DESIGN CALCULATION COVER SHEET						
Project	Detailed Design on Port Reactivation Project in La Union Province	Project Code	JC1N004			
Section	Civil	Calc. File No.				
Sub-Section	Quaywail	Calc. Index No.				
Sub-Section	Quaywall	Calc. Index No.				

Subject:

**Container and Multi-purpose Berth** 

Calculation Objective:

Reinforcement of coping

### References, Calculation Notes and Comments

**Refer to Drawings** 

QW-01-040~QW-01-055

Calculation based on

**TECHNICAL STANDERDS AND COMMENTARIES** 

FOR

PORT AND HARBOUR FACILITIES IN JAPAN

Design Load

**Crane Foundation Part** 

Container Crane Lode (Refer Design Condition)

**Yutirity Tonnel Part** 

**Container Berth** 

100t TypeTruck crane outrigger 900kN

Multi-purpose Berth

35t Type Fork Rift Wheel

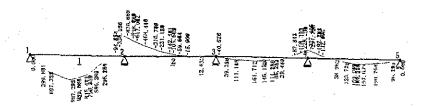
440kN

Rev	Prep	ared	No. of	Che	cked	Revi	ewed	Superseded
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File in Calc. File

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i		

Figure of Bending Moment



+1/1 (i---j) +1/1

No of Mambar 1 (1-2)

Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection & (元)
i	0.000	0.000	830, 961	0.000	0,000
1 ·	0. 500 i	399.881	768. 561 <sup>1</sup>	0.000	0, 010
2	0.900 !	697, 321	718. 641	0.000	0, 016
3	0. 900	697, 355	341. 329	0,000	0.016
4	2.000	997. 292	204. 061	0.000	0. 026
5	2.000	997, 275	-173. 251	0.000	0, 026
6 '	2. 300	939, 705	-210.679	0.000	0, 027
7	2.300	939, 683	-210.691	0.000	0, 027
8	2. 350	929, 015	-216, 919	0.000	0, 027
9 .	2. 700	845. 449	-260. 599	0.000	0, 025
10 .	2. 700	845, 423	-260, 611	0,000	0, 025
11	2.900	790. 833	-285. 559	0.000	0, 023
12	2.900	790. 766	-662. 871	0.000	0, 023
13	3. 200	586. 360	-700, 299	0.000	0, 020
14	3. 200	586. 289	-700.311	0.000	0.020
15	3. 600	295, 256	-750. 219	0.000	0.015

Working Condition

Prepared by	Y. Ando	Checked by	. NISHIHURA
	26 107 12002		08 1 08 1200 2

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.
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		References/

Point	Distance	Bending moment	Shearing force	Axial force	Deflection
	(m)	Mz (kN·m)	Sy (kH)	Nx (kN)	δ (m,m)
i	0.000	-468, 279	859.641	0.000	0.000
1	0. 400	-134, 406	809. 721	0.000	0.002
2	0.400	-134, 325	809.709	0.000	0.002
3	0.900	254.854	747, 321	0.000	0.006
4	0.900	254. 892	370. 009	0.000	0.006
5	1.800	537, 329	257. 701	0.000	0.010
6	1.800	537. 317	-119. 611	0.000	0.010
7	2.300	461, 930	-181, 999	0.000	0. 010
8	2.300	461. 912	-182.011	0.000	0.010
9	2.700	379, 146	-231.919	0.000	0.008
10	2.700	379, 123	-231. 931	0.000	0.008
11	2, 900	330, 267	-256. 879	0.000	0.007
12	2.900	330, 203	-634. 191	0.000	0, 007
13	3, 200	134. 397	-671.619	0.000	0.006
14	3, 200	134.329	-671.631	0.000	0, 006
15	3.800	-291.038	-746. 499	0.000	0.002
16	3.800	-291. 152	-1123, 811	0.000	0.002
17	4. 100	-633. 794	-1161, 239	0.000	0. 000
18	4. 100	-633, 911	-1161.251	0.000	0. 000
19	4. 300	-868. 538	-1186. 199	0. 000	0. 000
20	4. 300	-868, 657	-1186.211	0.000	0.000
j	4.600	-1230.013	-1223. 639	0.000	0.000

### No of March 4 (4 - 5)

Point	Distance	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	-1230, 013	1470. 138	0,000	0.000
1	0, 100	-1083, 623	1457, 658	0.000	0.000
2	0. 100	-1083. 476	1457. 646	0.000	0,000
3	0.400	-651.942	1420, 218	0,000	0. 002
4	0.400	-651, 837	1042.906	0.000	0. 002
5 (	0.600	-445, 854	1017.958	0.000	0.004
6	0.600	<b>-44</b> 5, <b>75</b> 2	1017. 946	0.000	0.004
7 ]	1. 300	236. 140	930. 598	0.000	0.011
8	1.300	236, 196	553. 286	0,000	0.011
9 i	1.800 !	497. 189	490.898	0.000	0.016

Working Condition

Prepared by	Y. Ando	Checked by	R. NISHIHURA
	26 1 07 1200 Z		08 108 1200 &



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		Refer	ences/

Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (taps)
20	4, 300	-846. <b>640</b>	-1115, 024	0,000	0,000
j	4.600	-1186. 646	-1152.451	0,000	0,000

No of Member 4 (4 - 5)

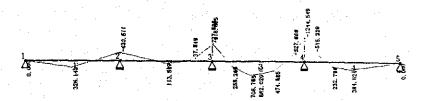
Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	-1186. 646	J 1541. 188	0.000	0.000
1 }	0.100	-1033. 152	1528. 708	0,000	0.000
2	0. 100	-1033, 035	1151. 395 ,	0.000	0.000
3	0.400	-693. 345	1113.968	0.000	0.003
4 \	0.400	-693. 233	1113, 955	0.000	0.003
5	0.600	-473.048	1089. 008	0.000	0.004
6	0.600	-472. 938	1688. 995	0.000	0. 004
7	1.300	258. 682	1001. 648	0.000	0. 012
8	1.300	258. 745	624. 335	0.000	0. 012
. 9	1.800	555. <b>25</b> 5	561. 948	0.000	0. 017
10	1. 800	555. 312	561. 935	0.000	0, 017
11	2. 200	770. 051	512, 028	0.000	0.020
12	2.200	770.064	134.715	0.000	0.020
13	2.350	788.856	116. 008	0.000	0. 021
14	2.400	794. 500	109. 768	0.000	0. 021
15	2. 400	794. 511	109. 755	0.000	0. 021
16	2. 700	821.814	72. 328	0.000	0.021
17	3. 300	842. 747	-2, 552	0.000	. 0.019
18	3, 300	842.709	-379. 865	0.000	0.019
19	4, 200	450. 336	-492.172 .	0.000	0.008
20	4, 200	450. 248	-869. 485	0.000	0.008
j	4. 700	0.000	-931.872	0.000	0.000

Working Condition

	Prepared by	YiAndo	Checked by	E. NISHIMURA
		26 107 12002		08 1 08 12002

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# Figure of Bending Moment



### V- - - - 1 (1 - 2)

.1	oir	ıt		Distance (m)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Defication δ (mm)
		i		0.000	0.000	369. 166	0.000	0.000
		1	:	2. 350	326, 143	-31.598	0.000	0.009
_		j	•	4. 700	-430.511	-552. 363	0.000	0.000

# No of Member 2 (2-3)

Distance (m)	Bending moment	Shearing force	Axial force	
	Mz (kN•m)	Sy (kN)	Nx (kN)	Deflection δ (am)
0.000	-430.511	462.028	0.000	0.000
2, 300	113. 547	11.067	0.000	0.000
3. 600	-37.745	-243.824	0.000	-0.001
3, 600	-37. 819	-733. 844	0. 000	-0.001
4, 500	-777. 595	-910. 287	0.000	0.000
4, 500	-777.737	-1400.307	0.000	0,000
4. 600 !	-918, 605	-1419. 894	0.000	0. 000
	2. 300   3. 600   3. 600   4. 500	2.300 113.547 3.600 -37.745 3.600 -37.819 4.500 -777.595 4.500 -777.737	2. 300     113. 547     11. 067       3. 600     -37. 745     -243. 824       3. 600     -37. 819     -733. 844       4. 500     -777. 595     -910. 287       4. 500     -777. 737     -1400. 307	2. 300     113. 647     11. 067     0. 000       3. 600     -37. 745     -243. 824     0. 000       3. 600     -37. 819     -733. 844     0. 000       4. 500     -777. 595     -910. 287     0. 000       4. 500     -777. 737     -1400. 307     0. 000

## Pausing Condition

Prepared by X And	Checked by & NISHIHURA
26 1 07 12	08 108 12002

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### No of Member 3 (3-4)

. Point	Point Distance Bending moment (m)   Wz (kN·m)		Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (am)	
i	0,000	-918. 605	1274. 886	0.000	0.000	
1	1.000	258. 247	1078. 816	0.000	0,008	
2	1.000	258. 306	588. 796	0,000	0,008	
3	1. 900	708.773	412. 353	0.000	0, 014	
4	1.900	708. 765	-77. 667	0,000	0. 014	
5	2, 300	662, 029	-156. 075	0.000	0.014	
6	3. 100	474. 426	-312. 931	0.000	0.011	
7	3.100	474, 345	-802. 951	0.000	0.011	
8	4,000	-327.620	-979. 394	0.000	0,003	
9	4.000	-327, 768	-1469, 414	0.000	0.003	
زز	4. 600	-1244. 549	[-1587. 036]	0,000	0,000	

### No of Member 4 (4-5)

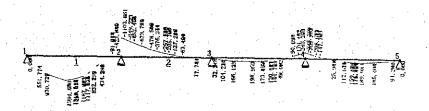
Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	-1244.549	1507. 477	0.000	0, 000
1	0.500	-515. 319	1409. 442	0.000	0. 001
2	0. 500	-515, 226	919. 422	0.000	0, 001
3	1.400	232.771	742, 979	0.000	0, 006
4	1.400	232. 796	252. 959	0.000	0.006
5	2. 350	384. 624	66. 712	0.000	0.009
j	4. 700	0.000	-394. 052	0.000	0,000

# Pausing Condition

Prepared by	Y. Ando	Checked by	2. VISH IMURA
	261 07 12002		08 / 08 /2002

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Figure of Bending Moment



K+ (i---i) K+

No of Mambas 1 (1 - 2)

Point	Distance (a)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i:	0,000	0,000	1134. 748	0.000	0.000
ı	0.500	551, 774	1072. 348	0.000	0. 013
2	0.900	970, 729	1022. 428	0. 000	0. 023
3 :	0.900	970, 775	454. 015	0.000	0. 023
4	2. 000	1394, 656	316.748	0.000	0, 037
5	2.000	1394, 630	-251. 665	0. 000 ;	0.037
6	2. 300	1313. 544	-289. 092	0.000	0.037
7	2.300	1313, 515	-289, 105	0.000	0. 037
8	2. 350	1298. 934	-295. 332	0.000	0.037
9	2, 700	1187.923	-339. 012	0.000	0. 035
10	2. 700	1187, 889	-339. 025	0,000	0.035
11	2.900	1117.625	-363. 972	0,000	0. 033
12	2. 900	1117. 531	<del>-9</del> 32. 385	0.000	0. 033
. 13	3. 200	832, 297	-969. 812	0.000	0. 029
14	3. 200	832, 199	-969, 825	0.000	0. 029
15	3, 600	434, 389	-1019. 732	0.000	0. 022

Seismic Condition

	Prepared by	Y. Ando	Checked by 2	NUHIHURA
		261 07 12002		08 1 08 1200 B



Project	Det	alled Des	sign on Port F	Reactivation P	roject in La U	Jnion	Calc. File N	0.
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Subject		Quaywall					Page No.	7 Rev.
	<del></del>		<del>- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1</del>					References/
	Point	Distance	Bending moment	Shearing force Sy (kN)	Axiel force Nx (kN)	Deflection o (mas)	Į	Votes
	i	0.000	-612. 186	1161. 522	0, 000	0.000		
	ı ·	0.400	-157. 562	1111, 602	0,000	0, 004	* .	
	2 .	0.400	-157. 449	1111, 589	0.000	0, 004	4.	
	3	0.900	382. 639	1049, 202	0,000	0.009		
	4	0.900	382. 688	480. 789	0,000	0, 009		
-	5	1.800	764. 817	368. 482	0.000	0. 014		
	6	1.800	764. 797	-199, 931	0.000	0.014		
	. 7	2. 300	649. 258	-262, 318	0.000	0. 014	$\mathcal{L}_{\mathcal{L}} = \mathcal{L}_{\mathcal{L}}$	
	8	2.300	649. 232	-262, 331	0.000	0.014		
,	9	2. 700 (	534. 347	-312, 238	0.000	0.012	. 1	
	10	2, 700 :	534. 315	-312, 251	0.000	0.012		
	11	2. 900	469. 403	-337. 198	0.000	0.011		en jakan aktor da T
	12	2. 900	469. 312	-905, 611	0.000	0.011		
	13	3. 200	192. 108	-943, 038	0,000	0.008		
·	14	3. 200	192. 013	-943, 051	0, 000	0. 008		
	15	3. 800		-1017. 918	0.000	0.003		
	16	3. 800 :	-396. 339	-1586, 331	0.000	0. 003		
-	17	4. 100 ;	-877. 690	-1623. 758	0.000	0.001		
	18	4. 100	-877-854	-1623. 771	0.000	0.001		
	19	4.300 :	-1204. 938	-1648. 718	0,000	0.000		
	20	4.300	-1205. 105	-1648. 731	0.000	0.000	. '	
<u> </u>	j	4. 600	1705. 169	-1686, 158	0.000	0. 000		
	- <i>-</i>				0.000	0.000		
No of 3:	lember	4 (4 - 5	•					
· Ţ	oint .	Distance	Bending moment	Shearing force Sy(kN)	Axial force Nx (kN)	Deflection of (mm)		
	i	0.000	-1705. 169	2034. 754	0.000	0.000	•	
	1 -	0. 100	-1502. 318	2022, 274	0,000	0.000		
	2	0.100 ;	-1502, 114	2022, 262	0.000	0.000		
•	3	0. 400 !	-901. 252	1984, 834	0.000	0.003		
	4	0.400 :	-901, 109	1416, 422	0.000	0.003		
	5	0. 600 ;	-620, 461	1391. 474	0,000	0.005		
	6	0.600	-620, 320	1391. 462	0. 000	0.005	10 to	
	. 7	1.300	322, 995	1304. 114	0, 000	0.015		
	. 8	1.300	323, 070	735, 702	0.000	0.015		
*	9	1.800 .	675, 252	673. 314	0.000	0. 021		
							<u> </u>	
					*		Seismic (	ondition
								OMUIE/OII
			Pre	pared by	Y. An	do Ch		NISHIHORA

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		Doloropood

Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (tan)
20	4, 300	-1171.935	~1541. 487	. 0.000	-0, 001
. ji	4. 600	-1639. 838	-1578. 915	0,000	0,000

### No of Member 4 (4-5)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (nm)
i į	0.000	-1639. 838	2141, 790	0,000	0.000
1;	0. 100	-1426, 283	2129, 310	0.000	0.001
2 .	0. 100	-1426. 125	1560, 898	0.000	0.001
3	0.400	<del>-9</del> 63. 626	1523, 470	0.000	0.004
4 :	0.400	<del>-9</del> 63. 472	1523, 458	0,000	0,004
5 ်	0. 600	-661. 427	1498, 510	0.000	0. 006
5	0.600	<del>-6</del> 61. 276	1498, 498	0.000	0.006
7	1. 300 }	356. 954	1411, 150	0,000	0. 017
8	1. 300	357. 039	842, 738	0,000	0, 017
9 .	1.800	762. 729	780, 350	0.000	0.024
10	1.800	762. 807	780, 338	0,000	0. 024
11	2. 200	1064. 885	730. 430	0.000	0, 028
12	2. 200	1064. 901	162. 018	0.000	0, 028
13	2. 350	1087. 785	143, 310	0.000	0. 029
14	2. 400	1094. 795	137. 070	0.000	0. 029
15	2. 400	1094. 809	137. 058	0.000	0.029
16	2. 700	1130. 300	99. 630	0,000	0.029
17	3. 300	1167. 614	24. 750	0,000	0. 026
18	3. 300	1167. 559	-543. 662	0,000	0.026
19	4. 200	627. 785	-655, 970	0,000	0, 011
20	4. 200	627. 661	-1224. 382	0.000	0.011
<u>;     </u>	4. 700	0.000	-1286, 770	0, 000	0.000

# Seismic Condition

	Prepared by	Y. Ando	Checked by	2. NISHIMURA
		26   07  200z		08 / 08 /2002

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Serviceability limit state

References/ Notes

$$W = k_1 x \{ 4C + 0.7 x (C_{\phi} - \phi) \} x (\sigma_{\phi} / Es)$$

W: crack width

 $k_1$ : coefficient of adhesive condition of re-bar

C: cover over re-bar Co : re-bar pitch φ : re-bar diameter

 $\sigma_{\,s}$  : increase of re-bar stress Es: Young's modulus of re-bar

 $Wa \approx 0.0035C$ 

Wa: acceptable crack width

C: cover over re-bar

### Ultimate limit state

1. Examination for moment 
$$\varepsilon_y = f_{yk}/(\gamma_{ms} \cdot E_s)$$

εy: yield strain of re-bar fik: yield strength of re-bar γ ms: material modulus Es: Young's modulus of re-bar

$$M_{nd} = Ts (d-0.4X) / \gamma_b$$

 $M_{\rm nd}$ : bearable moment Ts: tensile strength d: effective height

X : effective distance between neutral axis and edge

γ b: material modulus

2.Examination for shearing force

$$V_{yd} = V_{cd} + V_{sd}$$

 $V_{yd}$ : design bearable shearing strength

 $V_{cd}$ : design bearable shearing strength without stirrup  $V_{sd}$ : design bearable shearing strength of stirrup

 $V_{yd} = \beta_d \cdot \beta_p \cdot \beta_a \cdot f_{vcd} \cdot b \cdot d / \gamma_b$  $\beta_d : (1/d)^{1/4}$ 

d : effective height

 $\beta_{\rm p}:(100{\rm p_w})^{10}$ 

 $\mathbf{p}_{\mathbf{w}}$  : ratio of re-bar to concrete

 $\beta_n$ : modulus related to moment

 $f_{vcd}: 0.2 \cdot (f_{cd})^{1/3}$ 

f<sub>cd</sub>: design strength of concrete

γ<sub>b</sub>: material modulus

1	 			<u></u>
	Prepared by	Y. Ando	Checked by	e. Nishimura
		26/07/2002		08 / 08 /2002

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### Fatigue limit state

## 1.Examination for moment

a) concrete

$$f_{rd} = k_1 \cdot f_d (1 - \log N / K)$$

 $\mathbf{f}_{rd}$  : bending and tensile strength of concrete  $\mathbf{k}_1$ : modulus related to strength condition

 $\mathbf{f}_i$ : design strength of concrete

N: repeated times

K: modulus related to concrete type

### b) concrete

$$f_{ard} = 190 \cdot 10^a / N^k (1 - \sigma_{sp} / f_{sd}) / \gamma_s$$

 $\mathbf{f}_{nd}$ : design strength of re-bar

 $a:0.81-0.003\phi$ 

 $\phi$ : diameter of re-bar

N: repeated times

k: 0.12 (constant)

 $\sigma_{\bullet p}$ : permanent load

 $\mathbf{f}_{sd}$ : design tensile strength of re-bar

 $\gamma_s$ : material modulus

# 2.Examination for shearing force

$$V_{red} = V_{ed} \cdot (1 - \log N / 11)$$

 $V_{red}$ : design bearable shear strength

 $V_{
m cd}$  : design bearable shear strength without stirrup

N : repeated times

$$V_{ed} = \beta_{d} \cdot \beta_{p} \cdot \beta_{n} \cdot f_{ved} \cdot b \cdot d / \gamma_{b}$$

 $\beta_d : (1/d)^{1/4}$ 

d : effective height

 $\beta_p : (100p_w)^{1/3}$ 

p, : ratio of re-bar to concrete

 $\beta$  . : modulus related to moment

 $f_{red}: 0.2 \cdot (f_{red})^{1/3}$ 

 $\mathbf{f}_{cd}$ : design strength of concrete

 $\gamma_b$ : material modulus

<u> </u>			'
Prepared by	Y. Ando	Checked by	P. NISHHUPA
	26 1 07 12002		08 / 08 /2002



