B. Sidewall (parallel to centerline: landside)

slab fixed on three sides and free on one side

P1 = -79.41 (kN/m²)

P2 = -94.04 (kN/m²)

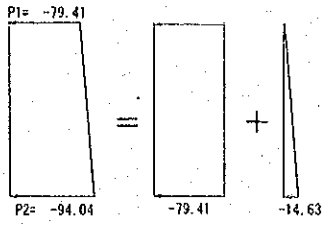
LX = 16.200 (m)

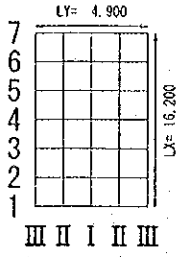
LY = 4.900 (m)

The ratio of a length of sides

$$\lambda = \frac{16.200}{4.900} = 3.31$$

The coefficient table of $\lambda$ = 3.25 is used.




(i) Section force by equivalent uniform load

P = -79.41 (kN/m²)

MX = P · LY² · X = -79.41 × 4.900² × X = -1906.63 × X

MY = P · LY² · Y = -79.41 × 4.900² × Y = -1906.63 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 7 | 0.0000 | 0.000 | 0.0432 | -82.367 |
| | 6 | 0.0067 | -12.774 | 0.0414 | -78.935 |
| | 5 | 0.0068 | -12.965 | 0.0416 | -79.316 |
| | 4 | 0.0070 | -13.346 | 0.0418 | -79.697 |
| | 3 | 0.0083 | -15.825 | 0.0415 | -79.125 |
| | 2 | 0.0136 | -25.930 | 0.0326 | -62.156 |
| | 1 | -0.0565 | 107.725 | -0.0094 | 17.922 |
| II | 7 | 0.0000 | 0.000 | 0.0105 | -20.020 |
| | 6 | 0.0015 | -2.860 | 0.0104 | -19.829 |
| | 5 | 0.0015 | -2.860 | 0.0104 | -19.829 |
| | 4 | 0.0017 | -3.241 | 0.0105 | -20.020 |
| | 3 | 0.0025 | -4.767 | 0.0107 | -20.401 |
| | 2 | 0.0062 | -11.821 | 0.0103 | -19.638 |
| | 1 | -0.0338 | 64.444 | -0.0056 | 10.677 |
| III | 7 | 0.0000 | 0.000 | -0.0872 | 166.258 |
| | 6 | -0.0141 | 26.884 | -0.0847 | 161.492 |
| | 5 | -0.0141 | 26.884 | -0.0845 | 161.111 |
| | 4 | -0.0141 | 26.884 | -0.0846 | 161.301 |
| | 3 | -0.0142 | 27.074 | -0.0851 | 162.255 |
| | 2 | -0.0120 | 22.880 | -0.0720 | 137.278 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

(ii)Section force by triangular distribution load

P = -14.63(kN/m²)

MX = P・LY²・X = -14.63 × 4.900² × X = -351.27 × X

MY = P・LY²・Y = -14.63 × 4.900² × Y = -351.27 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 7 | 0.0000 | 0.000 | 0.0029 | -1.019 |
| | 6 | 0.0008 | -0.281 | 0.0071 | -2.494 |
| | 5 | 0.0022 | -0.773 | 0.0139 | -4.883 |
| | 4 | 0.0035 | -1.229 | 0.0209 | -7.341 |
| | 3 | 0.0059 | -2.072 | 0.0277 | -9.730 |
| | 2 | 0.0123 | -4.321 | 0.0263 | -9.238 |
| | 1 | -0.0496 | 17.423 | -0.0083 | 2.916 |
| II | 7 | 0.0000 | 0.000 | 0.0003 | -0.105 |
| | 6 | 0.0002 | -0.070 | 0.0017 | -0.597 |
| | 5 | 0.0005 | -0.176 | 0.0034 | -1.194 |
| | 4 | 0.0008 | -0.281 | 0.0052 | -1.827 |
| | 3 | 0.0018 | -0.632 | 0.0072 | -2.529 |
| | 2 | 0.0058 | -2.037 | 0.0086 | -3.021 |
| | 1 | -0.0302 | 10.608 | -0.0050 | 1.756 |
| III | 7 | 0.0000 | 0.000 | -0.0008 | 0.281 |
| | 6 | -0.0019 | 0.667 | -0.0116 | 4.075 |
| | 5 | -0.0045 | 1.581 | -0.0271 | 9.519 |
| | 4 | -0.0071 | 2.494 | -0.0428 | 15.034 |
| | 3 | -0.0097 | 3.407 | -0.0583 | 20.479 |
| | 2 | -0.0099 | 3.478 | -0.0594 | 20.865 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

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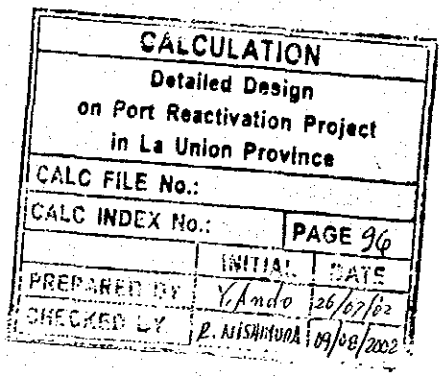
| CHECKED BY | E. NISHIMURA | 09/08/2002 |

The sum total of (i) and (ii)

| | | MX | MY |
|---|---|---|---|
| I | 7 | 0.000 | -83.386 |
| | 6 | -13.055 | -81.429 |
| | 5 | -13.738 | -84.199 |
| | 4 | -14.575 | -87.038 |
| | 3 | -17.897 | -88.855 |
| | 2 | -30.251 | -71.394 |
| | 1 | 125.148 | 20.838 |
| II | 7 | 0.000 | -20.125 |
| | 6 | -2.930 | -20.426 |
| | 5 | -3.036 | -21.023 |
| | 4 | -3.522 | -21.847 |
| | 3 | -5.399 | -22.930 |
| | 2 | -13.858 | -22.659 |
| | 1 | 75.052 | 12.433 |
| III | 7 | 0.000 | 166.539 |
| | 6 | 27.551 | 165.567 |
| | 5 | 28.465 | 170.630 |
| | 4 | 29.378 | 176.335 |
| | 3 | 30.481 | 182.734 |
| | 2 | 26.358 | 158.143 |
| | 1 | 0.000 | 0.000 |



Correction of the non-balance bending moment in a side wall corner

Non-balance arises in bending moment of a transverse direction on the intersection of side wall(perpendicular to levee normal) and side wall(parallel to centerline) Since it is calculated as slab fixed on three sides and free on one side, moment is distributed and corrected by the rigid ratio of slab.
Correction is made about corner (ⅢAxis) and the central part of span(ⅠAxis)

Rigid ratio

$$K1 = \frac{E1 \cdot I1}{L1} \qquad K2 = \frac{E2 \cdot I2}{L2}$$

$E1 = E2$ $\qquad I1 = I2$

The relative share of moment

$$e1 = \frac{K1}{K1 + K2} = \frac{L2}{L1 + L2} = \frac{4.900}{4.900 + 4.700} = 0.510$$

$$e2 = \frac{K2}{K1 + K2} = \frac{L1}{L1 + L2} = \frac{4.700}{4.900 + 4.700} = 0.490$$

Correction of moment in corner (ⅢAxis)

When referred to as ( M1 > M2 )

$\Delta M = M1 - M2$

Correction moment

$M1' = M1 - \Delta M \cdot e1 = M1 - 0.510 \cdot \Delta M$

$M2' = M2 + \Delta M \cdot e2 = M2 + 0.490 \cdot \Delta M$

Correction of the moment in the central part (ⅠAxis) of span

Let 50% of the quantity of corrections in Ⅲ Axis be the quantity of corrections However, when a correction value is smaller than the original moment, a safe value is taken, and the value before correction is used.

$M_{1B}' = M_{1B} - 1/2 \cdot \Delta M \cdot e1 = M_{1B} - 0.255 \cdot \Delta M$

$M_{2B}' = M_{2B} + 1/2 \cdot \Delta M \cdot e2 = M_{2B} + 0.245 \cdot \Delta M$

The table of a correction moment

| Sidewall(perpendicular to levee normal) e1 | | | Sidewall(parallel to centerline) e2 | |
|---|---|---|---|---|
| Ⅰ | Ⅲ | | Ⅲ | Ⅰ |
| $M_{1B} > M_{1B}'$ | $M1 > M1'$ | $\Delta M \cdot e1$ ( $\Delta M$ ) $\Delta M \cdot e2$ | $M2 < M2'$ | $1/2 \cdot \Delta M \cdot e2 < M_{2B} < M_{2B}'$ |
| $1/2 \cdot \Delta M \cdot e1$ | | | | |

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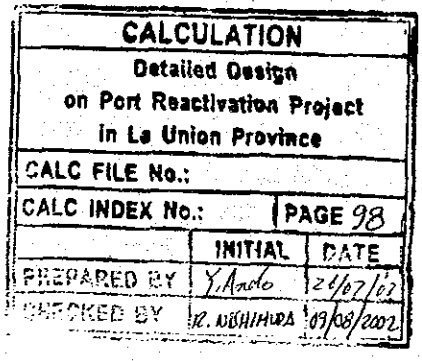
| CHECKED BY | R. NISHIMURA | 09/08/2002 |

(a) Sidewall (perpendicular to levee normal:seaside) and Front wall (parallel to centerline:seaside)
(1) While afloat

| Sidewall (perpendicular to levee normal:seaside) e1 = 0.510 | | | | | Front wall (parallel to centerline:seaside) e2 = 0.490 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | I | | III | | | III | | I | |
| 7 | 2.292 | | -0.170 | | | -0.738 | | 2.676 | |
| | > | 0.145 | > | 0.290 ( 0.568) | 0.278 | < | 0.139 | < | |
| 7' | 2.147 | | -0.460 | | | -0.460 | | 2.815 | |
| 6 | 6.027 | | -9.508 | | | -10.703 | | 6.551 | |
| | > | 0.305 | > | 0.609 ( 1.195) | 0.586 | < | 0.293 | < | |
| 6' | 5.722 | | -10.117 | | | -10.117 | | 6.844 | |
| 5 | 11.800 | | -22.836 | | | -25.005 | | 12.826 | |
| | > | 0.553 | > | 1.106 ( 2.169) | 1.063 | < | 0.531 | < | |
| 5' | 11.247 | | -23.942 | | | -23.942 | | 13.357 | |
| 4 | 17.742 | | -36.419 | | | -39.492 | | 19.285 | |
| | > | 0.784 | > | 1.567 ( 3.073) | 1.506 | < | 0.753 | < | |
| 4' | 16.958 | | -37.986 | | | -37.986 | | 20.038 | |
| 3 | 23.685 | | -49.916 | | | -53.794 | | 25.559 | |
| | > | 0.989 | > | 1.978 ( 3.878) | 1.900 | < | 0.950 | < | |
| 3' | 22.696 | | -51.894 | | | -51.894 | | 26.509 | |
| 2 | 23.600 | | -52.803 | | | -54.809 | | 24.267 | |
| | > | 0.512 | > | 1.023 ( 2.006) | 0.983 | < | 0.491 | < | |
| 2' | 23.088 | | -53.826 | | | -53.826 | | 24.758 | |
| 1 | -7.046 | | 0.000 | | | 0.000 | | -7.658 | |
| | > | 0.000 | > | 0.000 ( 0.000) | 0.000 | < | 0.000 | < | |
| 1' | -7.046 | | 0.000 | | | 0.000 | | -7.658 | |



The moment after correction

| | Sidewall (perpendicular to levee normal: seaside) e1 = 0.510 | | Front wall (parallel to centerline: seaside) e2 = 0.490 | |
|---|---|---|---|---|
| | I | III | III | I |
| 7' | 2.292 | -0.460 | -0.460 | 2.815 |
| 6' | 6.027 | -10.117 | -10.117 | 6.844 |
| 5' | 11.800 | -23.942 | -23.942 | 13.357 |
| 4' | 17.742 | -37.986 | -37.986 | 20.038 |
| 3' | 23.685 | -51.894 | -51.894 | 26.509 |
| 2' | 23.600 | -53.826 | -53.826 | 24.758 |
| 1' | -7.046 | 0.000 | 0.000 | -7.658 |

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| CHECKED BY | R. NISHINOMIYA | 09/06/2002 |

(2) After Construction

| Sidewall (perpendicular to levee normal : seaside) e1 = 0.510 | | | | | Front wall (parallel to centerline : seaside) e2 = 0.490 | | | |
|---|---|---|---|---|---|---|---|---|
| | I | | III | | | III | | I |
| 7 | -77.136 | | 154.800 | | | 166.539 | | -83.386 |
| | > | 2.993 | > | 5.987 ( 11.739) | 5.752 | < | 2.876 | < |
| 7' | -74.143 | | 160.787 | | | 160.787 | | -86.262 |
| 6 | -75.631 | | 153.947 | | | 165.567 | | -81.429 |
| | > | 2.963 | > | 5.926 ( 11.620) | 5.694 | < | 2.847 | < |
| 6' | -72.668 | | 159.873 | | | 159.873 | | -84.276 |
| 5 | -78.115 | | 158.572 | | | 170.630 | | -84.199 |
| | > | 3.075 | > | 6.150 ( 12.058) | 5.908 | < | 2.954 | < |
| 5' | -75.040 | | 164.722 | | | 164.722 | | -87.153 |
| 4 | -80.668 | | 163.828 | | | 176.335 | | -87.038 |
| | > | 3.189 | > | 6.379 ( 12.507) | 6.128 | < | 3.064 | < |
| 4' | -77.479 | | 170.207 | | | 170.207 | | -90.102 |
| 3 | -83.045 | | 170.814 | | | 182.734 | | -88.855 |
| | > | 3.040 | > | 6.079 ( 11.920) | 5.841 | < | 2.920 | < |
| 3' | -80.005 | | 176.893 | | | 176.893 | | -91.775 |
| 2 | -69.955 | | 153.443 | | | 158.143 | | -71.394 |
| | > | 1.199 | > | 2.397 ( 4.700) | 2.303 | < | 1.152 | < |
| 2' | -68.756 | | 155.840 | | | 155.840 | | -72.546 |
| 1 | 19.403 | | 0.000 | | | 0.000 | | 20.838 |
| | > | 0.000 | > | 0.000 ( 0.000) | 0.000 | < | 0.000 | < |
| 1' | 19.403 | | 0.000 | | | 0.000 | | 20.838 |

| CALCULATION | | |
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| CHECKED BY | E. NISHIHUDA | 09/08/2002 |

The moment after correction

| Sidewall (perpendicular to levee normal : seaside) e1 = 0.510 | | | Front wall (parallel to center line : seaside) e2 = 0.490 | |
|---|---|---|---|---|
| | I | III | III | I |
| 7' | -77.136 | 160.787 | 160.787 | -86.262 |
| 6' | -75.631 | 159.873 | 159.873 | -84.276 |
| 5' | -78.115 | 164.722 | 164.722 | -87.153 |
| 4' | -80.668 | 170.207 | 170.207 | -90.102 |
| 3' | -83.045 | 176.893 | 176.893 | -91.775 |
| 2' | -69.955 | 155.840 | 155.840 | -72.546 |
| 1' | 19.403 | 0.000 | 0.000 | 20.838 |

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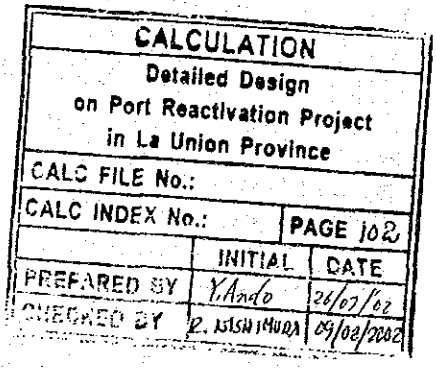
| CHECKED BY | E. NISHIMURA | 09/08/2002 |

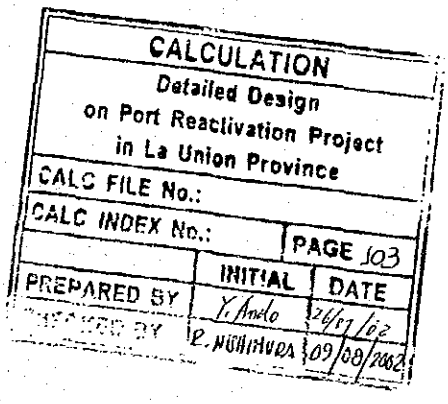
(b) Sidewall(perpendicular to levee normal:landside) and Rear wall(parallel to centerline : landside)
(1) While afloat

| Sidewall(perpendicular to levee normal:landside) e1 = 0.510 | | | | | Rear wall(parallel to centerline : landside) e2 = 0.490 | | | |
|---|---|---|---|---|---|---|---|---|
| | I | | III | | | III | | I |
| 7 | 2.292 | | -0.170 | | | -0.738 | | 2.676 |
| | > | 0.145 | > | 0.290 ( 0.568) | 0.278 | < | 0.139 | < |
| 7' | 2.147 | | -0.460 | | | -0.460 | | 2.815 |
| 6 | 6.027 | | -9.508 | | | -10.703 | | 6.551 |
| | > | 0.305 | > | 0.609 ( 1.195) | 0.586 | < | 0.293 | < |
| 6' | 5.722 | | -10.117 | | | -10.117 | | 6.844 |
| 5 | 11.800 | | -22.836 | | | -25.005 | | 12.826 |
| | > | 0.553 | > | 1.106 ( 2.169) | 1.063 | < | 0.531 | < |
| 5' | 11.247 | | -23.942 | | | -23.942 | | 13.357 |
| 4 | 17.742 | | -36.419 | | | -39.492 | | 19.285 |
| | > | 0.784 | > | 1.567 ( 3.073) | 1.506 | < | 0.753 | < |
| 4' | 16.958 | | -37.986 | | | -37.986 | | 20.038 |
| 3 | 23.685 | | -49.916 | | | -53.794 | | 25.559 |
| | > | 0.989 | > | 1.978 ( 3.878) | 1.900 | < | 0.950 | < |
| 3' | 22.696 | | -51.894 | | | -51.894 | | 26.509 |
| 2 | 23.600 | | -52.803 | | | -54.809 | | 24.267 |
| | > | 0.512 | > | 1.023 ( 2.006) | 0.983 | < | 0.491 | < |
| 2' | 23.088 | | -53.826 | | | -53.826 | | 24.758 |
| 1 | -7.046 | | 0.000 | | | 0.000 | | -7.658 |
| | > | 0.000 | > | 0.000 ( 0.000) | 0.000 | < | 0.000 | < |
| 1' | -7.046 | | 0.000 | | | 0.000 | | -7.658 |



The moment after correction

| | Sidewall (perpendicular to levee normal : landside) e1 = 0.510 | | Rear wall (parallel to centerline : landside) e2 = 0.490 | |
|---|---|---|---|---|
| | I | III | III | I |
| 7' | 2.292 | -0.460 | -0.460 | 2.815 |
| 6' | 6.027 | -10.117 | -10.117 | 6.844 |
| 5' | 11.800 | -23.942 | -23.942 | 13.357 |
| 4' | 17.742 | -37.986 | -37.986 | 20.038 |
| 3' | 23.685 | -51.894 | -51.894 | 26.509 |
| 2' | 23.600 | -53.826 | -53.826 | 24.758 |
| 1' | -7.046 | 0.000 | 0.000 | -7.658 |



(2) After Construction

| Sidewall (perpendicular to levee normal : landside) e1 = 0.510 | | | | | | Rear wall (parallel to centerline : landside) e2 = 0.490 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | | | III | | | | III | | | I |
| 7 | -77.136 | | | 154.800 | | | | 166.539 | | | -83.386 |
| | > | 2.993 | | > | 5.987 | ( 11.739) | 5.752 | < | 2.876 | < | |
| 7' | -74.143 | | | 160.787 | | | | 160.787 | | | -86.262 |
| 6 | -75.631 | | | 153.947 | | | | 165.567 | | | -81.429 |
| | > | 2.963 | | > | 5.926 | ( 11.620) | 5.694 | < | 2.847 | < | |
| 6' | -72.668 | | | 159.873 | | | | 159.873 | | | -84.276 |
| 5 | -78.115 | | | 158.572 | | | | 170.630 | | | -84.199 |
| | > | 3.075 | | > | 6.150 | ( 12.058) | 5.908 | < | 2.954 | < | |
| 5' | -75.040 | | | 164.722 | | | | 164.722 | | | -87.153 |
| 4 | -80.668 | | | 163.828 | | | | 176.335 | | | -87.038 |
| | > | 3.189 | | > | 6.379 | ( 12.507) | 6.128 | < | 3.064 | < | |
| 4' | -77.479 | | | 170.207 | | | | 170.207 | | | -90.102 |
| 3 | -83.045 | | | 170.814 | | | | 182.734 | | | -88.855 |
| | > | 3.040 | | > | 6.079 | ( 11.920) | 5.841 | < | 2.920 | < | |
| 3' | -80.005 | | | 176.893 | | | | 176.893 | | | -91.775 |
| 2 | -69.955 | | | 153.443 | | | | 158.143 | | | -71.394 |
| | > | 1.199 | | > | 2.397 | ( 4.700) | 2.303 | < | 1.152 | < | |
| 2' | -68.756 | | | 155.840 | | | | 155.840 | | | -72.546 |
| 1 | 19.403 | | | 0.000 | | | | 0.000 | | | 20.838 |
| | > | 0.000 | | > | 0.000 | ( 0.000) | 0.000 | < | 0.000 | < | |
| 1' | 19.403 | | | 0.000 | | | | 0.000 | | | 20.838 |

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| CHECKED BY | R. NISHIMURA | 09/08/2002 |

The moment after correction

| Sidewall (perpendicular to levee normal : landside) e1 = 0.510 | | Rear wall (parallel to centerline : landside) e2 = 0.490 | |
|---|---|---|---|
| I | III | III | I |
| 7' -77.136 | 160.787 | 160.787 | -86.262 |
| 6' -75.631 | 159.873 | 159.873 | -84.276 |
| 5' -78.115 | 164.722 | 164.722 | -87.153 |
| 4' -80.668 | 170.207 | 170.207 | -90.102 |
| 3' -83.045 | 176.893 | 176.893 | -91.775 |
| 2' -69.955 | 155.840 | 155.840 | -72.546 |
| 1' 19.403 | 0.000 | 0.000 | 20.838 |

