b). IN TRANVERSAL DIRECTION

(dave)

· · · . #]	riesa	L080 +	Train	Load +	moact	+ Lateral	Load	4 Wind	lòàd	i Ea	arth Pressu	
3 C 1 C	1. N. M. M. L.		1 A A A A A A A A A A A A A A A A A A A					1.444110	LVDU	T E 8	nui riessu	ω.

ITEMS	V [tf]	× [m]	M [ <b>t</b> -m]	H [1]	y [m]	M [ʧ-m]
Vd [DL]	22.60					
Vd [Ц]	33.50 129.96	2.30 2.30	77.05 298.91			
Vd[]	66.00	2,30	151.81			
Ve[DL]	33.50	-2.30	-77.05			
V● [∐]	124,15	-2.30	-285.55			
Və [1]	63.05	-2.30	-145.02			
H [L ]				11.40	9.04	103.06
H [W]				8.40	9.04	75.94
				7.84	10.18	79.80
Sub- total	450.17		20.15	7.84 35,48	10.18	79.80 338.59
W [pler]	321.91	0.00	0.00			000.00
TOTAL	772.08		20.15	35.48		338.69
	Σ		358.74 tf-	· m		
	Σ		772.08 11			
	Σ	n =	35.48 tf	0.4e —		
			1977 F 191 -	0.46 m		

	1997 - 1997 - 1998 1997 - 1997 - 1998 1997 - 1997 - 1998	* <i>* *</i>			ta an	
ITEMS	V [t†]	x [m]	M [ʧ-m]	H [1]	y [m]	M [tf-m]
Vd [DL]	33,50	2.30	77.05			
Vd [LL]	81.00	2.30	186.30	1		
Ve [DL]	33.50	-2.30	-77.05			
Ve [LL]	81.00	-2.30	-186.30			
H [Eq]				14.58	9.04	131.80
H [Eq ]				14,58	9.04	
Sub- total	229.00		0.00	29.16		131.80
W [pier]	321.91	0.00	0.00	57.94	2,95	171.04
TOTAL	550.91		0.00	87.10		302.85
	Σ	M =	302.85 tf	- m		
	Σ	V . 🖓 🖬	550.91 tf			
	Σ	Н =	87.10 tf			
	and the second	- 1		and the second second		station and the

2) Dead Load + Earth Pressure + Seismic [LL]

= M/N = 0.55 m

3) Dead Load + Earth Pressure + Selsmic + Flowing Water

			en de la composition	n shi ka sa	t series i	2008-445-
ITEMS	V	$\mathbf{x}_{i}$	<b>M</b>	$\mathcal{H} = \{ \boldsymbol{H}_{1}^{(i)} \}$	Y	M
	[tf]	[m]	[tī-tī]	[t]	[m]	[tf-m]
Vd [DL]	33,50	2.30	77.05			
∧q [r⊤ ]	81.00	2.30	186.30			
Ve [DL]	33,50	-2.30	-77.05			
V●[LL]	81.00	-2.30	-186.30			
H [Eq]				14,58	9.04	131,80
H [Eq]				14.58	9.04	131.80
H [Wp]				0.07	2.40	0.17
Sub-total	229.00		0.00	29.23		263,78
W [pier]	321.91	0.00	0.00	57.94	2.95	171.04
TOTAL	550.91		0.00	87.18		434.82
	Σ	M =	434.82 ti	- m		
	Σ	V =	550.91 ti			
		H =	87.18 ti			
						onerse en Objective
		• • =	M/N =	0.79 m		

## A.2. TRAIN ON THE LEFT SIDE OF PIER

# a). IN LONGITUDINAL DIRECTION

1) Dead Load + Train Load + Earth Pressure

ITEMS	V [tf]	x [m]	M [tf-m]	н [t]	Y [m]	M [#-m]
Vd [DL]	33.50	0.60	20,10			
νа[Щ]	152.15	0.60	91.29			
Ve [DL]	33,60	-0.60	-20.10			
Ve [LL]	0.00	-0.60	0.00			
На				0.00	7.39	0.00
He				0.00	7.39	0.00
Sub- total	219.15		91.29	0.00		0.00
W [pler]	321.91	0.00	0.00			0,00
TOTAL	541.06		91.29			
	Σ	M =	91.29 tf-	, m		
	Σ	V =		n an tha an Bha an Marta		
	Σ	H =	0.00 tf			
		ę =	M/N =	0.17 m		
						e ny generativné Produktory

2) Dead Load + Train Load + Impact + Earth Pressure

ITEMS	v [tt]	x [m]	M [15-m]	H [t]	y [m]	M [tf-m]
Vd [DL]	33.50	0.60	20.10			
V9 [Щ]	152.15	0.60	91.29			
Vd[1]	77.27	0.60	46.36			
Ve[DL]	33.50	-0.60	-20.10			
V∙ [Щ]	0.00	-0.60	0.00			
Ve[ ]	0.00	-0.60	0.00			
Hd He				0,00 0.00	7.39 7.39	0.00 0.00
Sub-total W [ pier]	296.42 321.91	0.00	137.65 0.00	0.00		0.00
Totel	618.34		137.65			
	and the first states of	M =	137.65 tf	m		
	Σ Σ		618.34 tf 0.00 tf			

= M/N = 0.22 m

3)	Dead	Load	ŧ	Earth	Pressure	+	Long	Rall	Losidt	nui.	
-							****	17.0011			

ITEMS	(t1)	x [m]	M [tf-m]	H [t]	У [m]	M [#-m]
Vd [DL] Vd [LL] Ve [DL] Ve [LL] Vd [Lr] Ve [Lr] He [Lr]	33.50 0.00 33.50 0.00 -1.70 1.70	0.60 0.60 -0.60 -0.60 0.60 -0.60	20.10 0.00 -20.10 0.00 -1.02 -1.02	30,49	7.39	225.28
Sub- totai W [pier] TOTAL	66.99 321.91 388.91	0.00	-2.04 0.00 -2.04	3.35 33.84	7.39	24.76 250.04

= 248.00 tf-m = 388.91 tf = 33.84 tf

M / N = 0.64 m

ITEMS	V	×	M	н	<b>y</b>	M
	[tf]	[m]	[ tf-m ]	[t]	[m]	[#-m]
Vd [DL]	33.50	0.60	20.10			
∨а [Щ]	152.15	0.60	91,29			
Ve [DL] Ve [LL]	93,50 0.00	-0.60 -0.60	-20.10 0.00			
Vd [Lr]	-4.24	0.60	-2.54			
V● [Lr] Hd [Lr]	1.70	-0.60	-1.02	71.69	7.39	F00 04
H•[Lr]				3.35	7.39	529.81 24.76
Sub- total W [pier]	216.61 321.91	0.00	87.73 0.00	75.04		554.56
TOTAL	538.52		87.73			
	Σ	M =	642.29 tf	- m		
	Σ Σ	V =	538.52 tf	and the second second		
		8 =	M/N =			

4) Dead Load + Train Load + Earth Pressure + Long Reil Load [L.]