Project	Detailed Design on Port Reactivation Project in La Union	Calc, File No.	
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		Refer Notes	ences/

### Calculation Result of FRAME

Working Max	moment (upper) 997.292	moment (under) -1230,013	kNm
( )	997.292	-1230.013	kNm
2		•	kNm
<b>③</b>			kNm
(4)			kNm

Mooring	moment (upper)	moment (under)
Max	708.773	

Earthquak m	oment (upper) mo	oment (under)
Max	1394.565	-1705.169 kNm
. ①	1394.656	-1705.169 kNm
2		kNm
3		kNm
<u>(4)</u>		kNm

Working	shearing force
Max	1541,188 kN
. ①	1541.188 kN
2	kN
(3) ·	kN
<b>(4</b> )	kN

1	Mooring	shearing force	
	Max	1587.036 kN	

Earthquake	shearing force
Max	2141.79 kN
1	2141.79 kN
<i>i</i> ②	kN
3	kN
4)	kN_

# Moment and Shearing Force of Member

	Prepared by	Y. Ando	Checked by 2	. NUHTHURA
		2610712002		08 1 08 12002

	Detailed Design on Por	t Reactivation Proj	ect in La Union	Calc. File	No.	
Section	Civil			Calc. Inde	ex No.	
Subject	Quaywall			Page No.	/2 Rev.	
		Typical section	(under)		References/ Notes	retin
		Case-1 Re-bar sectional area sectional width b	D22 nos 3.871 As	19 73.549	110.00	
		height d' location of re-bar Es	260 effective	e height 250		
		Ec n neutral axis x	25 8	75.504		
		Md Os	997.292 kNm	35.524 cm 355.24 mm		
		cover over re-bar pitch of re-bar width of crack w	0.057 kN/mm 89 mm 100 mm			
		acceptable width o	f crack wa	0.117 0.312 OK!		
		Typical section (L	pper)			
		Re-bar sectional area sectional width b	D22 nos 3.871 As 200	19 73.549	:	
		height d' location of re-bar Es	260 effective ( 10 200	neight 250		
		Ec n neutral axis x	25 8 35.	524 cm		
		Md O's cover over re-bar	1230.013 kNm 0.070 kN/mm²	5.24 mm		
		pitch of re-bar width of crack w acceptable width of c	89 mm 100 mm 0. rack wa	144 312 OK!		
				<u> </u>		
				,		
	Serviceability Limit	State : Working	Condition:			
		Prepared by	Y. Ando	Checked by	e. Nishihuea	
	<del></del>	<del></del>	2610712002	Checked by	08 1 08 120	

Wide section (under)   Release	Calc. Index No.   Page No.   A Rev.	Section	Civil	Wide section (u Case-1 Re-bar sectional area sectional width I height d' location of re-bates Es Ec n	(inder)  D22 nos 3.871 As 250 260 effective heigh 10 200 25 8	Calc, Ind Page No. 24 92.904	ex No /3 Rev	
Viride section (under)   References	Page No.	Subject	Quaywall	Gase-1 Re-bar sectional area sectional width I height d' location of re-ba Es Ec n neutral axis x	D22 nos 3.871 As 250 260 effective heigh 10 200 25 8	Page No. 24 92.904	References	
Wide section (upper) Case - Re-bar D22 nos 24 sectional airea 3.871 As 92.904 height d' 260 effective heigh 250 Es 200 Es 200 Es 25 n 8 708.773 kNm  Md 708.773 kNm  G 5 0.032 kN/mm² cover over re-bar 100 mm width of crack w 0.086 accontable width of crack w 0.012 OK 1  Wide section (upper) Case - Re-bar D22 nos 24 sectional airea 3.871 As 92.904 sectional airea 3.871 As 92.904 sectional airea 2.700 Es 200 Es 200 Md 1244.549 kNm  G 5 0.056 kH/mm² cover over re-bar 10 Es 200 Md 1244.549 kNm  G 5 0.056 kH/mm² cover over re-bar 100 mm width of crack w 1155 occurs w 1155 occurs width of crack w 1155 occurs width occurs width of crack w 1155 occurs width occurs	Wide section (under)  Case-1 Re-bar D22 nes sectional vides   250 height of 260 effective heigh   250 Es   200 Es   250 n   358.96 cm   35			Gase-1 Re-bar sectional area sectional width I height d' location of re-ba Es Ec n neutral axis x	D22 nos 3.871 As 250 260 effective heigh 10 200 25 8	24 92.904	References	
Re-bar D22 nos 24 sectional width 1 250 height d' 260 effective heigh 250 houten of re-ba 10 Es 200 Ec 25 n 8 neutral axis x 35.596 cm 356.96 mm 4 708.773 kblm 6 s 0.032 kbl/mm² cover over re-ba 100 mm width of crack w. 0.312 OK!  Wide section (upper)  Case-1 Re-bar D22 nos 24 sectional area 3.371 As 92.904 sectional width 1 250 height d' 260 effective heigh 250 houten of re-bar 10 Es 200 Ec 25 n 8 35.596 cm 356.96 mm  Md 1244.549 kblm 7 s 35.696 cm 356.96 mm  Md 1244.549 kblm 7 s 25.96 mm  Md 1244.549 kblm 7 cover over re-ba 89 mm intch of re-abar 100 mm width of crack w. 0.312 OK!	Re-bar D22 nos 24 sectional wideh t 250 height d' 250 effective heigh 250 location of re-ba 10 Es 200 Eo 25 n neutral axis x 35.696 cm  Md 708.773 kNm  O s 0.032 kN/mm² cover over re-ba 89 nm pitch of crack w 0.088 acceptable width of crack v. 0.312 OK 1  Wide section (upper)  Case-1 Re-bar D22 nos 24 sectional width t 250 height d' 280 effective heigh 250 ledge of re-bar 100 mm  Md 1244.549 kNm  O s 0.088 acceptable width of crack w 0.012 OK 1  Wide section (upper)  Case-1 Re-bar D22 nos 24 sectional width t 250 height d' 280 effective heigh 250 ledge of re-bar 100 Es 25 n Md 1244.549 kNm  O s 0.058 kH/mm² cover over re-ba 89 mm sitch of re-bar 100 mm width of crack w 0.115 acceptable width of crack w 0.115			Re-bar sectional area sectional width I height d' location of re-ba Es Ec n neutral axis x	3.871 As 250 260 effective heigh 10 200 25 8	92.904		
height d'	height d' 280 effective heigh 250 location of re-bs 10 Es 200 Eo 25 n 8 neutral axis x 35.596 cm 366.96 mm Md 708.773 kNm d's 0.032 kN/mm³ cover over re-bs 89 mm pitch of re-bar 100 mm width of casck w 0.086 saccestable width of crack w 0.312 OK!  Wide section (upper)  Case-1 The-bar D22 nos 24 sectional area 3.371 / As 92.904 sectional area 4.200 location of re-bs 100 les 200 location of re-bs 100 les 200 location of re-bs 200 location of re-bs 200 location of re-bs 100 location of re-bar 100 location of re-			height d' location of re-ba Es Ec n neutral axis x	260 effective heigh 10 200 25 8	250		
EG 25 n neutral axis x 35.696 cm 356.96 mm  Md 708.773 kNm  G s 0.032 kN/mm cover over re-b: 89 mm pitch of rer-bar 100 mm width of crack w 0.066 sacceptable width of crack w: 0.312 OK!  Wide section (upper)  Case-  Re-bar D22 nos 24 sectional area 3.871 As 92.904 sectional area 3.871 As 92.904 sectional area 1.871 As 92.904 sectional area 2.871 As 92.904 sectional area 3.871 As 92.904 sectional area 4.904 secti	Ec 25 n 8 neutral axis x 35.596 cm 356.96 mm Md 708.773 kNm 70 0.012 kN/mm² cover over re-bi 89 mm pitch of re-bar 100 mm witth of reack w 0.066 acceptable width of erack w 0.312 OK!  Wide section (upper)  Gase-I Re-bar D22 nos 24 sectional width 1 250 height d' 250 effective heigh 250 location of re-bar 10 Ea 200 Ec 25 n 85.696 cm 356.96 mm Md 1244.549 kNm 70 c 0.050 kH/mm² cover over re-bar 89 mm pitch of re-bar 100 mm width of crack w 0.115 asceptable width of crack w 0.115 asceptable width of crack w 0.312 OK!			Ec n neutral axis x	<b>2</b> 5 8			
Md 708.773 kNm  Os 0.032 kN/mm² cover over re-b: 89 nm pitch of re-bar 100 mm width of crack w 0.066 acceptable width of crack w: 0.312 OK !  Wide section (upper)  Case-1 Re-bar D22 nos 24 sectional area 3.871 As 92.904 sectional width t 250 height d' 260 effective heigh 250 location of re-bt 10 Es 200 Ec 25 n 8 35.996 cm 355.99 mm  Md 1244.549 kNm  Os 0.056 kN/mm² cover over re-b: 89 mm pitch of re-bar 100 mm width of crack w 0.115 seceptable width of crack w. 0.312 OK !	Md 708.773 kN/mm² cover over re-br 89 mm pitch of re-bar 100 mm width of crack w 0.066 acceutable width of crack w. 0.312 OK!  Wide section (upper)  Case-1 Re-bar D22 nos 24 sectional width 1 250 height d' 260 effective heigh 250 location of re-br 10 Es 200 Ec 25 n 8 neutral axis x 35.696 cm Md 1244.549 kNm G cover over re-br 89 mm pitch of re-bar 100 mm width of crack w 0.115 acceptable width of crack w 0.312 OK!			j	98 <b>60</b> 6			
over over re-br 89 mm pitch of re-bar 100 mm width of crack w 0.066 acceptable width of crack w. 0.312 OK!  Wide section (upper)  Case-1 Re-bar D22 nos 24 sectional area 3.871 As 92.904 sectional width 1 250 height d' 260 effective heigh 250 location of re-bar 10 Es 200 Ec 25 n 8 35.696 cm 365.696 mm Md 1244.549 kNm  S cover over re-ba 89 mm pitch of re-bar 100 mm width of crack w 0.115 acceptable width of crack w. 0.312 OK!	over over re-br 89 nm pitch of re-bar 100 mm width of crack w 0.066 acceptable width of crack w: 0.312 OK!  Wide section (upper)  Case-I Re-bar D22 nos 24 sectional width ! 250 height d' 250 effective heigh 250 location of re-ba 10 Es 200 Ec 25 n 8 neutral axis x 35.698 cm 356.89 mm  Md 1244.549 kNm 7 sover over re-brise pm mm pitch of re-bar 100 mm width of reack w 0.115 acceptable width of crack w 0.312 OK!				356.96			,
Wide section (upper)  Case-1 Re-bar D22 nos 24 sectional area 3.87! As 92.904 sectional width 1 250 height d' 260 effective heigh 250 location of re-bi 10 Es 200 Ec 25 In 8 35.696 cm Md 1244.549 kNm  T s 0.056 kN/mm² cover over re-bi 89 mm pitch of re-bar 100 mm width of crack w 0.115 acceptable width of crack w. 0.312 OK!	Wide section (upper)  Gase-1 Re-bar D22 nos 24 sectional area 3.871 As 92.904 sectional width 1 250 height of 260 effective heigh 250 location of re-ba 10 Es 200 Ec 25 n 8 neutral axis x 35.896 cm 356.96 mm  Md 1244.549 kNm  T s 0.056 kN/mm² cover over re-ba 89 mm pitch of re-bar 100 mm width of crack w 0.115 secceptable width of crack w. 0.312 OK!			σs cover over re~b:	0.032 kN/mm² 89 mm			
Case—I Re—bar D22 nos 24 sectional area 3.871 As 92.904 sectional width 1 250 height d' 260 effective heigh 250 location of re—ba 10 Es 200 Ec 25 n 8 neutral axis x 35.696 cm meutral axis x 35.696 mm  Md 1244.549 kNm  G s 0.056 kN/mm² cover over re—ba 99 mm pitch of re—bar 100 mm width of crack w 0.115 acceptable width of crack w 0.312 OK!	Case-1 Re-bar D22 nos 24 sectional area 3.871 As 92.904 sectional width 1 250 height d' 260 effective heigh 250 location of re-ba 10 Es 200 Ec 25 n 8 neutral axis x 35.696 cm 356.96 mm Md 1244.549 kNm   Os 0.056 kN/mm² cover over re-ba 89 mm pitch of re-bar 100 mm width of crack w 0.115 lacceptable width of crack w. 0.312 OK!				0.066 of crack w: 0.312	I		
Case—I Re—bar D22 nos 24 sectional area 3.871 As 92.904 sectional width 1 250 height d' 260 effective heigh 250 location of re—ba 10 Es 200 Ec 25 n 8 neutral axis x 35.696 cm meutral axis x 35.696 mm  Md 1244.549 kNm  G s 0.056 kN/mm² cover over re—ba 99 mm pitch of re—bar 100 mm width of crack w 0.115 acceptable width of crack w 0.312 OK!	Case-1 Re-bar D22 nos 24 sectional area 3.871 As 92.904 sectional width 1 250 height d' 260 effective heigh 250 location of re-ba 10 Es 200 Ec 25 n 8 neutral axis x 35.696 cm 356.96 mm Md 1244.549 kNm   Os 0.056 kN/mm² cover over re-ba 89 mm pitch of re-bar 100 mm width of crack w 0.115 lacceptable width of crack w. 0.312 OK!			Wide section (un	ranc			
height d' 260 effective heigh 250 location of re-bs 10 Es 200 Ec 25 n 8 neutral axis x 35,696 cm 356.96 mm  Md 1244.549 kNm	height d' 260 effective heigh 250 location of re-bz 10 Es 200 Ec 25 n 8 35.696 cm 356.96 mm  Md 1244.549 kNm	l.		Case-1 Re-bar sectional area	D22 nos 3.871 As			
n 8 neutral axis x 35.696 cm 356.96 mm  Md 1244.549 kNm  S 0.056 kN/mm² cover over re-bi 89 mm pitch of re-bar 100 mm width of crack w 0.115 acceptable width of crack w. 0.312 OK!	neutral axis x 35.696 cm 356.96 mm  Md 1244.549 kNm  S 0.056 kN/mm² cover over re-b; 88 mm pitch of re-bar 100 mm width of crack w 0.115 lacceptable width of crack w. 0.312 OK!			height d' location of re-ba Es	260 effective heigh 10 200	250		
Md 1244.549 kNm  ### State of the content of the co	Md 1244.549 kNm  To 0.056 kN/mm² cover over re-b: 89 mm pitch of re-bar 100 mm width of crack w 0.115 acceptable width of crack w. 0.312 OK!  Ultimate Limit State Pausing Condition			n	8 35.696 d			
pitch of re-bar 100 mm width of crack w 0.115 acceptable width of crack w 0.312 OK!	pitch of re-bar 100 mm  width of crack w 0.115  acceptable width of crack w 0.312 OK!  Ultimate Limit State Pausing Condition			σs	1244.549 kNm 0.056 kN/mm <sup>2</sup>	nm		
	Ultimate Limit State Pausing Condition			pitch of re-bar width of crack w	100 mm 0.115	OK!		•
Illtimate Limit State Pausing Condition				· .		<del></del> :		
Illtimate Limit State Pausing Condition		4 · *						
Illtimate Limit State Pausing Condition				•				
Illtimate Limit State Pausing Condition			•			. '		
Ultimate Limit State Pausing Condition								
Ultimate Limit State Pausing Condition								
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				<u> </u>	Refere	nces/
		Typical section			Notes	
		examination for	moment			
		Re-ber	D22 nos	19	*	
		sectional area	3.871 As 200	73,549		
		height d'	260 effective heig	th 250		
		location of re-ba	10	1		
		Es	200 kN/mm <sup>2</sup>			
		γ <sub>ms</sub>	1.0			
		f <sub>yk</sub> Ey	345 N/mm² 0.00173	j		
		Ts	2,537,441 N			
		Fad	18.5 N/mm <sup>2</sup>			•
•		x	100.85 mm			
		εs γ <sub>b</sub>	0.06591 OK!			
		M <sub>ne</sub>	1.15 5427.2 kNm			
e e		γ,	1.0			
	•	M <sub>a</sub>	997.292 kNm			
		<u>F</u>	0.18 OK!			
		examination for s	hearing force			
		Re-bar	D22 nos	19		
	•	sectional area	3.871 As	73.549		
		sectional width the	200		4	
		location of re-ba	260 effective height	r 250		
		fcd	18.5 N/mm²			
<i>;</i> .		fvcd	0.529 N/mm <sup>2</sup>	. ]		
		β <sub>d</sub>	0.795			
		$\beta_{p}$	0.528			
		76	1.3			
		V <sub>cd</sub>	854.34 kN			
	·	2) stirrup Re-bar	D9 pitch	15		
		sectional area	7.942 Aw	15) 15.884		
		fwyd	345 N/mm <sup>2</sup>			
•		z	217.391 cm			
		γ <sub>b</sub>	1.15	ļ		
		V <sub>sd</sub>	6906.08 kN			
		$V_{\rm rd}$	7760.42 kN 1.0			
		v.	1541.188 kN			
		F	0.2 OK!	.		
				<del></del>		
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		•				
				<i>Y</i> *		÷
				•	•	
	Fatigue Limit	State   Wor	king Condition			
1		7101	THE CONGRESSION			
		Prepared by	Y. Ando	Checked by	e. WISH	HURA
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		Wide section		ji ago iv	<del></del>	ences/	
	$(x_1, \dots, x_n) \in \mathcal{C}_{n-1}(X_n)$	examination for					
		Re-bar sectional area sectional width t	D22 nos 3.871 As 250	24 92.904			:
		height d' location of re-ba	260 effective heig	<del>di</del> 250			
		Es	10 200 kN/mm²				•
		7 ma	1.0		4		
		fyk	345 N/mm <sup>2</sup>	ar an in the			
		εy Ts	0.00173				٠.
		fcd	3,205,188 N 18.5 N/mm <sup>2</sup>				
		×	101,91 mm				
		Es	0.08236 OK!				
		γ <sub>b</sub> M <sub>nd</sub>	1.15				
		γ t	6854.2 kNm 1.0				
		M <sub>d</sub>	708.773 kNm				
		le	0.1 OK!				
		examination for s					٠.
	<b>1.</b>	1) main re-bar	nearing force				
		Re-bar	D22 nos	24			
		sectional area sectional width t	3.871 As	92.904		100	
		height d'	250 260 effective heigh	250			
		location of re-ba	10	200			
		fod	18.5 N/mm <sup>2</sup>				
4 174		fvcd β <sub>d</sub>	0.529 N/mm² 0.795		٠		
	× .	$\beta_{\rm p}$	0.530				
		rb	1.3				
•		V <sub>cd</sub>	1071.97 kN				
		2) stirrup					
		Re-bar sectional area	D9 pitch	20			
		fwyd	7.942 Aw 345 N/mm²	15.884			
		z	217.391 cm				
•		r <sub>b</sub>	1.15				
4		V <sub>sd</sub>	5179.56 kN	· <b>!</b>			
		V <sub>yd</sub>	6251.53 kN				
•		γ <sub>t</sub>    V <sub>d</sub>	1.0 1587.036 kN				
		F	0.25 OK!			ter stell	
				l			
							- 7-
+ 1						· · · .	
	Fatigue Limit Sta	ate Pausing Co	ondition *				٠.
							_
	<u> </u>	Prepared by	Y. Ando	Checked by	e. NIS	HIMURA	٠.
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Project	Detailed Design on P	ort Reactivation	Project in La Union	Calc.	File No.	
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	· ·			II ago		ences/
		Typical section			Notes	
		examination for				
		Re-bar sectional area	D22 nos 3.871 As	19  73.549		
		sectional width t	200	]		
*		height d' location of re-ba	260 effective heigh	250		
		Es	200 kN/mm²	ł		
		r <sub>me</sub>	1.0			
	·	f <sub>M</sub>	345 N/mm²			
		E y Ts	0.00173 2,537,441 N			
		fcd	18.5 N/mm <sup>2</sup>			
		χ εs	100.85 mm			
		r	0.06591 OK! 1.0			
		M <sub>nd</sub>	6241,2 kNm			
· .		r	1.0			
•		M <sub>d</sub>	1394.565 kNm	.		
		<u> </u>	0.22 OK!	· · · · ·		
		examination for s	nearing force	<del></del>		
		1) main re-bar Re-bar	D22 nos	10	•	
		sectional area	3.871 As	19 73.549		
		sectional width the ight d'.	200	· [		
		location of re-ba	260 effective heigh 10	250		
		fcd	18.5 N/mm <sup>2</sup>			
		fvcd	0.529 N/mm <sup>2</sup>			
		$\beta_d$	0.795 0.528			
		r	1.15			
		V <sub>cd</sub>	965.78 kN			
		2) stirrup Re-bar				
		sectional area	D9 pitch 7.942 Aw	20 15.884		
		fwyd	345 N/mm <sup>2</sup>	10.004		
		z	217.391 cm		•	
		$V_{\rm sd}$	1.0 5956.49 kN			
		V <sub>yd</sub>	6922.27 kN			
		γ,	1.0			
		۸٩	2141.79 kN			
		<u> </u>	0.31 OK!			
				4		
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			:	
	Ultimate Limit Sta	ıte Seismic C	ondition 14.			
	<u> </u>	Prepared by	Y. Ando	Checked by	P. NIS	HIHURA
		<del></del>				