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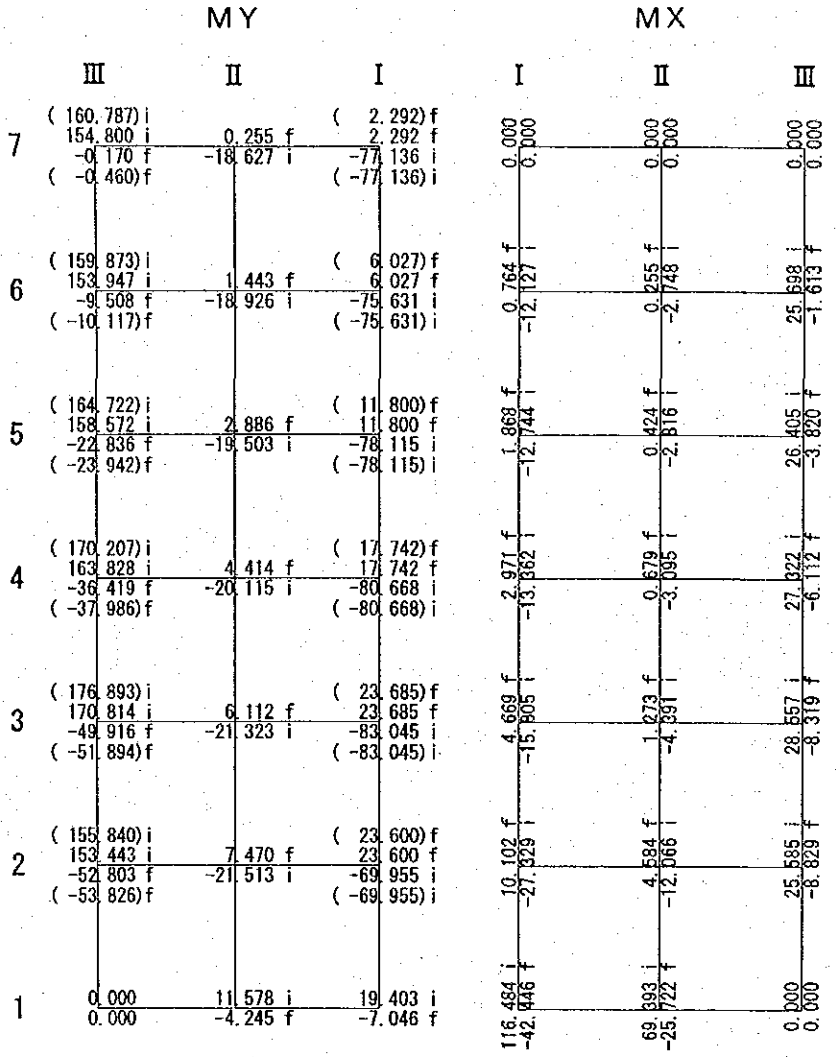
| CHECKED BY | E. NISHIMURA | 09/08/2002 |

Sidewall(perpendicular to levee normal,seaside) Colligation of bending moment
Top(left)side : +moment
Bottom(right)side : −moment
( ) : The moment after correction of corner




f : While afloat
i : from inside After Construction
o : from outside After Construction

| CALCULATION | | |
|---|---|---|
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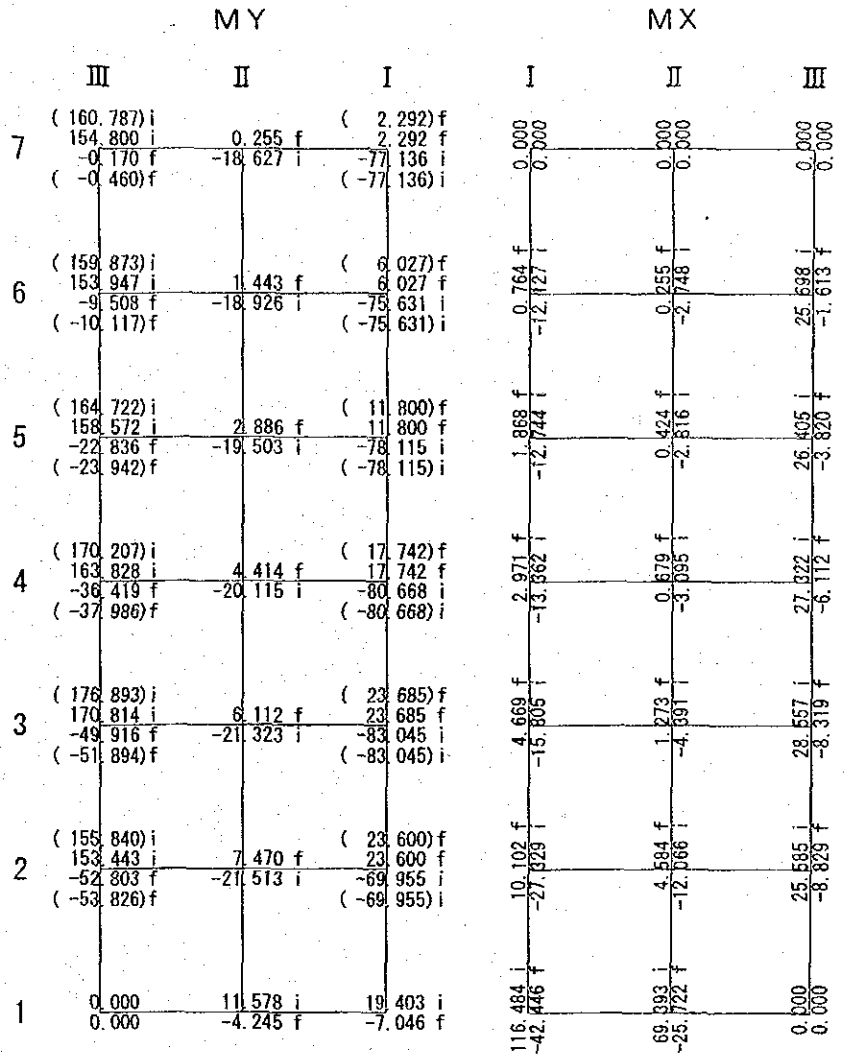
| PREPARED BY | Y. Ando | 21/07/02 |
| CHECKED BY | E. NISHIMURA | 01/08/2002 |

Sidewall (perpendicular to levee normal, landside) Colligation of bending moment

Top (left) side : +moment

Bottom (right) side : −moment

( ) : The moment after correction of corner




f : While afloat

i : from inside After Construction

o : from outside After Construction

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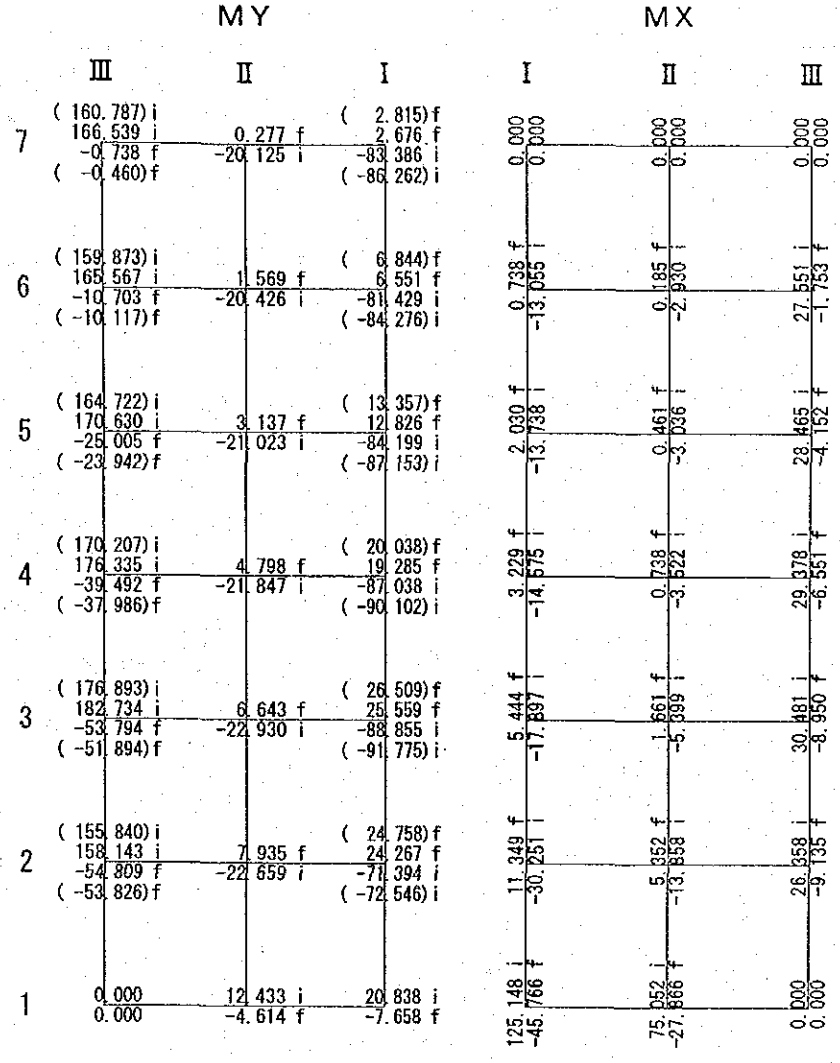
| CALC FILE No.: | | |
| CALC INDEX No.: | PAGE J07 | |
| | INITIAL | DATE |
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | K. NISHIMURA | 09/08/2002 |

Front wall(parallel to centerline, seaside)  Colligation of bending moment
Top(left)side : +moment
Bottom(right)side : −moment
( ) : The moment after correction of corner




f : While afloat
i : from inside After Construction
o : from outside After Construction

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|---|---|---|
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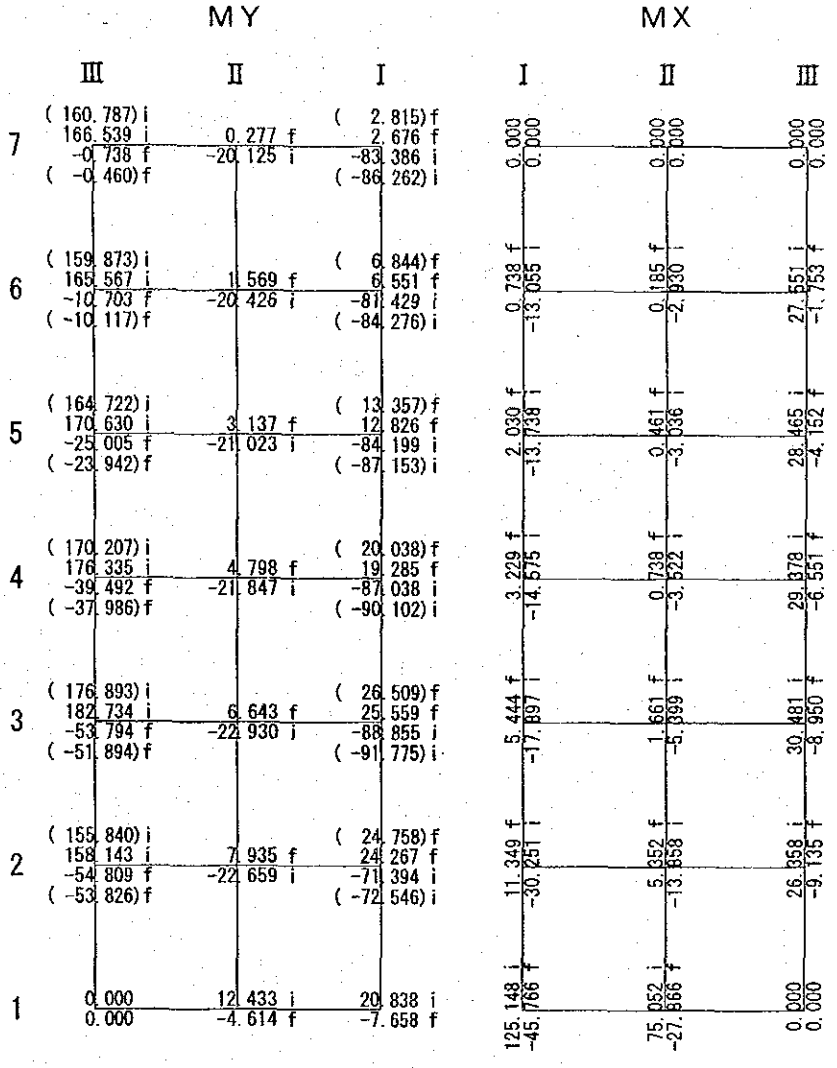
| | INITIAL | DATE |
| PREPARED BY | Y.Ando | 26/07/02 |
| CHECKED BY | M. NISHIMURA | 09/08/2002 |

Rear wall(parallel to centerline, andside) Colligation of bending moment
Top(left)side : +moment
Bottom(right)side : −moment
( ) : The moment after correction of corner




f : While afloat
i : from inside After Construction
o : from outside After Construction

| CALCULATION | | |
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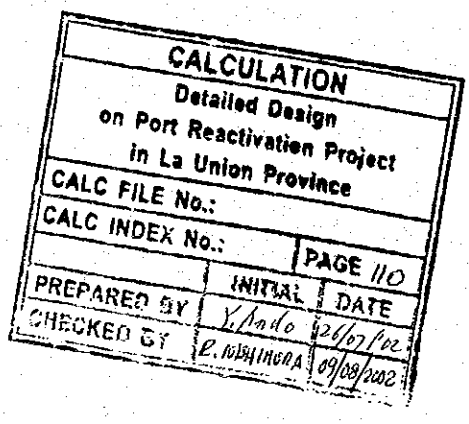
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | E. NISHIHARA | 29/08/2002 |

Bottom slab

Bottom slab is calculated as a slab fixed on four sides

Note) The mark of bending moment (+): upper tensile
(-): downside tensile



A Room

While afloat

slab fixed on four sides

P1 = 32.75(kN/m²)

P2 = 32.75(kN/m²)

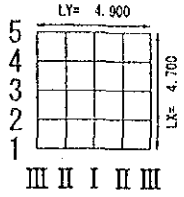
LX = 4.700(m)

LY = 4.900(m)

The ratio of a length of sides

$$\lambda = \frac{4.700}{4.900} = 0.96$$

The coefficient table of $\lambda$ = 1.00 is used.


Section force by equivalent uniform load

P = 32.75(kN/m²)

MX = P・LX²・X = 32.75 × 4.700² × X = 723.45 × X

MY = P・LX²・Y = 32.75 × 4.700² × Y = 723.45 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0513 | -37.113 | -0.0086 | -6.222 |
| | 4 | 0.0096 | 6.945 | 0.0116 | 8.392 |
| | 3 | 0.0206 | 14.903 | 0.0206 | 14.903 |
| | 2 | 0.0096 | 6.945 | 0.0116 | 8.392 |
| | 1 | -0.0513 | -37.113 | -0.0086 | -6.222 |
| II | 5 | -0.0324 | -23.440 | -0.0054 | -3.907 |
| | 4 | 0.0059 | 4.268 | 0.0059 | 4.268 |
| | 3 | 0.0116 | 8.392 | 0.0096 | 6.945 |
| | 2 | 0.0059 | 4.268 | 0.0059 | 4.268 |
| | 1 | -0.0324 | -23.440 | -0.0054 | -3.907 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | -3.907 | -0.0324 | -23.440 |
| | 3 | -0.0086 | -6.222 | -0.0513 | -37.113 |
| | 2 | -0.0054 | -3.907 | -0.0324 | -23.440 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

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E. NISHIHARA 05/06/2002

A Room

After Construction

Upward load (above)

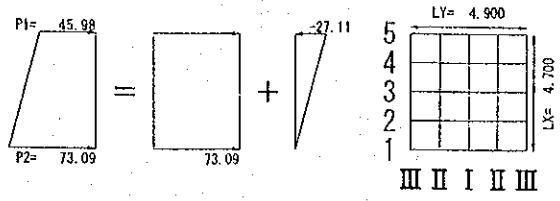
slab fixed on four sides

P1 = 45.98 (kN/m²)

P2 = 73.09 (kN/m²)

LX = 4.700 (m)

LY = 4.900 (m)




The ratio of a length of sides

$$\lambda = \frac{4.700}{4.900} = 0.96$$

The coefficient table of $\lambda$ = 1.00 is used.

(i) Section force by equivalent uniform load

P = 73.09 (kN/m²)

MX = P・LX²・X = 73.09 × 4.700² × X = 1614.56 × X

MY = P・LX²・Y = 73.09 × 4.700² × Y = 1614.56 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0513 | -82.827 | -0.0086 | -13.885 |
| | 4 | 0.0096 | 15.500 | 0.0116 | 18.729 |
| | 3 | 0.0206 | 33.260 | 0.0206 | 33.260 |
| | 2 | 0.0096 | 15.500 | 0.0116 | 18.729 |
| | 1 | -0.0513 | -82.827 | -0.0086 | -13.885 |
| II | 5 | -0.0324 | -52.312 | -0.0054 | -8.719 |
| | 4 | 0.0059 | 9.526 | 0.0059 | 9.526 |
| | 3 | 0.0116 | 18.729 | 0.0096 | 15.500 |
| | 2 | 0.0059 | 9.526 | 0.0059 | 9.526 |
| | 1 | -0.0324 | -52.312 | -0.0054 | -8.719 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | -8.719 | -0.0324 | -52.312 |
| | 3 | -0.0086 | -13.885 | -0.0513 | -82.827 |
| | 2 | -0.0054 | -8.719 | -0.0324 | -52.312 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

CALCULATION

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| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | E. NISHIHURA | 09/08/2002 |

(ii)Section force by triangular distribution load

P = -27.11(kN/m²)

MX = P・LX²・X = -27.11 × 4.700² × X = -598.86 × X

MY = P・LX²・Y = -27.11 × 4.700² × Y = -598.86 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0334 | 20.002 | -0.0056 | 3.354 |
| | 4 | 0.0080 | -4.791 | 0.0069 | -4.132 |
| | 3 | 0.0103 | -6.168 | 0.0103 | -6.168 |
| | 2 | 0.0015 | -0.898 | 0.0047 | -2.815 |
| | 1 | -0.0179 | 10.720 | -0.0030 | 1.797 |
| II | 5 | -0.0223 | 13.355 | -0.0037 | 2.216 |
| | 4 | 0.0052 | -3.114 | 0.0040 | -2.395 |
| | 3 | 0.0058 | -3.473 | 0.0048 | -2.875 |
| | 2 | 0.0006 | -0.359 | 0.0018 | -1.078 |
| | 1 | -0.0101 | 6.048 | -0.0017 | 1.018 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0036 | 2.156 | -0.0208 | 12.456 |
| | 3 | -0.0043 | 2.575 | -0.0257 | 15.391 |
| | 2 | -0.0019 | 1.138 | -0.0116 | 6.947 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

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| PREPARED BY | Y. Ando | 27/07/02 |
| CHECKED BY | E. MIYAHARA | 09/08/2002 |

The sum total of (i) and (ii)

| | | MX | MY |
|---|---|---|---|
| I | 5 | -62.825 | -10.531 |
| | 4 | 10.709 | 14.597 |
| | 3 | 27.092 | 27.092 |
| | 2 | 14.602 | 15.914 |
| | 1 | -72.107 | -12.088 |
| II | 5 | -38.957 | -6.503 |
| | 4 | 6.412 | 7.131 |
| | 3 | 15.256 | 12.625 |
| | 2 | 9.167 | 8.448 |
| | 1 | -46.264 | -7.701 |
| III | 5 | 0.000 | 0.000 |
| | 4 | -6.563 | -39.856 |
| | 3 | -11.310 | -67.436 |
| | 2 | -7.581 | -45.365 |
| | 1 | 0.000 | 0.000 |

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PREPARED BY: Y. Ando 26/07/02
E. NISHIHARA 09/08/2002

B Room

While afloat

slab fixed on four sides

P1 = 32.75(kN/m²)

P2 = 32.75(kN/m²)

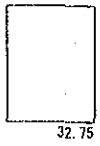
LX = 4.600(m)

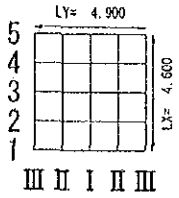
LY = 4.900(m)

The ratio of a length of sides

$$\lambda = \frac{4.600}{4.900} = 0.94$$

The coefficient table of $\lambda$ = 1.00 is used.



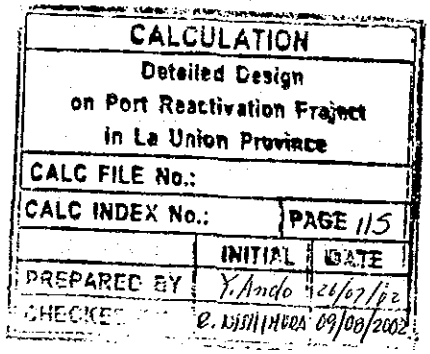

Section force by equivalent uniform load

P = 32.75(kN/m²)

MX = P・LX²・X = 32.75 × 4.600² × X = 692.99 × X

MY = P・LX²・Y = 32.75 × 4.600² × Y = 692.99 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0513 | -35.550 | -0.0086 | -5.960 |
| | 4 | 0.0096 | 6.653 | 0.0116 | 8.039 |
| | 3 | 0.0206 | 14.276 | 0.0206 | 14.276 |
| | 2 | 0.0096 | 6.653 | 0.0116 | 8.039 |
| | 1 | -0.0513 | -35.550 | -0.0086 | -5.960 |
| II | 5 | -0.0324 | -22.453 | -0.0054 | -3.742 |
| | 4 | 0.0059 | 4.089 | 0.0059 | 4.089 |
| | 3 | 0.0116 | 8.039 | 0.0096 | 6.653 |
| | 2 | 0.0059 | 4.089 | 0.0059 | 4.089 |
| | 1 | -0.0324 | -22.453 | -0.0054 | -3.742 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | -3.742 | -0.0324 | -22.453 |
| | 3 | -0.0086 | -5.960 | -0.0513 | -35.550 |
| | 2 | -0.0054 | -3.742 | -0.0324 | -22.453 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |



B Room

After Construction

Upward load (above)

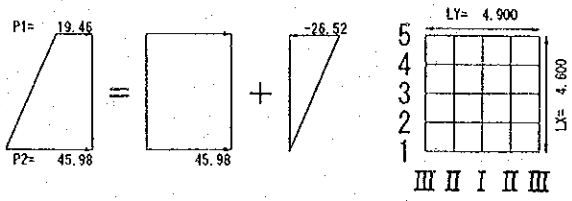
slab fixed on four sides

P1 = 19.46(kN/m²)

P2 = 45.98(kN/m²)

LX = 4.600(m)

LY = 4.900(m)




The ratio of a length of sides

$$\lambda = \frac{4.600}{4.900} = 0.94$$

The coefficient table of $\lambda$ = 1.00 is used.