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ITEMS	[tr]	x [m]	M [ <b>tf-</b> m]	<b>H</b>	У [m]	M [tf-m]
/d [DL]	33.50	0.60	20.10			
/d [LL]	152.15	0,60	91.29			
/e [DL]	33.50	-0.60	-20.10			
/•[LL]	0.00	-0.60	0.00			•
/d [ir +8]	-4.24	0.60	-2.54			
/•[L+B]	1.70	-0.60	-1,02			
id [Lr + B ]				71.69	7.39	529.81
l● [L+ + ₽ ]				3.35	7.39	24.76
Sub- total	216.61		87.73	75.04		554.56
V (pler)	321.91	0.00	0.00			
TOTAL	538.52		87.73			
	Σ	M =	642.29 t	f- m		
	Σ	V =	638.52 t	t.		
		H =	75.04 t	ŧ		

ITEMS	V	X	M	н	y	M
	[tf]	[m]	[tl-m]	[t]	[m]	[ť-m]
			÷* .			
Vd [DL]	33.50	0.60	20.10			
V в [Ц.]	152.15	0.60	91.29			
Vd [1]	77.27	0.60	46.36			
V (DL)	33,60	-0.60	-20.10			
Ve [止]	0.00	-0.60	0.00			
V•[1]	0.00	-0.60	0.00			
Vd [Lr]	-1.70	0.60	-1.02			
V● [∐-]	1.70	-0.60	-1.02			
Hd [Lr]				23,69	7.39	175.09
н∙[∟]				3.35	7.39	24.76
Sub- total	296.42		135.62	27.04		199.84
W [pier]	321.91	0.00	0.00			
TOTAL	618,33		135.62			
	Σ	M =	335.46 ti	- m		
	Σ	V =	618.33 ti			
	Σ	н =	27.04 ti	a de la companya de l		
n de la constant La constant de la constant						
		e =	M/N =	0.54 m		n in the transformer The type states
and the second second			1	the tage of the second s		2 B B B B B B

5) Dead Load + Train Load + impact + Earth Pressure + Long Rail Load [LL]

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7) Dead Load + Train Load + Impact + Brake Load + Long Rail Load + Earth Pressure

ITEMS	V [tf]	x [m]	M [t/-m]	H [t]	y [m]	M [tf-m]
					and a straight state	
Vd [DL]	33,50	0.60	20.10			1
∨а[Ц]	152.15	0.60	91.29			
Aq [ 1]	77.27	0.60	46.36			
Ve [DL]	33.50	-0.60	-20.10			1
Vе[Ц]	0.00	-0.60	0.00			
V•[]]	0.00	-0,60	0.00	N.		
Vd [Lr +B]	-4.24	0.60	-2.54			
Ve [Lr+B]	1.70	-0.60	-1.02			
Hd [Lr +B ]				71.69	7 ~~	
Не [Lr + В ]				3.35	7.39	529.81
Sub- total	293.88		134.09		7.39	24.76
/V [pier]	321.91	0.00		75.04		554.56
TOTAL	615.79	0.00	0.00			er en begen. November
		<u> </u>	134.03	<u>- 1</u>		
	Σ	M	688.66 tf-	n.		
	Σ	<b>∀ =</b>	615.79 tf			
	ΣΙ	ਜ ≑	75.04 tf			
		) ÷	M/N =	1.12 m		

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ITEMS	V.	x	M	н	V	M
	[tf]	[m]	[ <b>tf-</b> m]	(r)	[m]	[#-m]
Vd [DL]	33.50	0.60	20.10			
∧q[IT]	152.15	0.60	91.29			
Ve [DL]	33.50	-0.60	-20.10			
V●[Ц]	0.00	-0.60	0.00			
Vd[Eq]	-0.64	0.60	-0.38			
V•[Eq.]	0.64	-0.60	-0,38			
Hd [Eq]				10.39	7.39	76.75
H • [Eq.]				3,35	7 39	24.76
Sub-total	219.15		90.53	13,74		101.50
W [pler]	321,91	0.00	0.00	57,94	2,95	171.04
TOTAL	541.06		90.53	71.68		272.55
	Σ	M =	363.07 tf	- m		
	Σ	V =	541.06 tf			
	ΣΙ	H =	71.68 tf			ing si Kas

9) Dead Load + Earth Pressure + Seismic [LL]