Project	Detailed Design on P	ort Reactivation F	roject in La Union	Calc. File	No.	
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		Wide section			Referei Notes	
		examination for I Re-bar sectional area	D22 nos	24		
		sectional width theight d'	3.871 As 250 260 effective hei	92.904 sh 250		
		location of re-ba Es Y ma	10 200 kN/mm² 1.0			
		f <sub>yk</sub> εy	345 N/mm <sup>2</sup> 0.00173			
		Ts fcd x	3,205,188 N 18,5 N/mm <sup>2</sup>			
		es r <sub>b</sub>	101.91 mm. 0.08236 OK! 1.15			
		M <sub>nd</sub> Y <sub>t</sub>	6854.2 kNm 1.0			
		M <sub>d</sub>	1394.565 kNm 0.2 OK!			
		examination for sh 1) main re~bar Re~bar	garing force D22 nos			
		sectional area sectional width t height d'	3.871 As 250	92.904		
1.44.		location of re-ba	260 effective heigh 10 18.5 N/mm <sup>2</sup>	250		
		fved β <sub>d</sub> β <sub>p</sub>	0.529 N/mm <sup>2</sup> 0.795 0.530			
		γ <sub>b</sub> V <sub>cd</sub>	1.3 1071.97 kN			
•		2) stirrup Re-bar sectional area	D9 pitch 7.942 Aw	20 15.884		
		fwyd z Y <sub>b</sub>	345 N/mm <sup>2</sup> 217.391 cm 1.15			
		V <sub>sd</sub> V <sub>yd</sub>	5179.56 kN 6251.53 kN			
		Υι V <sub>d</sub> F	1.0 2141.79 kN O.34 OK !			
	,					
٠.		en de la companya de La companya de la co				
						•
	Ultimate Limit Sta	te : Seismic	Condition			
		Prepared by	Y. Ando	Checked by	D. NIS	HIHURA
			2610712002	<u> </u>		08 12002

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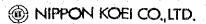
•	
I Minor	cantian
Typical	3664011

Typical section	<u> </u>	
examination for	moment	
1) concrete		
Re-bar	D22 nos	19
sectional area	3.871 As	73.549
sectional width Ł	200	
height d	260 effective heigh	ri 250
location of re-ba	10	
N	30,000 times	
K	10	et .
kl	0.85	
fd	18.5 kN/mm <sup>2</sup>	
frd	8,685.0 kN/mm <sup>2</sup>	•
re	1.3	
σ <sub>rd</sub>	385 kN	
F	0.05763 OK!	
2) re-bar		
γ.	1.05	
$\phi$	22 mm	
а	0.744	
k	0.12	
fsrd	291280 kN/m <sup>2</sup>	100
F	0.00139 OK!	

examination for			
Re-bar	D22		19
sectional area	3.871	As	73.549
sectional width b	200		
height d'	260	effective heigh	250
location of r <del>e-b</del> a	10		
fcd	18.5	N/mm²	
lvcd	0.529	N/mm²	
β <sub>a</sub>	0.795		4.5
β,	0.528	* * *	
γ <sub>b</sub>	1,0		
V <sub>ed</sub>	1110.64	kN	:
N ·	30,000	times	
$\sigma_{\sf rd}$	385	kN	
V <sub>red</sub>	658.6	kN	
-	0.585	OK!	

Fatigue Limit State Working Condition

Prepared by	Y. Ando	Checked by	E. NICHIMURA
	2610712002		08 108 12002



Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section		Calc. Index No.	
Subject	Quaywall	Page No. /9	Rev.

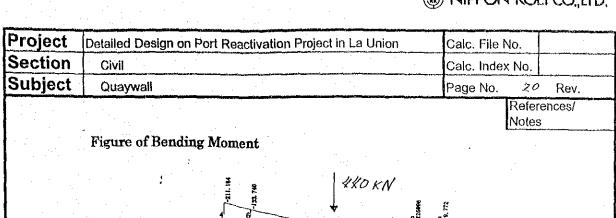
Wide	section

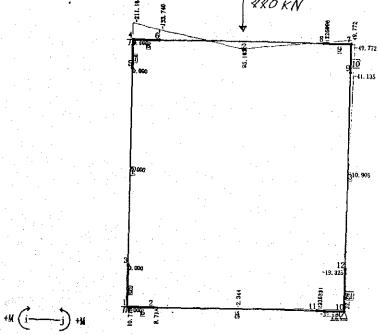
Wide section		100
examination for r	noment	
1) concrete		·
Re-bar	D22 nos	. 19
sectional area	3.871 As	73.549
sectional width b	200	, , , , ,
height d'	260 effective hei	zh 250
location of re-bas	10	
N	30,000 times	,
K	10	
k1	0.85	
fd	18.5 kN/mm <sup>2</sup>	
frd	8,685.0 kN/mm <sup>2</sup>	÷
7 c	1.3	
$\sigma_{rd}$	500 kN	
F	0.07484 OK!	
2) re-bar		
$\gamma_*$	1.05	
φ	22 mm	
a	0.744	
ķ	0.12	
fsrd	291280 kN/m <sup>2</sup>	
F	0.0018 OK!	

examination for Re-bar	D22	nos	19
sectional area	3,871	As	73.549
sectional width I	200	and the second s	
height d'	260	effective height	250
location of re-ba	10		
fcd	18.5	N/mm <sup>2</sup>	1000
fvcd	0.529	N/mm <sup>2</sup>	
β <sub>a</sub>	0.795		* * *
$\beta_{p}$	0.528		
rb	1.0		
V <sub>ed</sub>	1110.64	kN	
N	30,000	times	
$\sigma_{\sf rd}$	500	kN	
V <sub>red</sub>	658.6	kN	
<u>F</u>	0.759	OK!	

Fatigue Limit State Pausing Condition

Prepared by	Y. Ando	Checked by &	. NISHIMURA
	261 07 12002		08 / 08 /2002





No of Member 1 (3-5)

		g i a cirk fati kilok			
Pai <b>nt</b>	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	0.000	0.000	0.000	0.000
1	0.875	0.000	0.000	0.000	0.000
	1. 750	0.000	0.000	0.000	0.000
MAX	0.000	0.000	0.000	0.000	
MIN	1. 750	0,000	0.000	0.000	

V----- 2 (6 - 8 '

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing torce Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	-133.740	309. 696	-34, 549	0.000
1	0.750	95, 157	300, 696	-34. 549	0, 043
2	0. 750	95, 143	-139. 305	-34. 549	0. 043
j	1.500	-12, 696	-148. 304	-34, 549	0.000
MAX	0.750	95. 157	300, 596	-34, 549	

Prepared by	Y. Ando	Checked by	e. UISHIHUEA
	29/1 07 1200z		00 108 12002

Project	Detailed	Design	on Port Read	tivation Proje	ct in La Unior	<u> </u>	Calc. File I	No.	
Section	Civil				<u> </u>		Calc, Inde	x No,	
Subject	Quay	wall					Page No.	2/	Rev.
No.	of Member	·. · ( 5 ~ 6	6)					Refer Notes	ences/
(10)			Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)			
	i	0.000	-7, 526	-0. 119	-793. 818	0.000			•
	1	-1. 900	-9. 580	-0.419	-793. 818	-0, 288			
	j	9. 800	-11.634	-0, 419	-793, 818	0.000			
No	of Member	8 ( 7 - 8	s )		•		•,		
	-	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)			
	i	0.000	~5.824	-0, 065	-1138, 140	0,000			
* . *	1	4. 900	-6. 141	-0.065	-1138.140	-0. 184		-	
	j	9. 800	-6. 457	-0, 065	-1138.140	0, 000		*	
		9 ( 9 -	10.)		· · · · · ·			. •	
. · · <b>,</b>	Point	Distance	Bending moment	Shearing force	Axial force	Deflection δ (mm)			
		(m)	Nz (kN·m) ,	Sy (k%) 0, 900	Nx (kN) -1304, 538	0,000			
	i	4.900	-1. 197 3. 212	0. 900	-1304. 538	0, 096	4		
	<u>'</u>	9. 800	7, 620		-1304.538	0,000		e.	
	No of Member — Point	10 ( 1 - Distance	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)			
	i	0.000	6. 525	-0.442	-149.157	0.000	-	i.	
· 	j	15. 200	-0. 187	-0. 442	-149. 157	0.000			•
	No of Member	11 (3-	- 12 )		1 - 11				
	Point	Distance (m)	Bending moment Uz (kN-m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (tain)	· •		
	i	0, 000	6. 500	-0.438	-458. 947	0.000	•		
	j	15. 200	-0. 154	-0.438	-458. 947	0.000		٠.	
	No of Member	, 12 ( 5 -	- 13 )						
	- n	Distance	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)			
	Point	( <del>13</del> )					-		
	i			-0. 592	-793. 818	0, 000			
			7. 526	-0. 592 -0. 592	-793. 818 -793. 818		<u>.</u>		
	i	0.000	7. 526						
	i	0.000	7. 526		-793. 818		lition Ve	ertical	Load
	i	0.000	7. 526 -1. 466		-793. 818	ng Conc			Load SHIHUDA

				W NIPPON	KOEI CO,,LI
Project	Detailed Design on I	Port Reactivation P	roject in La Union	Calc, File N	о.
Section	Civil			Calc. Index	No.
Subject	Quaywall			Page No.	22 Rev.
Calcul	lation Result of FRAME			1	References/ Notes
Workin Ma	x 95.157	-133.74 kNm	Working Max	shearing force 309,696 kN	
) <u>(</u>	95.157	-133.74 kNm		309.696 kN	

Working n Max	noment (upper) m 95.157	oment (under) -133.74 kNm
1	95.157	-133.74 kNm
2		kNm
3		kNm
- (4)		kNm

		<u> </u>	
Mooring	moment (upper)	moment (under)	
		momorie (anaor)	
Max	4.0		kNm

	ent (upper) moment (unde	7)
_Max		kNm
1		kNm
<b>②</b>	*	kNm
(3)		kNm
ā)		kNm

Working	shearing force
Max	309.696 kN
1	309.696 kN
2	kN
3	kN
<u> </u>	kN

Ī	Mooring	shearing force	e
ĺ	Max		kN

Earthquake	shearing force	
Max		kN
1		kN
② ③		kN .
3		kN
4)		kN -

Moment and Shearing Force of Member

Prepared by	Y. Ando	Checked by	e. Nishimura
	26 107 12002		08 / 08 /2002

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No
Section	Civil	Calc. Index No.
Subject	Quaywall	Page No. 23. Rev.

### Serviceability limit state

References/ Notes

$$W = k_1 x \{4C + 0.7 x (C_0 - \phi)\} x (\sigma_1 / E_s)$$

W: crack width

 $\mathbf{k_1}$ : coefficient of adhesive condition of re-bar

C: cover over re-bar Co : re-bar pitch φ : re-bar diameter

 $\sigma_{\,\bullet}$  : increase of re-bar stress Es: Young's modulus of re-bar

Wa = 0.0035C

Wa: acceptable crack width

C: cover over re-bar

### Ultimate limit state

1.Examination for moment  $\varepsilon_{\rm r} = f_{\rm yk}/(\gamma_{\rm ms} \cdot E_{\rm S})$ 

 $\epsilon_y$ : yield strain of re-bar  $f_{rk}$ : yield strength of re-bar γ ms: material modulus

Es: Young's modulus of re-bar

$$M_{\rm nd} = Ts (d-0.4X) / \gamma_b$$

Mnd: bearable moment Ts: tensile strength

d : effective height

X : effective distance between neutral axis and edge

γ<sub>b</sub>: material modulus

2. Examination for shearing force

$$V_{\rm pd} = V_{\rm cd} + V_{\rm sd}$$

 $V_{yd}$ : design bearable shearing strength

 $m V_{cd}$  : design bearable shearing strength without stirrup

 $V_{\omega}$ : design bearable shearing strength of stirrup

 $V_{yd} = \beta_d \cdot \beta_p \cdot \beta_n \cdot f_{vd} \cdot b \cdot d / \gamma_b$  $\beta_d : (I/d)^{\nu_d}$ 

d : effective height

 $\beta_p: (100p_*)^{1/3}$ 

p. : ratio of re-bar to concrete  $\beta_n$ : modulus related to moment

 $f_{red}: 0.2 \cdot (f_{red})^{1/3}$ 

 $f_{\text{cd}}$  : design strength of concrete

η<sub>b</sub>: material modulus

 <u> </u>			
Prepared by	Y. Ando	Checked by	P. NSHIMURA
·	26 1 07 12002		08/08/2002

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.
Section	Civil	Calc. Index No.
Subject	Quaywall	Page No. 24 Rev.

Typical section (u	nder)			
Case-1				
Re-bar	D19	nos		15
sectional area	2.865	As		42.975
sectional width b	150			
height d'	40	effecti	ve height	30
location of re-bar	10			
Es	200			
Ec ·	25			
n	8			
neutral axis x			9.657 d	m
•			96.57 n	nn l
Md	95.157	kNm		
σ\$	0.083	kN/mr	n <sup>2</sup>	ı
cover over re-bar	90.5	mm		1
pitch of re-bar	100	mm		
width of crack w			0.174	İ
acceptable width of	crack wa		0.317	ok!

Typical section (upper)

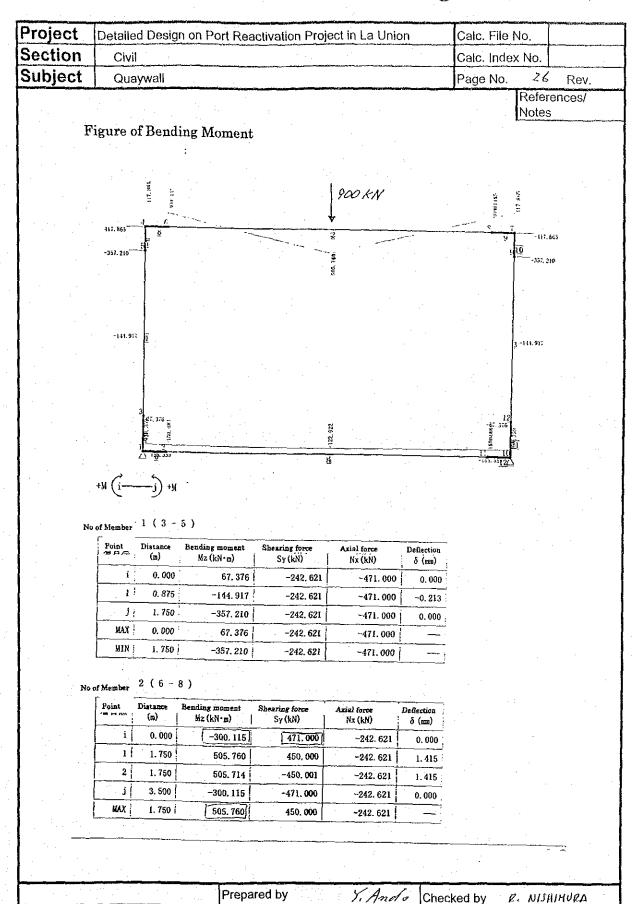
Typical section (u)	,pc17			
Case-I				
Re-bar	D19	nos		15
sectional area	2.865	As		42.975
sectional width b	150			
height d'	40	effectiv	e height	30
location of re-bar	10		_	
Es	200			
Ec	25			
n .	- 8			
neutral axis x			9.657 c	m
			96.57 m	nn i
Md	133.74	kNm		
σs .	0.116	kN/mm	2	
cover over re-bar	90.5	mm		j
pitch of re-bar	100			[
width of crack w			0.243	
acceptable width of o	rack wa	100	0.317	OK!

# Serviceability Limit State Working Condition

Prepared by	Y. Ando	Checked by	P. DISHIMURA
	26 1 07 12002		08 1 08 12002

# (I) NIPPON KOEI CO.,LTD.

Section Civil Calc, Index No.	Project	Detailed Design on Po	ort Reactivation P	roject in La Union	Calc, Fil	e No.	
Page No. 25   Rev.	Section						
Typical section   Examination for themself   References   Notes	Subject	**************************************	·		<del></del>		Rev
Examination for shearing force     1) main re-bar   Re-bar   D19   nos   15     sectional area   2.865 As   42.975     sectional width   150     height d'   40 effective heigh   30     location of re-ba   10     fcd   18.5 N/mm²     fvcd   0.529 N/mm²     β	Subject	**************************************	examination for Re-bar sectional area sectional width theight d'location of re-balls Y man for the following the f	0.19 nos 2.865 As 300 40 effective h 10 200 kN/mm <sup>2</sup> 1.0 345 N/mm <sup>2</sup> 0.00173 2.866,433 N 18.5 N/mm <sup>2</sup> 75.95 mm 0.13475 OK! 1.15 672 kNm 1.0 95.157 kNm	Page No. 29 83.085	Refere	
2			1) main re-bar Re-bar sectional area sectional width t height d' location of re-ba f cd fvcd β d β p γ b Vcd 2) stirrup Re-bar sectional area	D19 nos 2.865 As 150 40 effective hei 10 18.5 N/mm² 0.529 N/mm² 1.351 0.985 1.3 243.71 kN D9 pitch 7.942 Aw 345 N/mm²	42.975 gh 30		
Prepared by KAnde Checked by E. NISHIMURA		Ultimate Limit S	Z Y b V ad V y t t t V d F State Worki	26.087 cm 1.15 828.73 kN 1072.44 kN 1.0 309.696 kN 0.3 OK!			
26 1 07 /2002 08 /08 /2002			Prepared by		Checked by	e. Nish	IMURA



26/07/2002

08 1 08 12002

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No	).
Section	Civil	Calc. Index i	
Subject	Quaywali		27 Rev.
			eferences/
	Serviceability limit state		lotes
	$W = k_1 \times \{4C + 0.7 \times (C_{\phi} - \phi)\} \times (\sigma_{\phi} / E_S)$		
	W: crack width		
	k <sub>1</sub> : coefficient of adhesive condition of re-bar		•
	o . cover over re.par		
	C <sub>o</sub> : re-bar pitch		
	φ : re-bar diameter		
	G.: increase of re-bar stress		
	Es: Young's modulus of re-bar		
	Wa = 0.0035C	<b>.</b>	
	Wa: acceptable crack width		
	C : cover over re-bar		
	rne: , ,		
	Ultimate limit state		
	1. Examination for moment	* **	
	$\epsilon_y = f_{yk}/(\gamma_{ms} \cdot E_s)$		
٠	ξ, : yield strain of re-bar	1111	. •
	$f_{rk}$ : yield strength of re-bar $\gamma_{ms}$ : material modulus		
	Es: Young's modulus of re-bar		
	$M_{nd} = Ts (d-0.4X) / \gamma_b$		
	M . hearoble	•	
	$M_{nd}$ : bearable moment Ts: tensile strength		*
	d : effective height		
	X : effective distance between neutral axis and ad-		
	Ys: material modulus		
	2.Examination for all		•
	2. Examination for shearing force $V_{rd} = V_{cd} + V_{sd}$		•
	$ m V_{rd}$ : design bearable shearing strength $ m V_{rd}$ : design bearable shearing strength without stirrup $ m V_{rd}$ : design bearable shearing		

f <sub>cd</sub> : (	design strength of concrete material modulus			
		<u> </u>	_	the state of the s
	Prepared by	YAndo	Checked by	e. Wishimura
		26 102 12002		12 1 00 10000