(i) Section force by equivalent uniform load

P = 45.98(kN/m²)

MX = P・LX²・X = 45.98 × 4.600² × X = 972.94 × X

MY = P・LX²・Y = 45.98 × 4.600² × Y = 972.94 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| Ⅰ | 5 | -0.0513 | -49.912 | -0.0086 | -8.367 |
| | 4 | 0.0096 | 9.340 | 0.0116 | 11.286 |
| | 3 | 0.0206 | 20.043 | 0.0206 | 20.043 |
| | 2 | 0.0096 | 9.340 | 0.0116 | 11.286 |
| | 1 | -0.0513 | -49.912 | -0.0086 | -8.367 |
| Ⅱ | 5 | -0.0324 | -31.523 | -0.0054 | -5.254 |
| | 4 | 0.0059 | 5.740 | 0.0059 | 5.740 |
| | 3 | 0.0116 | 11.286 | 0.0096 | 9.340 |
| | 2 | 0.0059 | 5.740 | 0.0059 | 5.740 |
| | 1 | -0.0324 | -31.523 | -0.0054 | -5.254 |
| Ⅲ | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | -5.254 | -0.0324 | -31.523 |
| | 3 | -0.0086 | -8.367 | -0.0513 | -49.912 |
| | 2 | -0.0054 | -5.254 | -0.0324 | -31.523 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

(ii) Section force by triangular distribution load

$P = -26.52 (kN/m^2)$

$MX = P \cdot LX^2 \cdot X = -26.52 \times 4.600^2 \times X = -561.16 \times X$

$MY = P \cdot LX^2 \cdot Y = -26.52 \times 4.600^2 \times Y = -561.16 \times Y$

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0334 | 18.743 | -0.0056 | 3.143 |
| | 4 | 0.0080 | -4.489 | 0.0069 | -3.872 |
| | 3 | 0.0103 | -5.780 | 0.0103 | -5.780 |
| | 2 | 0.0015 | -0.842 | 0.0047 | -2.637 |
| | 1 | -0.0179 | 10.045 | -0.0030 | 1.683 |
| II | 5 | -0.0223 | 12.514 | -0.0037 | 2.076 |
| | 4 | 0.0052 | -2.918 | 0.0040 | -2.245 |
| | 3 | 0.0058 | -3.255 | 0.0048 | -2.694 |
| | 2 | 0.0006 | -0.337 | 0.0018 | -1.010 |
| | 1 | -0.0101 | 5.668 | -0.0017 | 0.954 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0036 | 2.020 | -0.0208 | 11.672 |
| | 3 | -0.0043 | 2.413 | -0.0257 | 14.422 |
| | 2 | -0.0019 | 1.066 | -0.0116 | 6.509 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

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| PREPARED BY | Y.Ando | 24/07/06 |
| CHECKED BY | E. DISIMULADA | 09/08/2006 |

The sum total of (i) and (ii)

| | | MX | MY |
|---|---|---|---|
| I | 5 | -31.169 | -5.224 |
| | 4 | 4.851 | 7.414 |
| | 3 | 14.263 | 14.263 |
| | 2 | 8.498 | 8.649 |
| | 1 | -39.867 | -6.684 |
| II | 5 | -19.009 | -3.178 |
| | 4 | 2.822 | 3.495 |
| | 3 | 8.031 | 6.646 |
| | 2 | 5.403 | 4.730 |
| | 1 | -25.855 | -4.300 |
| III | 5 | 0.000 | 0.000 |
| | 4 | -3.234 | -19.851 |
| | 3 | -5.954 | -35.490 |
| | 2 | -4.188 | -25.014 |
| | 1 | 0.000 | 0.000 |

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| | INITIAL | DATE |
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| PREPARED BY | Y.Ando | 24/07/02 |
| CHECKED BY | E.NISHIMURA | 09/08/2002 |

C Room

While afloat

slab fixed on four sides

P1 = 32.75(kN/m²)

P2 = 32.75(kN/m²)

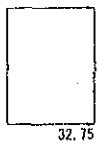
LX = 4.600(m)

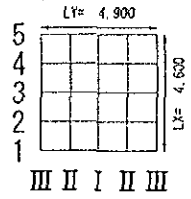
LY = 4.900(m)

The ratio of a length of sides

$$\lambda = \frac{4.600}{4.900} = 0.94$$

The coefficient table of $\lambda$ = 1.00 is used.




Section force by equivalent uniform load

P = 32.75(kN/m²)

MX = P・LX²・X = 32.75 × 4.600² × X = 692.99 × X

MY = P・LX²・Y = 32.75 × 4.600² × Y = 692.99 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0513 | -35.550 | -0.0086 | -5.960 |
| | 4 | 0.0096 | 6.653 | 0.0116 | 8.039 |
| | 3 | 0.0206 | 14.276 | 0.0206 | 14.276 |
| | 2 | 0.0096 | 6.653 | 0.0116 | 8.039 |
| | 1 | -0.0513 | -35.550 | -0.0086 | -5.960 |
| II | 5 | -0.0324 | -22.453 | -0.0054 | -3.742 |
| | 4 | 0.0059 | 4.089 | 0.0059 | 4.089 |
| | 3 | 0.0116 | 8.039 | 0.0096 | 6.653 |
| | 2 | 0.0059 | 4.089 | 0.0059 | 4.089 |
| | 1 | -0.0324 | -22.453 | -0.0054 | -3.742 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | -3.742 | -0.0324 | -22.453 |
| | 3 | -0.0086 | -5.960 | -0.0513 | -35.550 |
| | 2 | -0.0054 | -3.742 | -0.0324 | -22.453 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

| CALCULATION | | |
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| | INITIAL | DATE |
| PREPARED BY | Y.Ando | 22/07/02 |
| CHECKED BY | R.NISHIMURA | 09/08/2002 |

C Room

After Construction

Upward load (above)

slab fixed on four sides

P1 = 0.00 (kN/m²)

P2 = 19.46 (kN/m²)

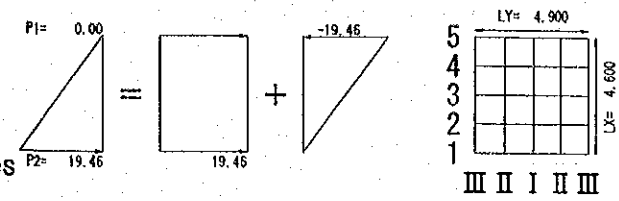
LX = 4.600 (m)

LY = 4.900 (m)

The ratio of a length of sides

$$\lambda = \frac{4.600}{4.900} = 0.94$$

The coefficient table of $\lambda$ = 1.00 is used.




(i) Section force by equivalent uniform load

P = 19.46 (kN/m²)

MX = P・LX²・X = 19.46 × 4.600² × X = 411.77 × X

MY = P・LX²・Y = 19.46 × 4.600² × Y = 411.77 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| Ⅰ | 5 | -0.0513 | -21.124 | -0.0086 | -3.541 |
| | 4 | 0.0096 | 3.953 | 0.0116 | 4.777 |
| | 3 | 0.0206 | 8.483 | 0.0206 | 8.483 |
| | 2 | 0.0096 | 3.953 | 0.0116 | 4.777 |
| | 1 | -0.0513 | -21.124 | -0.0086 | -3.541 |
| Ⅱ | 5 | -0.0324 | -13.341 | -0.0054 | -2.224 |
| | 4 | 0.0059 | 2.429 | 0.0059 | 2.429 |
| | 3 | 0.0116 | 4.777 | 0.0096 | 3.953 |
| | 2 | 0.0059 | 2.429 | 0.0059 | 2.429 |
| | 1 | -0.0324 | -13.341 | -0.0054 | -2.224 |
| Ⅲ | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | -2.224 | -0.0324 | -13.341 |
| | 3 | -0.0086 | -3.541 | -0.0513 | -21.124 |
| | 2 | -0.0054 | -2.224 | -0.0324 | -13.341 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

(ii) Section force by triangular distribution load

P = -19.46(kN/m²)

MX = P・LX²・X = -19.46 × 4.600² × X = -411.77 × X

MY = P・LX²・Y = -19.46 × 4.600² × Y = -411.77 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0334 | 13.753 | -0.0056 | 2.306 |
| | 4 | 0.0080 | -3.294 | 0.0069 | -2.841 |
| | 3 | 0.0103 | -4.241 | 0.0103 | -4.241 |
| | 2 | 0.0015 | -0.618 | 0.0047 | -1.935 |
| | 1 | -0.0179 | 7.371 | -0.0030 | 1.235 |
| II | 5 | -0.0223 | 9.183 | -0.0037 | 1.524 |
| | 4 | 0.0052 | -2.141 | 0.0040 | -1.647 |
| | 3 | 0.0058 | -2.388 | 0.0048 | -1.977 |
| | 2 | 0.0006 | -0.247 | 0.0018 | -0.741 |
| | 1 | -0.0101 | 4.159 | -0.0017 | 0.700 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0036 | 1.482 | -0.0208 | 8.565 |
| | 3 | -0.0043 | 1.771 | -0.0257 | 10.583 |
| | 2 | -0.0019 | 0.782 | -0.0116 | 4.777 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

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| | E. Nishimura | 09/08/2002 |

The sum total of (i) and (ii)

| | | MX | MY |
|---|---|---|---|
| I | 5 | -7.371 | -1.235 |
| | 4 | 0.659 | 1.936 |
| | 3 | 4.242 | 4.242 |
| | 2 | 3.335 | 2.842 |
| | 1 | -13.753 | -2.306 |
| II | 5 | -4.158 | -0.700 |
| | 4 | 0.288 | 0.782 |
| | 3 | 2.389 | 1.976 |
| | 2 | 2.182 | 1.688 |
| | 1 | -9.182 | -1.524 |
| III | 5 | 0.000 | 0.000 |
| | 4 | -0.742 | -4.776 |
| | 3 | -1.770 | -10.541 |
| | 2 | -1.442 | -8.564 |
| | 1 | 0.000 | 0.000 |

| CALCULATION | | |
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| PREPARED BY | Y. Ando | 26/07/02 |
| | R. NISHIHARA | 29/08/2002 |

C Room

Downward load (below)

slab fixed on four sides

P1 = -7.07 (kN/m²)

P2 = 0.00 (kN/m²)

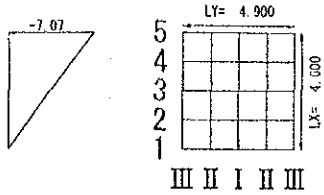
LX = 4.600 (m)

LY = 4.900 (m)

The ratio of a length of sides

$$\lambda = \frac{4.600}{4.900} = 0.94$$

*The coefficient table of λ = 1.00 is used.*




Section force by triangular distribution load

P = -7.07 (kN/m²)

MX = P・LX²・X = -7.07 × 4.600² × X = -149.60 × X

MY = P・LX²・Y = -7.07 × 4.600² × Y = -149.60 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0334 | 4.997 | -0.0056 | 0.838 |
| | 4 | 0.0080 | -1.197 | 0.0069 | -1.032 |
| | 3 | 0.0103 | -1.541 | 0.0103 | -1.541 |
| | 2 | 0.0015 | -0.224 | 0.0047 | -0.703 |
| | 1 | -0.0179 | 2.678 | -0.0030 | 0.449 |
| II | 5 | -0.0223 | 3.336 | -0.0037 | 0.554 |
| | 4 | 0.0052 | -0.778 | 0.0040 | -0.598 |
| | 3 | 0.0058 | -0.868 | 0.0048 | -0.718 |
| | 2 | 0.0006 | -0.090 | 0.0018 | -0.269 |
| | 1 | -0.0101 | 1.511 | -0.0017 | 0.254 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0036 | 0.539 | -0.0208 | 3.112 |
| | 3 | -0.0043 | 0.643 | -0.0257 | 3.845 |
| | 2 | -0.0019 | 0.284 | -0.0116 | 1.735 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

D Room

While afloat

slab fixed on four sides

P1 = 32.75(kN/m²)

P2 = 32.75(kN/m²)

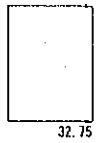
LX = 4.700(m)

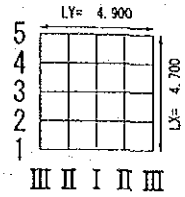
LY = 4.900(m)

The ratio of a length of sides

$$\lambda = \frac{4.700}{4.900} = 0.96$$

The coefficient table of $\lambda$ = 1.00 is used.



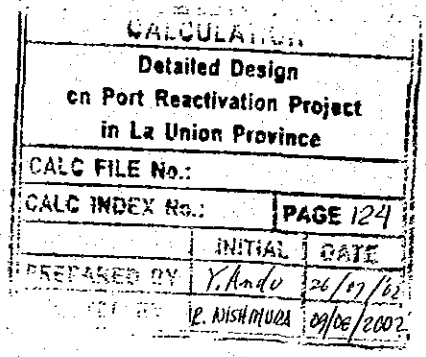

Section force by equivalent uniform load

P = 32.75(kN/m²)

MX = P・LX²・X = 32.75 × 4.700² × X = 723.45 × X

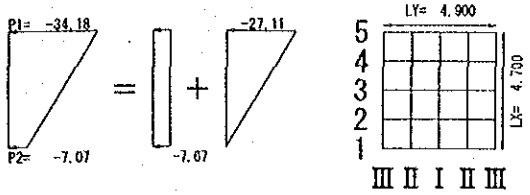
MY = P・LX²・Y = 32.75 × 4.700² × Y = 723.45 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0513 | -37.113 | -0.0086 | -6.222 |
| | 4 | 0.0096 | 6.945 | 0.0116 | 8.392 |
| | 3 | 0.0206 | 14.903 | 0.0206 | 14.903 |
| | 2 | 0.0096 | 6.945 | 0.0116 | 8.392 |
| | 1 | -0.0513 | -37.113 | -0.0086 | -6.222 |
| Ⅱ | 5 | -0.0324 | -23.440 | -0.0054 | -3.907 |
| | 4 | 0.0059 | 4.268 | 0.0059 | 4.268 |
| | 3 | 0.0116 | 8.392 | 0.0096 | 6.945 |
| | 2 | 0.0059 | 4.268 | 0.0059 | 4.268 |
| | 1 | -0.0324 | -23.440 | -0.0054 | -3.907 |
| Ⅲ | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | -3.907 | -0.0324 | -23.440 |
| | 3 | -0.0086 | -6.222 | -0.0513 | -37.113 |
| | 2 | -0.0054 | -3.907 | -0.0324 | -23.440 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |



D Room

Downward load (below)
slab fixed on four sides
P1 = -34.18(kN/m²)
P2 = -7.07(kN/m²)
LX = 4.700(m)
LY = 4.900(m)




The ratio of a length of sides

$$\lambda = \frac{4.700}{4.900} = 0.96$$

The coefficient table of $\lambda$ = 1.00 is used.

(i)Section force by equivalent uniform load

P = -7.07(kN/m²)

MX = P・LX²・X = -7.07 × 4.700² × X = -156.18 × X

MY = P・LX²・Y = -7.07 × 4.700² × Y = -156.18 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0513 | 8.012 | -0.0086 | 1.343 |
| | 4 | 0.0096 | -1.499 | 0.0116 | -1.812 |
| | 3 | 0.0206 | -3.217 | 0.0206 | -3.217 |
| | 2 | 0.0096 | -1.499 | 0.0116 | -1.812 |
| | 1 | -0.0513 | 8.012 | -0.0086 | 1.343 |
| II | 5 | -0.0324 | 5.060 | -0.0054 | 0.843 |
| | 4 | 0.0059 | -0.921 | 0.0059 | -0.921 |
| | 3 | 0.0116 | -1.812 | 0.0096 | -1.499 |
| | 2 | 0.0059 | -0.921 | 0.0059 | -0.921 |
| | 1 | -0.0324 | 5.060 | -0.0054 | 0.843 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0054 | 0.843 | -0.0324 | 5.060 |
| | 3 | -0.0086 | 1.343 | -0.0513 | 8.012 |
| | 2 | -0.0054 | 0.843 | -0.0324 | 5.060 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

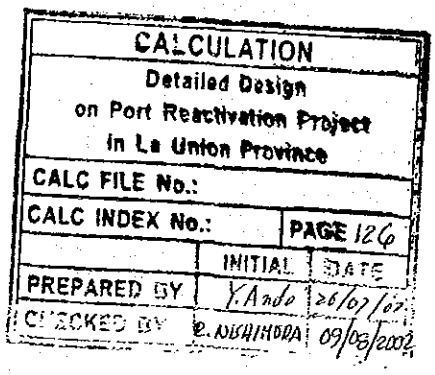
(ii)Section force by triangular distribution load

P = -27.11(kN/m²)

MX = P・LX²・X = -27.11 × 4.700² × X = -598.86 × X

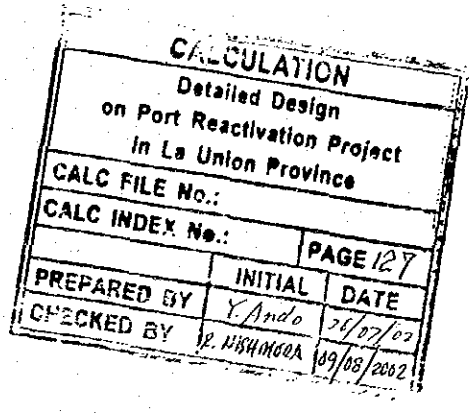
MY = P・LX²・Y = -27.11 × 4.700² × Y = -598.86 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 5 | -0.0334 | 20.002 | -0.0056 | 3.354 |
| | 4 | 0.0080 | -4.791 | 0.0069 | -4.132 |
| | 3 | 0.0103 | -6.168 | 0.0103 | -6.168 |
| | 2 | 0.0015 | -0.898 | 0.0047 | -2.815 |
| | 1 | -0.0179 | 10.720 | -0.0030 | 1.797 |
| II | 5 | -0.0223 | 13.355 | -0.0037 | 2.216 |
| | 4 | 0.0052 | -3.114 | 0.0040 | -2.395 |
| | 3 | 0.0058 | -3.473 | 0.0048 | -2.875 |
| | 2 | 0.0006 | -0.359 | 0.0018 | -1.078 |
| | 1 | -0.0101 | 6.048 | -0.0017 | 1.018 |
| III | 5 | 0.0000 | 0.000 | 0.0000 | 0.000 |
| | 4 | -0.0036 | 2.156 | -0.0208 | 12.456 |
| | 3 | -0.0043 | 2.575 | -0.0257 | 15.391 |
| | 2 | -0.0019 | 1.138 | -0.0116 | 6.947 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |



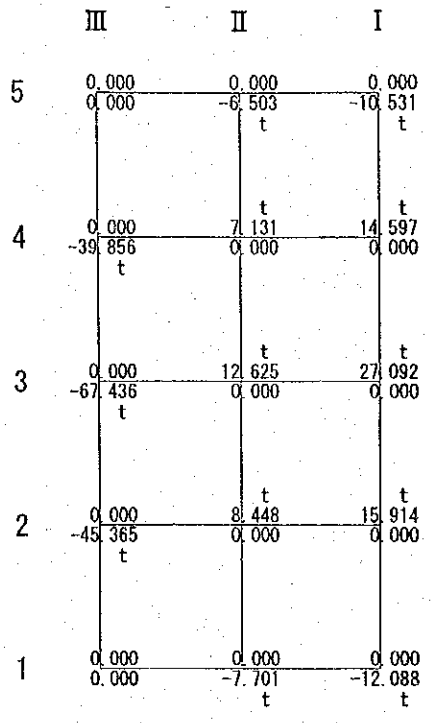
The sum total of (i) and (ii)

| | | MX | MY |
|---|---|---|---|
| I | 5 | 28.014 | 4.697 |
| | 4 | -6.290 | -5.944 |
| | 3 | -9.385 | -9.385 |
| | 2 | -2.397 | -4.627 |
| | 1 | 18.732 | 3.140 |
| II | 5 | 18.415 | 3.059 |
| | 4 | -4.035 | -3.316 |
| | 3 | -5.285 | -4.374 |
| | 2 | -1.280 | -1.999 |
| | 1 | 11.108 | 1.861 |
| III | 5 | 0.000 | 0.000 |
| | 4 | 2.999 | 17.516 |
| | 3 | 3.918 | 23.403 |
| | 2 | 1.981 | 12.007 |
| | 1 | 0.000 | 0.000 |

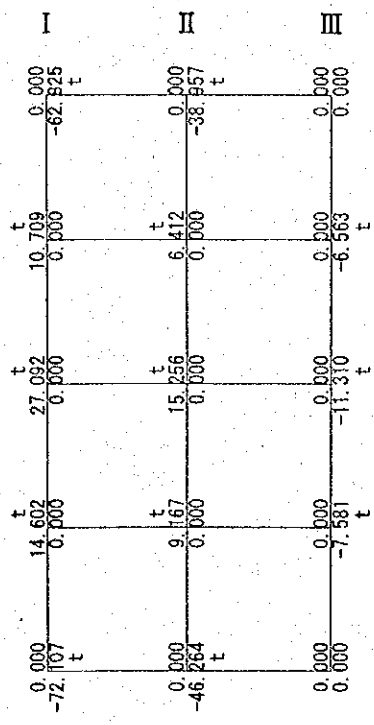


Bottom slab A Room　Colligation of bending moment
Top(left)side : +moment
Bottom(right)side : -moment

MY




MX




f : While afloat
t : Load from a top
b : Load from the bottom

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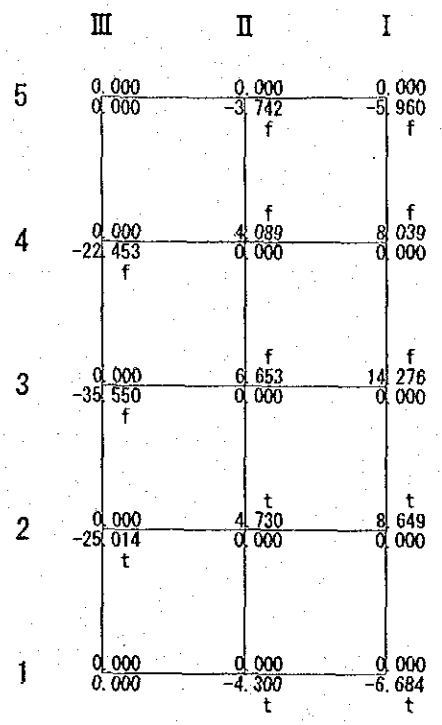
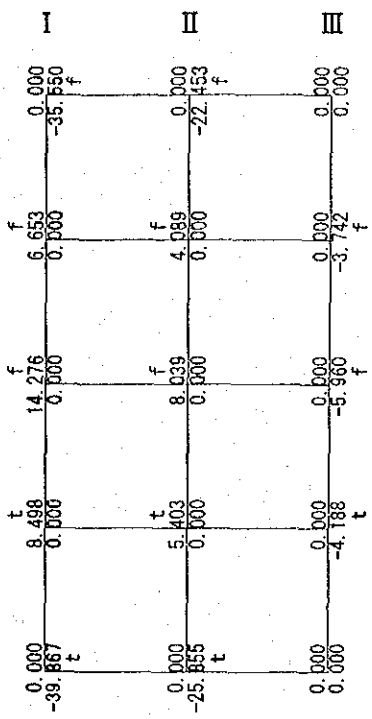
Bottom slab B Room  Colligation of bending moment
Top(left)side : +moment
Bottom(right)side : −moment

MY




MX




f : While afloat
t : Load from a top
b : Load from the bottom

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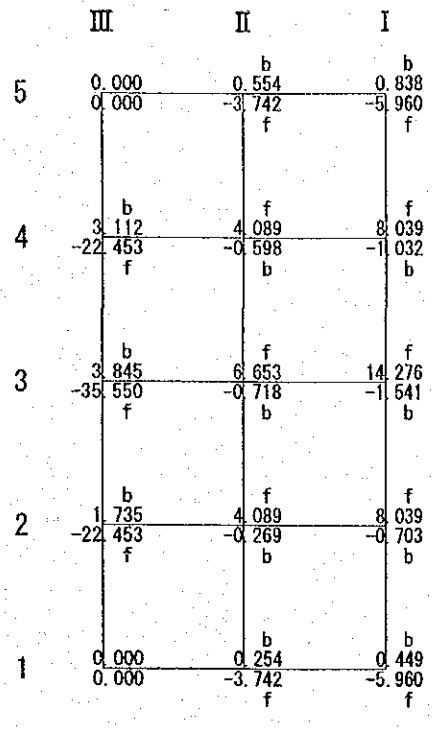
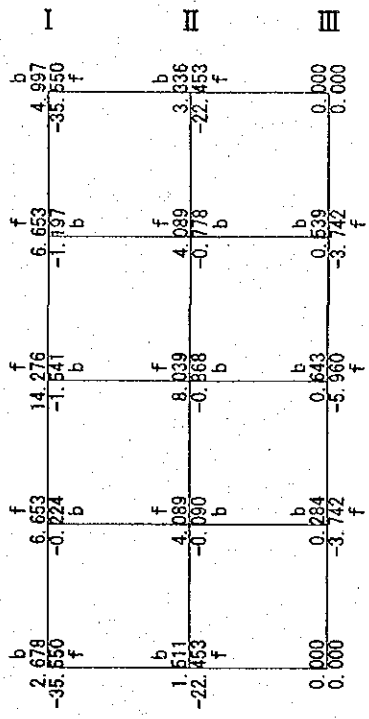
Bottom slab C Room　Colligation of bending moment
Top(left)side : +moment
Bottom(right)side : −moment

MY




MX




f : While afloat
t : Load from a top
b : Load from the bottom

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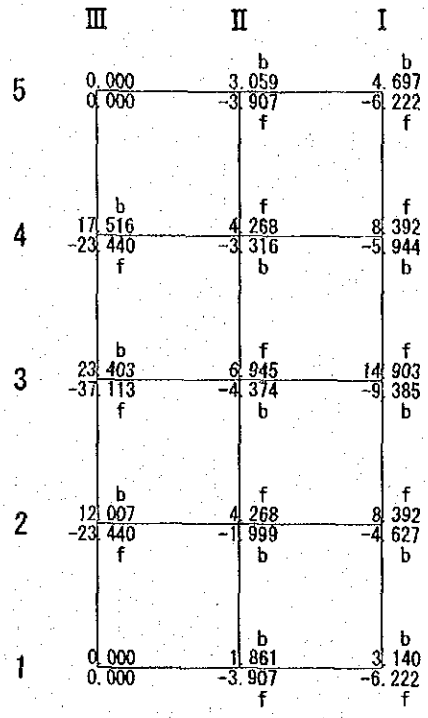
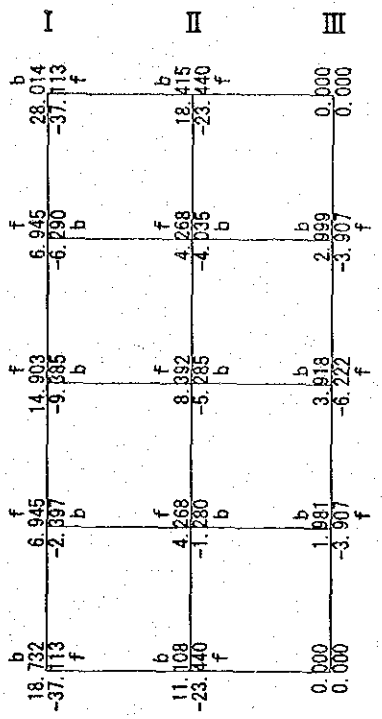
| CHECKED BY | R. NISHIMURA | 09/05/2002 |

Bottom slab D Room　Colligation of bending moment
Top(left)side : +moment
Bottom(right)side : −moment

MY




MX




f : While afloat
t : Load from a top
b : Load from the bottom

CIRCULATION
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| PREPARED BY | Y. Anko | 24/07/02 |
| CHECKED BY | E. MISHIMURA | 09/06/2002 |

Footing

Footing is examined as cantilever beam supported with the wall of before or back.