Vd [DL]       33.50       0.60       20.10         Vd [LL]       152.15       0.60       91.29         Ve [DL]       33.50       -0.60       -20.10         Ve [DL]       33.50       -0.60       -20.10         Ve [LL]       0.00       -0.60       0.00         Ve [Eq]       -2.18       0.60       -1.31         Ve [Eq]       0.64       -0.60       -0.38         Hd [Eq]       321.91       0.00       57.94       2.95         Sub- total       217.61       89.60       38.85       287.06         W [pler]       321.91       0.00       57.94       2.95       171.04         Sub- total       217.61       89.60       96.79       458.11         V [pler]       321.91       0.00       57.94       2.95       171.04         Sub- total       217.61       89.60       96.79       458.11         V =       539.52       539.52       11       158.11	ITEMS	V [tf]	(m)	M [tf-m]	H [t]	y (m)	M
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						[ [m]	[ <u>t</u> -m]
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			[	†		<u> </u>	<u> </u>
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		33.50	0.60	20.10			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		152.15	0.60	1			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		33.50					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	•	0.00	-0,60				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		-2.18	0.60	1.1. 1.1. 1.1. 1.44.			
Hd [Eq]       35.50       7.39       262.31         He [Eq]       3.35       7.39       24.76         Sub-total       217.61       89.60       38.85       287.06         W [pler]       321.91       0.00       67.94       2.95       171.04         TOTAL       539.52       M       =       547.71       t1-m $\Sigma$ M       =       547.71       t1-m $\Sigma$ V       =       539.52       t1		0.64	-0.60				
He       Eq       3.35       7.39       24.76         Sub-total       217.61       89.60       38.85       287.06         W [pler]       321.91       0.00 $0.00$ $57.94$ 2.95 $171.04$ TOTAL       539.52       M       =       547.71       tf-m $\Sigma$ M       =       547.21       tf-m $\Sigma$ V       =       539.52       tf-m					35 50	7 30	262.24
Sub-total       217.61       89.60       38.85       287.06         W [pler]       321.91       0.00 $\overline{0.00}$ $\overline{57.94}$ 2.95 $\overline{171.04}$ TOTAL       539.52       M       =       547.71       tf-m $\Sigma$ M       =       547.71       tf-m $\Sigma$ V       =       539.52       tf	He [Eq ]						· .
$\frac{\text{W [pler]}}{\text{TOTAL}} = \frac{321.91}{539.52} = \frac{0.00}{96.79} = \frac{0.00}{57.94} = \frac{547.71}{2.95} = \frac{171.04}{458.11}$ $\Sigma M = 547.71 \text{ thm}$ $\Sigma V = 539.52 \text{ th}$	and the second	217.61		89.60		1.00	
TOTAL       539.52       89.60       96.79       458.11 $\Sigma$ M       =       547.71       tf-m $\Sigma$ V       =       539.52       tf		321.91	0.00	0.00		2.95	and the second second
$\Sigma M = 547.71 \text{ tH-m}$ $\Sigma V = 539.52 \text{ tH}$	TOTAL	539.52				2.00	
ΣV = 539.52 tr							400.11
그는 사람이 많은 것 같은 것		Σ	М =	547.71 th	- m		
그는 것 같은 것 같		Σ ,	V = =	539.52 tf			in an Agian
이 방법 이는 것 같아요. 이 가지 않는 것 같아? 김 씨가 말했는 것 같아요. 이 동안 가지 않는 것 같아요. 이 가지 않는 것 같아요. 이 가지 않는 것 같아요.		Σ	H <sup>a</sup> ≓ ,	96.79 tt			
그 그 그는 물에 집을 가 있을 때 말을 들어야 한다. 그는 것이라는 것이 같이 많이 많이 나라.							
e = M / N = 1.02 m			θ =	M/N =	1.02 m		

b), IN TRANVERSAL DIRECTION

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1)	Dead Lo	oad + Tra	In Load 4	maact +	Lateral Load +	1Ailard Load	· · · · · · · · · · · · · · · · · · ·	
							्र दुझाया	Pressure

ITEMS	V	×	M A	Н		<del></del>
	[tt]	[m]	[ <b>ʊ</b> -m]	[1]	y [m]	M [tf-m]
Vd [DL]	22.50					
Vd [Ц]	33.50	2.30	77.05			
Vd [1]	152.15	2.30	349.95			
Ve [DL]	77.27	2.30	177.73			
V●[LL]	33.50	-2.30	-77.05			
Ve [1]	0.00 0.00	-2.30	0.00			
Н [Ш]	<b>U.UU</b>	-2.30	0.00			
	kun sensir Destats			14,40	9.04	130.18
H [W]				0.00	9.04	0.00
				7.69	10.18	78,29
Sub-total	296.42		527.68	0.00	10.18	0.00
W [pier]	321,91	0.00	0.00	22.09		208.47
TOTAL	618.34	<b>U.U</b> U	527.68			
			UX7,00	22.09		208.47
	Σ	M =	736.14 tf	• m		
	Σ	V =	618.34 tf			
an an an an an an an Arrange. An ann an Arrange an Ar	Σ	H s satut a	22.09 tf	and the second		
		e =	M/N =		a da seguere. A seguere	
	an an garage an an an tao a		and the second second			e de la companya de l

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# 2) Dead Load + Earth Pressure + Seismic [LL]

	·					
ITEMS	(t†]	x [m]	M [世-m]	H [t]	У [m]	M [世-m]
Vd [DL] Vd [LL] Ve [DL] Ve [LL]	33,60 152,15 33,50 0,00	2.30 2.30 -2.30	77.05 349.95 -77.05			
H [Eq] H [Eq] Sub-total	219.15	-2.30	0.00	14.58 0.00 14.58	9.04 9.04	131.80
W [pier] TOTAL	321.91 541.06	0.00	0.00 349.95	57,94 72.52	2.95	131.80 171.04 302.85
		M = V = -1 =	652.79 tf- 541.06 tf 72.52 tf	m		
		) =	M/N =	1.21 m		

3) Dead Load + Earth Pressure + Selsmic + Flowing Water

ITEMS	V	X		T	<u></u>	
	[tr]	[m]	M [tf-m]		y [m]	M [廿-m]
Vd [DL]	33.50	2.30	77.05			
∨а[ш]	152.15	2.30	349.95			
Ve [DL]	33.50	-2.30	-77.05			
V•[L]	0.00	-2.30	0.00			
H [Eq]			0,00			
H [Eq]				14.58	9.04	131.80
1 [Wp]				0.00	9,04	0.00
Sub-total	219.15		349.95	0.07	2.40	0.17
N [pier]	321.91	0.00	0.00	14.65 0.00		131.98
TOTAL	541.06		349.95	14.65	2.95	0.00
						131.98
	Σ	M State a	481.92 tf-	m		
	Σ	⊻ ي	541.06 tf			
	Σ	H =	14.65 tr			
		• • • • <b>*</b>	MIN =	0.89 m		
				0.03 III		

#### IN HWL CONDITION ₿.

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## B.1. TRAIN ON BOTH SIDE OF PIER