 $V_{rd} = \beta_d \cdot \beta_p \cdot \beta_n \cdot f_{red} \cdot b \cdot d / \gamma_b$   $\beta_d : (1/d)^{1/4}$  d : effective height  $\beta_p : (100p_w)^{1/3}$ 

p. : ratio of re-bar to concrete  $\beta_n$ : modulus related to moment

fred: 0.2 · (fed) 1/3

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section	Civil	Calc. Index No.	
Subject	Quaywail	Page No. 28	Rev.
1		D-4-	***

### Calculation Result of FRAME

Working	moment (upper)	moment (under)	
Max	505.76	-300.115	kNm
0	505.76	-300.115	
2			kNm
3			kNm
4	:		kNm

Working	shearing force
Max	471 kN
1	471 kN
Ž 3	kN
	kN
4	kN

Mooring	moment (upper)	moment	(under)	
	memory (oppor)	momorie	(unact)	
Max		•		kNm
				271 4411

Mooring	shearing force	
Max		kN

Earthquaki	moment (upp	er) moment (un	ider)
Max			<u>kN</u> m
0			kNm
② ③			kNm
(3)			kNm
4			kNm

Earthquake	shearing force	
Max		kN
(1)		kΝ
2		kN
3		kN
L 4		kN

# Moment and Shearing Force of Member

	Prepared by	Y. Ando	Checked by	E. NISHTHURA
		26 107 12002		08 1 08 12002



Project	Detailed Design on I	ort Reactivation F	roject in La Union		Calc. File	No.		
Section	Civil		The state of the s		Calc. Inde		<del></del>	
Subject	Quaywall				Page No.		Rev.	
	gady train	·			age No.		ences/	سسب
.•		Typical section (u	nder)			Notes		
		Gase-1 Re-bar	D25 nos			<u> </u>		
		sectional area	5.067 As	146.94	3			
		sectional width b	300			. i		
		height d' location of re-bar	40 effective heigh 10	ս 3	0	-		
		Es	200					
		Ec	25	٠				
		neutral axis x	8 11.908					
-			119.08					
		Md	505.76 kNm					
•		σs cover over re-bar	0.132 kN/mm <sup>2</sup>					
		pitch of re-bar	87.5 mm 100 mm					
		width of crack w	0.266					
•		acceptable width of	crack wa 0.306	OK!	]	•		
		Typical section (up Case-1	per)	·			•	
		Re-bar	D25 nos	29				
		sectional area	5.067 As	146.943		÷		
		sectional width 6	300	* .				
•		location of re-bar	40 effective height	30				
		Es	200					
		Ec n	25 8	1.				
		neutral axis x	11.908 c	·m				
	•	ļ.,	119,08 г					
-		Md σs	300.115 kNm					
		cover over re-bar	0.078 kN/mm² 87,5 mm	•				
1		pitch of re-bar	100 mm	- 1				
		width of crack w	0.157					
	•	C. C. Madai O. C.	ack wa 0.306	OK!				
		•						
	•				-			
								. :
	4							
•		•						
			•					
				* **.	: :			
		•						
			•					
			5				•	
	•							
					+ .			
ķ	Serviceability Limit	State : Worl	cing Condition					
		Prepared by						
· · · · · · · · · · · · · · · · · · ·	<u> </u>	li rebaien pa	Y. Ando	Check	ed by		HMURA	
		1.0	26 107 12002	1		08 1	08 121	002

Section			on Project in La Union		Calc. File		
	Civil				Calc. Inde	x No.	
Subject	Quaywall				Page No.		Rev.
							ences/
•		Typical section	·			Notes	; }
		examination for r			]		
		Re-bar	D25 nos	29			
		sectional area	5.067 As	146.943			
		sectional width theight d'	300 40 effective heigh	20			
	,	location of re-ba	10	30			
		Es	200 kN/mm <sup>2</sup>		1		
		Υms	1.0				
		f <sub>yk</sub>	345 N/mm²	•	,		
		εy	0.00173	•	-		
		Ts	5,069,534 N		1		-
		fcd	18.5 N/mm²				
		×	134.33 mm				
4	1	εs	0.07467 OK!				
		r	1.15				•
		M <sub>nd</sub>	1085.6 kNm				-
		$r_1$	1.0				
	4	M <sub>d</sub>	505.76 kNm				
		F	0.47 OK!				
						,	
		examination for s	hearing force				
		1) main re-bar	2				
	200	Re-bar	D25 nos	29			
		sectional area sectional width t	5.067 As 300	146.943			
		height d'	40 effective height	. 30			
		location of re-ba	10	30			* *
		fcd	18.5 N/mm <sup>2</sup>	ĺ			
		fved	0.529 N/mm <sup>2</sup>	i			
		β <sub>d</sub>	1.351				
		B	1.178				
		r	1.3	l			
		V <sub>cd</sub>	582.93 kN	[			
		2) stirrup	J02.55 KW				
	:	Re-bar	D9 pitch	30			
		sectional area	7.942 Aw	15.884			
		fwyd	345 N/mm²				•
* . *		z	26.087 cm	İ			
		76	1.15		•		
		V <sub>sd</sub>	414.37 kN	-			
		Vyd	997.3 kN				
		$r_i$	1.0				
		V <sub>a</sub>	471 kN	1			
		F	0.5 OK!	1			
	•	· · · · · · · · · · · · · · · · · · ·					
			4	•			
				*			
				•			
	•	-					
		to Working C	ondition				•
11	Itimate Limit Sto		AC 2 4 CE   D   A   L   A   B				
U	ltimate Limit Sta	te , working (			1		
U	Itimate Limit Sta			<del></del>	· · · · · · · · · · · · · · · · · · ·		
U	Itimate Limit Sta	Prepared by		Check	ked by ₽	. NIJHI	IHURA

	W NIPPO	N KOEI CO., LTD.	
	DESIGN CALCULATION CO	OVER SHEET	
Project	Detailed Design on Port Reactivation Project in La Union Province	Project Code	JC1N004
Section	Civil	Calc. File No.	
Sub-Section	Quaywall	Calc. Index No.	
Subject:	Container and Multi-purpose	e Berth	

# Calculation Objective:

Randside Crane Foundation Pile

### References, Calculation Notes and Comments

Refer to Drawings

QW-01-001~QW-01-006

QW-01-040~QW-01-044

QW-01-056

Calculation based on

**TECHNICAL STANDERDS AND COMMENTARIES** 

PORT AND HARBOUR FACILITIES IN JAPAN

Design Load

Container Crane( Refer to Design Condition )

Rev	Prep	ared	No. of	Che	cked	Rev	iewed	Superseded
	by Date Pages		Pages	by	Date	, by Date		by Calc No.
0	Shorter	26/07/02	9	is II	26. Tely 02	OF STATE OF	26/08/02	
Α			/		7			
В								
С								

File in Calc. File

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.
Section	Civil	Calc. Index No.
Subject	Quaywali	Page No. / Rev.
<u> </u>		References/

Figure of Bending Moment



+M (i----j) +M

Point	Distance (m)	Bending moment Mz (kN-m)	Shearing force Sy (kN)	Axial force Nx (kN)	Defication δ (mm)
i i	0.000	117. 208	-11, 960	0,000	0.000
1	4.900	58. 604	-11,960	0.000	1: 759
j	9.800	0.000	-11.960	0.000	0,000
MAX į	0.000	117. 208	-11.960	0.000	
MIN ,	9, 800	0. 000	-11.960	0.000	T

No of Member 2 (1 - 3)

Peint	Distance (m)	Rending moment Nz (kN·m)	Shesring force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
· i	0.000	-117. 208	0.580	0.000	0.000
j	15. 200	-108. 396	0.580	0,000	0.000
МАХ	15. 200 ·	-108.396	0.580	0.000	
HIN !	0.000	-117. 208	0.580	0,000	

Working Condition Horizontal Load

26 167 12002 08 108 120	Prepared by	Y. Ando	Checked by 2	NISHIHUQA
		26 167 1200z		08 / 08 /2002

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		References/

#### No of Member 7 (5 - 6

Point	Distance (u)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
í	0.000	-7. 526	-0, 419	-793. 818	0.000
1	4.900	-9.580	-0. 419	-793, 818	-0. 288
j	9, 800	-11.634	-0, 419	-793. 818	0.000

#### No of Mamber 8 (7 - 8

Point	Distance (m)	Bending moment Mz (kN+m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection d (mm)
í	0.000	-5.824	-0.065	-1138. 140	0.000
1	4. 900	-6, 141	-0.065	-1138.140	-0.184
j	9. 800	-6. 457	-0. 065	-1138.140	0.000

### No of Member 9 (9 - 10)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Azial force Nx (kN)	Deflection δ (mm)
i	0.000	-1, 197	0,900	-1304. 538	0.000
1	4. 900	3, 212	0. 900	-1304. 538	0, 096
j	9. 800	7. 620	0.900	-1304.538	0.000

### No of Member 10 ( $1 \sim 11$ )

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	6, 525	-0.442	-149. 157	0.000
j	15. 200	-0. 187	-0.442	-149 157	0.000

### No of Member 11 (3 - 12)

	Point	Distance (g)	Bending moment Mz (kN-m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
	i	0. 000	6, 500	-0. 438	-458. 947	0.000
L	į	15. 20 <b>0</b>	-0. 154	-0. 438	-458.947	0.000

### No of Member 12 ( 5 - 13 )

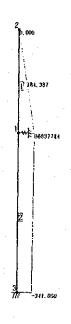
_					4.4
Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
j	0.000	7. 526	-0.592	-793.818	0.000
j	15. 200	-1.466	-0.592	-793.818	0.000

# Working Condition Vertical Load

26/07/2002 08/08/200	Prepared by	Y. Ando	Checked by	2. DISHIMURA
00 100 12002		261 07 12002		08 108 12002

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
Section	Civil	Calc. Index No.	
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' Figure of Bending Moment



+M (i----j) +M

No of Montes 1 (1 - 2)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	368. 774	-37. 630	0.000	0.000
1	4. 900	184. 387	-37. 630	0.000	5. 534
j	9. 800	0. 000	-37. 630	0.000	0.000
МАХ	0. 000	368. 774	-37. 630	0.000	
MIN	9. 800	0.000	-37. 630	0.000	·

No of Member 2 (1 - 3)

Point	Dista <u>nce</u> (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0. 000	-368.774	1. 824	0.000	0.000
j	15. 200	-341.050	1.824	0.000	0.000
KAK	15. 200	-341.050	1. 824	0.000	
MIN	0. 000	-368. 774	1. 824	0.000	_

Pausing Condition · Horizontal Load

Prepared by	Y. Ando	Checked by	2. NISHINORA
	26107/2002		08 / 08 /2002

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	Or and a superior of the parties of the last of the superior o
Section	Civil	Calc. Index No.	
Subject	Quaywall	Page No. ≰	Rev.
		Refer	ences/

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Azia) torce Nx (kN)	Deflection & (mm)
i	0.000	-11. 422	-0, 894	-1731, 329	0.000
1	4. 900	-15. 801	-0. 894	-1731, 329	-0, 474
jj	9.800	-20. 181	-0. 894	-1731, 329	0.000

No of Member 8 (7 - 8)

Point	Distance (m)	Bending moment Nz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i 0.000	~0.288	1. 426	~2026. 945	0,000	
1	4. 900	6. 700	1. 426	2026. 945	0.201
j	9. 800	13.688	1. 426	-2026. 945	0.000

No of Member 9 (9 - 10)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	
i	0.000	7. 640	3. 078	-1845. 913	0, 000	
1	4. 900	22. 723	3. 078	-1845. 913	0, 682	
j	9. 800	37. 806	. 3.078	-1845. 913	0.000	

No of Member 10 (1 - 11)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	
i	0.000	16. 164	-1. 729	-326. 556	0,000	
j	15. 200	~10. 115	-1. 729	-326, 556	0,000	

No of Member 11 (3 - 12)

Point	Distance (u)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ
î	0.000	15. 432	-1. 619	~1071, 257	0.000
j	15. 200	-9. 179	-1.619	-1071. 257	0.000

.. ... 12 (5 - 13)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	
i	0.000	11. 422	-1.018	-1731.329	0.000	
j	15, 200	-4. 054	-1.018	~1731. 329	0,000	

Pausing Condition - Vertical Load

	Prepared by	Y. Ando	Checked by	e. Dishimued
		26107 12002		08 108 12002

Section Subject	tailed Design on Civil Quaywall of Bending Mon			D. 000 ☐ 274. 547 ☐ 55885698		Catc. File to Catc. Index Page No.	x No.	Rev. ences/
Subject Figure	Quaywall	ment	1	<u>₹</u> 224. 547			Refere	ences/
Figure		ment	1	<u>₹</u> 224. 547				
	of Bending Mo	ment		<u>₹</u> 224. 547				
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	j) +¥		3	-530, 608				
No of Mew	ber 1 (1 - 2)							
Pain		moment Sho	earing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)			
		558. 698	-58. 970	<del></del>	<u> </u>			
	1 4.900	274. 547	-57. 010					
	j 9.800 ;	0. 000	<b>-55. 050</b>	0.000	0.000			
<u>.</u>	er 2 (1 - 3)							
Point	Distance Bending m		aring force Sy (kN)	Axial force Nx (kN)	Deflection . δ (mm)		•	
	<del></del>	558. 698	1, 848	0.000	0. 000			
	j 15. 200 -5	530. 608	1.848	0.000	0. 000			
	•	•	· -				J. A.	

## Seismic Condition · Horizontal Load

	Prepared by	Y. Ando	Checked by	Z, NSHIHURA
		2610712002		08 / 08 /2002

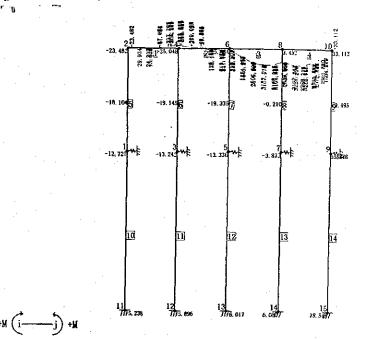
Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
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Point	Distance (m)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Azial force Nx (kN)	Deflection δ (mm)
i	0,000	9. 288	-0. 480	-1803, 182	0.000
j	15, 200	1, 998	-0. 480	-1803. 182	0. 000

No of Member 14 ( 9 - 15 )

Po	oint	Distance (m)	Bending moment Mz (kN+m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection & (mm)
:	i	0.000	1.444	0, 696	-2053, 256	0,000
-	j	15. 200	12.028	0. 696	-2053. 256	0.000

## Figure of Bending Moment



1 (2-4)

	Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection d (mm)
Ĺ	i	0.000	-23. 482	101, 126	-1.097	0.000
Į	1	0.800	29. 931	32, 406	-1. 097	-0.002
	2	0.800	29. 934	32. 397	-1. 097	-0. 002
L	3	1. 700	24. 307	-44. 904	-1. 097	-0.006
ľ	4	1.700	24. 302	-44, 913	-1. 097	-0, 006

Seismic Condition Vertical Load

Prepared by	Y. Ando	Checked by	R. NISHIHURA
	26/07/2002		08 1 08 1200 2

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Check of stress of sheet pipe pile

$$\frac{\sigma_c}{\sigma_{ca}} + \frac{\sigma_b}{\sigma_{bs}} < 1$$

σ = R/A R: axial force A: sectional area

σ ca. σ ba: acceptable stress

σ<sub>ba</sub> = M/Z M: moment Z: section modulus

#### Calculation Result

L	moment axial force	117.208 kNm 1304.538 kN	_
	moment axial force	kNm kN	: -
Earthquak	moment axial force	558.698 kNm 2053.256 kN	

### Stress

$\sigma_{c_{\bullet}}$	140 N/mm <sup>2</sup>			
$\sigma_{\rm ba}$	140 N/mm²			
Working				
$\sigma_{\circ}$	= R/A	50.6 N/mm <sup>2</sup>		
$\sigma_{\mathbf{b}_{i}}$	= M/Z	23.4 N/mm <sup>2</sup>		
f	0.53	ок!		

$\sigma_{\rm ca}$ $\sigma_{\rm ha}$	140 N	√mm²	
$\sigma_{ha}$	140 N	l∕mm²	
Mooring $\sigma_{\rm e}$	= R/A = M/Z		0 N/mm² 0 N/mm²
f	0.00	<u>ок !</u>	

$\sigma_{\rm ca}$	210 N/mm <sup>2</sup>		
$\sigma_{ba}$	210 /	N/mm²	
  Earthqu	Jake		
$\sigma_{\epsilon}$	= R/A	79.7 N/mm <sup>2</sup>	
$\sigma_{b}$	= M/Z	111.5 N/mm <sup>2</sup>	
f	0,91	OK!	

i					
		Prepared by	Y. Ando	Checked by	R. WISH MURA
			2616712002		08 1 08 12002

Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.
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#### Calculation Result

	moment axial force	117.208 1304.538	
_	moment axial force	368.774 2026.945	
Earthquak	moment axial force	558.698 2053.256	

#### Stress

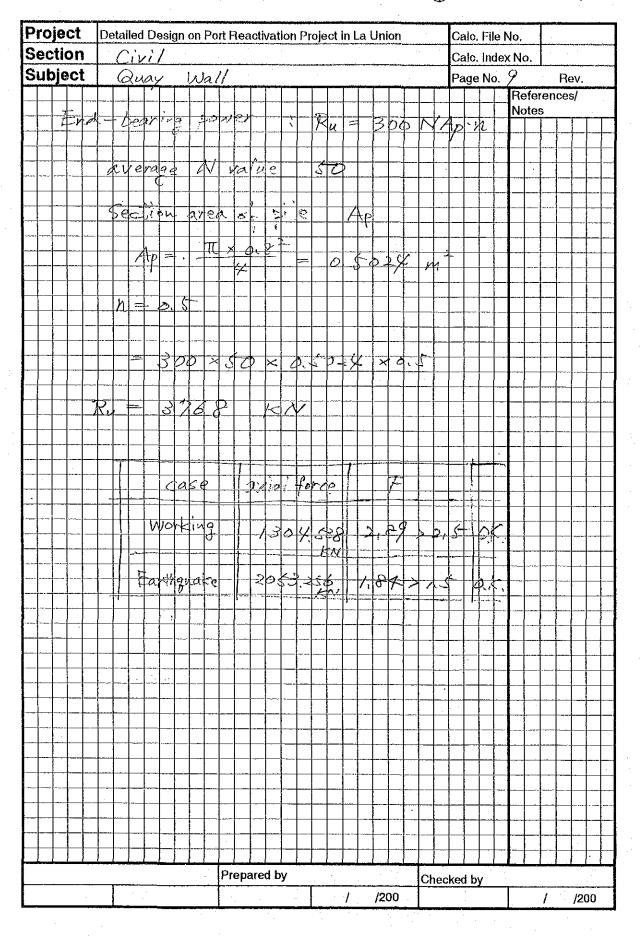
σ.	140 1	V/mm²
$\sigma_{ba}$ .	140 1	V/mm²
Working		
σ.	= R/A	39.4 N/mm <sup>2</sup>
σ,	= M/Z	18.4 N/mm²
f	0.41	_ ок !

σ.,,	140 1	V/mm²
σ <sub>ba</sub>	140 1	√mm²
Mooring		
$\sigma_{c}$	= R/A	61.3 N/mm <sup>2</sup>
$\sigma_{\mathfrak{b}}$	= M/Z	57.8 N/mm <sup>2</sup>
f	0.85	_ок!

σω	210	N/mm²
$\sigma_{ba}$	210 1	V/mm²
Earthq	uake	
$\sigma_{ m c}$	= R/A	62.1 N/mm <sup>2</sup>
$\sigma_{\rm b}$	= M/Z	87.6 N/mm²
u f	0.71	OK!

ł	<u> </u>				
I		Prepared by	Y. Ando	Checked by	2. NSHIHURA
			2610712002		08 1 08 1200 2

## (I) NIPPON KOEI CO., LTD.



DESIGN CALCULATION COVER SHEET						
Project Detailed Design on Port Reactivation Project Project Code JC1NG						
Section	Civil	Calc. File No.				
Sub-Section	Quaywall	Calc. Index No.				