Bending moment and Shearing force are calculated by the lower formula.

Bending moment

$M = 1/6 \cdot L^2 \cdot (2 \cdot P_1 + P_2)$

Shearing force

$V = 1/2 \cdot L \cdot (P_1 + P_2)$

Let the examination position of shearing force be the position which separated h/2 from the footing end.

Moment , Shearing force

Sea side

Above

M = 1/6 × 1.00² × (2 × 0.00 + 0.00 ) = 0.000 (kN·m/m)

V = 1/2 × 0.65 × ( 0.00 + 0.00 ) = 0.000 (kN/m)

Below

M = 1/6 × 1.00² × (2 × 313.81 + 305.26 ) = 155.480 (kN·m/m)

V = 1/2 × 0.65 × ( 313.81 + 308.25 ) = 202.170 (kN/m)

Land side

Above

M = 1/6 × 1.00² × (2 × 38.98 + 33.99 ) = 18.658 (kN·m/m)

V = 1/2 × 0.65 × ( 38.98 + 35.74 ) = 24.284 (kN/m)

Below

M = 1/6 × 1.00² × (2 × 0.00 + 0.00 ) = 0.000 (kN·m/m)

V = 1/2 × 0.65 × ( 0.00 + 0.00 ) = 0.000 (kN/m)

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| CHECKED BY | [illegible] | 09/08/2002 |

Partition Wall

(1)Equivalent uniform load by the difference of the water level in during installation

(a) Partition wall(perpendicular to levee normal)

slab fixed on three sides and free on one side

P1 = 5.05(kN/m²)

P2 = 5.05(kN/m²)

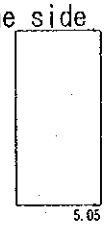
LX = 16.200(m)

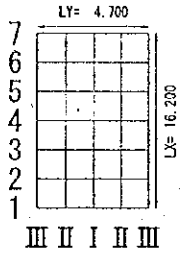
LY = 4.700(m)

The ratio of a length of sides

$$\lambda = \frac{16.200}{4.700} = 3.45$$

The coefficient table of $\lambda$ = 3.50 is used.




Section force by equivalent uniform load

P = 5.05(kN/m²)

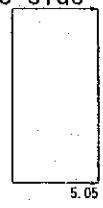
MX = P・LY²・X = 5.05 × 4.700² × X = 111.56 × X

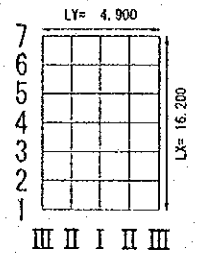
MY = P・LY²・Y = 5.05 × 4.700² × Y = 111.56 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| Ⅰ | 7 | 0.0000 | 0.000 | 0.0432 | 4.819 |
| | 6 | 0.0067 | 0.747 | 0.0415 | 4.630 |
| | 5 | 0.0068 | 0.759 | 0.0416 | 4.641 |
| | 4 | 0.0069 | 0.770 | 0.0417 | 4.652 |
| | 3 | 0.0079 | 0.881 | 0.0417 | 4.652 |
| | 2 | 0.0132 | 1.473 | 0.0343 | 3.826 |
| | 1 | -0.0564 | -6.292 | -0.0094 | -1.049 |
| Ⅱ | 7 | 0.0000 | 0.000 | 0.0105 | 1.171 |
| | 6 | 0.0015 | 0.167 | 0.0104 | 1.160 |
| | 5 | 0.0015 | 0.167 | 0.0104 | 1.160 |
| | 4 | 0.0016 | 0.178 | 0.0104 | 1.160 |
| | 3 | 0.0022 | 0.245 | 0.0107 | 1.194 |
| | 2 | 0.0058 | 0.647 | 0.0105 | 1.171 |
| | 1 | -0.0335 | -3.737 | -0.0056 | -0.625 |
| Ⅲ | 7 | 0.0000 | 0.000 | -0.0877 | -9.783 |
| | 6 | -0.0142 | -1.584 | -0.0851 | -9.493 |
| | 5 | -0.0141 | -1.573 | -0.0847 | -9.449 |
| | 4 | -0.0141 | -1.573 | -0.0846 | -9.438 |
| | 3 | -0.0143 | -1.595 | -0.0855 | -9.538 |
| | 2 | -0.0125 | -1.394 | -0.0750 | -8.367 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

(b) Partition wall(parallel to centerline)

slab fixed on three sides and free on one side




P1 = 5.05 (kN/m²)
P2 = 5.05 (kN/m²)
LX = 16.200 (m)
LY = 4.900 (m)
The ratio of a length of sides

$$\lambda = \frac{16.200}{4.900} = 3.31$$

The coefficient table of $\lambda$ = 3.25 is used.

Section force by equivalent uniform load

P = 5.05 (kN/m²)

MX = P・LY²・X = 5.05 × 4.900² × X = 121.25 × X
MY = P・LY²・Y = 5.05 × 4.900² × Y = 121.25 × Y

| | | X | MX | Y | MY |
|---|---|---|---|---|---|
| I | 7 | 0.0000 | 0.000 | 0.0432 | 5.238 |
| | 6 | 0.0067 | 0.812 | 0.0414 | 5.020 |
| | 5 | 0.0068 | 0.825 | 0.0416 | 5.044 |
| | 4 | 0.0070 | 0.849 | 0.0418 | 5.068 |
| | 3 | 0.0083 | 1.006 | 0.0415 | 5.032 |
| | 2 | 0.0136 | 1.649 | 0.0326 | 3.953 |
| | 1 | -0.0565 | -6.851 | -0.0094 | -1.140 |
| II | 7 | 0.0000 | 0.000 | 0.0105 | 1.273 |
| | 6 | 0.0015 | 0.182 | 0.0104 | 1.261 |
| | 5 | 0.0015 | 0.182 | 0.0104 | 1.261 |
| | 4 | 0.0017 | 0.206 | 0.0105 | 1.273 |
| | 3 | 0.0025 | 0.303 | 0.0107 | 1.297 |
| | 2 | 0.0062 | 0.752 | 0.0103 | 1.249 |
| | 1 | -0.0338 | -4.098 | -0.0056 | -0.679 |
| III | 7 | 0.0000 | 0.000 | -0.0872 | -10.573 |
| | 6 | -0.0141 | -1.710 | -0.0847 | -10.270 |
| | 5 | -0.0141 | -1.710 | -0.0845 | -10.246 |
| | 4 | -0.0141 | -1.710 | -0.0846 | -10.258 |
| | 3 | -0.0142 | -1.722 | -0.0851 | -10.318 |
| | 2 | -0.0120 | -1.455 | -0.0720 | -8.730 |
| | 1 | 0.0000 | 0.000 | 0.0000 | 0.000 |

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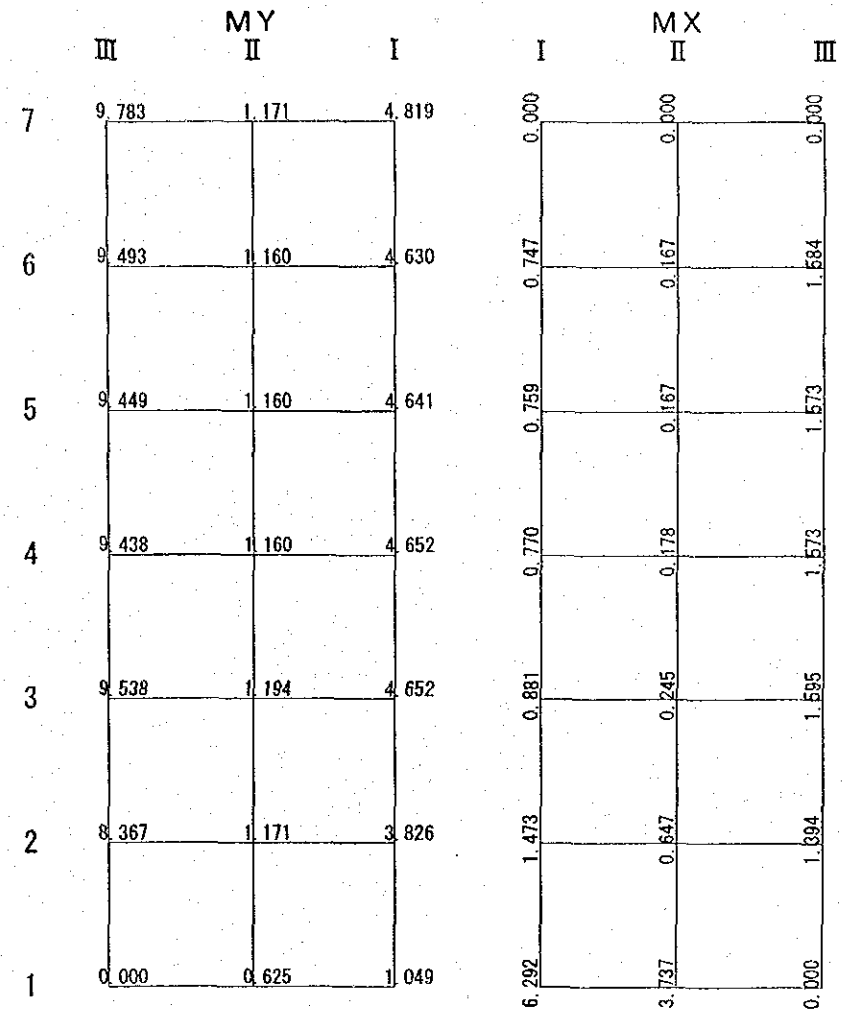
| CHECKED BY | E.AIISII/HUDA | 09/08/2002 |

Partition wall(perpendicular to levee normal) Colligation of bending moment

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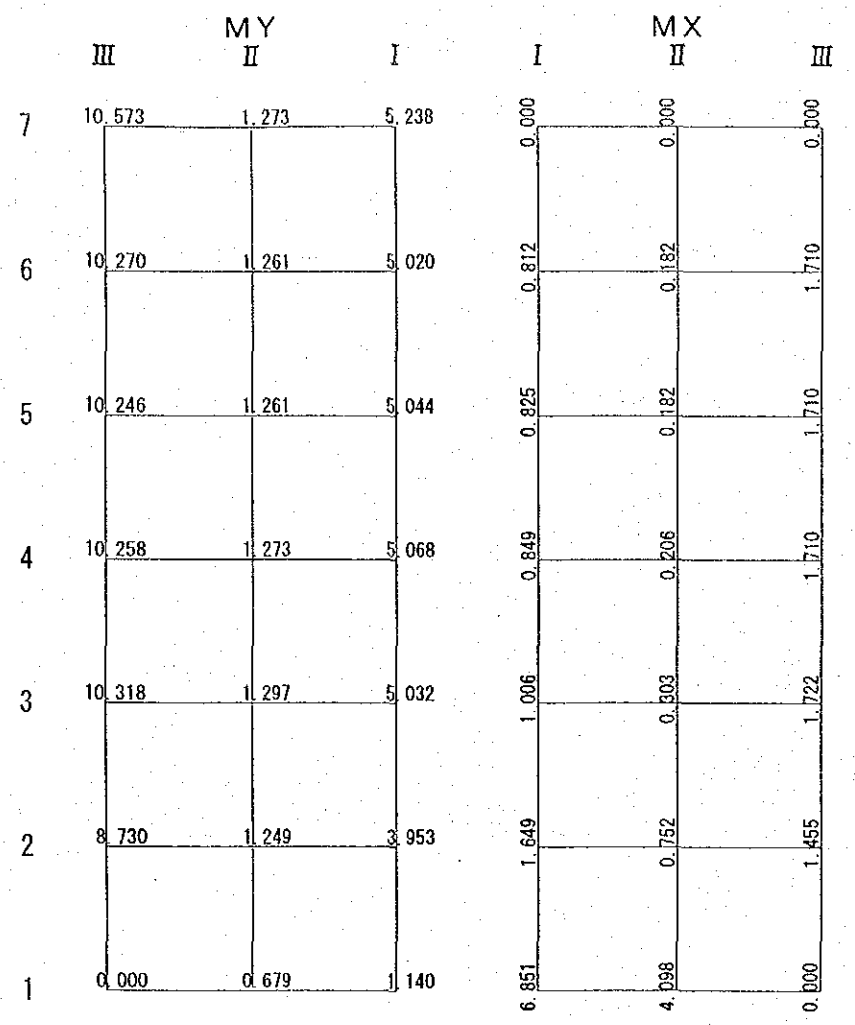
| CHECKED BY | E. NISHIMURA | 09/08/2002 |

Partition wall(parallel to centerline) Colligation of bending moment

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| CHECKED BY | E. OOMHORA | 09/08/2002 |

4. Design of Members

Effective height of each part material

(1) Side wall

It arranges horizontally outside.

h = 40.0(cm)

An inner side cover = 6.0(cm)

An outside cover = 8.0(cm)

Effective height

Outside steel reinforcement

Horizontal d = 31.0( 37.6)(cm)

Perpendicular d = 29.0( 35.6)(cm)

Inner side steel reinforcement

Horizontal d = 33.0(cm)

Perpendicular d = 31.0(cm)

※ ( ) : Effective quantity in consideration of haunch

(2) Bottom slab

The steel reinforcement of the perpendicular to levee normal is arranged outside.

h = 60.0(cm)

An upper cover = 6.0(cm)

A lower cover = 8.0(cm)

Effective height

Lower steel reinforcement

Perpendicular to levee normal d = 51.0( 57.6)(cm)

Parallel to center line d = 49.0( 55.6)(cm)

Upper steel reinforcement

Perpendicular to levee normal d = 53.0(cm)

Parallel to center line d = 51.0(cm)

※ ( ) : Effective quantity in consideration of haunch

(3) Partition wall

One half of partition wall thickness is considered to be effective thickness

d = 10.0( 16.6)(cm)

※ ( ) : Effective quantity in consideration of haunch

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| PREPARED by | Y. Ando | 26/07/02 |
| CHECKED by | R. NISHIMURA | 09/08/2002 |

Ultimate limit state (Under ordinary conditions)
Sidewall (perpendicular to levee normal:seaside)—Horizontal inner side steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 5.043 | 33.0 | 0.56 | D22 | 20.0 | 19.36 | 179.322 | 0.03 | |
| | 6 | 13.261 | 33.0 | 1.48 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| | 5 | 25.961 | 33.0 | 2.91 | D22 | 20.0 | 19.36 | 179.322 | 0.16 | |
| | 4 | 39.035 | 33.0 | 4.40 | D22 | 20.0 | 19.36 | 179.322 | 0.24 | |
| | 3 | 52.109 | 33.0 | 5.91 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 2 | 51.922 | 33.0 | 5.88 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 1 | 21.343 | 33.0 | 2.39 | D22 | 20.0 | 19.36 | 179.322 | 0.13 | |
| II | 7 | 0.560 | 33.0 | 0.06 | D22 | 20.0 | 19.36 | 179.322 | 0.00 | |
| | 6 | 3.175 | 33.0 | 0.35 | D22 | 20.0 | 19.36 | 179.322 | 0.02 | |
| | 5 | 6.350 | 33.0 | 0.71 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 4 | 9.712 | 33.0 | 1.08 | D22 | 20.0 | 19.36 | 179.322 | 0.06 | |
| | 3 | 13.448 | 33.0 | 1.50 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| | 2 | 16.436 | 33.0 | 1.84 | D22 | 20.0 | 19.36 | 179.322 | 0.10 | |
| | 1 | 12.736 | 33.0 | 1.42 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| III | 7 | 170.286 | 33.0 | 20.29 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.50 | ※ |
| | 6 | 169.345 | 33.0 | 20.17 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.49 | ※ |
| | 5 | 174.430 | 33.0 | 20.82 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 4 | 180.209 | 33.0 | 21.57 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 3 | 187.892 | 33.0 | 22.57 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 2 | 168.783 | 33.0 | 20.10 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.49 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.00 | |
| I' | 7 | 5.043 | 33.0 | 0.56 | D22 | 20.0 | 19.36 | 179.322 | 0.03 | |
| | 6 | 13.261 | 33.0 | 1.48 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| | 5 | 25.961 | 33.0 | 2.91 | D22 | 20.0 | 19.36 | 179.322 | 0.16 | |
| | 4 | 39.035 | 33.0 | 4.40 | D22 | 20.0 | 19.36 | 179.322 | 0.24 | |
| | 3 | 52.109 | 33.0 | 5.91 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 2 | 51.922 | 33.0 | 5.88 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 1 | 21.343 | 33.0 | 2.39 | D22 | 20.0 | 19.36 | 179.322 | 0.13 | |
| III' | 7 | 176.868 | 33.0 | 21.14 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.52 | ※ |
| | 6 | 175.860 | 33.0 | 21.01 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 5 | 181.192 | 33.0 | 21.70 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 4 | 187.224 | 33.0 | 22.48 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 3 | 194.578 | 33.0 | 23.45 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.57 | ※ |
| | 2 | 171.419 | 33.0 | 20.43 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.50 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner

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| PREPARED BY | Y. Ando | 26/07/02 |
| R. ASHIMURA | | 09/08/2002 |

Serviceability limit state

Sidewall (perpendicular to levee normal: seaside) —Horizontal inner side steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 2.292 | 33.0 | D22 | 20.0 | 19.36 | 3.932 | 0.0007 | |
| | 6 | 6.027 | 33.0 | D22 | 20.0 | 19.36 | 10.340 | 0.0019 | 0.0040×6.0 |
| | 5 | 11.800 | 33.0 | D22 | 20.0 | 19.36 | 20.245 | 0.0037 | =0.0240 |
| | 4 | 17.742 | 33.0 | D22 | 20.0 | 19.36 | 30.440 | 0.0055 | |
| | 3 | 23.685 | 33.0 | D22 | 20.0 | 19.36 | 40.636 | 0.0074 | |
| | 2 | 23.600 | 33.0 | D22 | 20.0 | 19.36 | 40.490 | 0.0074 | |
| | 1 | 19.403 | 33.0 | D22 | 20.0 | 19.36 | 33.289 | 0.0061 | |
| II | 7 | 0.255 | 33.0 | D22 | 20.0 | 19.36 | 0.438 | 0.0001 | |
| | 6 | 1.443 | 33.0 | D22 | 20.0 | 19.36 | 2.476 | 0.0005 | 0.0040×6.0 |
| | 5 | 2.886 | 33.0 | D22 | 20.0 | 19.36 | 4.951 | 0.0009 | =0.0240 |
| | 4 | 4.414 | 33.0 | D22 | 20.0 | 19.36 | 7.573 | 0.0014 | |
| | 3 | 6.112 | 33.0 | D22 | 20.0 | 19.36 | 10.486 | 0.0019 | |
| | 2 | 7.470 | 33.0 | D22 | 20.0 | 19.36 | 12.816 | 0.0023 | |
| | 1 | 11.578 | 33.0 | D22 | 20.0 | 19.36 | 19.864 | 0.0036 | |
| III | 7 | 154.800 | 33.0 | D22, D25 | 10.0 | 44.69 | 119.713 | 0.0176 | |
| | 6 | 153.947 | 33.0 | D22, D25 | 10.0 | 44.69 | 119.053 | 0.0175 | 0.0040×6.0 |
| | 5 | 158.572 | 33.0 | D22, D25 | 10.0 | 44.69 | 122.630 | 0.0181 | =0.0240 |
| | 4 | 163.828 | 33.0 | D22, D25 | 10.0 | 44.69 | 126.695 | 0.0187 | |
| | 3 | 170.814 | 33.0 | D22, D25 | 10.0 | 44.69 | 132.097 | 0.0194 | |
| | 2 | 153.443 | 33.0 | D22, D25 | 10.0 | 44.69 | 118.664 | 0.0175 | |
| | 1 | 0.000 | 33.0 | D22, D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |
| I' | 7 | 2.292 | 33.0 | D22 | 20.0 | 19.36 | 3.932 | 0.0007 | |
| | 6 | 6.027 | 33.0 | D22 | 20.0 | 19.36 | 10.340 | 0.0019 | 0.0040×6.0 |
| | 5 | 11.800 | 33.0 | D22 | 20.0 | 19.36 | 20.245 | 0.0037 | =0.0240 |
| | 4 | 17.742 | 33.0 | D22 | 20.0 | 19.36 | 30.440 | 0.0055 | |
| | 3 | 23.685 | 33.0 | D22 | 20.0 | 19.36 | 40.636 | 0.0074 | |
| | 2 | 23.600 | 33.0 | D22 | 20.0 | 19.36 | 40.490 | 0.0074 | |
| | 1 | 19.403 | 33.0 | D22 | 20.0 | 19.36 | 33.289 | 0.0061 | |
| III' | 7 | 160.787 | 33.0 | D22, D25 | 10.0 | 44.69 | 124.343 | 0.0183 | |
| | 6 | 159.873 | 33.0 | D22, D25 | 10.0 | 44.69 | 123.636 | 0.0182 | 0.0040×6.0 |
| | 5 | 164.722 | 33.0 | D22, D25 | 10.0 | 44.69 | 127.386 | 0.0188 | =0.0240 |
| | 4 | 170.207 | 33.0 | D22, D25 | 10.0 | 44.69 | 131.628 | 0.0194 | |
| | 3 | 176.893 | 33.0 | D22, D25 | 10.0 | 44.69 | 136.798 | 0.0201 | |
| | 2 | 155.840 | 33.0 | D22, D25 | 10.0 | 44.69 | 120.517 | 0.0177 | |
| | 1 | 0.000 | 33.0 | D22, D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |

Notes) I ～III : Before correction Slab of a middle part

Notes) I' ～III' : After correction Slab of side wall corner

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| PREPARED BY | Y. Ando | 26/07/02 |
| | R. MISHIMURA | 09/06/2002 |

Ultimate limit state (Under ordinary conditions)
Sidewall (perpendicular to levee normal: seaside) — Horizontal outside steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 84.852 | 31.0 | 10.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.43 | ※ |
| | 6 | 83.195 | 31.0 | 10.21 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.42 | ※ |
| | 5 | 85.927 | 31.0 | 10.56 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.44 | ※ |
| | 4 | 88.734 | 31.0 | 10.92 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.45 | ※ |
| | 3 | 91.348 | 31.0 | 11.25 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.46 | ※ |
| | 2 | 76.948 | 31.0 | 9.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.39 | ※ |
| | 1 | 15.502 | 37.6 | 1.52 | D22, D13 | 10.0 | 25.69 | 268.072 | 0.06 | |
| II | 7 | 20.491 | 31.0 | 2.44 | D22 | 20.0 | 19.36 | 167.704 | 0.13 | |
| | 6 | 20.820 | 31.0 | 2.48 | D22 | 20.0 | 19.36 | 167.704 | 0.14 | |
| | 5 | 21.454 | 31.0 | 2.56 | D22 | 20.0 | 19.36 | 167.704 | 0.14 | |
| | 4 | 22.126 | 31.0 | 2.64 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 3 | 23.455 | 31.0 | 2.80 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 2 | 23.664 | 31.0 | 2.83 | D22 | 20.0 | 19.36 | 167.704 | 0.16 | |
| | 1 | 9.339 | 37.6 | 0.91 | D22 | 20.0 | 19.36 | 206.044 | 0.05 | |
| III | 7 | 0.374 | 37.6 | 0.04 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |
| | 6 | 20.918 | 37.6 | 2.05 | D22 | 20.0 | 19.36 | 206.044 | 0.11 | |
| | 5 | 50.241 | 37.6 | 4.97 | D22 | 20.0 | 19.36 | 206.044 | 0.27 | |
| | 4 | 80.125 | 37.6 | 8.00 | D22 | 20.0 | 19.36 | 206.044 | 0.43 | |
| | 3 | 109.821 | 37.6 | 11.07 | D22 | 20.0 | 19.36 | 206.044 | 0.59 | |
| | 2 | 116.172 | 37.6 | 11.73 | D22 | 20.0 | 19.36 | 206.044 | 0.62 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |
| I' | 7 | 84.852 | 31.0 | 10.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.43 | ※ |
| | 6 | 83.195 | 31.0 | 10.21 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.42 | ※ |
| | 5 | 85.927 | 31.0 | 10.56 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.44 | ※ |
| | 4 | 88.734 | 31.0 | 10.92 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.45 | ※ |
| | 3 | 91.348 | 31.0 | 11.25 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.46 | ※ |
| | 2 | 76.948 | 31.0 | 9.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.39 | ※ |
| | 1 | 15.502 | 37.6 | 1.52 | D22, D13 | 10.0 | 25.69 | 268.072 | 0.06 | |
| III' | 7 | 1.012 | 37.6 | 0.10 | D22 | 20.0 | 19.36 | 206.044 | 0.01 | |
| | 6 | 22.260 | 37.6 | 2.18 | D22 | 20.0 | 19.36 | 206.044 | 0.12 | |
| | 5 | 52.675 | 37.6 | 5.22 | D22 | 20.0 | 19.36 | 206.044 | 0.28 | |
| | 4 | 83.573 | 37.6 | 8.35 | D22 | 20.0 | 19.36 | 206.044 | 0.45 | |
| | 3 | 114.172 | 37.6 | 11.52 | D22 | 20.0 | 19.36 | 206.044 | 0.61 | |
| | 2 | 118.423 | 37.6 | 11.97 | D22 | 20.0 | 19.36 | 206.044 | 0.63 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner

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CALC INDEX No.: PAGE 140
INITIAL | DATE
PREPARED BY: Y. Ando 24/07/02
V. NISHIMURA 01/08/2002

Serviceability limit state

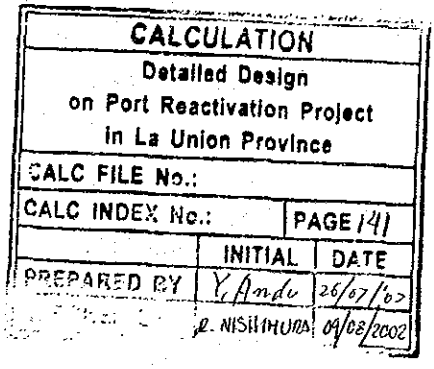
Sidewall (perpendicular to levee normal: seaside) — Horizontal outside steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W (cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 77.136 | 31.0 | D22, D13 | 10.0 | 25.69 | 107.773 | 0.0205 | |
| | 6 | 75.631 | 31.0 | D22, D13 | 10.0 | 25.69 | 105.671 | 0.0201 | 0.0035×8.0 |
| | 5 | 78.115 | 31.0 | D22, D13 | 10.0 | 25.69 | 109.141 | 0.0208 | =0.0280 |
| | 4 | 80.668 | 31.0 | D22, D13 | 10.0 | 25.69 | 112.708 | 0.0215 | |
| | 3 | 83.045 | 31.0 | D22, D13 | 10.0 | 25.69 | 116.029 | 0.0221 | |
| | 2 | 69.955 | 31.0 | D22, D13 | 10.0 | 25.69 | 97.740 | 0.0186 | |
| | 1 | 7.046 | 37.6 | D22, D13 | 10.0 | 25.69 | 8.047 | 0.0015 | |
| II | 7 | 18.627 | 31.0 | D22 | 20.0 | 19.36 | 34.108 | 0.0076 | |
| | 6 | 18.926 | 31.0 | D22 | 20.0 | 19.36 | 34.656 | 0.0077 | 0.0035×8.0 |
| | 5 | 19.503 | 31.0 | D22 | 20.0 | 19.36 | 35.712 | 0.0079 | =0.0280 |
| | 4 | 20.115 | 31.0 | D22 | 20.0 | 19.36 | 36.833 | 0.0082 | |
| | 3 | 21.323 | 31.0 | D22 | 20.0 | 19.36 | 39.045 | 0.0087 | |
| | 2 | 21.513 | 31.0 | D22 | 20.0 | 19.36 | 39.393 | 0.0088 | |
| | 1 | 4.245 | 37.6 | D22 | 20.0 | 19.36 | 6.359 | 0.0014 | |
| III | 7 | 0.170 | 37.6 | D22 | 20.0 | 19.36 | 0.255 | 0.0001 | |
| | 6 | 9.508 | 37.6 | D22 | 20.0 | 19.36 | 14.243 | 0.0032 | 0.0035×8.0 |
| | 5 | 22.836 | 37.6 | D22 | 20.0 | 19.36 | 34.208 | 0.0076 | =0.0280 |
| | 4 | 36.419 | 37.6 | D22 | 20.0 | 19.36 | 54.555 | 0.0121 | |
| | 3 | 49.916 | 37.6 | D22 | 20.0 | 19.36 | 74.773 | 0.0166 | |
| | 2 | 52.803 | 37.6 | D22 | 20.0 | 19.36 | 79.098 | 0.0176 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |
| I' | 7 | 77.136 | 31.0 | D22, D13 | 10.0 | 25.69 | 107.773 | 0.0205 | |
| | 6 | 75.631 | 31.0 | D22, D13 | 10.0 | 25.69 | 105.671 | 0.0201 | 0.0035×8.0 |
| | 5 | 78.115 | 31.0 | D22, D13 | 10.0 | 25.69 | 109.141 | 0.0208 | =0.0280 |
| | 4 | 80.668 | 31.0 | D22, D13 | 10.0 | 25.69 | 112.708 | 0.0215 | |
| | 3 | 83.045 | 31.0 | D22, D13 | 10.0 | 25.69 | 116.029 | 0.0221 | |
| | 2 | 69.955 | 31.0 | D22, D13 | 10.0 | 25.69 | 97.740 | 0.0186 | |
| | 1 | 7.046 | 37.6 | D22, D13 | 10.0 | 25.69 | 8.047 | 0.0015 | |
| III' | 7 | 0.460 | 37.6 | D22 | 20.0 | 19.36 | 0.689 | 0.0002 | |
| | 6 | 10.117 | 37.6 | D22 | 20.0 | 19.36 | 15.155 | 0.0034 | 0.0035×8.0 |
| | 5 | 23.942 | 37.6 | D22 | 20.0 | 19.36 | 35.864 | 0.0080 | =0.0280 |
| | 4 | 37.986 | 37.6 | D22 | 20.0 | 19.36 | 56.902 | 0.0126 | |
| | 3 | 51.894 | 37.6 | D22 | 20.0 | 19.36 | 77.736 | 0.0173 | |
| | 2 | 53.826 | 37.6 | D22 | 20.0 | 19.36 | 80.630 | 0.0179 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |

Notes) I ～III : Before correction Slab of a middle part

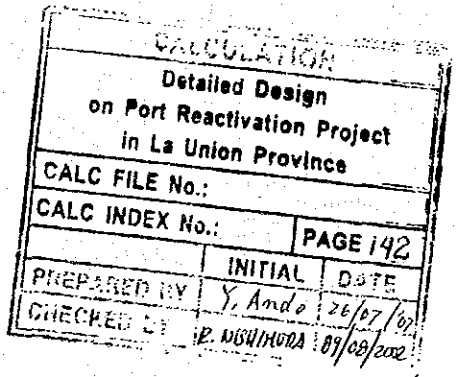
Notes) I' ～III' : After correction Slab of side wall corner



Ultimate limit state (Under ordinary conditions)
Sidewall(perpendicular to levee normal:seaside)—Perpendicular inner side steel reinforcement
B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 1.681 | 31.0 | 0.20 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 5 | 4.109 | 31.0 | 0.49 | D16 | 40.0 | 4.97 | 45.410 | 0.10 | |
| | 4 | 6.537 | 31.0 | 0.78 | D16 | 40.0 | 4.97 | 45.410 | 0.16 | |
| | 3 | 10.272 | 31.0 | 1.22 | D16 | 40.0 | 4.97 | 45.410 | 0.25 | |
| | 2 | 22.226 | 31.0 | 2.65 | D16 | 40.0 | 4.97 | 45.410 | 0.54 | |
| | 1 | 128.129 | 31.0 | 16.07 | D16,D25 | 10.0 | 35.27 | 287.063 | 0.49 | ※ |
| II | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 0.560 | 31.0 | 0.07 | D16 | 40.0 | 4.97 | 45.410 | 0.01 | |
| | 5 | 0.934 | 31.0 | 0.11 | D16 | 40.0 | 4.97 | 45.410 | 0.02 | |
| | 4 | 1.494 | 31.0 | 0.18 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 3 | 2.802 | 31.0 | 0.33 | D16 | 40.0 | 4.97 | 45.410 | 0.07 | |
| | 2 | 10.086 | 31.0 | 1.20 | D16 | 40.0 | 4.97 | 45.410 | 0.24 | |
| | 1 | 76.330 | 31.0 | 9.34 | D16,D16 | 10.0 | 19.86 | 171.711 | 0.49 | ※ |
| III | 7 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |
| | 6 | 28.269 | 31.0 | 3.38 | D16 | 20.0 | 9.93 | 89.107 | 0.35 | |
| | 5 | 29.046 | 31.0 | 3.48 | D16 | 20.0 | 9.93 | 89.107 | 0.36 | |
| | 4 | 30.054 | 31.0 | 3.60 | D16 | 20.0 | 9.93 | 89.107 | 0.37 | |
| | 3 | 31.413 | 31.0 | 3.77 | D16 | 20.0 | 9.93 | 89.107 | 0.39 | |
| | 2 | 28.143 | 31.0 | 3.37 | D16 | 20.0 | 9.93 | 89.107 | 0.35 | |
| | 1 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |

※ It determines from serviceability limit state.



Serviceability limit state

Sidewall (perpendicular to levee normal: seaside) —Perpendicular inner side steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As (cm²) | σse (N/mm²) | Crack width W(cm) | Permission crack width $W_{all}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.764 | 31.0 | D16 | 40.0 | 4.97 | 5.216 | 0.0015 | 0.0040×8.0 |
| | 5 | 1.868 | 31.0 | D16 | 40.0 | 4.97 | 12.752 | 0.0038 | =0.0320 |
| | 4 | 2.971 | 31.0 | D16 | 40.0 | 4.97 | 20.282 | 0.0060 | |
| | 3 | 4.669 | 31.0 | D16 | 40.0 | 4.97 | 31.874 | 0.0094 | |
| | 2 | 10.102 | 31.0 | D16 | 40.0 | 4.97 | 68.963 | 0.0203 | |
| | 1 | 116.484 | 31.0 | D16, D25 | 10.0 | 35.27 | 120.393 | 0.0228 | |
| II | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.255 | 31.0 | D16 | 40.0 | 4.97 | 1.741 | 0.0005 | 0.0040×8.0 |
| | 5 | 0.424 | 31.0 | D16 | 40.0 | 4.97 | 2.895 | 0.0009 | =0.0320 |
| | 4 | 0.679 | 31.0 | D16 | 40.0 | 4.97 | 4.635 | 0.0014 | |
| | 3 | 1.273 | 31.0 | D16 | 40.0 | 4.97 | 8.690 | 0.0026 | |
| | 2 | 4.584 | 31.0 | D16 | 40.0 | 4.97 | 31.294 | 0.0092 | |
| | 1 | 69.393 | 31.0 | D16, D16 | 10.0 | 19.86 | 124.000 | 0.0235 | |
| III | 7 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |
| | 6 | 25.698 | 31.0 | D16 | 20.0 | 9.93 | 89.512 | 0.0201 | 0.0040×8.0 |
| | 5 | 26.405 | 31.0 | D16 | 20.0 | 9.93 | 91.974 | 0.0206 | =0.0320 |
| | 4 | 27.322 | 31.0 | D16 | 20.0 | 9.93 | 95.168 | 0.0214 | |
| | 3 | 28.557 | 31.0 | D16 | 20.0 | 9.93 | 99.470 | 0.0223 | |
| | 2 | 25.585 | 31.0 | D16 | 20.0 | 9.93 | 89.118 | 0.0200 | |
| | 1 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |

| CALCULATION | | |
|---|---|---|
| Detailed Design on Port Reactivation Project in La Union Province | | |
| CALC FILE No.: | | |
| CALC INDEX No.: | | PAGE 143 |
| | INITIAL | DATE |
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | R. NISHIMURA | 09/08/2002 |

Ultimate limit state (Under ordinary conditions)
Sidewall (perpendicular to levee normal:seaside)—Perpendicular outside steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn ($cm^2$) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | Mud (kN·m) | $\gamma i \cdot Md/Mud$ |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 29.0 | 0.00 | D13 | 20.0 | 6.34 | 53.833 | 0.00 |
| | 6 | 13.340 | 29.0 | 1.70 | D13 | 20.0 | 6.34 | 53.833 | 0.27 |
| | 5 | 14.019 | 29.0 | 1.78 | D13 | 20.0 | 6.34 | 53.833 | 0.29 |
| | 4 | 14.699 | 29.0 | 1.87 | D13 | 20.0 | 6.34 | 53.833 | 0.30 |
| | 3 | 17.386 | 29.0 | 2.22 | D13 | 20.0 | 6.34 | 53.833 | 0.36 |
| | 2 | 30.062 | 29.0 | 3.86 | D13, D13 | 10.0 | 12.67 | 104.945 | 0.32 |
| | 1 | 93.386 | 35.6 | 9.92 | D13, D13 | 10.0 | 12.67 | 130.031 | 0.79 |
| II | 7 | 0.000 | 29.0 | 0.00 | D13 | 40.0 | 3.17 | 27.249 | 0.00 |
| | 6 | 3.023 | 29.0 | 0.38 | D13 | 40.0 | 3.17 | 27.249 | 0.12 |
| | 5 | 3.098 | 29.0 | 0.39 | D13 | 40.0 | 3.17 | 27.249 | 0.13 |
| | 4 | 3.404 | 29.0 | 0.43 | D13 | 40.0 | 3.17 | 27.249 | 0.14 |
| | 3 | 4.830 | 29.0 | 0.61 | D13 | 40.0 | 3.17 | 27.249 | 0.19 |
| | 2 | 13.273 | 29.0 | 1.69 | D13 | 20.0 | 6.34 | 53.833 | 0.27 |
| | 1 | 56.592 | 35.6 | 5.94 | D13, D13 | 10.0 | 12.67 | 130.031 | 0.48 |
| III | 7 | 0.000 | 35.6 | 0.00 | D13 | 40.0 | 3.17 | 33.525 | 0.00 |
| | 6 | 3.549 | 35.6 | 0.37 | D13 | 40.0 | 3.17 | 33.525 | 0.12 |
| | 5 | 8.405 | 35.6 | 0.87 | D13 | 40.0 | 3.17 | 33.525 | 0.28 |
| | 4 | 13.448 | 35.6 | 1.39 | D13 | 40.0 | 3.17 | 33.525 | 0.44 |
| | 3 | 18.304 | 35.6 | 1.90 | D13 | 40.0 | 3.17 | 33.525 | 0.60 |
| | 2 | 19.424 | 35.6 | 2.01 | D13 | 40.0 | 3.17 | 33.525 | 0.64 |
| | 1 | 0.000 | 35.6 | 0.00 | D13 | 40.0 | 3.17 | 33.525 | 0.00 |

Serviceability limit state

Sidewall(perpendicular to levee normal:seaside)—Perpendicular outside steel reinforcement

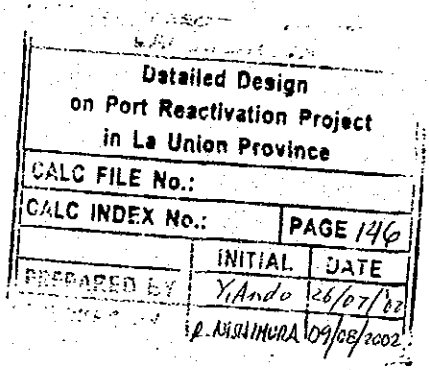
B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | $\sigma se$ ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 29.0 | D13 | 20.0 | 6.34 | 0.000 | 0.0000 | |
| | 6 | 12.127 | 29.0 | D13 | 20.0 | 6.34 | 69.932 | 0.0186 | 0.0035×10.0 |
| | 5 | 12.744 | 29.0 | D13 | 20.0 | 6.34 | 73.490 | 0.0195 | =0.0350 |
| | 4 | 13.362 | 29.0 | D13 | 20.0 | 6.34 | 77.054 | 0.0205 | |
| | 3 | 15.805 | 29.0 | D13 | 20.0 | 6.34 | 91.142 | 0.0242 | |
| | 2 | 27.329 | 29.0 | D13,D13 | 10.0 | 12.67 | 80.606 | 0.0186 | |
| | 1 | 42.446 | 35.6 | D13,D13 | 10.0 | 12.67 | 101.256 | 0.0233 | |
| II | 7 | 0.000 | 29.0 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |
| | 6 | 2.748 | 29.0 | D13 | 40.0 | 3.17 | 31.177 | 0.0105 | 0.0035×10.0 |
| | 5 | 2.816 | 29.0 | D13 | 40.0 | 3.17 | 31.949 | 0.0107 | =0.0350 |
| | 4 | 3.095 | 29.0 | D13 | 40.0 | 3.17 | 35.114 | 0.0118 | |
| | 3 | 4.391 | 29.0 | D13 | 40.0 | 3.17 | 49.818 | 0.0167 | |
| | 2 | 12.066 | 29.0 | D13 | 20.0 | 6.34 | 69.580 | 0.0185 | |
| | 1 | 25.722 | 35.6 | D13,D13 | 10.0 | 12.67 | 61.361 | 0.0141 | |
| III | 7 | 0.000 | 35.6 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |
| | 6 | 1.613 | 35.6 | D13 | 40.0 | 3.17 | 14.849 | 0.0050 | 0.0035×10.0 |
| | 5 | 3.820 | 35.6 | D13 | 40.0 | 3.17 | 35.167 | 0.0118 | =0.0350 |
| | 4 | 6.112 | 35.6 | D13 | 40.0 | 3.17 | 56.268 | 0.0189 | |
| | 3 | 8.319 | 35.6 | D13 | 40.0 | 3.17 | 76.586 | 0.0257 | |
| | 2 | 8.829 | 35.6 | D13 | 40.0 | 3.17 | 81.281 | 0.0273 | |
| | 1 | 0.000 | 35.6 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |

Ultimate limit state (Under ordinary conditions)
Sidewall (perpendicular to levee normal: landside) --Horizontal inner side steel reinforcement
B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 5.043 | 33.0 | 0.56 | D22 | 20.0 | 19.36 | 179.322 | 0.03 | |
| | 6 | 13.261 | 33.0 | 1.48 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| | 5 | 25.961 | 33.0 | 2.91 | D22 | 20.0 | 19.36 | 179.322 | 0.16 | |
| | 4 | 39.035 | 33.0 | 4.40 | D22 | 20.0 | 19.36 | 179.322 | 0.24 | |
| | 3 | 52.109 | 33.0 | 5.91 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 2 | 51.922 | 33.0 | 5.88 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 1 | 21.343 | 33.0 | 2.39 | D22 | 20.0 | 19.36 | 179.322 | 0.13 | |
| II | 7 | 0.560 | 33.0 | 0.06 | D22 | 20.0 | 19.36 | 179.322 | 0.00 | |
| | 6 | 3.175 | 33.0 | 0.35 | D22 | 20.0 | 19.36 | 179.322 | 0.02 | |
| | 5 | 6.350 | 33.0 | 0.71 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 4 | 9.712 | 33.0 | 1.08 | D22 | 20.0 | 19.36 | 179.322 | 0.06 | |
| | 3 | 13.448 | 33.0 | 1.50 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| | 2 | 16.436 | 33.0 | 1.84 | D22 | 20.0 | 19.36 | 179.322 | 0.10 | |
| | 1 | 12.736 | 33.0 | 1.42 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| III | 7 | 170.286 | 33.0 | 20.29 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.50 | ※ |
| | 6 | 169.345 | 33.0 | 20.17 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.49 | ※ |
| | 5 | 174.430 | 33.0 | 20.82 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 4 | 180.209 | 33.0 | 21.57 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 3 | 187.892 | 33.0 | 22.57 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 2 | 168.783 | 33.0 | 20.10 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.49 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.00 | |
| I' | 7 | 5.043 | 33.0 | 0.56 | D22 | 20.0 | 19.36 | 179.322 | 0.03 | |
| | 6 | 13.261 | 33.0 | 1.48 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| | 5 | 25.961 | 33.0 | 2.91 | D22 | 20.0 | 19.36 | 179.322 | 0.16 | |
| | 4 | 39.035 | 33.0 | 4.40 | D22 | 20.0 | 19.36 | 179.322 | 0.24 | |
| | 3 | 52.109 | 33.0 | 5.91 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 2 | 51.922 | 33.0 | 5.88 | D22 | 20.0 | 19.36 | 179.322 | 0.32 | |
| | 1 | 21.343 | 33.0 | 2.39 | D22 | 20.0 | 19.36 | 179.322 | 0.13 | |
| III' | 7 | 176.868 | 33.0 | 21.14 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.52 | ※ |
| | 6 | 175.860 | 33.0 | 21.01 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 5 | 181.192 | 33.0 | 21.70 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 4 | 187.224 | 33.0 | 22.48 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 3 | 194.578 | 33.0 | 23.45 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.57 | ※ |
| | 2 | 171.419 | 33.0 | 20.43 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.50 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22, D25 | 10.0 | 44.69 | 376.716 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner



Serviceability limit state

Sidewall (perpendicular to levee normal: landside) --Horizontal inner side steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 2.292 | 33.0 | D22 | 20.0 | 19.36 | 3.932 | 0.0007 | |
| | 6 | 6.027 | 33.0 | D22 | 20.0 | 19.36 | 10.340 | 0.0019 | 0.0040×6.0 |
| | 5 | 11.800 | 33.0 | D22 | 20.0 | 19.36 | 20.245 | 0.0037 | =0.0240 |
| | 4 | 17.742 | 33.0 | D22 | 20.0 | 19.36 | 30.440 | 0.0055 | |
| | 3 | 23.685 | 33.0 | D22 | 20.0 | 19.36 | 40.636 | 0.0074 | |
| | 2 | 23.600 | 33.0 | D22 | 20.0 | 19.36 | 40.490 | 0.0074 | |
| | 1 | 19.403 | 33.0 | D22 | 20.0 | 19.36 | 33.289 | 0.0061 | |
| II | 7 | 0.255 | 33.0 | D22 | 20.0 | 19.36 | 0.438 | 0.0001 | |
| | 6 | 1.443 | 33.0 | D22 | 20.0 | 19.36 | 2.476 | 0.0005 | 0.0040×6.0 |
| | 5 | 2.886 | 33.0 | D22 | 20.0 | 19.36 | 4.951 | 0.0009 | =0.0240 |
| | 4 | 4.414 | 33.0 | D22 | 20.0 | 19.36 | 7.573 | 0.0014 | |
| | 3 | 6.112 | 33.0 | D22 | 20.0 | 19.36 | 10.486 | 0.0019 | |
| | 2 | 7.470 | 33.0 | D22 | 20.0 | 19.36 | 12.816 | 0.0023 | |
| | 1 | 11.578 | 33.0 | D22 | 20.0 | 19.36 | 19.864 | 0.0036 | |
| III | 7 | 154.800 | 33.0 | D22, D25 | 10.0 | 44.69 | 119.713 | 0.0176 | |
| | 6 | 153.947 | 33.0 | D22, D25 | 10.0 | 44.69 | 119.053 | 0.0175 | 0.0040×6.0 |
| | 5 | 158.572 | 33.0 | D22, D25 | 10.0 | 44.69 | 122.630 | 0.0181 | =0.0240 |
| | 4 | 163.828 | 33.0 | D22, D25 | 10.0 | 44.69 | 126.695 | 0.0187 | |
| | 3 | 170.814 | 33.0 | D22, D25 | 10.0 | 44.69 | 132.097 | 0.0194 | |
| | 2 | 153.443 | 33.0 | D22, D25 | 10.0 | 44.69 | 118.664 | 0.0175 | |
| | 1 | 0.000 | 33.0 | D22, D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |
| I' | 7 | 2.292 | 33.0 | D22 | 20.0 | 19.36 | 3.932 | 0.0007 | |
| | 6 | 6.027 | 33.0 | D22 | 20.0 | 19.36 | 10.340 | 0.0019 | 0.0040×6.0 |
| | 5 | 11.800 | 33.0 | D22 | 20.0 | 19.36 | 20.245 | 0.0037 | =0.0240 |
| | 4 | 17.742 | 33.0 | D22 | 20.0 | 19.36 | 30.440 | 0.0055 | |
| | 3 | 23.685 | 33.0 | D22 | 20.0 | 19.36 | 40.636 | 0.0074 | |
| | 2 | 23.600 | 33.0 | D22 | 20.0 | 19.36 | 40.490 | 0.0074 | |
| | 1 | 19.403 | 33.0 | D22 | 20.0 | 19.36 | 33.289 | 0.0061 | |
| III' | 7 | 160.787 | 33.0 | D22, D25 | 10.0 | 44.69 | 124.343 | 0.0183 | |
| | 6 | 159.873 | 33.0 | D22, D25 | 10.0 | 44.69 | 123.636 | 0.0182 | 0.0040×6.0 |
| | 5 | 164.722 | 33.0 | D22, D25 | 10.0 | 44.69 | 127.386 | 0.0188 | =0.0240 |
| | 4 | 170.207 | 33.0 | D22, D25 | 10.0 | 44.69 | 131.628 | 0.0194 | |
| | 3 | 176.893 | 33.0 | D22, D25 | 10.0 | 44.69 | 136.798 | 0.0201 | |
| | 2 | 155.840 | 33.0 | D22, D25 | 10.0 | 44.69 | 120.517 | 0.0177 | |
| | 1 | 0.000 | 33.0 | D22, D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |

Notes) I ～III : Before correction Slab of a middle part

Notes) I' ～III' : After correction Slab of side wall corner

CALCULATION

Detailed Design on Port Reactivation Project in La Union Province

CALC FILE No.:

CALC INDEX No.: PAGE 147

| | INITIAL | DATE |
|---|---|---|
| PREPARED BY | Y.Ando | 26/07/02 |
| CHECKED BY | R. ARAKAWA | 29/08/2002 |

Ultimate limit state (Under ordinary conditions)
Sidewall (perpendicular to levee normal: landside) —Horizontal outside steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 84.852 | 31.0 | 10.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.43 | ※ |
| | 6 | 83.195 | 31.0 | 10.21 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.42 | ※ |
| | 5 | 85.927 | 31.0 | 10.56 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.44 | ※ |
| | 4 | 88.734 | 31.0 | 10.92 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.45 | ※ |
| | 3 | 91.348 | 31.0 | 11.25 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.46 | ※ |
| | 2 | 76.948 | 31.0 | 9.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.39 | ※ |
| | 1 | 15.502 | 37.6 | 1.52 | D22, D13 | 10.0 | 25.69 | 268.072 | 0.06 | |
| II | 7 | 20.491 | 31.0 | 2.44 | D22 | 20.0 | 19.36 | 167.704 | 0.13 | |
| | 6 | 20.820 | 31.0 | 2.48 | D22 | 20.0 | 19.36 | 167.704 | 0.14 | |
| | 5 | 21.454 | 31.0 | 2.56 | D22 | 20.0 | 19.36 | 167.704 | 0.14 | |
| | 4 | 22.126 | 31.0 | 2.64 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 3 | 23.455 | 31.0 | 2.80 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 2 | 23.664 | 31.0 | 2.83 | D22 | 20.0 | 19.36 | 167.704 | 0.16 | |
| | 1 | 9.339 | 37.6 | 0.91 | D22 | 20.0 | 19.36 | 206.044 | 0.05 | |
| III | 7 | 0.374 | 37.6 | 0.04 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |
| | 6 | 20.918 | 37.6 | 2.05 | D22 | 20.0 | 19.36 | 206.044 | 0.11 | |
| | 5 | 50.241 | 37.6 | 4.97 | D22 | 20.0 | 19.36 | 206.044 | 0.27 | |
| | 4 | 80.125 | 37.6 | 8.00 | D22 | 20.0 | 19.36 | 206.044 | 0.43 | |
| | 3 | 109.821 | 37.6 | 11.07 | D22 | 20.0 | 19.36 | 206.044 | 0.59 | |
| | 2 | 116.172 | 37.6 | 11.73 | D22 | 20.0 | 19.36 | 206.044 | 0.62 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |
| I' | 7 | 84.852 | 31.0 | 10.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.43 | ※ |
| | 6 | 83.195 | 31.0 | 10.21 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.42 | ※ |
| | 5 | 85.927 | 31.0 | 10.56 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.44 | ※ |
| | 4 | 88.734 | 31.0 | 10.92 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.45 | ※ |
| | 3 | 91.348 | 31.0 | 11.25 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.46 | ※ |
| | 2 | 76.948 | 31.0 | 9.42 | D22, D13 | 10.0 | 25.69 | 217.190 | 0.39 | ※ |
| | 1 | 15.502 | 37.6 | 1.52 | D22, D13 | 10.0 | 25.69 | 268.072 | 0.06 | |
| III' | 7 | 1.012 | 37.6 | 0.10 | D22 | 20.0 | 19.36 | 206.044 | 0.01 | |
| | 6 | 22.260 | 37.6 | 2.18 | D22 | 20.0 | 19.36 | 206.044 | 0.12 | |
| | 5 | 52.675 | 37.6 | 5.22 | D22 | 20.0 | 19.36 | 206.044 | 0.28 | |
| | 4 | 83.573 | 37.6 | 8.35 | D22 | 20.0 | 19.36 | 206.044 | 0.45 | |
| | 3 | 114.172 | 37.6 | 11.52 | D22 | 20.0 | 19.36 | 206.044 | 0.61 | |
| | 2 | 118.423 | 37.6 | 11.97 | D22 | 20.0 | 19.36 | 206.044 | 0.63 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner

CALCULATION
Detailed Design on Port Reactivation Project in La Union Province
CALC FILE No.:
CALC INDEX No.: PAGE 148

| | INITIAL | DATE |
|---|---|---|
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED | R. NISHIHORA | 09/08/2002 |

Serviceability limit state

Sidewall (perpendicular to levee normal: landside) --Horizontal outside steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 77.136 | 31.0 | D22, D13 | 10.0 | 25.69 | 107.773 | 0.0205 | |
| | 6 | 75.631 | 31.0 | D22, D13 | 10.0 | 25.69 | 105.671 | 0.0201 | 0.0035×8.0 |
| | 5 | 78.115 | 31.0 | D22, D13 | 10.0 | 25.69 | 109.141 | 0.0208 | =0.0280 |
| | 4 | 80.668 | 31.0 | D22, D13 | 10.0 | 25.69 | 112.708 | 0.0215 | |
| | 3 | 83.045 | 31.0 | D22, D13 | 10.0 | 25.69 | 116.029 | 0.0221 | |
| | 2 | 69.955 | 31.0 | D22, D13 | 10.0 | 25.69 | 97.740 | 0.0186 | |
| | 1 | 7.046 | 37.6 | D22, D13 | 10.0 | 25.69 | 8.047 | 0.0015 | |
| II | 7 | 18.627 | 31.0 | D22 | 20.0 | 19.36 | 34.108 | 0.0076 | |
| | 6 | 18.926 | 31.0 | D22 | 20.0 | 19.36 | 34.656 | 0.0077 | 0.0035×8.0 |
| | 5 | 19.503 | 31.0 | D22 | 20.0 | 19.36 | 35.712 | 0.0079 | =0.0280 |
| | 4 | 20.115 | 31.0 | D22 | 20.0 | 19.36 | 36.833 | 0.0082 | |
| | 3 | 21.323 | 31.0 | D22 | 20.0 | 19.36 | 39.045 | 0.0087 | |
| | 2 | 21.513 | 31.0 | D22 | 20.0 | 19.36 | 39.393 | 0.0088 | |
| | 1 | 4.245 | 37.6 | D22 | 20.0 | 19.36 | 6.359 | 0.0014 | |
| III | 7 | 0.170 | 37.6 | D22 | 20.0 | 19.36 | 0.255 | 0.0001 | |
| | 6 | 9.508 | 37.6 | D22 | 20.0 | 19.36 | 14.243 | 0.0032 | 0.0035×8.0 |
| | 5 | 22.836 | 37.6 | D22 | 20.0 | 19.36 | 34.208 | 0.0076 | =0.0280 |
| | 4 | 36.419 | 37.6 | D22 | 20.0 | 19.36 | 54.555 | 0.0121 | |
| | 3 | 49.916 | 37.6 | D22 | 20.0 | 19.36 | 74.773 | 0.0166 | |
| | 2 | 52.803 | 37.6 | D22 | 20.0 | 19.36 | 79.098 | 0.0176 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |
| I' | 7 | 77.136 | 31.0 | D22, D13 | 10.0 | 25.69 | 107.773 | 0.0205 | |
| | 6 | 75.631 | 31.0 | D22, D13 | 10.0 | 25.69 | 105.671 | 0.0201 | 0.0035×8.0 |
| | 5 | 78.115 | 31.0 | D22, D13 | 10.0 | 25.69 | 109.141 | 0.0208 | =0.0280 |
| | 4 | 80.668 | 31.0 | D22, D13 | 10.0 | 25.69 | 112.708 | 0.0215 | |
| | 3 | 83.045 | 31.0 | D22, D13 | 10.0 | 25.69 | 116.029 | 0.0221 | |
| | 2 | 69.955 | 31.0 | D22, D13 | 10.0 | 25.69 | 97.740 | 0.0186 | |
| | 1 | 7.046 | 37.6 | D22, D13 | 10.0 | 25.69 | 8.047 | 0.0015 | |
| III' | 7 | 0.460 | 37.6 | D22 | 20.0 | 19.36 | 0.689 | 0.0002 | |
| | 6 | 10.117 | 37.6 | D22 | 20.0 | 19.36 | 15.155 | 0.0034 | 0.0035×8.0 |
| | 5 | 23.942 | 37.6 | D22 | 20.0 | 19.36 | 35.864 | 0.0080 | =0.0280 |
| | 4 | 37.986 | 37.6 | D22 | 20.0 | 19.36 | 56.902 | 0.0126 | |
| | 3 | 51.894 | 37.6 | D22 | 20.0 | 19.36 | 77.736 | 0.0173 | |
| | 2 | 53.826 | 37.6 | D22 | 20.0 | 19.36 | 80.630 | 0.0179 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |

Notes) I ~III : Before correction Slab of a middle part

Notes) I' ~III' : After correction Slab of side wall corner

CALCULATION

Detailed Design on Port Reactivation Project in La Union Province

CALC FILE No.:

CALC INDEX No.: PAGE 149

| | INITIAL | DATE |
|---|---|---|
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | E. NISHIHARA | 9/08/2002 |

Ultimate limit state (Under ordinary conditions)
Sidewall (perpendicular to levee normal: landside) —Perpendicular inner side steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 1.681 | 31.0 | 0.20 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 5 | 4.109 | 31.0 | 0.49 | D16 | 40.0 | 4.97 | 45.410 | 0.10 | |
| | 4 | 6.537 | 31.0 | 0.78 | D16 | 40.0 | 4.97 | 45.410 | 0.16 | |
| | 3 | 10.272 | 31.0 | 1.22 | D16 | 40.0 | 4.97 | 45.410 | 0.25 | |
| | 2 | 22.226 | 31.0 | 2.65 | D16 | 40.0 | 4.97 | 45.410 | 0.54 | |
| | 1 | 128.129 | 31.0 | 16.07 | D16,D25 | 10.0 | 35.27 | 287.063 | 0.49 | ※ |
| II | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 0.560 | 31.0 | 0.07 | D16 | 40.0 | 4.97 | 45.410 | 0.01 | |
| | 5 | 0.934 | 31.0 | 0.11 | D16 | 40.0 | 4.97 | 45.410 | 0.02 | |
| | 4 | 1.494 | 31.0 | 0.18 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 3 | 2.802 | 31.0 | 0.33 | D16 | 40.0 | 4.97 | 45.410 | 0.07 | |
| | 2 | 10.086 | 31.0 | 1.20 | D16 | 40.0 | 4.97 | 45.410 | 0.24 | |
| | 1 | 76.330 | 31.0 | 9.34 | D16,D16 | 10.0 | 19.86 | 171.711 | 0.49 | ※ |
| III | 7 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |
| | 6 | 28.269 | 31.0 | 3.38 | D16 | 20.0 | 9.93 | 89.107 | 0.35 | |
| | 5 | 29.046 | 31.0 | 3.48 | D16 | 20.0 | 9.93 | 89.107 | 0.36 | |
| | 4 | 30.054 | 31.0 | 3.60 | D16 | 20.0 | 9.93 | 89.107 | 0.37 | |
| | 3 | 31.413 | 31.0 | 3.77 | D16 | 20.0 | 9.93 | 89.107 | 0.39 | |
| | 2 | 28.143 | 31.0 | 3.37 | D16 | 20.0 | 9.93 | 89.107 | 0.35 | |
| | 1 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |

※ It determines from serviceability limit state.

| CALCULATION | | |
|---|---|---|
| Detailed Design on Port Reactivation Project in La Union Province | | |
| CALC FILE No.: | | |
| CALC INDEX No.: | | PAGE 150 |
| | INITIAL | DATE |
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | E. NISHIMURA | 09/08/2002 |

Serviceability limit state

Sidewall(perpendicular to levee normal:landside)—Perpendicular inner side steel reinforcement

B = 100cm

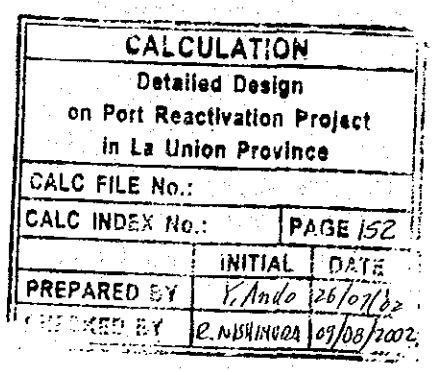
| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.764 | 31.0 | D16 | 40.0 | 4.97 | 5.216 | 0.0015 | 0.0040×8.0 |
| | 5 | 1.868 | 31.0 | D16 | 40.0 | 4.97 | 12.752 | 0.0038 | =0.0320 |
| | 4 | 2.971 | 31.0 | D16 | 40.0 | 4.97 | 20.282 | 0.0060 | |
| | 3 | 4.669 | 31.0 | D16 | 40.0 | 4.97 | 31.874 | 0.0094 | |
| | 2 | 10.102 | 31.0 | D16 | 40.0 | 4.97 | 68.963 | 0.0203 | |
| | 1 | 116.484 | 31.0 | D16,D25 | 10.0 | 35.27 | 120.393 | 0.0228 | |
| II | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.255 | 31.0 | D16 | 40.0 | 4.97 | 1.741 | 0.0005 | 0.0040×8.0 |
| | 5 | 0.424 | 31.0 | D16 | 40.0 | 4.97 | 2.895 | 0.0009 | =0.0320 |
| | 4 | 0.679 | 31.0 | D16 | 40.0 | 4.97 | 4.635 | 0.0014 | |
| | 3 | 1.273 | 31.0 | D16 | 40.0 | 4.97 | 8.690 | 0.0026 | |
| | 2 | 4.584 | 31.0 | D16 | 40.0 | 4.97 | 31.294 | 0.0092 | |
| | 1 | 69.393 | 31.0 | D16,D16 | 10.0 | 19.86 | 124.000 | 0.0235 | |
| III | 7 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |
| | 6 | 25.698 | 31.0 | D16 | 20.0 | 9.93 | 89.512 | 0.0201 | 0.0040×8.0 |
| | 5 | 26.405 | 31.0 | D16 | 20.0 | 9.93 | 91.974 | 0.0206 | =0.0320 |
| | 4 | 27.322 | 31.0 | D16 | 20.0 | 9.93 | 95.168 | 0.0214 | |
| | 3 | 28.557 | 31.0 | D16 | 20.0 | 9.93 | 99.470 | 0.0223 | |
| | 2 | 25.585 | 31.0 | D16 | 20.0 | 9.93 | 89.118 | 0.0200 | |
| | 1 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |

| CALCULATION | | |
|---|---|---|
| Detailed Design on Port Reactivation Project In La Union Province | | |
| CALC FILE No.: | | |
| CALC INDEX No.: | | PAGE 151 |
| | INITIAL | DATE |
| PREPARED BY | Y. Ando | 26/07/02 |
| | R. NISHIHARA | 29/08/2002 |

Ultimate limit state (Under ordinary conditions)
Sidewall (perpendicular to levee normal: landside) --Perpendicular outside steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 29.0 | 0.00 | D13 | 20.0 | 6.34 | 53.833 | 0.00 |
| | 6 | 13.340 | 29.0 | 1.70 | D13 | 20.0 | 6.34 | 53.833 | 0.27 |
| | 5 | 14.019 | 29.0 | 1.78 | D13 | 20.0 | 6.34 | 53.833 | 0.29 |
| | 4 | 14.699 | 29.0 | 1.87 | D13 | 20.0 | 6.34 | 53.833 | 0.30 |
| | 3 | 17.386 | 29.0 | 2.22 | D13 | 20.0 | 6.34 | 53.833 | 0.36 |
| | 2 | 30.062 | 29.0 | 3.86 | D13, D13 | 10.0 | 12.67 | 104.945 | 0.32 |
| | 1 | 93.386 | 35.6 | 9.92 | D13, D13 | 10.0 | 12.67 | 130.031 | 0.79 |
| II | 7 | 0.000 | 29.0 | 0.00 | D13 | 40.0 | 3.17 | 27.249 | 0.00 |
| | 6 | 3.023 | 29.0 | 0.38 | D13 | 40.0 | 3.17 | 27.249 | 0.12 |
| | 5 | 3.098 | 29.0 | 0.39 | D13 | 40.0 | 3.17 | 27.249 | 0.13 |
| | 4 | 3.404 | 29.0 | 0.43 | D13 | 40.0 | 3.17 | 27.249 | 0.14 |
| | 3 | 4.830 | 29.0 | 0.61 | D13 | 40.0 | 3.17 | 27.249 | 0.19 |
| | 2 | 13.273 | 29.0 | 1.69 | D13 | 20.0 | 6.34 | 53.833 | 0.27 |
| | 1 | 56.592 | 35.6 | 5.94 | D13, D13 | 10.0 | 12.67 | 130.031 | 0.48 |
| III | 7 | 0.000 | 35.6 | 0.00 | D13 | 40.0 | 3.17 | 33.525 | 0.00 |
| | 6 | 3.549 | 35.6 | 0.37 | D13 | 40.0 | 3.17 | 33.525 | 0.12 |
| | 5 | 8.405 | 35.6 | 0.87 | D13 | 40.0 | 3.17 | 33.525 | 0.28 |
| | 4 | 13.448 | 35.6 | 1.39 | D13 | 40.0 | 3.17 | 33.525 | 0.44 |
| | 3 | 18.304 | 35.6 | 1.90 | D13 | 40.0 | 3.17 | 33.525 | 0.60 |
| | 2 | 19.424 | 35.6 | 2.01 | D13 | 40.0 | 3.17 | 33.525 | 0.64 |
| | 1 | 0.000 | 35.6 | 0.00 | D13 | 40.0 | 3.17 | 33.525 | 0.00 |