## a). IN LONGITUDINAL DIRECTION

1) Dead Load + Train Load + Earth Pressure

ITEMS	V [tf]	x [m]	M [tf-m]	H [t]	y (m)	M [tf-m]
Vd [DL]	33.50	0.60	20,10			
Vd [LL]	129.96	0.60	77,98		n an	
Ve [DL]	33.50	-0.60	-20.10			
\•[止]```	124.15	-0.60	-74.49			
Hd				0.00	7.39	0.00
Heistan				0.00	7.39	0.00
Sub- total	321.11		3.49	0.00		0.00
W [pler]	280.90	0.00	0.00			
TOTAL	602.01		3.49		n an the Second Second	

$$M/N = 0$$

.01 m

2) Dead Load + Train Load + Impact + Earth Pressure

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		T	-			
ITEMS	V	×	M	H	y	
	[tf]	[m] :	[ <b>#-</b> m]	(t)	[m]	[#-m]
	<u> </u>	and the sec				
Vd [DL]	33.50	0.60	20.10			
Vd [11]	129.96	0.60	77,98			
Vd[I]	66.00	0.60	39.60			
V. [DL]	33.50	-0.60	-20.10			
٧ө [Ц]	124.15	-0.60	-74.49			
V • [   ]	63.05	-0.60	-37.83			
Hd				0.00	7.39	0.00
He				0.00	7,39	0.00
Sub-total	450.17		5.26	0.00		0.00
W [ pler]	280,90	0,00	0.00			0.00
Total	731.07		5.26			
	Σ	M =	5.26 11			
	Σ	₩ - V •	and the state of the second	• <b>f</b> 11		
	Σ	ч = Н =	731.07 tf			

= 0.01 m M / N =

9]		roaq	+	Earth	Pressure	ŧ	Long	Rall	Load	r DL	1
----	--	------	---	-------	----------	---	------	------	------	------	---

ITEMS	V [tf]	x [m]	M [#-m]	H [t]	y [m]	M [tf-m]
Vd [DL] Vd [LL] Ve [DL] Ve [LL] Vd [Lr] Ve [Lr] Hd [Lr] He [Lr]	33.50 0.00 33.50 0.00 -1.70 1.70	0.60 0.60 -0.60 -0.60 0.60 -0.60	20.10 0.00 -20.10 0.00 -1.02 -1.02	30.49 59.58	7.39	225.28
Sub- total W [pler] TOTAL	66.99 280.90 347.90	0.00	-2.04 0.00 -2.04	90.07		<u>440.32</u> 665.60

- = 663.56 t f- m
- = 347.90 tf = 90.07 tf
- = M/N =

1.91 m

ITEMS	V [t/]	x [m]	M [#-m]	H [t]	y [m]	M [#-m]
	1.200					
d [DL]	33.50	0.60	20.10			
d [LT]	129,96	0.60	77.98			
e [DL]	33.50	-0.60	-20.10			
● [ <u>□</u> ] = :"	124.15	-0,60	-74.49			
գ [Ի ]	-1.70	0.60	-1.02			
• [[]]•	1.70	-0.60	-1.02			
d [Lr.]				25.58	-	
•[나] •					7.39	189.06
Jb- total	321.10		1.45	15.77	7.39	116.50
[pler]	280.90	0.00		41.35		305,56
DTAL	602.01	0.00	0.00			
///4	602.01		1.45			
	Σ - Σ	М — =	307.01 tr-	m		
	Σ	V = =	602.01 tf			
	Σ	H' =	41.35 tf			
1	A STATE AND A	$f(x) = \int_{\mathbb{R}^{n-1}}  x ^{2n-1}  x ^{2n} dx$				at i sa ti

4) Dead Load + Train Load + Earth Pressure + Long Rall Load [LL]

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- 1	<b></b>	M /	N	=	1	0.92	m
 94		1.1			1.5	. 11 A.A.	

75.35 tf

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8

601.68 tf

1.5				그는 것이 가지 않는 것이 있었다.	
	5.4	· · · · .			
Σ	M	1.11	. <del>.</del> .	556.31 tf-m	
		1.00			
-		1.1.1	· · · ·		
$\Sigma$	v.	1.1.1	<b>H</b>	601.68 tf	1.4
-	•			AA114A [F]	

ITEMS	V [tT]	x [m]	M [tf-m]	H [t]	ý [m]	M [#-m]
	4				<b>6 11 4</b>	[ []
√₫ [DL]	33.50	0.60	20.10			
/d [IT]	129,96	0.60	77.98			
/e [DL]	33.50	-0,60	-20.10			
/• [LL]	124.15	-0,60	-74.49			
/d [Lr +B ]	-3,50	0.60	-2.10			
• [Lr + B ]	3:17	-0.60	-1.90			
ld [Lr +B ]		-		59.58	7.39	440.32
(• [L +8]				15,77	7.39	116.50
Sub- total	320.78		-0.52	75.35		556.82
V [pier]	280.90	0.00	0.00			
OTAL	601.68		-0.52			

6) Dead Load + Train Load + Brake Load + Long Rell Load + Fight D

0.42 m

41.35 tr

/ N-= м

	[ [ [ I T ] ]	[m]	[#-m]	[t]	[m]	[tf-m]
				+		
Vd [DL]	33,50	0.60	20.10			
Vq [11]	129.96	0.60	77.98			
Vq[1]	66.00	0.60	39.60			
V • [DL]	33.50	-0.60	-20.10			
Ve [LL]	124.15	-0.60	-74.49			
Ve[]]	63.05	-0.60	-37.83			
Vd [L ]	-1.70	0.60	-1.02			
Ve [L] =	1.70	-0.60	-1.02			
Hd [Lr ]				25.58	7.39	189.06
H•[L] = 2				15.77	7.39	116.50
Sub- total	450.16		3.22	41.35		305.56
W [pier]	280.90	0.00	0.00			000.00
TOTAL	731.06		3.22			
	and the second second	M =	308.78 tf			
	Σ	V #	731.06 tf			

5) Dead Load + Train Load + Impact + Earth Pressure + Long Rail Load [LL]

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			a a da bara b			
ITEMS	٧	X	M	H H at	У	M
	[tit]	[m]	(ʧ-m)	[t]	[m]	[tf-m]
Vd [DL]	33.60	0.60	20.10			
Vd [∐]	129.96	0.60	77.98			
Vd [   ]	66.00	0.60	39.60			
V • [DL]	33.50	-0.60	-20.10			
Ve[LL]	124.15	-0.60	-74.49			
V. [ ]	63.05	-0.60	-37 83			
Vd [Lr + B ]	-3.50	0.60	-2.10			
Ve [Lr + B]	3.17	-0,60	-1.90		n an an tha an an an Thail an tha an	
Hd [Lr + B ]				59.58	7.39	440.32
H • [L + B ]				15.77	7.39	116.50
Sub- total	449.84		1.25	75.35		556,82
W [pler]	280,90	0.00	0.00			
TOTAL	730.74		1.25	an tha an		
	Σ	M =	558.08 ti	ŀ m		
	Σ	V =	730.74 tf			
	Σ	· · · · · · · ·	75.35 ti	ſ		tan Alamatan Alamatan

7) Dead Load + Train Load + Impact + Brake Load + Long Rail Load + Earth Pressure

0.76 m N.