Subject:

Container and Multi-purpose Berth

Calculation Objective:

Rainforcement of cran foundation

References, Calculation Notes and Comments

**Refer to Drawings** 

QW-01-057

Calculation based on

**TECHNICAL STANDERDS AND COMMENTARIES** 

**FOR** 

PORT AND HARBOUR FACILITIES IN JAPAN

Design Load

Container Crane

(Refer to Design Condition & Crane Foundation Pile)

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File in Calc. File

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•	· <u>·</u>		<del></del>		
Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection $\delta$ (mm)
5	1.900	2037. 197	1002. 136	-1. 657	0, 220
. 6	1.900	2037. 268	698. 327	~1. 657	0. 220
7	2, 500	2440, 737	646. 796	-1. 657	0. 248
8	2.800	2630. 910	621, 026	-1. 657	0. 251
9	2,800	2630. 942	317. 217	-1. 657	0. 251
10	2.900	2662, 203	308. 636	-1.657	0. 250
11	3.700	2881.624	239. 916	-1.657	0. 207
12	3.700	2881. 648	239. 907	-1. 657	0, 207
13	3.900	2927. 889	222. 736	-1.657	0, 187
14	3. 900	2927. 881	-81, 073	-1.657	0. 187
15	4.000	2919. 353	-89. 654	-1.657	0.175
. 16	4.000	2919. 344	-89. 663	-1.657	0. 175
17	4. 800	2820. 141	-158. 374	-1. 657	0.043
18	4. 800	2819. 972	-1677. 383	-1.657	0.043
19	4.900	2651, 975	-1685, 964	-1. 657	0. 022
20	4.900	2651.804	-1685. 973	-1. 657	0. 022
j	5, 000	2482. 949	-1694.554	-1.657	0.000

#### No of Mamber 2 (4 - 6)

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Point	Distance (m)	Bending momen: Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	
i	0, 000	2486. 018	-421.003	-1. 602	0, 000	
1	0. 900	2072. 325	-498. 313	-1.602	0. 094	
2	1. 000	2022. 065	-506. 903	-1.602	0. 101	
3	1. 000	2022. 013	-506. 912	-1. 602	0.101	
4	1. 900	1531. 063	-584. 213	-1. 602	0. 130	
5	1.900	1531. 004	-584. 222	~1. 602	0. 130	
6	2.000	1472, 212	-592. 803	-1. 602	0.130	
7	2.000	1472. 152	-592.812	-1.602	0.130	
8	2. 500	1165, 073	-635. 753	-1.602	0. 124	
9	2. 900	903, 900	-670.113	-1.602	0. 111	
10	2. 900	- 903. 832	-670. 122	-1.602	0.111	
11	3, 000	836, 459	-678. 703	-1. 602	0. 108	
12	3. 000	836. 390	-678.712	-1.602	0. 108	
13	3.900	190, 837	-756. 013	~1. 602	0.061	
14	3.900	190.760	~756.022	-1.602	0.061	

Prepared by	Y. Ando	Checked by &	NISHIHURA
	26 1 07 12002		08 108 12002

Project	Deta	Detailed Design on Port Reactivation Project in La Union					Calc. File	No.	
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				·				Notes	
No of M	-	1			······································				
P	oint	Distance (m)	Bending moment  Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)			
	5:	1, 900	119.760	-14, 053	-0. 211	0. 006	•		
	6 :	1, 900	119.759	-14. 061	-0.211	0.006			
	7	2, 500	95. 867	-65, 593	-0. 211	0.006			
	8 :	2. 800	72. 323	-91, 363	-0.211	0.005			
	9 ·	2, 800	72. 314	-91. 371	-0.211	0.005			
	10	2, 900	62. 758	-99, 953	-0. 211	0.004			
	11 }	3, 700	~44. 692	-168.673	-0. 211	0.001		•	
	12	3, 700	-44. 709	-168, 681	-0.211	0. 001			
· —	13 '	3. 900	-80. 145	-185, 853	-0.211	0.000			
7	14	3. 900	-80. 164	-185.861	-0. 211	0.000			
	15	4.000	-99. 160	-194, 443	-0. 211	0.000			
	16:	4. 000	-99.179	-194, 451	-0.211	0.000			
<del></del>	17 .	4. 800	-282. 202	-263. 163	-0. 211	-0.001			
	18	4.800	-282. 228	-263. 171	-0. 211	<del></del>			•
	19	4. 900	-308. 948	-271, 753	-0.211	0.000		12	
	20	4. 900	-308.975	-271. 761	-0. 211	0.000		* *	
· · · · · · · · · · · · · · · · · · ·		5. 000	-336. 552	-280, 343	-0. 211				
<u> </u>							•		
No of N	(emh <b>e</b> r	2 (4 ~	6)						
	oint	Distance	Bending moment	Shearing force	Axial force	Deflection			•
· · · · · · · · · · · · · · · · · · ·	<u> </u>	(m)	Mz (kN·m)	Sy (kN)	Nx (kN)	δ (mm)		•	
<u> </u>	i i	0.000	~345. 064	178. 605	-0.416	0.000			-
<u> </u>	1 :	0.900	~219. 109	101. 295	-0. 416	-0.014			
<u></u>	2 [	1.000	-209. 409	92, 705	-0.416	-0.015			
	3	1.000	-209. 400	92. 696	-0.416	-0.015			
· .	4	1. 900	-160. 764	15. 395	-0. 416	-0. 022			
	5	1.900	-160. 763	15. 386	-0.416	-0. 022			
-	6	2.000	-159. 654	6. 805	-0, 416	-0.022	•		
	7	2.000	-159, 654	6, 796	-0.416	-0. 022			
	. 8	2.500	-166, 990	-36. 145	-0. 416	-0.023			
	9	2. 900	-188, 320	-70. 505	-0.416	-0.023			
·	10	2. 900	-188, 327	-70, 514	-0. 416	-0.023			
	11	3, 000	-195. 800	-79. 095	-0.416	-0. 023			
	12	3.000	-195, 808	-79. 104	-0.416	-0. 023	•		
	13	3.900	-301, 775	-156. 405	-0. 416	-0, 018			
	14	3. 900	-301. 791	-156. 414	-0. 416	-0.018	-		٠

Prepared by

Y. Ando

26107 12002

Checked by

P. NISHIMURA

08 108 12002

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Point	Distance (m)	Bonding moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
5	1.900	921. 409	425, 074	-2, 898	0.108
6	1, 900	921. 452	425. 066	-2. 898	0. 108
7	2. 500	1160, 991	373, 534	-2.898	0.123
8	2. 800	1269. 186	347, 764	-2. 898	0.126
9	2. 800	1269. 221	347. 756	-2.898	0. 126
10	2. 900	1303, 533	339, 174	-2.898	0.126
11	3, 700	1547. 385	270, 454	-2.898	0. 107
12	3, 700	1547. 412	270. 446	-2. 898	0. 107
13	3. 900	1599, 758	253. 274	-2. 898	0.097
14	3. 900	1599. 783	253. 266	-2. 898	0.097
15	4. 000	1624. 656	244. 684	-2. 898	0.091
16	4.000	1624, 680	244. 676	-2. 898	0. 091
17	4.800	1792. 915	175. 964	-2. 898	0.023
18	4. 800	1792. 933	175. 956	-2.898	0. 023
19	4. 900	1810. 082	167. 374	-2. 898	0. 012
. 20	4. 900	1810. 099	. 167. 366	-2. 898	0.012
j	5.000	1826, 390	158. 784	-2. 898	0.000

#### No of March 2 (4 - 6)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	1798, 153	958, 615	-4. 902	0.000
1	0.900	2626. 116	881. 305	-4.902	0. 192
2	1.000	2683. 437	568. 915	-4, 902	0. 209
3	1.000	2683, 495	568. 906	-4. 902	0. 209
4	1, 900	3160, 671	491.605	-4.902	0. 319
5	1. 900	3160. 721	491. 596	-4. 902	0. 319
6	2. 000	3209. 402	483. 015	-4. 902	0. 325
7	2. 000	3209. 420	179. 206	-4. 902	0. 325
8	2. 500	3288. 272	136. 265	~4.902	0. 342
9	2. 900	3335. 906	101, 905	-4. 902	0. 334
10	2. 900	3335. 885	-201.904	-4. 902	0. 334
11	3.000	3315, 287	-210. 485	-4. 902	0. 330
12	3.000	3315. 265	-210. 494	-4. 902	0. 330
13	3. 900	3091.060	-287, 795	-4.902	0. 234
14	3. 900	3091.031	-287. 804	-4. 902	0. 234

# Working Condition Vertical Load

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FN: Calculation\_Sheet

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( Member					
Point	Distance (m)	Bending moment  Nz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection & (num)
15	4.000	-814. 397	-388. 507	··0. 024	-0.037
16	4. 000	-814. 436	-388, 515	-0.024	-0.037
17	4. 100	-853. 677	-397. 097	~0. 024	-0. 035
18	4. 100	-853. 717	-397. 105	-0.024	-0. 035
19	4. 900	-1198, 843	-465. 817	-0. 024	-0. 005
20	4. 900	-1198. 890	-465, 825	-0, 024	-0. 005
j	5. 000	-1245.854	-474. 407	-0. 024	0.000

### NoofMember 3 (6-8)

	<u></u>	<u> </u>			
Point !	Distance	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection & (mm)
<u>i</u> i	0. 000 1	-1245, 137	494. 976	-0.054	0.000
1	0, 900	-834. 448	417. 666	~0, 054	-0.032
2 [	1.000	-793, 111	409. 076	~0.054	-0. 034
3	1.000	-793. 070	409. 067	~0. 054	-0. 034
4	1.900	-459, 732	331. 766	~0.054	-0.040
5	1. 900	-459. 699	. 331.757	-0.054	-0.040
6	2. 000	-426, 985	323. 176	-0. 054	-0. 039
7	2, 000	-426. 952	323. 167	-0.054	-0. 039
8	2.500	-276. 135	280. 226	~0. 054	-0. 035
9	2.900	-170. 916	245. 866	~0.054	-0. 031
10	2. 900	-170. 891	245. 857	-0.054	-0. 031
11	3, 000	-146, 759	237. 276	~0.054	-0. 029
12	3.000	-146, 735	237. 267	~0.054	-0.029
13	3.900	32. 000	159. 966	~0. 054	-0. 015
14	3, 900	32.016	159. 957	~0.054	-0.015
15	4, 000	47, 567	151. 376	-0.054 ;	-0.014
16	4.000 !	47. 582	151. 367	~0.054	-0.014
17	4. 100 }	62. 275	142. 786	-0.054	-0.012
18	4, 100	62. 289	142. 777	-0, 054	-0. 012
19	4, 900	149. 016	74, 066	-0.054	-0.001
20	4, 900 /	149. 023	74. 057	-0.054	-0.001
j	5, 000	155. 993	65. 476	-0.054	0.000

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Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
15	4. 000	2112.585	-850, 678	-3, 524	0, 171
16	4. 000	2112. 499	-850, 687	-3, 524	0. 171
17	4. 100	2027. 088	-859, 268	-3. 524	0. 157
. 18	4. 100	2027. 001	-859, 277	-3. 524	0. 157
19	4. 900	1281. 805	-1231, 788	-3, 524	0.020
20	4. 900	1281.681	-1231.797	-3. 524	0.020
j	5. 000	1158, 197	j-1240. 378	-3. 524	0.000

#### No of Member 3 (6 - 8)

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Point	Distance (m)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflectio δ (mm)
i	0.000	1172. 202	-96. 175	-2. 665	0.000
1	0.900	1050, 855	-173, 485	-2. 665	0.050
2	1.000	1033.077	-182.075	-2. 665	0.054
3	1.000	1033, 059	-182. 083	-2. 665	0.054
4	1.900	834. 420	-259, 385	-2. 665	0. 071
. 5	1,900	834. 394	-259, 393	-2.665	0.071
6	2. 000	808. 053	-267, 975	-2, 665	0.071
7	2. 000	808. 025	-267. 983	-2. 665	0. 071
8	2. 500	663, 328	-310, 925	-2. 665	0.068
9	2.900	532.086	-345. 285	-2. 665	0.062
10	2. 900	532.0\$1	-345, 293	-2. 665	0.062
11	3, 000	497. 128	-353, 875	-2. 665	0.060
12	3.000	497. 092	-353, 883	-2. 665	0.060
13	3. 900	143. 851	-431, 185	-2. 665	0. 035
14	3.900	143. 808	-431, 193	-2. 665	0. 035
15	4.000	100. 303	-439.775	-2.665	0. 032
16	4. 000	100, 259	-439. 783	-2. 665	0.032
17	4. 100	55. 896	-448, 365	-2. 665	0.028
18	4. 100	55. 851	-448. 373	-2. 665	0.028
19	4. 900	-330, 284	-517.085	-2. 665	0.003
20	4. 900	330. 336	-517, 093	-2. 665	0. 003
j	5. 000	-382. 421	-525, 675	-2.665	0.000

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Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
15	4. 000	2661. 337	-162. 294	-4. 493 .	0, 162
16	4. 000	2661. 320 !	-162. 303	-1, 493	0. 162
17	4. 100	2644. 678	~170. 884	-4, 493	0, 150
18	4. 100	2644. 661	-170. 893	-1. 493	0. 150
19	1. 900	2480. 483	-239, 604	-4. 493	0.020
20	4. 900	2480. 458	-239. 613	-4. 493	0. 020
j	5.000	2456, 093	-248, 194	-4.493	0.000

No of Member 3 (6 - 8)

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection $\delta$ (mm)
i	0.000	2449. 096	686. 085	-4. 902 !	0.000
. 1:	0. 900	3031. 783	608.775	-1, 902	0, 201
2	1.000	3061. 851	296. 385	-4.902	0, 218
3 ;	1.000	3061. 881	296. 377	-4. 902	0.218
4 :	1.900:	3293, 809	219. 075	-4, 902	0. 324
5 !	1, 900 ;	3293. 831	219.067	-4. 902	0.324
6	2.000	3315. 287	210. 485	-4.902	0. 330
7	2. 000	3315. 308	210. 477	-4. 902 ;	0. 330
8 ‡	2,500	3288. 272	-136. 265	-4. 902	0.342
. 9 ;	2.900	3226. 894	-170, 625	-4. 902	0. 331
10 ;	2. 900 .	3226. 877	-170, 633	-4.902	0. 331
- 11	3,000 .	3209. 402	-179. 215	-4. 902 i	0. 325
12	3,000 :	3209. 353	-483. 023	-4.902	0. 325
13	3.900	2739. 899	-560. 325	-4. 902	0. 226
14	3.900 :	2739. 843	-560. 333	-4. 902	0. 226
15	4.000	2683. 437	-568. 915	-4.902	0. 209
16	4.000	2683. 380	-568. 923	-4. 902	0. 209
17	4.100	2626. 116	-577. 505	-4. 902	0. 192
18	4. 100	2626. 027	-881. 313	-4.902	0. 192
19	4.900	1893. 585	-950. 025	-4. 902	0. 024
20	4.900	1893. 489	-950. 033	-4. 902	0.024
ĵļ	5. 000	1798. 153	-958. 615	-4. 902	V. 000

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Point == K	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (am)
15	4. 000	-632. 942	-518, 432	~0. 260	-0. 015
16	4. 000	-632.994	-518. 441	-0. 260	-0. 015
17	4. 100	-685. 214	-527. 022	-0, 260 :	-0.015
18	4. 100	-685, 268	-527. 031	-0. 260	-0, 015
19	4. 900	-1134.320	-595. 742	-0.260	-0.003
20	4. 900	-1134.380	-595, 751	-0, 260	-0. 003
j	5. 000	-1194. 324	-604. 332	-0, 260	0, 000

No of Member 3 (6 - 8)

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Point	Distance (m)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	-1190. 604	372. 943	0.007	0.000
1	0, 900	~889. 745	295. 633	0.007	-0.044
2	1,000	-860. 611	287. 043	0.007	-0. 047
3	1.000	-860. 582	287. 034	0.007	-0.047
4	1.900	-637. 062	209. 733	0.007	-0.063
5	1. 900	-637. 040	. 209.724	0.007	-0.063
6	2.000	-616. 518	201. 143	0. 007	-0.064
7	2.000	~616. 497	201. 134	0.007	-0.064
8	2.500	~526. 684	158. 193	0.007	-0. 063
9	2. 900	~470. 278	123, 833	0, 007	-0. 059
10	2. 900	~470. 266	123. 824	0.007	-0. 059
11	3. 000	~458. 325	115. 243	0. 007	-0.058
12	3. 000	~458. 313	115. 234	0. 007	-0. 058
13	3. 900	~389. 395	37. 933	0.007	-0.039
14	3.900	~389. 391	37. 924	0. 007	-0. 039
15	4.000	~386. 032	29. 343	0.007	-0.036
16	4. 000	-386, 029	29. 334	0. 007	-0.036
17	4. 100	-383. 527	20, 753	0.007	-0.033
18	4. 100	~383, 525	20. 744	0.007	-0.033
19	4. 900	-394. 412	-47. 967	0. 007	-0.004
20	4. 900	-394. 417	-47. 976	0, 007	-0.004
. ј	5. 000	-399. 638	-56. 557	0.007	0.000

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Point	Distance (m)	Beading moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
15 ;	4.000	2988. 360	-15.011	-4. 823	0. 193
16	4. 000	2988. 328	-318. 820	-4, 823	0. 193
17	4. 100 -	2956. 050	-327. 401	~4. 823	0. 178
18	4. 100	2956, 017	-327. 410	-4. 823	0. 178
19	4. 900 :	2666, 641	-396, 121	-4. 823	0. 024
20 ;	4. 900	2666. 570	-699, 930	-4. 823	0, 024
j' Ì	5. 000	2596, 219	-708, 511	-4. 823	0.000

#### No of Momber 3 (6 - 8)

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Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	2593, 828	550. 142	-4.965	0.000
1 !	0. 900	3054. 167	472. 832	-4. 965	0. 196
2	1.000	3101.021	464. 242	-4. 965	0. 212
3	1.000	3101.068	464. 234	-4. 965	0. 212
4	1.900	3241. 009	83. 132	-4. 965	0.311
5	1. 900	3241.018	83. 124	-4. 965	0.311
6	2. 000	3248. 893	74. 542	-4. 965	0.316
7	2. 000	3248. 870	-229. 266	-4. 965	0.316
8	2. 500	3123. 527	-272. 208	-4. 965	0. 325
9	2.900	3007. 772	-306. 568	-4. 965	0. 313
10	2. 900	3007. 741	-306. 576	-4. 965	0.313
11	3, 000	2976. 686	-315. 158	-4. 965 !	0. 307
12	3.000	2976. 654	-315. 166	-4.965	0. 307
13	3. 900	2415. 214	-696. 268	-4. 965	0. 209
14	3. 900	2415. 144	-696. 276	-4. 965	0. 209
15	4. 000	2345. 158	-704. 858	-4.965	0. 194
16	4.000	2345. 056	-1008. 666	-4. 965	0. 194
17	4. 100	2243. 863	-1017. 248	-4. 965	0.178
18	4. 100	2243. 760	-1017. 256	-4. 965	0. 178
19	4.900	1402.577	-1085. 968	-4. 965	0. 022
20	4.900	1402. 467	-1085. 976	-4. 965	0. 022
j	5.000	1293, 551	-1094.558	-4.965	0.000

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	Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)		-	
		í 0.000	2158.582	194, 861	-2. 719	0.000	• .		
		0.900	2299, 168	117, 551	-2, 719	0.124	·		•
		2 0.900	2299, 179	117. 542	-2, 719	0. 124			
		3 1, 100	2320, 960	100, 371	-2, 719	0, 143			
		4 1.100	2320, 939	-203, 438	-2, 719	0. 143			
		5 1, 800	2157. 514	-263, 559	-2, 719	0. 183			
		6 1.800	2157, 487	-263, 568	-2.719	0. 183			
		7 2,000	2103, 084	-280, 739	-2.719	0. 187		÷	
		8 2.000	2103.025	-584, 548	-2.719	0. 187			
		9 2, 100	2044. 200	-593, 129	-2, 719	0. 188			
	1	0 2,100	2044. 140	-593, 138	-2.719	0. 188			
	1	2, 500	1800. 077	-627. 489	-2.719	0. 186			
	1	2 2.900	1542, 209	-661.849	-2, 719	0. 173			
* .	1	2.900	1542, 142	-661.858	-2.719	0. 173			
	1	4 3.000	1475, 594	-670, 439	-2, 719	0. 168			
	1	3.000	1475, 527	-670, 448	-2.719	0, 168	-	•	
	11	6 3. 200	1339, 788	-687. 619	-2. 719	0. 158			
	1	7 3. 800	911. 755	-739, 159	-2, 719	0.115			
	1:	8 3.800	911.680	-739. 168	-2, 719	0. 115			
	1:	9 4. 100	686.142	-764. 929	-2. 719	0.089			
	2	0 4.100	686.064	-764, 938	-2. 719	0.089			
		j 5. 000	-37, 084	-842. 239	-2. 719	0.000			-
No	of Mem	ber 5 (1 - :	2)						
	Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)			
		i 0.000	-11.079	-1. 764	-231. 134	0.000			
		4. 900	-19. 725	-1.764	-231.134	-0.592			•
	<u> </u>	j 9. 800	-28, 370	-1.764	-231, 134	0. 000			
		6(3~4	4 )						
No	of Membe	or	· /			-			