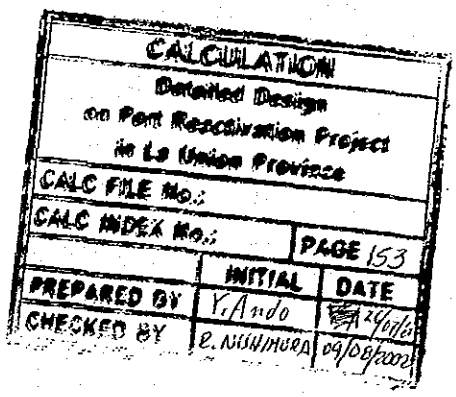


Serviceability limit state

Sidewall (perpendicular to levee normal: landside) —Perpendicular outside steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As (cm²) | σse (N/mm²) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 29.0 | D13 | 20.0 | 6.34 | 0.000 | 0.0000 | |
| | 6 | 12.127 | 29.0 | D13 | 20.0 | 6.34 | 69.932 | 0.0186 | 0.0035×10.0 |
| | 5 | 12.744 | 29.0 | D13 | 20.0 | 6.34 | 73.490 | 0.0195 | =0.0350 |
| | 4 | 13.362 | 29.0 | D13 | 20.0 | 6.34 | 77.054 | 0.0205 | |
| | 3 | 15.805 | 29.0 | D13 | 20.0 | 6.34 | 91.142 | 0.0242 | |
| | 2 | 27.329 | 29.0 | D13, D13 | 10.0 | 12.67 | 80.606 | 0.0186 | |
| | 1 | 42.446 | 35.6 | D13, D13 | 10.0 | 12.67 | 101.256 | 0.0233 | |
| II | 7 | 0.000 | 29.0 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |
| | 6 | 2.748 | 29.0 | D13 | 40.0 | 3.17 | 31.177 | 0.0105 | 0.0035×10.0 |
| | 5 | 2.816 | 29.0 | D13 | 40.0 | 3.17 | 31.949 | 0.0107 | =0.0350 |
| | 4 | 3.095 | 29.0 | D13 | 40.0 | 3.17 | 35.114 | 0.0118 | |
| | 3 | 4.391 | 29.0 | D13 | 40.0 | 3.17 | 49.818 | 0.0167 | |
| | 2 | 12.066 | 29.0 | D13 | 20.0 | 6.34 | 69.580 | 0.0185 | |
| | 1 | 25.722 | 35.6 | D13, D13 | 10.0 | 12.67 | 61.361 | 0.0141 | |
| III | 7 | 0.000 | 35.6 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |
| | 6 | 1.613 | 35.6 | D13 | 40.0 | 3.17 | 14.849 | 0.0050 | 0.0035×10.0 |
| | 5 | 3.820 | 35.6 | D13 | 40.0 | 3.17 | 35.167 | 0.0118 | =0.0350 |
| | 4 | 6.112 | 35.6 | D13 | 40.0 | 3.17 | 56.268 | 0.0189 | |
| | 3 | 8.319 | 35.6 | D13 | 40.0 | 3.17 | 76.586 | 0.0257 | |
| | 2 | 8.829 | 35.6 | D13 | 40.0 | 3.17 | 81.281 | 0.0273 | |
| | 1 | 0.000 | 35.6 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |

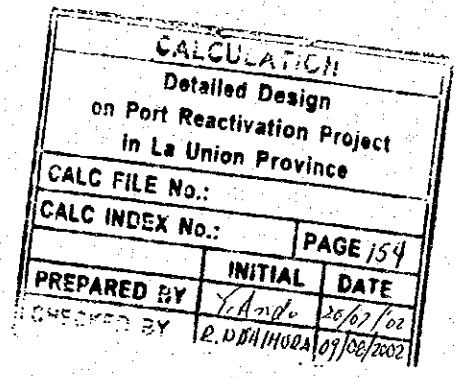


Ultimate limit state (Under ordinary conditions)
Sidewall(parallel to centerline:seaside)--Horizontal inner side steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 5.887 | 33.0 | 0.66 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 6 | 14.413 | 33.0 | 1.61 | D22 | 20.0 | 19.36 | 179.322 | 0.09 | |
| | 5 | 28.218 | 33.0 | 3.17 | D22 | 20.0 | 19.36 | 179.322 | 0.17 | |
| | 4 | 42.428 | 33.0 | 4.79 | D22 | 20.0 | 19.36 | 179.322 | 0.26 | |
| | 3 | 56.232 | 33.0 | 6.38 | D22 | 20.0 | 19.36 | 179.322 | 0.34 | |
| | 2 | 53.390 | 33.0 | 6.05 | D22 | 20.0 | 19.36 | 179.322 | 0.33 | |
| | 1 | 22.920 | 33.0 | 2.57 | D22 | 20.0 | 19.36 | 179.322 | 0.14 | |
| II | 7 | 0.609 | 33.0 | 0.07 | D22 | 20.0 | 19.36 | 179.322 | 0.00 | |
| | 6 | 3.451 | 33.0 | 0.38 | D22 | 20.0 | 19.36 | 179.322 | 0.02 | |
| | 5 | 6.902 | 33.0 | 0.77 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 4 | 10.556 | 33.0 | 1.18 | D22 | 20.0 | 19.36 | 179.322 | 0.06 | |
| | 3 | 14.616 | 33.0 | 1.63 | D22 | 20.0 | 19.36 | 179.322 | 0.09 | |
| | 2 | 17.458 | 33.0 | 1.95 | D22 | 20.0 | 19.36 | 179.322 | 0.11 | |
| | 1 | 13.677 | 33.0 | 1.53 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| III | 7 | 183.191 | 33.0 | 21.96 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 6 | 182.120 | 33.0 | 21.82 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 5 | 187.689 | 33.0 | 22.54 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 4 | 193.964 | 33.0 | 23.37 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.57 | ※ |
| | 3 | 201.001 | 33.0 | 24.30 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.59 | ※ |
| | 2 | 173.951 | 33.0 | 20.76 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.00 | |
| I' | 7 | 6.193 | 33.0 | 0.69 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 6 | 15.058 | 33.0 | 1.68 | D22 | 20.0 | 19.36 | 179.322 | 0.09 | |
| | 5 | 29.387 | 33.0 | 3.30 | D22 | 20.0 | 19.36 | 179.322 | 0.18 | |
| | 4 | 44.084 | 33.0 | 4.98 | D22 | 20.0 | 19.36 | 179.322 | 0.27 | |
| | 3 | 58.322 | 33.0 | 6.63 | D22 | 20.0 | 19.36 | 179.322 | 0.36 | |
| | 2 | 54.471 | 33.0 | 6.18 | D22 | 20.0 | 19.36 | 179.322 | 0.33 | |
| | 1 | 22.920 | 33.0 | 2.57 | D22 | 20.0 | 19.36 | 179.322 | 0.14 | |
| III' | 7 | 176.868 | 33.0 | 21.14 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.52 | ※ |
| | 6 | 175.860 | 33.0 | 21.01 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 5 | 181.192 | 33.0 | 21.70 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 4 | 187.224 | 33.0 | 22.48 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 3 | 194.578 | 33.0 | 23.45 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.57 | ※ |
| | 2 | 171.419 | 33.0 | 20.43 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.50 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner



Serviceability limit state

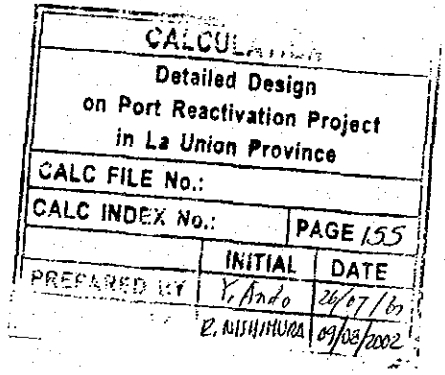
Sidewall(parallel to centerline:seaside)--Horizontal inner side steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 2.676 | 33.0 | D22 | 20.0 | 19.36 | 4.591 | 0.0008 | |
| | 6 | 6.551 | 33.0 | D22 | 20.0 | 19.36 | 11.239 | 0.0020 | 0.0040×6.0 |
| | 5 | 12.826 | 33.0 | D22 | 20.0 | 19.36 | 22.005 | 0.0040 | =0.0240 |
| | 4 | 19.285 | 33.0 | D22 | 20.0 | 19.36 | 33.087 | 0.0060 | |
| | 3 | 25.559 | 33.0 | D22 | 20.0 | 19.36 | 43.851 | 0.0080 | |
| | 2 | 24.267 | 33.0 | D22 | 20.0 | 19.36 | 41.635 | 0.0076 | |
| | 1 | 20.838 | 33.0 | D22 | 20.0 | 19.36 | 35.752 | 0.0065 | |
| II | 7 | 0.277 | 33.0 | D22 | 20.0 | 19.36 | 0.475 | 0.0001 | |
| | 6 | 1.569 | 33.0 | D22 | 20.0 | 19.36 | 2.692 | 0.0005 | 0.0040×6.0 |
| | 5 | 3.137 | 33.0 | D22 | 20.0 | 19.36 | 5.382 | 0.0010 | =0.0240 |
| | 4 | 4.798 | 33.0 | D22 | 20.0 | 19.36 | 8.232 | 0.0015 | |
| | 3 | 6.643 | 33.0 | D22 | 20.0 | 19.36 | 11.397 | 0.0021 | |
| | 2 | 7.935 | 33.0 | D22 | 20.0 | 19.36 | 13.614 | 0.0025 | |
| | 1 | 12.433 | 33.0 | D22 | 20.0 | 19.36 | 21.331 | 0.0039 | |
| III | 7 | 166.539 | 33.0 | D22,D25 | 10.0 | 44.69 | 128.791 | 0.0190 | |
| | 6 | 165.567 | 33.0 | D22,D25 | 10.0 | 44.69 | 128.040 | 0.0189 | 0.0040×6.0 |
| | 5 | 170.630 | 33.0 | D22,D25 | 10.0 | 44.69 | 131.955 | 0.0194 | =0.0240 |
| | 4 | 176.335 | 33.0 | D22,D25 | 10.0 | 44.69 | 136.367 | 0.0201 | |
| | 3 | 182.734 | 33.0 | D22,D25 | 10.0 | 44.69 | 141.315 | 0.0208 | |
| | 2 | 158.143 | 33.0 | D22,D25 | 10.0 | 44.69 | 122.298 | 0.0180 | |
| | 1 | 0.000 | 33.0 | D22,D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |
| I' | 7 | 2.815 | 33.0 | D22 | 20.0 | 19.36 | 4.830 | 0.0009 | |
| | 6 | 6.844 | 33.0 | D22 | 20.0 | 19.36 | 11.742 | 0.0021 | 0.0040×6.0 |
| | 5 | 13.357 | 33.0 | D22 | 20.0 | 19.36 | 22.916 | 0.0042 | =0.0240 |
| | 4 | 20.038 | 33.0 | D22 | 20.0 | 19.36 | 34.379 | 0.0063 | |
| | 3 | 26.509 | 33.0 | D22 | 20.0 | 19.36 | 45.481 | 0.0083 | |
| | 2 | 24.758 | 33.0 | D22 | 20.0 | 19.36 | 42.477 | 0.0077 | |
| | 1 | 20.838 | 33.0 | D22 | 20.0 | 19.36 | 35.752 | 0.0065 | |
| III' | 7 | 160.787 | 33.0 | D22,D25 | 10.0 | 44.69 | 124.343 | 0.0183 | |
| | 6 | 159.873 | 33.0 | D22,D25 | 10.0 | 44.69 | 123.636 | 0.0182 | 0.0040×6.0 |
| | 5 | 164.722 | 33.0 | D22,D25 | 10.0 | 44.69 | 127.386 | 0.0188 | =0.0240 |
| | 4 | 170.207 | 33.0 | D22,D25 | 10.0 | 44.69 | 131.628 | 0.0194 | |
| | 3 | 176.893 | 33.0 | D22,D25 | 10.0 | 44.69 | 136.798 | 0.0201 | |
| | 2 | 155.840 | 33.0 | D22,D25 | 10.0 | 44.69 | 120.517 | 0.0177 | |
| | 1 | 0.000 | 33.0 | D22,D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |

Notes) I ～III : Before correction Slab of a middle part

Notes) I' ～III' : After correction Slab of side wall corner

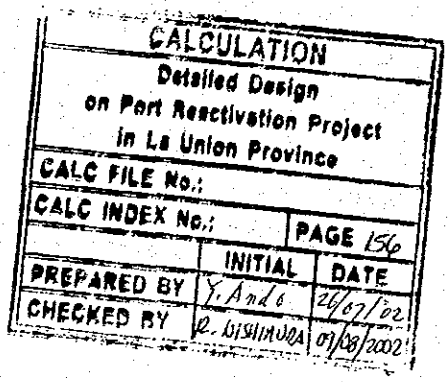


Ultimate limit state (Under ordinary conditions)
Sidewall(parallel to centerline:seaside)--Horizontal outside steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 91.722 | 31.0 | 11.30 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.41 | ※ |
| | 6 | 89.570 | 31.0 | 11.02 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.40 | ※ |
| | 5 | 92.617 | 31.0 | 11.42 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.42 | ※ |
| | 4 | 95.740 | 31.0 | 11.82 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.43 | ※ |
| | 3 | 97.738 | 31.0 | 12.08 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.44 | ※ |
| | 2 | 78.531 | 31.0 | 9.62 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.35 | ※ |
| | 1 | 16.849 | 37.6 | 1.65 | D22, D16 | 10.0 | 29.29 | 302.158 | 0.06 | |
| II | 7 | 22.137 | 31.0 | 2.64 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 6 | 22.469 | 31.0 | 2.68 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 5 | 23.125 | 31.0 | 2.76 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 4 | 24.030 | 31.0 | 2.87 | D22 | 20.0 | 19.36 | 167.704 | 0.16 | |
| | 3 | 25.223 | 31.0 | 3.02 | D22 | 20.0 | 19.36 | 167.704 | 0.17 | |
| | 2 | 24.924 | 31.0 | 2.98 | D22 | 20.0 | 19.36 | 167.704 | 0.16 | |
| | 1 | 10.150 | 37.6 | 0.99 | D22 | 20.0 | 19.36 | 206.044 | 0.05 | |
| III | 7 | 1.624 | 37.6 | 0.16 | D22 | 20.0 | 19.36 | 206.044 | 0.01 | |
| | 6 | 23.549 | 37.6 | 2.31 | D22 | 20.0 | 19.36 | 206.044 | 0.13 | |
| | 5 | 55.014 | 37.6 | 5.45 | D22 | 20.0 | 19.36 | 206.044 | 0.29 | |
| | 4 | 86.886 | 37.6 | 8.69 | D22 | 20.0 | 19.36 | 206.044 | 0.46 | |
| | 3 | 118.352 | 37.6 | 11.96 | D22 | 20.0 | 19.36 | 206.044 | 0.63 | |
| | 2 | 120.585 | 37.6 | 12.19 | D22 | 20.0 | 19.36 | 206.044 | 0.64 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |
| I' | 7 | 94.884 | 31.0 | 11.71 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.43 | ※ |
| | 6 | 92.700 | 31.0 | 11.43 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.42 | ※ |
| | 5 | 95.865 | 31.0 | 11.83 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.43 | ※ |
| | 4 | 99.110 | 31.0 | 12.25 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.45 | ※ |
| | 3 | 100.950 | 31.0 | 12.49 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.45 | ※ |
| | 2 | 79.797 | 31.0 | 9.78 | D22, D16 | 10.0 | 29.29 | 244.159 | 0.36 | ※ |
| | 1 | 16.849 | 37.6 | 1.65 | D22, D16 | 10.0 | 29.29 | 302.158 | 0.06 | |
| III' | 7 | 1.011 | 37.6 | 0.10 | D22 | 20.0 | 19.36 | 206.044 | 0.01 | |
| | 6 | 22.260 | 37.6 | 2.18 | D22 | 20.0 | 19.36 | 206.044 | 0.12 | |
| | 5 | 52.675 | 37.6 | 5.22 | D22 | 20.0 | 19.36 | 206.044 | 0.28 | |
| | 4 | 83.573 | 37.6 | 8.35 | D22 | 20.0 | 19.36 | 206.044 | 0.45 | |
| | 3 | 114.172 | 37.6 | 11.52 | D22 | 20.0 | 19.36 | 206.044 | 0.61 | |
| | 2 | 118.423 | 37.6 | 11.97 | D22 | 20.0 | 19.36 | 206.044 | 0.63 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner



Serviceability limit state

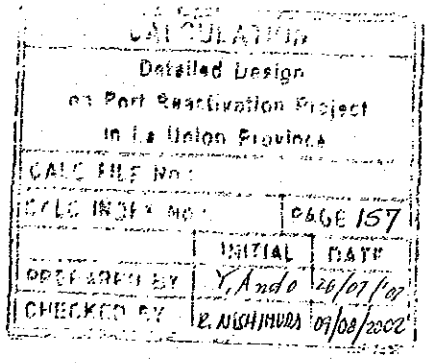
Sidewall(parallel to centerline:seaside)--Horizontal outside steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | $\sigma se$ ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 83.386 | 31.0 | D22,D16 | 10.0 | 29.29 | 102.821 | 0.0195 | |
| | 6 | 81.429 | 31.0 | D22,D16 | 10.0 | 29.29 | 100.408 | 0.0190 | 0.0035×8.0 |
| | 5 | 84.199 | 31.0 | D22,D16 | 10.0 | 29.29 | 103.824 | 0.0197 | =0.0280 |
| | 4 | 87.038 | 31.0 | D22,D16 | 10.0 | 29.29 | 107.324 | 0.0203 | |
| | 3 | 88.855 | 31.0 | D22,D16 | 10.0 | 29.29 | 109.565 | 0.0208 | |
| | 2 | 71.394 | 31.0 | D22,D16 | 10.0 | 29.29 | 88.034 | 0.0167 | |
| | 1 | 7.658 | 37.6 | D22,D16 | 10.0 | 29.29 | 7.715 | 0.0015 | |
| II | 7 | 20.125 | 31.0 | D22 | 20.0 | 19.36 | 36.851 | 0.0082 | |
| | 6 | 20.426 | 31.0 | D22 | 20.0 | 19.36 | 37.402 | 0.0083 | 0.0035×8.0 |
| | 5 | 21.023 | 31.0 | D22 | 20.0 | 19.36 | 38.496 | 0.0086 | =0.0280 |
| | 4 | 21.847 | 31.0 | D22 | 20.0 | 19.36 | 40.004 | 0.0089 | |
| | 3 | 22.930 | 31.0 | D22 | 20.0 | 19.36 | 41.987 | 0.0093 | |
| | 2 | 22.659 | 31.0 | D22 | 20.0 | 19.36 | 41.491 | 0.0092 | |
| | 1 | 4.614 | 37.6 | D22 | 20.0 | 19.36 | 6.912 | 0.0015 | |
| III | 7 | 0.738 | 37.6 | D22 | 20.0 | 19.36 | 1.106 | 0.0002 | |
| | 6 | 10.703 | 37.6 | D22 | 20.0 | 19.36 | 16.033 | 0.0036 | 0.0035×8.0 |
| | 5 | 25.005 | 37.6 | D22 | 20.0 | 19.36 | 37.457 | 0.0083 | =0.0280 |
| | 4 | 39.492 | 37.6 | D22 | 20.0 | 19.36 | 59.158 | 0.0131 | |
| | 3 | 53.794 | 37.6 | D22 | 20.0 | 19.36 | 80.582 | 0.0179 | |
| | 2 | 54.809 | 37.6 | D22 | 20.0 | 19.36 | 82.102 | 0.0182 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |
| I' | 7 | 86.262 | 31.0 | D22,D16 | 10.0 | 29.29 | 106.368 | 0.0201 | |
| | 6 | 84.276 | 31.0 | D22,D16 | 10.0 | 29.29 | 103.919 | 0.0197 | 0.0035×8.0 |
| | 5 | 87.153 | 31.0 | D22,D16 | 10.0 | 29.29 | 107.466 | 0.0204 | =0.0280 |
| | 4 | 90.102 | 31.0 | D22,D16 | 10.0 | 29.29 | 111.103 | 0.0210 | |
| | 3 | 91.775 | 31.0 | D22,D16 | 10.0 | 29.29 | 113.166 | 0.0214 | |
| | 2 | 72.546 | 31.0 | D22,D16 | 10.0 | 29.29 | 89.455 | 0.0169 | |
| | 1 | 7.658 | 37.6 | D22,D16 | 10.0 | 29.29 | 7.715 | 0.0015 | |
| III' | 7 | 0.460 | 37.6 | D22 | 20.0 | 19.36 | 0.689 | 0.0002 | |
| | 6 | 10.117 | 37.6 | D22 | 20.0 | 19.36 | 15.155 | 0.0034 | 0.0035×8.0 |
| | 5 | 23.942 | 37.6 | D22 | 20.0 | 19.36 | 35.864 | 0.0080 | =0.0280 |
| | 4 | 37.986 | 37.6 | D22 | 20.0 | 19.36 | 56.902 | 0.0126 | |
| | 3 | 51.894 | 37.6 | D22 | 20.0 | 19.36 | 77.736 | 0.0173 | |
| | 2 | 53.826 | 37.6 | D22 | 20.0 | 19.36 | 80.630 | 0.0179 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |

Notes) I ～III : Before correction Slab of a middle part

Notes) I' ～III' : After correction Slab of side wall corner

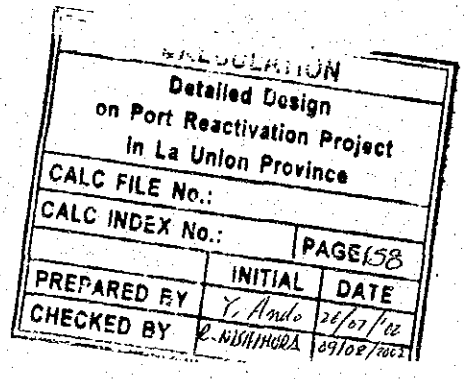


Ultimate limit state (Under ordinary conditions)
Sidewall(parallel to centerline:seaside)---Perpendicular inner side steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 1.624 | 31.0 | 0.19 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 5 | 4.466 | 31.0 | 0.53 | D16 | 40.0 | 4.97 | 45.410 | 0.11 | |
| | 4 | 7.105 | 31.0 | 0.84 | D16 | 40.0 | 4.97 | 45.410 | 0.17 | |
| | 3 | 11.977 | 31.0 | 1.42 | D16 | 40.0 | 4.97 | 45.410 | 0.29 | |
| | 2 | 24.970 | 31.0 | 2.98 | D16 | 40.0 | 4.97 | 45.410 | 0.60 | |
| | 1 | 137.658 | 31.0 | 17.35 | D16,D25 | 10.0 | 35.27 | 287.063 | 0.53 | ※ |
| II | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 0.406 | 31.0 | 0.05 | D16 | 40.0 | 4.97 | 45.410 | 0.01 | |
| | 5 | 1.015 | 31.0 | 0.12 | D16 | 40.0 | 4.97 | 45.410 | 0.02 | |
| | 4 | 1.624 | 31.0 | 0.19 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 3 | 3.654 | 31.0 | 0.43 | D16 | 40.0 | 4.97 | 45.410 | 0.09 | |
| | 2 | 11.774 | 31.0 | 1.40 | D16 | 40.0 | 4.97 | 45.410 | 0.29 | |
| | 1 | 82.555 | 31.0 | 10.13 | D16,D16 | 10.0 | 19.86 | 171.711 | 0.53 | ※ |
| III | 7 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |
| | 6 | 30.306 | 31.0 | 3.63 | D16 | 20.0 | 9.93 | 89.107 | 0.37 | |
| | 5 | 31.310 | 31.0 | 3.75 | D16 | 20.0 | 9.93 | 89.107 | 0.39 | |
| | 4 | 32.315 | 31.0 | 3.88 | D16 | 20.0 | 9.93 | 89.107 | 0.40 | |
| | 3 | 33.528 | 31.0 | 4.02 | D16 | 20.0 | 9.93 | 89.107 | 0.41 | |
| | 2 | 28.992 | 31.0 | 3.47 | D16 | 20.0 | 9.93 | 89.107 | 0.36 | |
| | 1 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |

※ It determines from serviceability limit state.