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8) Dead Load + Earth Pressure + Seismic (DL)

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ITEMS	V [t1]	x [m]	M [ឋ-m]	H [t]	y [m]	M [ช-m]
Vd [DL]	33.50	0.60	20.10			
V4 [LL]	0.00	0.60	0.00			
Ve [DL]	33.50	-0.60	-20.10			
V.€ [∐_]	0.00	-0,60	0.00			
∨d [Eq ]	-0.64	0.60	-0.38			
Ve [Eq ]	0.64	-0.60	-0.38			
Hd [Eq ]				10.39	7.39	76.75
H• [Eq ]				3,35	7.39	24.76
Sub-total	67.00		-0.76	13.74	]	101.50
W [pler]	280.90	0.00	0.00	50.56	2.55	129.15
TOTAL	347.90		-0,76	64.30		230.65
	Σ	a la parte da la	229.89   347.90	e steve en structe d'al		

347.90 tf 64.30 tf

0.66 m M/N = 22

9) Dead Loa	id +	Earth	Pressure	+	Seismic	111	١
-------------	------	-------	----------	---	---------	-----	---

ITEMS	V .	X	M	н	Τ γ	M
	[tf]	[m]	[ <b>tf-m</b> ]	[t]	[m]	[#-m]
	and the second				<u> </u>	
Vd [DL]	33.50	0.60	20.10			
Vd [Ц.] 🗄	81.00	0.60	48.60			
Ve [DL]	33,50	-0.60	-20.10			·
V. (Щ.) 224	81.00	-0.60	-48.60		and a second	
Vd [Eq ]	-2.18	0.60	-1.31			
V• [Eq ]	2.17	-0.60	-1.30			
Hd [Eq ]				35.50	7,39	000.04
H • [Eq ]				11.45		262.31
Sub- total	228.99		-2.61	46.95	7.39	84.62
W [pier]	280,90	0.00	0.00	50.56	n an an an an an an Th <b>re</b> ad	346,92
TOTAL	509.89		-2.61	97.51	2.55	129.15
				37,31	I	476.07
	Σ	M =	473.46 tf	~		
	Σ		509.89 tf	• (11		
	and the theory of the	and the state of the second	and the second			
	Σ	н =	97.51 tf			
		e =	M/N =	0.93 m		

b). IN TRANVERSAL DIRECTION

1) Dead Load + Train Load + Impact + Lateral Load + Wind Load + Earth Pressure

Vd[DL] 3 Vd[LL] 12 Vd[I] 6 Ve[DL] 3 V•[LL] 12	[tf] 3.50 9.96	[m] 2.30	[ <b>t</b> f-m]	[ <b>t</b> ]	[m]	[ <b>t</b> f-m]
Vd [LL]     121       Vd [l]     60       Ve [DL]     33       Ve [LL]     124       Ve [L]     63       H     [L]	9,96	and a second second	77.05			
Vd [LL]     121       Vd [l]     60       Ve [DL]     33       Ve [LL]     124       Ve [L]     63       H     [L]	9,96	and a second second	77.05	1 - 1 - 1 - 1 - 1		1 2 3 4
Vd [l]     60       Ve [DL]     30       Ve [L]     124       Ve [l]     60       H     [L]	a in 1911 🚺	11 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	77.05			
Ve [DL] 3: Ve [LL] 124 Ve [I] 6: H [Lr]		2.30	298.91			
V•[LL] 124 V•[1] H [Lr]	6.00	2.30	151.81			
V●[ ] H [止]	3.50	-2.30	-77.05			
н [Г.]	4.15	-2.30	-285,55			
	9.05	-2.30	-145.02			
ΗΓΙΑΥΙ				11.40	9,04	103.06
H IW 1				8.40	9.04	75.94
				7.84	10.18	79.80
				7.84	10.18	79.80
	3.17		20.15	35,48		338.59
	0.90	0.00	0.00			
TOTAL 731	1.07		20.15	35.48		338.59
n Alfred Color (1997) 1995 - Alfred Color (1997) 1996 - Alfred Color (1997)	Σ.Μ		358.74 tr-	m i i i i i		
	ΣV	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	731.07 tf			
	ΣΗ	<b>*</b>	35.48 tf			
	8	- 1 - <b></b>	`M / N (≕)	0.49 m	Angeler States	1

4]	DASO	Load	+	Earth	Pressure	ŧ	Selsmic	TLL	1
----	------	------	---	-------	----------	---	---------	-----	---

2.30 2.30	77.06 186.30			
2.00	1 100.00	1		
-2.30 -2.30	-77.05 -186.30			
		14.58 14.58	9.04 9.04	131.80
0.00	0.00	29.16 50.56	2.55	131.80 129.15
		79.72 m		260.95
		= 260.95 tf-1	= 260.95 tf-m = 509.90 tf	= 260.95 t f- m

= M/N = 0.51 m

TT-UO	T	<b></b>		al a serie de la serie Al serie de la s		
ITEMS	(tf)	x [m]	M [ʧ-m]	H [t]	y [m]	[17-m]
Vd [DL]	33.50	2.30	77.05			
Vq [Щ]	81.00	2.30	186,30			
Ve[DL]	33.50	-2.30	-77.05			
<b>V∳[Щ]]</b> № С	B1.00	-2.30	-186.30			
H [Eq]				14.58	9.04	
H [Eq]				14.58	9.04	131.80
H [Wp]				1.25	4.75	131.80
Sub- total	229.00		0.00	30.41	4.10	5.93
N [pier]	280.90	0.00	0.00	50.56	2.55	269.54
TOTAL	509,90		0.00	80.97	¥.00	129.15 398.69
		M = V = H =	398.69 tr 509.90 tr 80.97 tr M / N =	• m 0.78 m		

3) Dead Load + Earth Pressure + Selsmic + Flowing Water

## B.2, TRAIN ON THE LEFT SIDE OF PIER

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## IN LONGITUDINAL DIRECTION **a**)