Point	(m)	Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection 8 (mm)
i	0.000	-10.313	-1.605	-728. 839	0,000
1	4. 900	-18. 176	-1. 605	-728. 839	-0.545
j	9. 800	-26. 039	-1.605	-728. 839	0.000

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Po	int	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
:	i	0,000	-974. 838	463. 239	-0. 242	0.000
	1	0.900 :	-592.712	385, 929	-0. 242	-0.019
	2 :	0.900	-592, 673	385, 920	~0. <b>24</b> 2 ·	-0. 019
	3	1. 100	-517, 244	. 368, 749	-0. 242	-0.020
1	4	1. 100	-517, 207 !	368. 740	~0, 242	-0.020
1	5	1.800	-280, 166 !	308. 619	-0. 242	-0, 020
	6	1.800 :	-280, 134 :	308, 610	-0.242	-0, 020
	7	2.000 !	-220, 160	291, 439	-0. 242	-0.019
-	8	2, 000	-220, 130	291, 430	-0. 242	-0.019
i	9	2. 100	-191, 445	282, 849	-0. 242	-0.018
	10	2. 100	-191, 417	282, 840	-0. 242	-0.018
	11	2.500	-85. 178	248, 489	-0. 242	-0,015
	12	2.900	7, 346	214. 129	-0. 242	-0.011
	13	2.900	7. 367	214. 120	-0. 242	-0.011
	14	3.000	28. 329	205, 539	-0. 242	-0.010
	15	3.000	28. 350	205, 530	-0. 242	-0,010
	16	3. 200	67.719	188, 359	-0. 242	-0.009
	17	3. 800	165. 272	136, 819	-0. 242	-0.004
	18	3. 800 !	165, 286	136. 810	-0. 242	-0.004
	19	4. 100	202.452	111.049	-0. 242	-0.002
	20	4. 100 [	202. 433	-192. 760	-0, 242	-0.002
	j	5. 000	-5. 813	-270, 061	-0, 242	0.000

### No of Member 5 (1 - 2)

Pois	nt	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
	i	0.000	-5, 676	-1.657	-1165.346	0.000
	1	4, 900	-13.793	-1.657	~1165.346	-0.414
	j	9, 800	~21.910	~1.657	~1165. 346	0.000

Nonf Member 6 (3 - 4)

Po	int	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force N <sub>X</sub> (kN)	Deflection δ (mm)
	i	0,000	2. 536	0.054	-1273, 551	0.000
	1	4, 900	2.802	0. 054	-1273. 551	0.084
	ji	9. 800	3.069	0.054	-1273, 551	0.000

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Point	Distance (a)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Axial forca Nx (kN)	Deflection: δ (mm)
i	0.000	1639. 054	477. 651	-1,933	0,000
1	0. 900	2034. 150	400. 341	-1.933	0, 124
2	0.900	2034, 190	400. 332	-1. 933	0, 124
3	1. 100	2112.500	383. 161	-1. 933	0, 144
4	1. 100	2112. 508	79, 352	-1, 933	0.144
5	1, 800	2147.007	19. 231	-1, 933	0. 190
6	1.800	2147. 009	19. 222	-1, 933	0, 190
7	2.000	2149. 135	2. 051	-1.933	0, 197
8	2.000	2149, 105	-301.758	-1.933	0. 197
9	2.100	2118.531	-310. 339	-1, 933	0, 199
10	2. 100	2118.500	-310. 348	-1. 933	0. 199
11	2. 500	1987. 523	-344. 699	-1. 933	0, 200
12	2.900	1842. 772	-379. 059	-1. 933	0. 189
13	2.900	1842. 733	-379. 068	-1.933	0. 189
14	3.000	1804. 436	-387, 649	-1. 933	0. 185
15	3, 000	1804. 397	-387, 658	-1. 933	0. 185
16	3, 200	1694, 808	-708. 629	-1. 933	0. 174
17	3.800	1254. 169	-760, 169	-1. 933	0. 130
18	3.800	1254. 092	-760, 178	-1. 933	0. 130
19	4. 100	991, 873	-1089. 739	-1. 933	0. 101
20	4.100	991, 763	~1089, 748	-1.933	0. 101
j	5.000	-23, 682	-1167.049	-1, <b>93</b> 3 j	0. 000

## $No of Member \cdot 5 (1-2)$

Point Distance		Bending moment   Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	
i	0.000	-8. 905	-0.911	-166.583	0.000	
1	4, 900	-13, 367	-0. 911	-166. 583	-0. 401	
j	9, 800	-17. 828	-0. 911	-166. 583	0.000	

Point	Distance (n)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	
i	0.000	-8.742	-0.877	-580. 037	0.000	
1	4, 900	-13. 037	-0.877	-580.037	~0.391	
j	9, 800	-17.333	-0.877	-580. 037	0.000	

Working Condition Ver	rtical	hea I
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Prepared by	Y. Ando	Checked by	2. NISHIMURA
	261 07 12002		08 1 08 12002

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No of Member ...

Point	Distance (m)	Bending moment Mz (kN-m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection $\delta$ (mm)	
3	1. 300	4254, 672	1173, 780	-4. 504	0, 250	
4	1, 300	4254. 733	605, 367	-4. 504	0. 250	
5	2. 400	4846. 332	470, 366	-4.504	0. 333	
6	2. 400	4846. 322	-98. 047	-4. 504	0. 333	
7	3. 300	4708. 392	-208, 500	-4. 504	0. 298	
8	3. 300	4708. 313	~776, 913	-4. 504	0. 298	
j	5. 000	3210. 302	-985, 558	-4. 504	0.000	
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#### No of Member 4 (8 - 10)

1	Point Distance		Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection 8 (mm)
ļ	i	0.000	3223. 990	1041. 387	-3. 078	0.000
	1	0.500	3729. 341	980, 017	-3. 078	0. 095
,[	2	0. 500	3729. 382	411.605	-3. 078	0. 095
	3	1. 400	4050. 086	301, 151	-3. 078	0. 209
[	4	1.400	4050. 059	-267, 261	-3. 078	0, 209
	5	2. 500	3681. 855	-402. 263	-3. 078	0. 245
	6	2. 500	3681. 757	-970. 675	-3. 078	0. 245
[	7	3. 400	2758. 548	-1081, 129	-3. 078	0, 196
	8	3. 400	2758. 381	-1649. 541	-3. 078	0. 196
1	_ j	5. 000	-37. 806	-1845, 913	-3. 078	0.000

#### v. -64---- 5 (1 - 2)

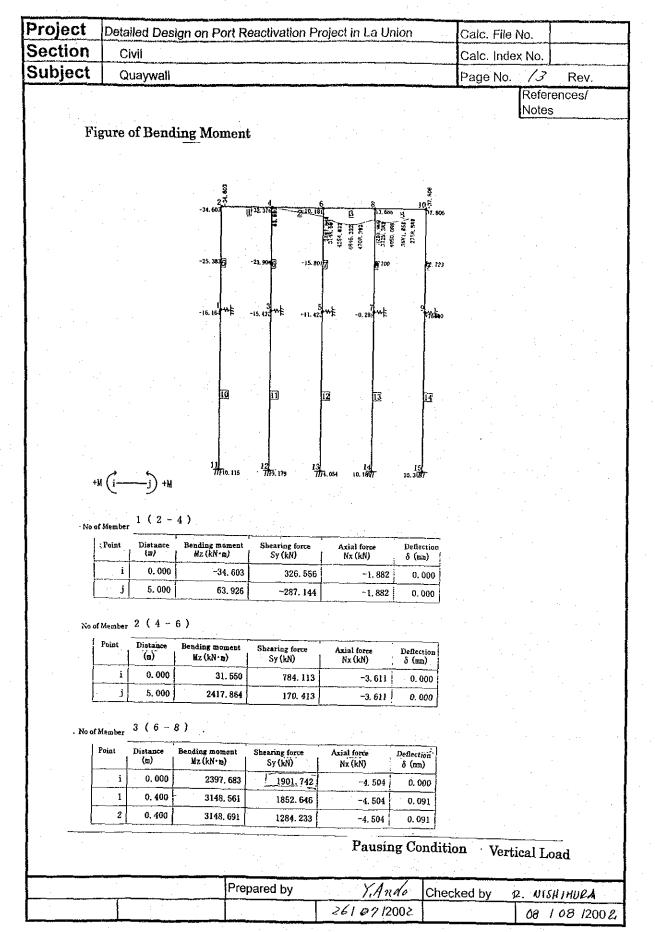
Point Distance		Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	
i	0.000	-16, 164	-1. 882	-326. 556	0. 000	
1	4. 900	-25. 383	-1, 882	-326. 556	-0. 762	
j	9. 800	-34. 603	-1. 882	~326. 556	0. 000	

#### No of Mamber 6 (3 - 4)

Point	Distance (a)	Bending moment Mz (kN·m)	Shearing force Sy(kN)	Axia) force Nx (kN)	Deflection δ (mm)	
i	0.000	-15. 432	-1. 729	-1071. 257	0.000	
1	4. 900	-23. 904	-1.729	-1071. 257	~0, 717	
j	9. 800	-32. 376	-1,729	-1071. 257	0.000	

## Pausing Condition - Vertical Load

Prepared by	Y. Ando	Checked by	D NISHIMU	IRA
	261 07 12002		08 108	/2002



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	of Membe	i - 1					<u> </u>	References/ Notes
	Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)	] 	
		1.900	2123, 329	1061. 949	~3, 550	0. 246	~	
		1.900	2123. 437	1061.940	-3.550	0. 246		
		2, 800	3044, 294	984. 639	~3.550	0. 284	- -	
1		2.800	3044. 343	484. 830	-3, 550	0. 284	· <del>-</del>	•
1		2.900	3092. 348	476. 249	-3, 550	0. 283	<b>-</b>	
1	10	2.900	3092, 396	476, 240	-3. 550	0. 283	<u>.</u>	
		3, 700	3445.859	407. 529	-3, 550	0. 238	4	
	1;	3.700	3445, 850	-92. 280	-3, 550	0. 238		
1 .	1	3, 900	3425.687	-109. 451	-3, 550	0. 214		
	1	3, 900	3425. 676	-109, 460	-3, 550	0. 214	· _4	
1	<u>ti</u>	4.000	3414. 312	-118.041	-3, 550	0. 201	· · · · · · · · · · · · · · · · · · ·	
}	10	6 4.000	3414.300	-118.050	-3,550	0. 201	<u> </u>	
	1	4.800	3292, 391	-186, 761	-3. 550 ;	0.050	:	
	; 1	B 4.800	3292. 322	-686, 570	-3, 550	0.050	· · · · · · · · · · · · · · · · · · ·	
	19	9 4. 900	3223. 306	-695, 151	-3,550	0. 025	-	
	20	4. 900	3223. 236	-695, 160	-3, 550	0.025	_	
		j 5.000	3153, 361	-703, 741	-3, 550	0. 000	<u>:</u>	
No	of Memb	Distance	Bending moment	Shearing force	Axial force	Deflection	- -	
	-	(m)	Mz (kN·m)	Sy (kN)	Nx (kN)	δ (п.п.)	<u>:</u>	
		i 0.000	3132. 271	<del></del>	-5, 159	.0.000		•
1		0.900	3918.857	446, 596	-5. 159	0. 258		
	<u> </u>	0.900	3918. 902	446. 587	-5. 159 - 5. 159	0. 258	7	•
	-	1.000	3963. 087	438.006	-5. 159	0. 280	· ·	•
	<del></del>	1.000	3963. 131	437, 997	-5. 159	0. 280		
		1.900	4322. 503	360, 696	-5. 159	0.413	·	
		1,900	4322.488	-139, 113	-5 159	0.413		
	<del> </del>	7 2.000	4308.163	-147. 694	-5. 159	0. 420		
		2.000	4308.148	-147, 703	-5. 159	0. 420		
	-	2.900	4090. 468	-724. 804	-5. 159	0.418		
	10		4090, 395	-724. 813	-5. 159	0.418		
	11	<del></del>	4017. 558	-733, 394	-5. 159	0. 411		
1	13	<del>- </del>	4017. 484	-733, 403	-5. 159	0.411		•
	13	<del></del> -	3322. 714	-810.704	-5. 159	0. 281		
1	1.	3.900	3322. 582	-1310, 513	-5. 159	0. 281		
					Seism	ic Con	dition Vertical	Load
Ĺ				repared by	Y.A	ndo	Checked by	E, WISHIHURA
		T			26107			08 / 08 /2002
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Point	Distance (m)	Bending moment Mz (kN·m)	Shearing form Sy (kN)	Axial furca Nx (kN)	Deflection & (mm)				
5	1.900	-45. 941	-98. 679	-0. 282	-0.014				
6	1. 900	-45. 951	-98. 688	-0. 282	-0.014				
7	2.800	-169. 541	-175. 989	-0. 282	-0, 020				
. 8	2.800	-169, 559	~175. 998	-0, 282	-0. 020				
9	2, 900	-187. 569	~184. 579	-0, 282	-0. 020				
10	2. 900	-187. 588	-184. 588	-0. 282	~0. 020				
11	3.700	-362. 721	-253, 299	-0. 282	-0. 020				
12	3, 700	-362. 746	-253. 308	-0. 282	-0. 020				
13	3. 900	-415, 098	-270. 479	-0. 282	-0. 019				
14	3.900	-415. 126	-270. 488	-0. 282 !	-0. 019				
15	4. 000	-442. 576	-279. 069	-0. 282	-0.018				
16	4.000	-442. 604	-279.078	-0. 282	-0. 018				
17	4. 800	-693, 319	-347.789	-0. 282	-0.005				
18	4. 800	-693. 354	-347. 798	-0. 282	-0.005				
19	4. 900	-728, 527	-356, 379	-0. 282 1	-0.003				
20	4. 900	-728. 563	-356. 388	-0. 282	-0. 003				
j	5.000	-764. 595	-364.969	-0. 282	0.000				

No of Member 2 (4 - 6)

Point	Distance (n)	Bending moment  Hz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
· i	0.000	-780. 653	227. 123	-0. 740	0.000
1	0.900	-611, 032	149. 813	-0.740	-0. 036
2	0.900	-611.017	149, 804	-0.740	-0, 036
3	1.000	-596. 480	141. 223	-0.740	-0. 039
4	1.000	-596. 466	141. 214	-0.740	-0.039
5	1.900	-504. 169	63, 913	~0.740	~0. 055
6	1. 900	-504. 163	63. 904	-0. 740	-0. 055
7	2.000	-498. 207	55. 323	-0.740	-0. 056
8	2. 000	-498. 202	55. 314	-0. 740	-0.056
9	2. 900	~483. 206	-21. 987	-0. 740	-0.057
10	2. 900	483. 208	-21.996	-0.740	-0. 057
11	3. 000	-485. 834	-30. 577	-0.740	-0.056
12	3.000	-485.838	-30, 586	-0.740	~0. 056
13	3. 900	-548, 143	-107. 887	-0.740	-0.041
14	3.900	-548. 154	-107.896	-0. 740	-0. 041

Seismic Condition Vertical Load

Prepared by	Y. Ando	Checked by	Z. NISHIHURA
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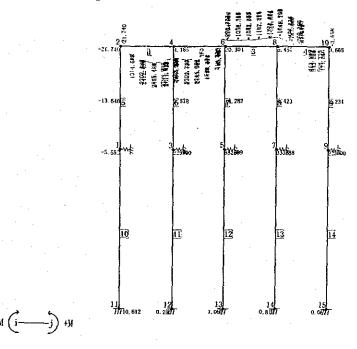
No	αf	Me	mber

	Point	Distance (m)	Bending moment Hz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection d (mm)
	i	0,000	-7. 484	0. 934	-1139, 754	0.000
ĺ	j	15, 200	6. 712	0. 934	-1139, 754	0.000

#### No of Member 14 (9 - 15

:	Point	Distance	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection d (mm)
į	i	0.000	-6, 114	0. 729	-847.944	0.000
:	jį	15. 200	4. 959	0. 729	-847. 944	0.000

### Figure of Bending Moment



#### No of Member 1 (2-4

Point	Distance (m)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	-21.740	1704.744	-1.652	0.000
1	0.800	1314.568	1636. 024	-1.652	0.124
2	0_800	1314.682	1136. 215	-1.652	0. 124
3	1. 700	2302. 380	1058. 914	-1. 652	0. 229
4	1.700	2302. 436	559, 105	-1.652	0. 229

### Seismic Condition Vertical Load [

Prepared by	Y, Ando	Checked by	L. DISHIMUPA
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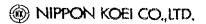
Point	Distance (u)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
5	1.900	1293, 180	631. 683	~4. 367	0. 156
6	1.900	1293, 244	631, 674	-4. 367	0. 156
7	2.800	1826. 905	564. 373	-4. 367	0. 182
- 8	2.800	1826. 961	554, 364	-4. 367	0. 182
9	2.900	1881, 913	545, 783	-4. 367	0, 182
10	2.900	1881.968	545. 774	-4. 367	0. 182
- 11	3. 700	2291. 052	477. 063	-4.367	0. 156
12	3.700	2291. 100	477. 054	-4. 367	0. 156
13	3, 900	2384. 746	459. 883	-4. 367	0.142
14	3, 900	2384. 793	459, 874		0.142
15	4.000	2430, 305	451. 293	-4. 367	0. 134
16	4.000	2430, 350	451, 284	-4.367	0. 134
17	4. 800	2763, 851	382. 573	-4.367	0.034
18	4. 800	2763. 890	382. 564	-4. 367	0. 034
19	4.900	2801.679	373. 983	-4, 367	0.018
20	4. 900	2801. 717	373.974	-4. 367	0.018
j	5, 000	2838, 648	365. 393	-4. 367	0. 000

#### No of Mambay 2 (4 - 6)

Point	Distance (u)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)		
i	0,000	2795. 661	1435. 807	-7.426	0.000		
1	0.900	4053. 098	1358. 497	-7. 426	0. 297		
2	0.900	4053, 185	858. 689	-7. 426	0, 297		
3	1.000	4138, 538	850, 107	-7. 426	0. 323		
4	1.000	4138. 624	850. 099	-7, 426	0. 323		
5	1.900	4868. 845	772.797	-7. 426	0. 492		
6	1.900	4868. 923	772. 789	-7. 426	0. 492		
7	2.000	4945. 695	764, 207	-7. 426	0. 502		
8	2.000	4945, 722	264. 399	-7, 426	0.502		
9	2. 900	5148. 872	: 187. 097	-7. 426	0.517		
. 10	2.900	5148.841	-312.711	-7, 426	0, 517		
11	3, 000	5117, 173	-321.293	-7, 426	0.509		
12	3.000	5117. 140	-321. 301	-7. 426	0.509		
13	3.900	4793, 220	-398. 603	-7. 426	0, 362		
14	3.900	4793. 179	-398. 611	-7. 426	0. 362		

## Seismic Condition · Vertical Load

Prepared by	Y, Ando	Checked by	. NISHTHURA
	26107 12002		08 1 08 12002



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Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
15	4. 000	-1624, 124	-558. 747	0, 599	-0, 082
16	4. 000	-1624.180	-558. 756	0, 599	-0, 082
17	4. 100	-1680, 428	-567. 337	0. 599	-0.077
18	4. 100	-1680, 485	-567. 346	0, 599	-0, 077
19	4. 900	-2161.786	-636. 057	0. 599	-0. 011
20	4.900	-2161.850	-636, 066	0, 599	-0.011
j	5.000	-2225.821	-644. 647	0, 599	0. 000

Nn of Member 3 (6 - 8)

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Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (aun)
i	0.000	-2224.641	678. 487	0, 549	ò. 000
1	0.900	-1648.793	601. 177	0. 549	~0, 072
2	0. 900	-1648. 732	601.168	0, 549	~0. 072
3	1. 000	-1589, 104	592. 587	0. 549	~0. 077
4	1.000	-1589.045	592. 578	0.549	~0. 077
_ 5	1, 900	-1090, 566	515. 277	0. 549	~0.098
6	1, 900	-1090.514	. 515. 268	0. 549	~0.098
7	2, 000	-1039.468	506. 687	0.549	~0. 098
_ 8	2.000	-1039. 417	506. 678	0. 549	~0.098
9	2, 900	-618. 239	429. 377	0. 549	-0.084
10	2, 900	-618. 196	429. 368	0.549	-0. 084
- 11	3.000	-575. 731	420. 787	0.549	-0, 081
12	3. 000	-575. 688	420. 778	0. 549	-0.081
13	3, 900	-231. 812	343. 477	0. 549	-0. 049
14	3. 900	-231.778	343. 468	0.549	-0.049
15	4. 000	-197. 894	334. 887	0.549	-0. 044
16	4.000	-197. 860	334. 878	0.549	-0. 044
17	4. 100	-164. 835	326. 297	0, 549	-0.040
18	4. 100	-164.802	326. 288	0.549	-0.040
19	4. 900	68. 714	257. 577	0. 549	-0. 004
20	4. 900	68. 740	257. 568	0.549	-0, 004
j	5. 000	94. 043	248. 987	0. 549	0.000
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Seismic Condition · Vertical Load

	Prepared by	Y, Ando	Checked by	R. MISHIHUBA
<del>,</del>		26/07/2002		08 / 08 /2002

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Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	δ (mm)
15	4. 000	3191. 234	-1319. 094	-5, 159	0. 261
16	4.000	3191, 101	-1319. 103	-5, 159	0.261
17	4. 100	3058. 895	-1327.684	~5. 159	0. 239
18	4. 100	3058. 761	-1327. 693	-5. 159	0. 239
19	4. 900	1919. 280	-1896, 204	-5. 159	0.030
20	4. 900	1919, 088	-1896. 213	-5. 159	0. 030
jį	5. 000	1729, 230	-1904. 794	-5. 159	0.000

No of Member 3 (6 - 8)

i Member	· · · · ·				
Point	Distance (m)	Bending moment Nz (kN·m)	Shearing force Sy (kN)	Axisl force Nx (kN)	Deflection δ (mm)
i	0,000	1752, 271	-294. 051	-3, 746	0.000
1	0.900	1452. 835	-371.361	-3. 746	0.063
2	0, 900	1452, 798	-371, 370	-3.746	0.063
3	1.000	1415. 269	-379. 951	-3. 746	0.067
4	1.000	1415. 231	-379. 960	-3. 746	0.067
5	1. 900	1038, 524	-457. 261	-3, 746	0.084
6	1. 900	1038, 478	-457. 270	-3. 746	0. 084
7	2.000	992. 368	-465, 851	-3.746	0.084
8	2.000	992. 321	-465. 860	-3. 746	0. 084
9	2. 900	538, 313	-543. 161	-3. 746	0.068
10	2, 900	538. 258	-543. 170	-3.746	0.068
11	3.000	483. 567	-551. 751	-3. 746	0.066
12	3.000	483. 511	-551.760	-3, 746	0.066
13	3. 900	-47. 799	-629. 061	-3. 746	0. 034
14	3. 900	-47. 862	-629. 070	-3. 746	0. 034
15	4.000	-111.134	-637. 651	-3. 746	0. 031
16	4. 000	-111. 199	-637. 660	-3, 746	0.031
17	4. 100	-175. 329	-646. 241	-3. 746	0. 027
18	4. 100	-175. 394	-646. 250	-3. 746	0. 027
19	4. 900	-719.810	-714. 961	-3. 746	0.002
20	4. 900	-719, 882	-714.970	-3. 746	0.002
j	5. 000	-791.735	-723. 551	-3. 746	0.000

Seismic Condition · Vertical Load

		Prepared by	Y.Ando	Checked by	P. NISHIMUPA
-			26107 12002		08 / 08 /2002

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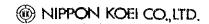
					Deflection δ (num)	
Point	Distance Bending moment (b) Mz (kN·m)		Shearing force Sy (kN)	Axial force Nx (kN)		
15	4.000	4094, 019	-186, 591	~6. 753	0, 246	
16	4.000	4094.000	-186. 600	-6, 753	0. 246	
17	4.100	4074. 931	-195. 181	-6. 753	0, 227	
18	4, 100	4074. 911	-195, 190	-6, 753	0. 227	
19	4.900	3891, 298	-263, 901	-6. 753	0.031	
20	4. 900	3891, 271	-263, 910	-6, 753	0. 031	
j	5.000	3864, 478	-272. 491	-6. 753	0. 000	

#### No of Member 3 (6 - 8)

Point	Distance (m)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	3852. 967	992, 893	-7. 426	0.000
1	0.900	4711.781	915, 583	-7, 126	0. 311
2	0. 900	4711, 823	415. 774	-7. 126	0. 311
3	1.000	4752. 930	407, 193	-7, 426	0. 337
4	1.000	4752. 971	407. 184	7, 426	0. 338
5	1.900	5084. 614	329, 883	-7. 426	0.500
6	1.900	5084. 647	329. 874	-7. 426	0. 500
7	2.000	5117. 173	321, 293	-7, 426	0. 509
8	2. 000	5117. 205	321. 284	-7. 426	0, 509
9	2. 900	4971.707	-255. 817	-7. 426	0.511
10	2. 900	4971, 681	-255. 826	-7. 426	0.511
11	3. 000	4945. 695	-264. 407	-7. 426	0. 502
12	3.000	4945. 618 (	-764. 216	-7, 426	0. 502
13	3. 900	4223. 119	-841.517	-7. 426	0. 348
14	3. 900	4223. 034	~841. 526 <sup>1</sup>	~7. 426	0. 348
15	4, 000	4138. 538	-850. 107	-7. 426	0. 323
16	4. 000	4138. 452	-850. 116	-7. 426	0. 323
17	4. 100	4053, 098	-858. 697	-7. 426	0. 297
18	4. 100	4052. 961	-1358, 506	-7. 426	0. 297
19	4. 900	2938. 812	-1427. 217	-7, 426	0. 038
20	4. 900	2938. 668	-1427. 226	-7. 426	0. 038
j	5. 000	2795. 661	-1435. 807	-7, 426	0.000

## Seismic Condition Vertical Load

Prepared by	Y. Ando	Checked by	E. NISHIMURA
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Point	Distance (m)	Bending moment liz (kN+m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
15	4.000	4632, 026	55, 713	-7. 297	0, 296
16	4. 000	4631, 981	-444. 095	-7, 297	0, 296
17	4, 100	4587, 188	-452. 677	-7, 297	0. 273
18	4. 100	4587, 142	-452, 685	-7, 297	0, 273
19	4. 900	4197. 558	-521, 397	-7. 297	0, 036
20	4. 900	4197. 455	-1021. 205	-7. 297	0,036
j	5, 000	4095, 009	-1029. 787	-7. 297	0.000

Na of Mambas 3 (6 - 8)

of Member	3 ( 0	<u>X4 - 5, 1 - 5 1</u>	A DESCRIPTION	to the same and	1 11
Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	4091. 075	769. 245	-7. 529	0. 000
1	0, 900	4748. 606	691, 935	-7. 529	0.302
2	0.900	4748. 676	691. 926	-7. 529	0.302
3	1.000	4817. 370	683, 345	-7. 529	0. 327
4	1, 000	4817. 439	683, 336	-7. 529	0. 327
5	1. 900	4997. 751	106. 235	-7. 529	0. 478
6	1.900	4997. 762	106. 226	-7. 529	0. 478
7	2.000	5007. 945	97. 645	-7. 529	0.486
8	2.000	5007, 904	-402. 164	-7. 529	0. 486
9	2.900	4611.215	-479. 465	-7. 529	0.481
10	2. 900	4611. 167	-479. 474	-7. 529	0. 481
11	3,000	4562, 839	-488. 055	-7.529	0. 472
12	3.000	4562.790	-488.064	-7. 529	0.472
13	3.900	3688. 960	-1065, 165	-7. 529	0. 321
14	3. 900	3688, 853	-1065. 174	-7. 529	0. 321
15	4. 000	3582, 014	-1073, 755	-7. 529 ;	0. 298
16	4. 000	3581.855	-1573. 564	-7. 529	0. 298
17	4, 100	3424. 229	-1582, 145	-7. 529	0. 273
18	4. 100	3424. 069	-1582. 154	-7. 529	0. 273
19	4, 900	2131, 025	-1650, 865	-7. 529	0.034
20	4. 900	2130.858	-1650.874	-7. 529	0.034
j	5. 000	1965, 509	-1659, 455	-7. 529	0.000

Seismic Condition - Vertical Load

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Point	Distance (m)	Bending moment Mz (khi-m)	Shearing force Sy (kN)	Axial force Nx (kN)	Dellection δ (mm)
i	0.000	3385. 158	216. 410	-4. 072	0.000
1	0. 900	3545. 138	139, 100	-4. 072	0. 189
2	0. 900	3545. 152	139, 092	-4. 072	0.189
3	1. 100	3571. 240	121.920	-4. 072	0. 217
4	1. 100	3571. 201	-377. 888	-4, 072	0. 217
5	1. 800	3285. 678	-438. 010	-4.072	0. 277
6	1.800	3285. 634	-438. 018	-4. 072	0. 277
7	2. 000	3196. 358	~455. 190	-4. 072	0. 284
. 8	2.000	3196. 262	-954. 998	-4. 072	0. 284
9	2. 100	3100. 430	-963. 580	-4.072	0. 285
10	2. 100	3100. 333	-963. 588	-4. 072	0. 285
11	2, 900	2302. 078	-1032. 300	-4.072	0. 261
12	2. 900	2301. 974	~1032. 308	-4. 072	0. 261
13	3.000	2198. 418	-1040. 890	-4. 072	0, 254
14	3.000	2198, 313	-1040. 898	~4. 072	0, 254
15	3. 200	1988. 523	-1058. 070	-4. 072	0. 238
16	3. 200	1988. 416	-1058. 078	-4, 072	0. 238
17	3. 800	1338, 219	-1109. 610	-4. 072	0.172
18	3. 800	1338, 107	-1109, 618	-4. 072	0.172
19	4. 100	1001, 470	-1135, 380	-4. 072	0. 133
20	4. 100	1001, 356	-1135. 388	~4. 072	0, 133
· j	5.000	-55, 161	-1212. 690	-4. 072	0.000

#### No of Member 5 (1-2)

	Point	Distance (m)	Bending moment Mz (kN-m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
Į	i	0.000	-16, 305	-2. 502	-207. 323	0.000
Ī	1	4.900	-28, 565	-2. 502	-207. 323	-0.857
Ĭ	j	9, 800	-40, 825	-2. 502	-207. 323	0.000

Point :	Distance (n)	Bending moment M2 (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0,000	-15, 826	-2. 402	<del>-9</del> 53. 622	0.000
1	4, 900	-27, 598	-2. 402	-953. 622	-0. 828
j	9, 800	-39, 370	-2. 402	-953. 622	0.000

Seismic Condition Vertice	-faα.∐ fæ
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No.	of Member	×		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
	.Point	Distance (m)	Bending motasist	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
	i	0,000	<u> </u>	859. 241	-0.089	0.000
	1	0, 900	-938, 214	781. 931	-0. 089	-0.018
	2	0, 900	-938, 135	781. 922	~0. 089	~0.018
	3	1. 100	-783, 546	764. 751	-0.089	-0.018
	4	1, 100	-783, 469	764.742	-0.089	-0.018
	5	1.800	-269, 266	704. 621	-0. 089	-0.009
	6	1, 800	-269, 195	704. 612	-0. 089	-0. 009
:	7	2. 000	-130.060	687, 441	-0.089	-0. 006
	8	2.000	-129, 990	687, 432	-0. 089	-0. 006
	9	2. 100	-61.745	678, 851	-0. 089	-0.004
	10	2. 100	-61.677	678, 842	-0.089	-0.004
	11	2. 900	453. 847	610, 131	-0.089	0. 010
	12	2. 900	453, 909	610, 122	-0.089	0. 010
ļ	13	3.000	514. 431	601.541	-0.089	0. 012
-	14	3.000	514, 441	101.732	-0. 089	0. 012
ļ	15	3. 200	533, 061	84. 561	-0, 089	0. 014
	16	3. 200	533, 070	84, 552	-0.089	0.014
[	17	3.800	568.335	33, 021	-0, 089	0, 015
j	18	3.800	568, 339	33, 012	-0, 089	0, 015
1	19	4. 100	474, 416	-492, 549	-0. 089	0, 013
ļ	20	4. 100	474, 366	-492, 558	-0. 089	0. 013
!	j <u> </u>	5. 000	-3.668	-569, 859	-0, 089	0.000

#### Noof Mamba 5 (1 - 2)

Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0.000	-5. 5 <b>52</b>	-1. 652	-1704, 744	0.000
1	4. 900	-13. 646	-1.652	-1704. 744	-0, 410
_ j	9. 800	-21.740	-1, 652	-1704.744	0,000

Point	Distance.	Bending moment Kz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (ໝa)
i	0.000	2. 970	0, 124	-1784, 200	0,000
1	4. 900.	3, 578	0. 124	-1784, 200	0, 107
j	9. 800	4, 185	0, 124	-1784, 200	0, 000

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Point	Distance (m)	Bending moment: Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (mm)
i	0,000	2530, <b>449</b>	681. 646	-2. 779	0.000
1	0, 900	3109, 141	604. 336	-2.779	0. 189
2	0.900	3109, 202	604. 327	-2.779	0. 189
3	1.100	3228, 290	587. 156	-2.779	0. 219
4	1. 100	3228, 299	87. 347	-2. 779	0.219
5	1. 800	3268. 394	27. 226	-2.779	0, 289
6	1.800	3268, 396	27. 217	-2.779	0. 289
7	2, 000	3272. 121	10.046	-2.779 :	0. 299
8	2, 000	3272. 071	-489. 763	-2.779	0. 299
9	2. 100 1	3222. 716	-498. 344	-2.779	0. 302
10	2. 100	3222. 665	-498. 353	-2, 779	0. 302
11	2. 900	2796. 552	-567. 064	-2, 779 <sup>‡</sup>	0. 288
12	2. 900	2796. 495	-567. 073	-2. 779 ;	0. 288
13	3. 000	2739. 416	-575. 654	-2.779	0. 281
14	3. 000	2739, 358	-575, 663	-2.779	0. 281
15	3. 200	2572. 588	-1092. 634	-2.779	0. 265
16	3, 200	2572. 477	-1092.643	-2, 779	0. 265
17	3.800	1901. 545	-1144. 174	-2, 779	0. 197
18	3. 800	1901. 429	-1144. 183	-2. 779	0. 197
19	4. 100	1504, 447	-1669. 744	-2. 779	0.153
20	4. 100	1504, 279	-1669. 753	-2. 779	0. 153
j	5. 000	-33. 112	-1747.054	-2.779	0.000

## No of Member 5 (1-2)

Point	Distance (m)	Bending moment	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection o (am)
ĭ	0.000	~12.727	-1.097	-101.126	0.000
1	4. 900	-18, 104	-1.097	-101.126	-0.543
j	9. 800	-23. 482	-1.097	-101.126	0.000

Point	Distance (m)	Bending moment Mz (kN·m)	Shearing force Sy (kN)	Axial force Nx (kN)	Deflection δ (am)
i	0.000	-13. 242	-1. 205	-708. 820	0.000
1	4. 900	-19, 145	-1. 205	-708. 820	-0. 575
j	9. 800	-25. 048	-1. 205	-708. 820 j	0.000

Seismic	Condition	Vertical 1	heal

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### Serviceability limit state

$$W = k_1 x \{4C + 0.7 x (C_{\phi} - \phi)\} x (\sigma_{\phi} / Es)$$

W: crack width

 $k_1$ : coefficient of adhesive condition of re-bar

C : cover over re-bar Co: re-bar pitch  $\phi$ : re-bar diameter

 $\sigma_{\bullet}$ : increase of re-bar stress Es: Young's modulus of re-bar

Wa = 0.0035C

Wa: acceptable crack width C: cover over re-bar

### Ultimate limit state

1.Examination for moment  $\epsilon_y = f_{yx}/(\gamma_{ms} \cdot E_S)$ 

 $\epsilon$  , : yield strain of re-bar  $f_{yk}$ : yield strength of re-bar γ ma : material modulus Es: Young's modulus of re-bar

 $M_{nd} = Ts (d-0.4X) / \gamma_b$ 

 $M_{nd}$ : bearable moment Ts: tensile strength d : effective height

X : effective distance between neutral axis and edge

y b: material modulus

2.Examination for shearing force

$$V_{yd} = V_{ed} + V_{sd}$$

 $V_{yd}$ : design bearable shearing strength

 $V_{cd}$  : design bearable shearing strength without stirrup

 $V_{
m sd}$  : design bearable shearing strength of stirrup

 $V_{sd} = \beta_d \cdot \beta_p \cdot \beta_p \cdot f_{red} \cdot b \cdot d / \gamma_b$  $\beta_d : (1/d)^{1/4}$ 

d : effective height

 $\beta_p : (100p_w)^{1/3}$ 

pw: ratio of re-bar to concrete  $\beta_n$ : modulus related to moment

 $\mathbf{f}_{vcd}: 0.2 \cdot (\mathbf{f}_{cd})^{vs}$ 

 $\mathbf{f}_{cd}$  : design strength of concrete

7ь: material modulus

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	261 07 12002		08 / 08 /2002

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### Fatigue limit state

### 1.Examination for moment

a) concrete

$$f_{rd} = k_1 \cdot f_d (I - \log N / K)$$

 $f_{\rm rd}$  : bending and tensile strength of concrete

 $k_1$ : modulus related to strength condition

 $\mathbf{f}_d$ : design strength of concrete

N: repeated times

K: modulus related to concrete type

#### b) concrete

$$f_{srd} \,=\, 190 \cdot 10^a \,/\, N^k \, (1-\sigma_{ep} \,/\, f_{ed}) \,/\,\, \gamma_{\,e}$$

 $f_{\text{ard}}$  : design strength of re-bar  $\,$ 

 $a:0.81-0.003\,\phi$ 

φ: diameter of re-bar

N: repeated times

k : 0.12 (constant)

 $\sigma_{sp}$  : permanent load

 $f_{sd}$ : design tensile strength of re-bar

 $\gamma_s$ : material modulus

## 2.Examination for shearing force

$$V_{red} = V_{ed} \cdot (1 - \log N / 11)$$

 $V_{red}$ : design bearable shear strength

 $V_{\rm cd}$  : design bearable shear strength without stirrup

N: repeated times

$$V_{cd} = \beta_d \cdot \beta_p \cdot \beta_p \cdot f_{vcd} \cdot b \cdot d / \gamma_b$$

 $\beta_{\rm d}:(1/{\rm d})^{1/4}$ 

d : effective height

 $\beta_{\, \scriptscriptstyle p}: (100 p_{\scriptscriptstyle w})^{1/3}$ 

pw: ratio of re-bar to concrete

 $\beta_n$  : modulus related to moment

 $f_{ved}: 0.2 \cdot (f_{ed})^{1/3}$ 

 $\mathbf{f}_{\mathsf{cd}}$ : design strength of concrete

γ<sub>b</sub>: material modulus

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	261 07 12002		08 / 08 /2002

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### Calculation Result of FRAME

Working	moment (upper)	moment (under)
Max	3335.908	-1245.854 kNm
①	2927.889	-336.552 kNm
2	3335.906	~1245.854 kNm
3	3315.308	
4	2320,96	-974.838 kNm

Mooring	moment (upper)	moment (under)	
Max	4846.332	-37.806 kNm	

Earthquak m	oment (upper) m	oment (under)
Max	5148.872	-2225.821 kNm
①	3445.859	-764.595 kNm
2	5148.872	~2225.821 kNm
3	5117.205	~2224.641 kNm
	3571.24	~1676.741 kNm

Working	shearing force
Max	1694,554 kN
①	1694,554 kN
2	1240.378 kN
3	1094.558 kN
4	1167.049 kN

Mooring	shearing force
Max	1901:742 kN

Earthquake	shearing force
Max	1904.794 kN
1	1704.744 kN
: ②	1904.794 kN
3	1659.455 kN
4	1747.054 kN

Moment and Shearing Force of Member

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ı	Prepared by	Y. Ando	Checked by	e. DISHIHURA
		26   07  2002		00 / 08 /2008

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Typical section (under)

Case-1				Case-2			
Re-bar	D29 nos			16 Re-bar	D25	nos	32
sectional area	6.424 As		,162.7	84 sectional area	5.067	As	162.144
sectional width b	170	11/		sectional width	170		
height d	200 effecti	ve heigh	1 1	90 height d'	<b>20</b> 0	effective heigh	າ 185
location of re-bar	10	/ -		location of re-b	15		
Es	200 /			Es	200		
Ec	25/		•	Ec	25		
n	- /8			n	8	:	
neutral axis x		38.307	cm	neutral axis x		46.049	cm
	<i>.</i>	383,07	mm	1		460,49	mm
Md /3	335,906 kNm			Md	3335.906	kNm	
σ\$	0.183 kN/m	m <sup>2</sup>		σs	0.121	kN/mm <sup>2</sup>	
cover over re-bar	85.5 mm	.*		cover over re-b	87.5		100
pitch of re-bar	100 mm			pitch of re-bar	100	mm	
width of crack w		0.358	•	width of crack w		0.244	
acceptable width of c	rack wa	0.299	NG!	acceptable width	of crack w		

Typical section (upner)

Case-1	4.5			Case-2			
Re-bar	D22 r	nos	16	Re-bar	D25 nos		
sectional area	3.871	As .	61.936	sectional area	5.067 As		<b>/</b> 55.737
sectional width b	170			sectional width	170		,
height d'	200 €	ffective height	190	height d'	200 effec	tive heigh	190
location of re-bar	10	_		location of re-b	10		
Es	. 200			Es	200		
Ec	25			Ec	25 /		
n ·	8			ln .	8	•	
neutral axis x		30,493	cm	neutral axis x		29.057 cr	n
		304.93 r	nm			290.57 m	
Md	1245.854 k	:Nm		lmd /	245.854 kNm		
σs	0.112 k	N/mm²		$\sigma_s$	0.124 kN/n	2 m2	
cover over re-bar	89 n			cover over re-b	87.5 mm	****	
pitch of re-bar	100 n	nm ·		pitch of re-bar	150 mm		
width of crack w		0.23		width of crack w		0.271	
acceptable width of	crack wa	0.312		acceptable width	of crack w	0.306	OK!