1) Dead Load + Train Load + Earth Pressure

			80 - 11 - 14 - 14 - 14 - 14 - 14 - 14 - 1	an Shear an	and the second	1.14
ITEMS	V 10	×	M	н	Y	M
	[tf]	[m]	[ <b>#</b> -m]	[1]	[m]	[ <b>t</b> -m]
					1	
Vđ [DL]	33.50	0.60	20.10			
V d [[LL]]	152.15	0.60	91.29			
Ve [DL]	33.60	-0.60	-20.10			
Ve [11]	0.00	-0.60	0.00			
Hd				0.00	7.39	0.00
He				0.00	7,39	0.00
Sub- total	219,15		91.29	0.00		0.00
W [pier]	280.90	0.00	0.00			
TOTAL	500.05		91.29			
	4				ter en	
	Σ	M =	91.29 tf	m		
	Σ	V =	500.05 tf			
	Σ	н =	0.00 tf			
		n an an an an Carr gath tha an				
		•	M/N =	0.18 m	化合金合金	

2) Dead Load + Train Load + Impact + Earth Pressure

ITEMS	¥ [tf]	x [m]	M [tf-m]	H [t]	y [m]	M [1-m]
V₫[DL]	33,50	0.60	20.10			
Vd [LL] Vd [I]	152.15 77.27	0.60 0.60	91.29 46.36			
Vе[DL] Vе[Ц] Vе[ ]	33.50 0.00 0.00	-0.60 -0.60 -0.60	-20.10 0.00 0.00			
Hd		-0.00	0.00	9.00 0.00	7.39 7.39	0.00 0.00
Sub-total W [ pler]	296.42 280.90	0.00	137.65 0.00	0.00		0.00
Total	577.32		137.65			

137.65 tf-m 577.32 tf

Σ м

Σ V Σ

Н

0.00 11

M/N = 0.24 m

3) Dead Load + Earth Pressure + Long Rail Load [DL]

ITEMS	V [tf]	x [m]	M [#-m]	H (t)	[m]	M [t/-m]
<u></u>						
Vd [DL]	33.50	0.60	20.10			
Vd [LL]	0.00	0.60	0.00			and a second s
Ve [DL]	33.50	-0.60	-20.10			
Ve[L]	0.00	-0.60	0.00		al de terres. No tra	
Vd [Lr]	-1,70	0.60	-1.02			
Ve [Lr]	1.70	-0.60	-1.02			
Hd [Lr ] 🗍				30,49	7.39	225.28
He[L]				3,35	7.39	223.28
Sub- total	66.99		-2,04	33.84		250.04
W (pier)	280.90	0.00	0.00			200.04
TOTAL	347.90		-2.04			

## = 248.00 tf-m

= 347.90 tf

ΣΜ

ΣV

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ė

= 33.84 tf

= M/N = 0.71 m

4) Dead Load + Train Load + Earth Pressure + Long Rali, Load [LL]

TENO	T	Υ	r	1		
ITEMS	V	×	M	H H	y s	M
	[tt]	[m]	[ˈɒff-mː]	[t] en	[m]	[#-m]
		and a state An an Anna an an				
Vd [DL]	33.50	0.60	20.10			
Vd [LL]	152.15	0.60	91.29			
Ve [DL]	33.50	-0.60	-20.10			
∨е[Щ]	0.00	-0.60	0.00			
Vd [比]	-4.24	0.60	-2.54		la en la terreta. La terreta de la gra	
V•[[[]]]•V	1.70	-0.60	-1.02			
Hd [나 ]				71.69	7.39	529.81
He [Lr]				3,35	7.39	24.76
Sub- total	216.61		87.73	75.04		554.56
W [pier]	280.90	0.00	0.00			
TOTAL	497.51		87.73			$\frac{x_{0,0}}{D_{0}}$
	an talihin a sa Talihin a sa					
	and the first second	M =	642.29 tf	4.5		
		V =	497.51 tf	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		
	Σ	H =	75.04 tf			
	an an tràite. Na chuirte					
		· 8 _ =	`:M:/N =;	1.29 m		

ITEMS	v	×		<u> </u>	T	T
	[tf]	[m]	M [ដ-៣]	н [t]	y [m]	[ tf-m ]
						<u> </u>
Vd [DL]	33,50	0.60	20.10			
Vd [LL]	152.15	0.60	91.29			
Vd [   ]	77.27	0.60	46.96			
Ve [DL]	33.50	-0.60	-20.10			
Ve [LL]	0.00	-0.60	0.00			
Ve[1]	0.00	-0.60	0.00			
Vd [Lr ]	-1.70	0.60	-1.02			
Və[Lī] ]	1.70	-0.60	-1.02			
Hd [Lr ]				23.69	7.39	175.09
Н•[Г]•Н				3,35	7,39	24.75
Sub- total	296.42		135.62	27.04		199.84
W [pier]	280.90	0.00	0.00			199104
TOTAL	577.32		135.62			

5) Dead Load + Train Load + Impact + Earth Pressure + Long Rail Load [LL]

 $\Sigma$  M = 335.46 tf-m  $\Sigma$  V = 577.32 tf

ΣΗ

θ

= 27.04 tf

= M/N = 0.58 m

52

ITEMS	V [tt]	x [m]	M [tf-m]	H. [t]	У [m]	M [#-m]
/d [DL]	<b>43 50</b>					
/d[LL]	33.50 152,15	0.60 0.60	20.10 91.29		1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 -	
/e [DL]	33.50	-0.60	-20.10			
′•[Щ]	0.00	-0.60	0.00			
d [Lr +8 ]	-4.24	0.60	-2.54			
● [Lr +B] d [Lr +B]	1.70	-0.60	-1.02			
• [Lr + B ]		1757 1764 - 1765		71.69 3,36	7,39 7,39	529.81 24,76
ub-total	216.61		87.73	75.04		554.56
V [pler]	280.90	0.00	0.00			
OTAL	497.51		87.73			