Serviceability Limit State Working Condition

	<u> </u>					
		Prep	ared by	YAndo	Checked by	e. Anuminium -
<u> </u>				26 1 07 12002		08 1 08 12002

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	ide section (under)	,	Refe Note	erences/
1	ase-1 e-bar D29 nos	Case-2 29 Re-bar D25	nos	32

Case-1				Case-2	·			Notes
Re-bar	D29 nos	s	_	Re-bar	D25	nos	. •	3:
sectional area	6.424 As	/	100 200	sectional area	D22	nos		24
,,-, -, -, -	0.127 /13		100.200	secuonal area	5.067	As		162,144
sectional width L	200				3.871			92.904
	300			sectional width Ł	300			
height d'		ective heigh	190	height d'	200	effective he	ight	189
location of re-ba	10			location of re-ba	15		10	
Ës	200 /			Es	200			
Ec	25			Ec	25	and the second second		
n	. /8			n	8			
neutral axis x		38.764 cm		neutral axis x	·	43.8	222	
	<i>-</i>	387.64 mm					.22	
Md / '	1846.332 kNi	m .		Md	4846.332		.22 !	nm
σs /	0.147 kN	/mm²		σs		kN/mm²		
cover over re-b:	85.5 mm	า		cover over re-ba	87.5			1.1
pitch of re-bar	100 mm	1		pitch of re~bar		mm	200	
width of crack w		0.288		width of crack w	100			4 4 4
acceptable width o	f crack w:	11777	1	acceptable width			25	A
			<u>~^``                                   </u>	вооврівые мішіп	of Grack Wa	0.3	UO	OK!

Wide section (up	per)							
Case-1				Case-2				
Re-bar	D22 nos	T	. 11	Re-bar	D22	nos		16
sectional area	3.871 As		42.581	sectional area	3.871	As	6	1.936
sectional width I	250			sectional width t	250			1,300
height d'	200 effective	heigh	190	height d'		effective hei	ght	190
location of re-ba	10			location of re-ba	10		ь	100
Es	200			Es	200			
Ec	25			Ec	25	* *		
n	8			ก	. 8	•		
neutral axis x	2	1.433 cm		neutral axis x		25.5	33 cm	
		14. <mark>3</mark> 3 mm	}				33 mm	
Md	37.806 kNm			Md	37.806		•• ••	
σs	0.005 kN/mm <sup>2</sup>	2		σs		kN/mm <sup>2</sup>	- 1 · 1	
cover over re-b:	89 mm		*.	cover over re-ba		mm		
pitch of re-bar	200 mm			pitch of re-bar	100			
width of crack w		0.012		width of crack w	11. 1 T	0.00	16	
acceptable width o	forack wa (	3.312	ok!	acceptable width o	f crack wa			ĸı [

	Servicea	bility Limit Sta	e Pausing C	ondition		
			Prepared by	Y. Ando	Checked by	e. Nishihura
ł				261 07 12002		48 / 08 /2002

Project	Detailed	Design on Port Re	activation Pro	ject in La Union	Calc.	File N	10.	
Section	) Civil	·			Calc.	Index	. No	
Subjec		wall		·····	Page			Rev.
Jubjec	•   Quay	wan	· · · · · · · · · · · · · · · · · · ·		rage	140.		
	1.0						Reference Notes	3S/
	Typical section	on				1	110162	
	examination f			_				
	sectional area	D25 nos	32		i			
	sectional width	5.067 As t 170	162.144	1				
	height d'	200 effective	ve heigh 185					
	location of re-	ba 15	re Holbit 100	]				
	Es	200 kN/mr	n <sup>2</sup>					
	Y ms	1.0	••	}				
	f <sub>yk</sub>	345 N/mm	2 .					
	έy	0.00173		•				
	Ts	5,593,968 N						
	fcd	18.5 N/mm	2					
	x	261.57 mm						
	εs		K! -					_
	Y .	1.15						
	M <sub>nd</sub>	8490 kNm	•					
	$r_{t}$	1.0						
	M <sub>a</sub>	3335.906 kNm						
	F	0.39 OI	. ·					
		5.00 01	<u> </u>					
	examination for	or shearing force		examination for she	aring force			
	1) main re~ba	7	. /	1) main re-bar	taring force			
	Re-bar	D25 nos		Re-bar	D25 nos		32	
	sectional area	5.067 As		sectional area	5.067 As		162.144	
	sectional width height d'			sectional width b	170			
	neight of re-b	200 effective		height d'	200 effective	height	185	
	fed		/ !	location of re-ba	15			
1	fvcd	18.5 N/mm <sup>2</sup>		fod	18.5 N/mm <sup>2</sup>			
	$\beta_{\mathbf{d}}$	0.529 N/mm²		fvcd	0.529 N/mm <sup>2</sup>			
j		0.857		β <sub>d</sub>	0.857			
- 1	β,	0.802		β <sub>p</sub>	0.802	100		
	γь	1,3		r <sub>b</sub>	1.3		1	
	Ved	880.06 kN	İ	V <sub>ed</sub> {	380.06 kN			
	2) stirrup			2) stirrup				•
	Re∽bar	D13 pitch		Re-bar [	16 pitch		20	
	sectional area	1.267 Aw		sectional area	1.986 Aw		3.972	
	fwyd	345 N/mm²	Į f	wyd	345 N/mm²			
	γ. /	160.87 cm			60.87 cm			
		1.15	· i	γ <sub>6</sub>	1.15			
	V <sub>ad</sub>	611.47 kN			58.46 kN		. [	-
	V <sub>yd</sub>	1491.53 kN	· · · · · · · · · · · · · · · · · · ·		38.52 kN		1	
	r./	1.0		γ <sub>t</sub>	1.0		. [	
1	V gl	1694.554 kN			4.554 kN		1	
· L	<i>z</i>	1.1 NG			0.92 OK!			
-								
* . *								
			•					
	* *							
Ţ	Iltimate Li	mit State   Work	ing Conditio	n		,		
_	and the second second						*	
		Prep	ared by	Y. Andn	Checked by	D	. NISH IN	ULA
		Prep	ared by	Y.Ando 261 07 1200 Z	Checked by	e	. NISHIH	

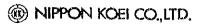
## (I) NIPPON KOEI CO.,LTD.

Project	Detailed Design	on Port Reactivation	Project	in La Union	C	alc, File	No.		
Section	Civil					alc, Inde			
Subject	Quaywall		<del></del>			age No.	3/	Rev	
	Wide section		<del></del>	·			Refere Notes		
	examination for m			,		•			
	Re-bar sectional area sectional width t	D25 nos 5.067 As 250	48 243.216						
	height d' location of re-be	200 effective height 10	190	,					٠
	Es Yma	200 kN/mm² 1,0							
4.12	f <sub>γ</sub> , εγ Ts	345 N/mm² 0.00173		•				•	
	fcd x	8,390,952 N 18.5 N/mm <sup>2</sup> 266.8 mm							
	εs γ <sub>b</sub>	0.0293 OK! 1.15	.			.*			
	M <sub>nd</sub> γ <sub>t</sub>	13084.6 kNm 1.0							
	M <sub>d</sub> F	4846.332 kNm 0.37 OK!							. :
	examination for st	nearing force		xamination for ) main re-bar	shearing	orce		$\neg$	
	Re-bar sectional area sectional width t	D25 nos 5.067 As	48   243.216 s	Re-bar ectional area	D25 5.067	nos As	24:	48 3.216	
	height d' location of re-ba	250 200 effective heigh 15	185 H	ectional width the leight d' ocation of re-ba		effective h		185	•
	ficd fycd	18.5 N/mm²	i f	'cd	18.5	N/mm²			
	Be	0.529 N/mm² 0.857	1/	vcd 3 <sub>d</sub>	0.529 0.857	N/mm <sup>2</sup>	6 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		
	$\begin{vmatrix} \beta_p \\ \gamma_b \end{vmatrix}$	0.807 1.3		3 <sub>p</sub> ~6	0.807 1.3	,			
, .	V <sub>cd</sub> 2) stirrup	1302/28 kN		cd ) stirrup	1302.28	kN			
	Re-bar sectional area fwyd	D13 pitch 1.267 Aw 345 N/mm²	2.534 s	e-bar ectional area	D16 1.986	Aw	3	20 .972	
	γ <sub>b</sub>	160.87 cm 1.15	z	vyd ´b	345 160.87 1.15	N/mm² cm			
	V <sub>sd</sub> V <sub>yd</sub>	611.47 kN 1913.75 kN	ľ	sd yd	958.46 2260.74				
·	γ. V.	1.0 1901.742 kN	7 V.	t	1.0 1901.742 l	kN			
·	V	0.99 OK!	<u>[</u> F		0.84	OK!			
					**				
·	Ultimate Limit	State Pausing C	ondition	<u> </u>					
		Prepared by		Y. Ando	Checke	d by	e. Nish	ичел	
			26	107 12002			1	08 12	າດດ

	Detailed Design on P	ort Reactivation F	Project in	La Union	Calc. Fil	e No.	
Section	Civil				Calc. Inc	dex No.	
Subject	Quaywall		<del></del>		Page No		Rev.
			<del>*</del>			Refere	
	Typical section					Notes	
	examination for momen				•	Been management	<del></del>
	Re-bar D2		32				
	sectional area	5.067 As	162.144		÷		
	sectional width I height d'	170 200 effective heigh	100				
-	location of re-ba	15	185				
•	Es	200 kN/mm <sup>2</sup>					
	r <sub>ms</sub>	1.0	ľ		•		
	f <sub>yk</sub>	345 N/mm <sup>2</sup>	J				•
		0173					
* *	<b>I</b>	3,968 N					
		18.5 N/mm² 61.57 <i>mm</i>					
		1925 OK!	· [		•		
	γ <sub>6</sub>	1.0	ŀ				
	M <sub>nd</sub> 9	763.6 kNm	,				
	$\gamma_{\rm t}$	1.0	l				
		3.872 kNm					
	<u>F</u>	0.53 OK!					
	examination for shearing	g force	71.		6		
	1) main re-bar	A TOTOG		) main re-l	for shearing force		j
	Re-bar D25			Re-bar	D25 nos		32
		5.067 As 170 /	, ,	ectional ar	5.067 As	162.	
	height d'	200 effective heigh		ectional w eight d'	170		
	location of re-ba	15		cation of	200 effective h	eight	185
	fcd	18.5 N/mm <sup>2</sup>		'cd	18.5 N/mm <sup>2</sup>		1
	fycd (	0.529 N/mm <sup>2</sup>	f	vcd	0.529 N/mm <sup>2</sup>		
		1.857		3 4	0.857		1
		0.802		3,	0.802		
	γ,	1.15		rb	1.15		ĺ
		4.86 kN		cd	994.86 kN		Ì
•	2) stirrup Re-bar D13	pitch	2010	) stirrup le-bar	018 -x i		
		.267 Aw		ectional ar	D16 pitch 1.986 Aw	3.9	20
•	fwyd /	345 N/mm <sup>2</sup>	. 1	vyd	345 N/mm <sup>2</sup>	3.5	14
		0.87 cm	z		160.87 cm		
	$r_b$	1.0		ъ	1.0		ı
	1 ./	3.19 kN		sd	1102.23 kN		1
	1 /	8.05 kN	V,		2097.09 kN	•	
	Y. 1904	1.0 794 kN	r		1.0		[
		1.12 NG !!	V,	a . 1	904.794 kN 0.91 OK !		1
	T	IIQ ()	<u>ir</u>		0.91 OK!		
					-		
					•		
•							•
				* *			
			•				
Ul	timate Limit State	Seismic Cond	lition				-
Ul	timate Limit State	Seismic Cond	lition ————	Y. And	Checked by	e. NIS	HIHURA

## (I) NIPPON KOEI CO., LTD.

Project	Detailed Design	on Port Reactivation (	Project in La Union	Calc. File	No.
Section	Civil			Calc. Inde	
Subject	Quaywall			Page No.	
	e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la co				References/
	Wide section				Notes
	examination for		20.01		
	Re-bar sectional area	D25, D22 nos As	32, 24 255.048		
	sectional width L	300 As	200.046		
	height d'	200 effective heigh	185		
	location of re-ba	15			
	Es	200 kN/mm <sup>2</sup>			\$
	γ <sub>ma</sub>	1.0			
	f <sub>yk</sub>	345 N/mm <sup>2</sup>			
	εγ	0.00173			
	Ts	8,799,156 N			· · · · · · · · · · · · · · · · · · ·
	fcd	18.5 N/mm <sup>2</sup>			
	x	233.15 mm			
	Es	0.04154 OK!			
	γ <sub>b</sub>	1.15			
	M <sub>nd</sub>	22240.7 kNm			,
	γ <sub>t</sub>	1.0		e e	
:	M <sub>d</sub>	5148.872 kNm			and the second
	<u> </u>	0.23 OK!			
	examination for	shearing force	/ evamination	for shearing force	<del></del>
	1) main re-bar	SHOOTING TO GC	1) main re-b	ar	
	Re-bar	D25, D22 nos		25, D22 nos	32, 24
	sectional area	As	255.048 sectional area		255.048
	sectional width t	300	sectional w	300	
	height d' location of re-ba	200 effective heigh 15	185 height d'	200 effective he	ight 185
1	fcd	18.5 N/mm <sup>2</sup>	location of	15	
	fvcd	0.529 N/mm <sup>2</sup>		18.5 N/mm <sup>2</sup>	
	Bd	0.857	fvcd e	0.529 N/mm² 0.857	
	$\beta$	0.772	β,	0.772	
·	1	1.3	$\beta$		
-	γ <sub>b</sub> V <sub>ed</sub>	1494.96 kN	$r_{\scriptscriptstyle b}$	1.3	
	2) stirrup	1494:90 KN	V <sub>ed</sub>	1494.96 kN	
	Re-bar	D13 pitch	2) stirrup 20 Re-bar	D16 pitch	20
	sectional area	1.267 Aw	2.534 sectional ar	D16 pitch 1.986 Aw	20 3.972
	fwyd	345 N/mm²	fwyd	345 N/mm <sup>2</sup>	5.57.2
	z /	160.87 cm	2	160.87 cm	
	r <sub>b</sub> /	1.15	$r_{b}$	1.15	
Į.	V <sub>sd</sub>	611.47 kN	V <sub>sd</sub>	958.46 kN	
ĺ	V <sub>vd</sub>	2106.43 kN		2453.42 kN	
	r./	1.0	r.	1.0	
	V <sub>g</sub> /	1904.794 kN	V <sub>d</sub> 1	904.794 kN	
•	<u> </u>	0.90 OK!	<u> </u>	0.78 OK!	
			1.		
į					
1			4 - 1		
· ·			•		
	_				
1			en en en en en en en en en en en en en e		
U.	ltimate Limit S	tate Seismic Cond	ition		
				<del></del>	
		Prepared by	YAndo	Checked by	Z - NISHIMURA
			26107 12002		08 / 08 /2002
· ·		<u>l</u>		<u> </u>	1 20 , 00 12002



Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.
Section	Civil	Calc. Index No.
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Typical section			
examination for	moment		``
1) concrete	, '		
Re-bar	D25 i	nos	32
sectional area	5.067	As	162.144
sectional width t	170		
height d'	200 (	effective height	185
location of re-ba	15		
N	30,000 (	times	
K	10		
k1	0.85		
fd	18.5	kN/mm²	100
frd	8,685.0	kN/mm²	
γ.	1.3		
$\sigma_{\rm rd}$	303.8	dN ,	
F	0.04547	OK!	
2) re-bar			
r.	1.05		-
φ	25 n	កភា	
a ·	0.735		
k	0.12		
fsrd	285310 k	(N/m²	
F	0.00112	OK!	

examination for	shearing f	orce	
Re-bar	D25	nos	32
sectional area	5.067	As	162.144
sectional width b	170		
height d'	200	effective heigh	185
location of re-ba	15		
fed	18.5	N/mm <sup>2</sup>	
fvcd	0.529	N/mm <sup>2</sup>	
β <sub>d</sub>	0.857		
B	0.802	•	
rb	. 1.0		
V <sub>ed</sub>	1144.08	kN	
N	30,000	times	
$\sigma_{\sf rd}$	303.8	kN	
V <sub>red</sub>	678.43	kN	
<u>F</u>	0,448	OK!	

Fatigue Limit State : Working Condition

Prepared by	YAndo	Checked by	E. NISHIMURA
	261 07 12002		08 / 08 /2002



Project	Detailed Design on Port Reactivation Project in La Union	Calc. File No.	
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Wide section		
examination for	moment	
(1) concrete		
Re~bar	D25 nos	48
sectional area	5.067 As	243.216
sectional width b	250	**
height d'	200 effective hei	<sub>gh</sub> 185
location of re-ba	15	
N .	30,000 times	
K	10 :	
k1	0.85	•
fd	18.5 kN/mm <sup>2</sup>	
frd	8,685.0 kN/mm <sup>2</sup>	
γ.,	1.3	
$\sigma_{\rm rd}$	580 kN	
F	0.08682 OK!	
2) re-bar		
$\gamma_s$	1.05	
φ	25 mm	
a ·	0.735	
k	0.12	
fsrd	285310 kN/m <sup>2</sup>	
F	0.00213 OK!	

Examination Re-bar	D25	nos	48
sectional area	5.067		243.216
sectional width t			
height d'		effective height	185
location of ra-ba	15	*	
fcd		N/mm <sup>2</sup>	
fvcd	0.529	N/mm²	
β <sub>d</sub>	0.857		
$\beta_{p}$	0.807		
γ,	1.0		
V <sub>cd</sub>	1692.97	kN	
N	30,000	times	
$\sigma_{\sf rd}$	580	kN	
V <sub>red</sub>	1003.91	kN	
<u>F</u>	0.578	OK!	

Fatigue Limit State Pausing Condition

	Prepared by	YAndo	Checked by 2	NISHINUEA
···		2610712002		08 1 08 12002