6) Dead Load + Train Load + Brake Load + Long Rail Load + Earth Pressure

= 642.29 tf-m

= 497.51 tf

= 75.04 tf

ΣΜ

ΣV

ΣH

0

= M / N = 1,29 m

ITEMS	V [tf]	x [m]	M [tf-m]	_ ∩ H _ )) [t]	у [m]	M [tf-m]
Vd [DL]	33,50	0.60	20.10			un É gran
	152.15	0.60	91.29			
Vd [1] 1	77.27	0.60	46.36			
Ve [DL]	33.50	-0.60	-20.10			
Ve[LL]	0.00	-0.60	0.00			
Ve[I]	0.00	-0.60	0.00			
Vd [Lr +B]	-4.24	0.60	-2.54			
Ve[L+B]	1.70	-0.60	-1.02			
Hd [L + B ]				71.69	7.39	529.81
H● [L +B]				3,35	7,39	24.76
Sub- total	293.88		134.09	75.04		554.56
W [pler]	280.90	0.00	0.00			
TOTAL	574.78	1	134.09			
	Σ		688.66 t 574.78 t	1 N N 1 N 1 N 1 N 1		

7) Dead Load + Train Load + Impact + Brake Load + Long Rall Load + Earth Pressure

574.78 tf ~

75.04 tf =

1.20 m M/N = ≒

8) Dead Load + Earth Pressure + Seismic [DL]

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ΣH

ITEMS	V [tt]	x [m]	M [#-m]	H (t)	y [m]	M [ <b>ʊ-</b> m]
Vd [DL]	33.5D	0.60	20.10			
va[LL]	152.15	0.60	91.29			
Ve[DL]	33.50	-0.60	-20.10			
∨∙ [Щ.]	0.00	-0.60	0.00			
Vd [Eq.]	-0.64	0.60	-0.38			
V • [Eq ]	0.64	-0.60	-0.38			
Hd [Eq]				10.39	7.39	76.75
H • [Eq ]				3,35	7,39	24.76
Sub- total	219.15		90.53	13.74		101.50
W [pler]	280,90	0.00	0.00	50.56	2.55	129.15
TOTAL	500.05		90.53	64,30		230.65

321.18 tf-m

500.05 tf 64.30 tf Ξ

0.64 m M/N = ----

9) Dead Load + Earth Pressure + Seismic [LL]

ITEMS	(t1)	x [m]	M [tf-m]	H [t]	y [m]	M [#-m]
Vd [DL] Vd [LL] Ve [DL] Ve [LL] Vd [Eq] Ve [Eq] Hd [Eq] He [Eq] Sub total W[pier] TOTAL	33.50 152.15 33.50 0.00 -2.18 0.64 217.61 280.90 498.51	0.60 0.60 -0.60 -0.60 0.60 -0.60 -0.60	20,10 91.29 -20,10 0.00 -1.31 -0.38 89.60 0.00 89.60	35.50 3.35 38.85 50.56 89.41	7.39 7.39 2.55	262.31 24.76 287.06 129.15 416.21
	Σ	M = V = H =	505.81 tf- 498.61 tf 89.41 tf	m		

1.01 m M-/N . =

b	)			l	N	•	T	F	Ż	Ś	\$	v	2	F	2	S	4	1	Ĵ	ſ	2	F	
	1	;	÷			ć		1	÷		١.				5	Ĵ	÷						

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IN TRANVERSAL DIRECTION

ITEMS	V [tf]	× [m]	M [ช-m]	H [t]	y [m]	M [\$7-m]
/d [DL]	33.50	2.30	77.05			
/d [LL]	152.15	2.30	77.05			
/d [1]	77.27	2.30	177.73			
/ə [DL]	33.50	-2.30	-77.05			
(•[ഥ]	0,00	-2.30	0.00			
'e (11): Chi	0.00	-2.30	0.00			· 부승규 가지 수 · · · · · · · · ·
[[ <b>[</b> ]]] []		9		14.40	9.04	130.18
				0.00	9.04	0.00
[W]				7.69	10.18	78.29
				0.00	10.18	0.00
iub-total	296.42		527.68	22.09		208,47
V [pler] OTAL	280.90	0.00	0.00			
	577.32		527,68	22.09	14 A.	208.47

C.

-2)	Dead	Load	+	Earth	Pressure	÷	Selsmic	[11]	}

ITEMS	V	x [m]	M [tf-m]	H [t]	У [m]	M [tf-m]
				1		
Vd [DL]	33.50	2.30	77.05			
Vd [LL]	152.15	2.30	349.95			
Ve [DL]	33,50	-2.30	-77.05			
Ve (Щ.)	0.00	-2.30	0.00			
H [Eq]				14.58	9,04	131.80
H [Eq]				0.00	9.04	
Sub- total	219.15		349.95	14.58		131.80
W [pler]	280.90	0.00	0.00	50,56	2,55	129,15
TOTAL	500.05		349.95	65.14		260.95
	Σ Σ Σ	¥ =	610.90 tf 500.05 tf 65.14 tf	- m		
		e =	M / N =			

3) Dead Load + Earth Pressure + Seismic + Flowing Water

ITEMS	V [tr]	x [m]	M [tf-m]	H [t]	y [m]	.M. [tf-m]
Vd [DL]	33.60	2.30	77.05			
νа[Ц]	152.15	2.30 2.30	349.95			
Ve [DL]	33.50	-2.30	-77.05			
∨•[Ц]	0.00	-2,30	0.00			
H [Eq]				14.58	9.04	131.80
H [Eq]				0.00	9.04	0.00
H [Wp]				1.25	4.75	5.93
Sub- total	219.16		349.95	15,83		137,74
W [pler]	280,90	0.00	0.00	50,56	2.55	129,15
TOTAL	500.05		349,95	66,39		266.88
	2 2 2 2	M	616.83 tf 500.05 tf 56.39 tf M / N =			

4.5. PILE CALCULATION

- 4.5.1. CAPACITY OF PILE a). ALLOWABLE CAPACITY OF PILE

  - 1) MATERIAL
    - PRESTRESS CONCRETE PILE.

Quality	· .	K-500		- 1 + 19 
Diameter	=	0.45	m	
g ; '···	2	0.23	tf/m	
Area	. <b>=</b>	0.159	m2 (End Pile)	
Area			m2 (Body of	
E	: <b>z</b>	1400000	t-f/m2	
t 🖡 sa san s	<u>i</u> <b>x</b>	0.002		
Pn	. =	130	tf.	 

- 2) BEARING CAPACITY OF PILE AT PIER CIREBON SIDE Elevation bottom of pler = -3.64 m+ Refer to Boring Log R-51 Elevation of ground surface = -2.62 m+
  - a) End Bearing

1 I I I	41:	=	45		N			an sin Sheri			
٨	12	=	0.5	(	36	+	50	+	45	)=	65.5
	lr 🦾		0.5	(	45	+	65,5				40
11.00	nerefore										
10 A 19	<b>r</b>	2 <b>**</b> 25	40						an e e ar Rationet e		
L	0	=	1.90	m				() () ()			ta ta i

-----= 4.22

Le

D

- qd = 18.44 × Nr = 18.44 × = 737.78 tf
- Pb = 737.78 x 0.159 = 117.34 tf

40

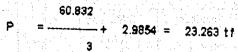
b) Friction

Elevtion [m+]	Soli Describtion	Thickness [ m ]	Nr	<b>†1</b>	LIxfi [t-f/m]
-3.64 - 4.62 -4.62 - 5.17 -5.17 - 12.62	sand sility send	0.98 0.55	1 	1	0.98 0.55
-12.62 - 14.17 -14.17 - 16.62	sandy clay	7.45 1.55	1 6	1	7.45 4.65
		2.45 12.98	50	totel	29.40 43.03

y Group of	Pile,		-	
		0,45	8	+ 3 <b>5</b> - 2
	1 F - 1987 - 1		19 Start 19	
= 0.	73	1.30	90 X	(5x2
				en an participar.
<b>*</b> 0.1	73 x 43.03	X 1.4137		44.408 tf
ng capacity	of plie.	ur sub se Peri l Tradición de la com		
			α. =	•
			α. =	1.15
	+ I + E + L	+ <b>B</b>	α	1.25
ent Factor				
		117.34	AA A 4	
	1 Pa			50.04
		3		50.21 tf
= 1.1(	5 Pa	■ 1.15 x		
= 1.2	5 Pa	= 1.25 x		62.77 tf
ondition				
and the second	and the second			
- 1.9	, <b>k</b> a =	• 1.50 X	50.21 =	75.32 tf
		117 34	44 400	
	Pa =	+ -		73.47 tf
		2	3	iowi II
	therefore :			
	Pa =	75.322 tf		
t canacity /	of nile			
on On	vi hile.			
= 43.03	× 1.4137 =	60.832 tf		
= 12.98	X 0.23 =			
60.832				
×	+ 2.9854 =	13.124 tf		
6				
	= 0. = 0. ng capacity itton DL + LL DL + LL DL + LL DL + LL ent Factor = 1.11 = 1.25 ondition = 1.5 it capacity of a 43.03 = 12.98 60.832	= 0.73 = 0.73 × 43.03 ng capacity of pile. Stition DL + LL + $i$ + E DL + LL + $i$ + E + Lr DL + LL + $i$ + E + Lr DL + LL + $i$ + E + Lr ent Factor = 1 Pa = 1.15 Pa = 1.25 Pa	$= 1 - \tan -1 \left( $	$= 1 - \tan - 1 \left( \frac{0.45}{1.35} + \frac{8}{90x} \right)$ $= 0.73$ $= 0.73$ $= 0.73 \times 43.03 \times 1.4137$ $= 1 - 2 \times 3 \times 44.41$ $= 1 - 2 \times 3 \times 44.408$ $= 1.5 - 2 \times 50.21 = 1.50 \times 50.21 \times 10^{-1}$

Earthquake Condition

d)



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1.15

1:25

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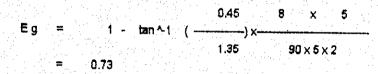
Elevation bottom of ple Refer to Boring Log F	r ₹-18	1	-3	.64	m+			* .		
Elevation of ground sur		¥.	1	.60	m+					
a) End Bearing	n Harat ar	а. С. с. с.	+ 1	1. j						
N1 =	45	· .	•							
N 2 🚽 🛁	0.50	.(		30	+	4	; 5_}=	37.	50	
	0,5									
therefore							•	i.		
Nr =	40	÷		• .	· .	et en	12	l state a	1 di	
Le =	0.66	m		·			1		÷	
						•.				
				÷.	da Maria		· .			
l de la <b>Le</b>										
	1.47	8 A. 1			5. A.		н н Н н н			. 1
D				÷.						. <sup>1</sup>
		1			1 1. 1 1.				a a a Reference	
d q =	5				dela el Recent					
and the first state of the stat	12.93			40						(
	517.33	tf.						an a la cara da serie da serie Serie da serie da ser		200
Pb =	517.33	X	0.1	59			=	82.2	3 tf	

b) Friction

3)

Elevtion [m+]	Soil Description	Thickness [ m ]	Nr	<b>†</b>	Lixfi [t-f/m]
-3.64 - 4.00 -4.00 - 13.4	sitty sand	0.36	3	0.6	0.22
-13.4 - 14.6	siity clay clay	9.40 1.20	30 30	3 12	28.20 14.40
-14.6 - 15.40	sity sand	0,80	30	12	9.60
		11.76		totai	52.42

Efficiency Group of Pile.



Pf = 0.73 x 52.42 x 1.4137 = 54.09 tf

c) Allowable bearing capacity of pile.

- Normal Condition

Condition :

DL + LL + I + E DL + LL + I + E + Lr DL + LL + I + E + Lr + B a

BH. 10 - 110

	Coefficie	nt i	Factor	·			a a	an an An an an				
	a	*	: . •		Pa		82.28	54.0	9			
•					n e Raj	1	3	<b>*</b>	<b>=</b>	40.95	tr	
	α		1.15		Pa		1.15		5 =	47.09		
	a	-	1.25	2 1	Pa	<b>2</b>	1.25	× 40.9	5 =	51,19	tf	
irtha	uake Co	ndi	ion		- 1				talget d Literat		÷.,	

- CI II I I I I I I I I I I I I I I I I	COU	ΠΟΦΙΡ

					82.278	54.094		
•	· ·	Ρ	a	1 =	+	8	59.17 tf	
÷		5			2	3		

d) Allowable Pull-Out capacity of pile.

- Normal Condition

E e ·

er wonen		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	and the second second second	
Pu	=	52,416	× 1.4137 =	74.101 tf
W pile	=		× 0.23 =	
		74.101		
P	=		+ 2.7048 =	15.055 tf
	an a	6		

- Earthquake Condition

74.101

P = -----+ 2.7048 = 27.405 tf

4.5.2. REACTION ON PILE