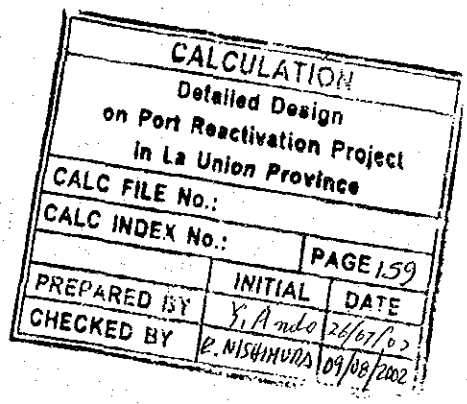


Serviceability limit state

Sidewall(parallel to centerline:seaside)—Perpendicular inner side steel reinforcement

B = 100cm

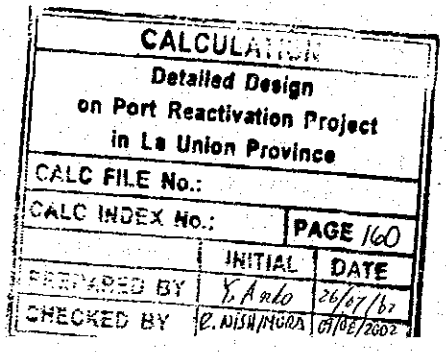
| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | $\sigma se$ ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.738 | 31.0 | D16 | 40.0 | 4.97 | 5.038 | 0.0015 | 0.0040×8.0 |
| | 5 | 2.030 | 31.0 | D16 | 40.0 | 4.97 | 13.858 | 0.0041 | =0.0320 |
| | 4 | 3.229 | 31.0 | D16 | 40.0 | 4.97 | 22.043 | 0.0065 | |
| | 3 | 5.444 | 31.0 | D16 | 40.0 | 4.97 | 37.165 | 0.0109 | |
| | 2 | 11.349 | 31.0 | D16 | 40.0 | 4.97 | 77.476 | 0.0228 | |
| | 1 | 125.148 | 31.0 | D16,D25 | 10.0 | 35.27 | 129.347 | 0.0245 | |
| II | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.185 | 31.0 | D16 | 40.0 | 4.97 | 1.263 | 0.0004 | 0.0040×8.0 |
| | 5 | 0.461 | 31.0 | D16 | 40.0 | 4.97 | 3.147 | 0.0009 | =0.0320 |
| | 4 | 0.738 | 31.0 | D16 | 40.0 | 4.97 | 5.038 | 0.0015 | |
| | 3 | 1.661 | 31.0 | D16 | 40.0 | 4.97 | 11.339 | 0.0033 | |
| | 2 | 5.352 | 31.0 | D16 | 40.0 | 4.97 | 36.537 | 0.0108 | |
| | 1 | 75.052 | 31.0 | D16,D16 | 10.0 | 19.86 | 134.112 | 0.0254 | |
| III | 7 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |
| | 6 | 27.551 | 31.0 | D16 | 20.0 | 9.93 | 95.966 | 0.0215 | 0.0040×8.0 |
| | 5 | 28.465 | 31.0 | D16 | 20.0 | 9.93 | 99.150 | 0.0223 | =0.0320 |
| | 4 | 29.378 | 31.0 | D16 | 20.0 | 9.93 | 102.330 | 0.0230 | |
| | 3 | 30.481 | 31.0 | D16 | 20.0 | 9.93 | 106.172 | 0.0238 | |
| | 2 | 26.358 | 31.0 | D16 | 20.0 | 9.93 | 91.810 | 0.0206 | |
| | 1 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |



Ultimate limit state (Under ordinary conditions)
Sidewall (parallel to centerline:seaside) —Perpendicular outside steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn ($cm^2$) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | Mud (kN·m) | $\gamma i \cdot Md/Mud$ |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 29.0 | 0.00 | D13 | 20.0 | 6.34 | 53.833 | 0.00 |
| | 6 | 14.361 | 29.0 | 1.83 | D13 | 20.0 | 6.34 | 53.833 | 0.29 |
| | 5 | 15.111 | 29.0 | 1.92 | D13 | 20.0 | 6.34 | 53.833 | 0.31 |
| | 4 | 16.033 | 29.0 | 2.04 | D13 | 20.0 | 6.34 | 53.833 | 0.33 |
| | 3 | 19.686 | 29.0 | 2.51 | D13 | 20.0 | 6.34 | 53.833 | 0.40 |
| | 2 | 33.275 | 29.0 | 4.28 | D13,D13 | 10.0 | 12.67 | 104.945 | 0.35 |
| | 1 | 100.690 | 35.6 | 10.73 | D13,D13 | 10.0 | 12.67 | 130.031 | 0.85 |
| II | 7 | 0.000 | 29.0 | 0.00 | D13 | 40.0 | 3.17 | 27.249 | 0.00 |
| | 6 | 3.223 | 29.0 | 0.41 | D13 | 40.0 | 3.17 | 27.249 | 0.13 |
| | 5 | 3.339 | 29.0 | 0.42 | D13 | 40.0 | 3.17 | 27.249 | 0.13 |
| | 4 | 3.874 | 29.0 | 0.49 | D13 | 40.0 | 3.17 | 27.249 | 0.16 |
| | 3 | 5.938 | 29.0 | 0.75 | D13 | 40.0 | 3.17 | 27.249 | 0.24 |
| | 2 | 15.244 | 29.0 | 1.94 | D13 | 20.0 | 6.34 | 53.833 | 0.31 |
| | 1 | 61.307 | 35.6 | 6.44 | D13,D13 | 10.0 | 12.67 | 130.031 | 0.52 |
| III | 7 | 0.000 | 35.6 | 0.00 | D13 | 40.0 | 3.17 | 33.525 | 0.00 |
| | 6 | 3.857 | 35.6 | 0.40 | D13 | 40.0 | 3.17 | 33.525 | 0.13 |
| | 5 | 9.135 | 35.6 | 0.94 | D13 | 40.0 | 3.17 | 33.525 | 0.30 |
| | 4 | 14.413 | 35.6 | 1.49 | D13 | 40.0 | 3.17 | 33.525 | 0.47 |
| | 3 | 19.691 | 35.6 | 2.04 | D13 | 40.0 | 3.17 | 33.525 | 0.65 |
| | 2 | 20.097 | 35.6 | 2.08 | D13 | 40.0 | 3.17 | 33.525 | 0.66 |
| | 1 | 0.000 | 35.6 | 0.00 | D13 | 40.0 | 3.17 | 33.525 | 0.00 |

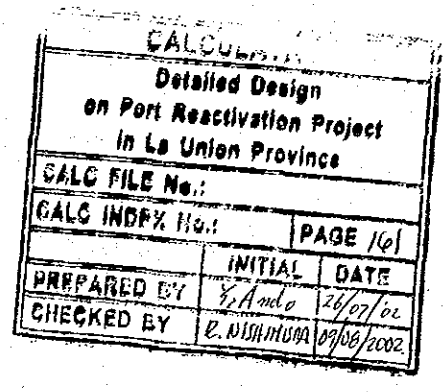


Serviceability limit state

Sidewall(parallel to centerline:seaside)--Perpendicular outside steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | $\sigma se$ ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 29.0 | D13 | 20.0 | 6.34 | 0.000 | 0.0000 | |
| | 6 | 13.055 | 29.0 | D13 | 20.0 | 6.34 | 75.283 | 0.0200 | 0.0035×10.0 |
| | 5 | 13.738 | 29.0 | D13 | 20.0 | 6.34 | 79.222 | 0.0210 | =0.0350 |
| | 4 | 14.575 | 29.0 | D13 | 20.0 | 6.34 | 84.049 | 0.0223 | |
| | 3 | 17.897 | 29.0 | D13 | 20.0 | 6.34 | 103.206 | 0.0274 | |
| | 2 | 30.251 | 29.0 | D13,D13 | 10.0 | 12.67 | 89.224 | 0.0206 | |
| | 1 | 45.766 | 35.6 | D13,D13 | 10.0 | 12.67 | 109.176 | 0.0252 | |
| II | 7 | 0.000 | 29.0 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |
| | 6 | 2.930 | 29.0 | D13 | 40.0 | 3.17 | 33.242 | 0.0112 | 0.0035×10.0 |
| | 5 | 3.036 | 29.0 | D13 | 40.0 | 3.17 | 34.445 | 0.0116 | =0.0350 |
| | 4 | 3.522 | 29.0 | D13 | 40.0 | 3.17 | 39.958 | 0.0134 | |
| | 3 | 5.399 | 29.0 | D13 | 40.0 | 3.17 | 61.254 | 0.0206 | |
| | 2 | 13.858 | 29.0 | D13 | 20.0 | 6.34 | 79.914 | 0.0212 | |
| | 1 | 27.866 | 35.6 | D13,D13 | 10.0 | 12.67 | 66.475 | 0.0153 | |
| III | 7 | 0.000 | 35.6 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |
| | 6 | 1.753 | 35.6 | D13 | 40.0 | 3.17 | 16.138 | 0.0054 | 0.0035×10.0 |
| | 5 | 4.152 | 35.6 | D13 | 40.0 | 3.17 | 38.224 | 0.0128 | =0.0350 |
| | 4 | 6.551 | 35.6 | D13 | 40.0 | 3.17 | 60.309 | 0.0202 | |
| | 3 | 8.950 | 35.6 | D13 | 40.0 | 3.17 | 82.395 | 0.0276 | |
| | 2 | 9.135 | 35.6 | D13 | 40.0 | 3.17 | 84.098 | 0.0282 | |
| | 1 | 0.000 | 35.6 | D13 | 40.0 | 3.17 | 0.000 | 0.0000 | |



Ultimate limit state (Under ordinary conditions)
Sidewall(parallel to centerline:landside)—Horizontal inner side steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 5.887 | 33.0 | 0.66 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 6 | 14.413 | 33.0 | 1.61 | D22 | 20.0 | 19.36 | 179.322 | 0.09 | |
| | 5 | 28.218 | 33.0 | 3.17 | D22 | 20.0 | 19.36 | 179.322 | 0.17 | |
| | 4 | 42.428 | 33.0 | 4.79 | D22 | 20.0 | 19.36 | 179.322 | 0.26 | |
| | 3 | 56.232 | 33.0 | 6.38 | D22 | 20.0 | 19.36 | 179.322 | 0.34 | |
| | 2 | 53.390 | 33.0 | 6.05 | D22 | 20.0 | 19.36 | 179.322 | 0.33 | |
| | 1 | 22.920 | 33.0 | 2.57 | D22 | 20.0 | 19.36 | 179.322 | 0.14 | |
| II | 7 | 0.609 | 33.0 | 0.07 | D22 | 20.0 | 19.36 | 179.322 | 0.00 | |
| | 6 | 3.451 | 33.0 | 0.38 | D22 | 20.0 | 19.36 | 179.322 | 0.02 | |
| | 5 | 6.902 | 33.0 | 0.77 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 4 | 10.556 | 33.0 | 1.18 | D22 | 20.0 | 19.36 | 179.322 | 0.06 | |
| | 3 | 14.616 | 33.0 | 1.63 | D22 | 20.0 | 19.36 | 179.322 | 0.09 | |
| | 2 | 17.458 | 33.0 | 1.95 | D22 | 20.0 | 19.36 | 179.322 | 0.11 | |
| | 1 | 13.677 | 33.0 | 1.53 | D22 | 20.0 | 19.36 | 179.322 | 0.08 | |
| III | 7 | 183.191 | 33.0 | 21.96 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 6 | 182.120 | 33.0 | 21.82 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 5 | 187.689 | 33.0 | 22.54 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 4 | 193.964 | 33.0 | 23.37 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.57 | ※ |
| | 3 | 201.001 | 33.0 | 24.30 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.59 | ※ |
| | 2 | 173.951 | 33.0 | 20.76 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.00 | |
| I' | 7 | 6.193 | 33.0 | 0.69 | D22 | 20.0 | 19.36 | 179.322 | 0.04 | |
| | 6 | 15.058 | 33.0 | 1.68 | D22 | 20.0 | 19.36 | 179.322 | 0.09 | |
| | 5 | 29.387 | 33.0 | 3.30 | D22 | 20.0 | 19.36 | 179.322 | 0.18 | |
| | 4 | 44.084 | 33.0 | 4.98 | D22 | 20.0 | 19.36 | 179.322 | 0.27 | |
| | 3 | 58.322 | 33.0 | 6.63 | D22 | 20.0 | 19.36 | 179.322 | 0.36 | |
| | 2 | 54.471 | 33.0 | 6.18 | D22 | 20.0 | 19.36 | 179.322 | 0.33 | |
| | 1 | 22.920 | 33.0 | 2.57 | D22 | 20.0 | 19.36 | 179.322 | 0.14 | |
| III' | 7 | 176.868 | 33.0 | 21.14 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.52 | ※ |
| | 6 | 175.860 | 33.0 | 21.01 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.51 | ※ |
| | 5 | 181.192 | 33.0 | 21.70 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.53 | ※ |
| | 4 | 187.224 | 33.0 | 22.48 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.55 | ※ |
| | 3 | 194.578 | 33.0 | 23.45 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.57 | ※ |
| | 2 | 171.419 | 33.0 | 20.43 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.50 | ※ |
| | 1 | 0.000 | 33.0 | 0.00 | D22,D25 | 10.0 | 44.69 | 376.716 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner

| CALCULATION | | |
|---|---|---|
| Detailed Design on Port Reactivation Project in La Union Province | | |
| CALC FILE No.: | | |
| CALC INDEX No.: | | PAGE 162 |
| | INITIAL | DATE |
| PREPARED BY | Y.Ando | 24/07/02 |
| CHECKED BY | R.NISHIMURA | 09/08/2002 |

Serviceability limit state

Sidewall(parallel to centerline:landside)--Horizontal inner side steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | $\sigma se$ ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$(cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 2.676 | 33.0 | D22 | 20.0 | 19.36 | 4.591 | 0.0008 | |
| | 6 | 6.551 | 33.0 | D22 | 20.0 | 19.36 | 11.239 | 0.0020 | 0.0040×6.0 |
| | 5 | 12.826 | 33.0 | D22 | 20.0 | 19.36 | 22.005 | 0.0040 | =0.0240 |
| | 4 | 19.285 | 33.0 | D22 | 20.0 | 19.36 | 33.087 | 0.0060 | |
| | 3 | 25.559 | 33.0 | D22 | 20.0 | 19.36 | 43.851 | 0.0080 | |
| | 2 | 24.267 | 33.0 | D22 | 20.0 | 19.36 | 41.635 | 0.0076 | |
| | 1 | 20.838 | 33.0 | D22 | 20.0 | 19.36 | 35.752 | 0.0065 | |
| II | 7 | 0.277 | 33.0 | D22 | 20.0 | 19.36 | 0.475 | 0.0001 | |
| | 6 | 1.569 | 33.0 | D22 | 20.0 | 19.36 | 2.692 | 0.0005 | 0.0040×6.0 |
| | 5 | 3.137 | 33.0 | D22 | 20.0 | 19.36 | 5.382 | 0.0010 | =0.0240 |
| | 4 | 4.798 | 33.0 | D22 | 20.0 | 19.36 | 8.232 | 0.0015 | |
| | 3 | 6.643 | 33.0 | D22 | 20.0 | 19.36 | 11.397 | 0.0021 | |
| | 2 | 7.935 | 33.0 | D22 | 20.0 | 19.36 | 13.614 | 0.0025 | |
| | 1 | 12.433 | 33.0 | D22 | 20.0 | 19.36 | 21.331 | 0.0039 | |
| III | 7 | 166.539 | 33.0 | D22,D25 | 10.0 | 44.69 | 128.791 | 0.0190 | |
| | 6 | 165.567 | 33.0 | D22,D25 | 10.0 | 44.69 | 128.040 | 0.0189 | 0.0040×6.0 |
| | 5 | 170.630 | 33.0 | D22,D25 | 10.0 | 44.69 | 131.955 | 0.0194 | =0.0240 |
| | 4 | 176.335 | 33.0 | D22,D25 | 10.0 | 44.69 | 136.367 | 0.0201 | |
| | 3 | 182.734 | 33.0 | D22,D25 | 10.0 | 44.69 | 141.315 | 0.0208 | |
| | 2 | 158.143 | 33.0 | D22,D25 | 10.0 | 44.69 | 122.298 | 0.0180 | |
| | 1 | 0.000 | 33.0 | D22,D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |
| I' | 7 | 2.815 | 33.0 | D22 | 20.0 | 19.36 | 4.830 | 0.0009 | |
| | 6 | 6.844 | 33.0 | D22 | 20.0 | 19.36 | 11.742 | 0.0021 | 0.0040×6.0 |
| | 5 | 13.357 | 33.0 | D22 | 20.0 | 19.36 | 22.916 | 0.0042 | =0.0240 |
| | 4 | 20.038 | 33.0 | D22 | 20.0 | 19.36 | 34.379 | 0.0063 | |
| | 3 | 26.509 | 33.0 | D22 | 20.0 | 19.36 | 45.481 | 0.0083 | |
| | 2 | 24.758 | 33.0 | D22 | 20.0 | 19.36 | 42.477 | 0.0077 | |
| | 1 | 20.838 | 33.0 | D22 | 20.0 | 19.36 | 35.752 | 0.0065 | |
| III' | 7 | 160.787 | 33.0 | D22,D25 | 10.0 | 44.69 | 124.343 | 0.0183 | |
| | 6 | 159.873 | 33.0 | D22,D25 | 10.0 | 44.69 | 123.636 | 0.0182 | 0.0040×6.0 |
| | 5 | 164.722 | 33.0 | D22,D25 | 10.0 | 44.69 | 127.386 | 0.0188 | =0.0240 |
| | 4 | 170.207 | 33.0 | D22,D25 | 10.0 | 44.69 | 131.628 | 0.0194 | |
| | 3 | 176.893 | 33.0 | D22,D25 | 10.0 | 44.69 | 136.798 | 0.0201 | |
| | 2 | 155.840 | 33.0 | D22,D25 | 10.0 | 44.69 | 120.517 | 0.0177 | |
| | 1 | 0.000 | 33.0 | D22,D25 | 10.0 | 44.69 | 0.000 | 0.0000 | |

Notes) I ～III : Before correction Slab of a middle part

Notes) I' ～III' : After correction Slab of side wall corner

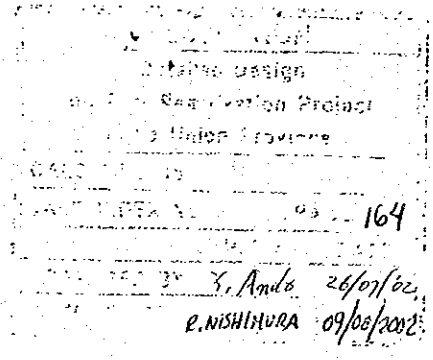
CALCULATION
Detailed Design
on Port Reactivation Project
in La Union Province
CALC FILE No.:
CALC INDEX No.: PAGE 163
INITIAL DATE
PREPARED BY: Y. Ando 26/07/02
E. NISHIHARA 09/08/2002

Ultimate limit state (Under ordinary conditions)
Sidewall(parallel to centerline:landside)—Horizontal outside steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn (cm²) | Diameter (mm) | Pitch (cm) | As (cm²) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 91.722 | 31.0 | 11.30 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.41 | ※ |
| | 6 | 89.570 | 31.0 | 11.02 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.40 | ※ |
| | 5 | 92.617 | 31.0 | 11.42 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.42 | ※ |
| | 4 | 95.740 | 31.0 | 11.82 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.43 | ※ |
| | 3 | 97.738 | 31.0 | 12.08 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.44 | ※ |
| | 2 | 78.531 | 31.0 | 9.62 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.35 | ※ |
| | 1 | 16.849 | 37.6 | 1.65 | D22,D16 | 10.0 | 29.29 | 302.158 | 0.06 | |
| II | 7 | 22.137 | 31.0 | 2.64 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 6 | 22.469 | 31.0 | 2.68 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 5 | 23.125 | 31.0 | 2.76 | D22 | 20.0 | 19.36 | 167.704 | 0.15 | |
| | 4 | 24.030 | 31.0 | 2.87 | D22 | 20.0 | 19.36 | 167.704 | 0.16 | |
| | 3 | 25.223 | 31.0 | 3.02 | D22 | 20.0 | 19.36 | 167.704 | 0.17 | |
| | 2 | 24.924 | 31.0 | 2.98 | D22 | 20.0 | 19.36 | 167.704 | 0.16 | |
| | 1 | 10.150 | 37.6 | 0.99 | D22 | 20.0 | 19.36 | 206.044 | 0.05 | |
| III | 7 | 1.624 | 37.6 | 0.16 | D22 | 20.0 | 19.36 | 206.044 | 0.01 | |
| | 6 | 23.549 | 37.6 | 2.31 | D22 | 20.0 | 19.36 | 206.044 | 0.13 | |
| | 5 | 55.014 | 37.6 | 5.45 | D22 | 20.0 | 19.36 | 206.044 | 0.29 | |
| | 4 | 86.886 | 37.6 | 8.69 | D22 | 20.0 | 19.36 | 206.044 | 0.46 | |
| | 3 | 118.352 | 37.6 | 11.96 | D22 | 20.0 | 19.36 | 206.044 | 0.63 | |
| | 2 | 120.585 | 37.6 | 12.19 | D22 | 20.0 | 19.36 | 206.044 | 0.64 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |
| I' | 7 | 94.884 | 31.0 | 11.71 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.43 | ※ |
| | 6 | 92.700 | 31.0 | 11.43 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.42 | ※ |
| | 5 | 95.865 | 31.0 | 11.83 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.43 | ※ |
| | 4 | 99.110 | 31.0 | 12.25 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.45 | ※ |
| | 3 | 100.950 | 31.0 | 12.49 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.45 | ※ |
| | 2 | 79.797 | 31.0 | 9.78 | D22,D16 | 10.0 | 29.29 | 244.159 | 0.36 | ※ |
| | 1 | 16.849 | 37.6 | 1.65 | D22,D16 | 10.0 | 29.29 | 302.158 | 0.06 | |
| III' | 7 | 1.011 | 37.6 | 0.10 | D22 | 20.0 | 19.36 | 206.044 | 0.01 | |
| | 6 | 22.260 | 37.6 | 2.18 | D22 | 20.0 | 19.36 | 206.044 | 0.12 | |
| | 5 | 52.675 | 37.6 | 5.22 | D22 | 20.0 | 19.36 | 206.044 | 0.28 | |
| | 4 | 83.573 | 37.6 | 8.35 | D22 | 20.0 | 19.36 | 206.044 | 0.45 | |
| | 3 | 114.172 | 37.6 | 11.52 | D22 | 20.0 | 19.36 | 206.044 | 0.61 | |
| | 2 | 118.423 | 37.6 | 11.97 | D22 | 20.0 | 19.36 | 206.044 | 0.63 | |
| | 1 | 0.000 | 37.6 | 0.00 | D22 | 20.0 | 19.36 | 206.044 | 0.00 | |

※ It determines from serviceability limit state.
Notes) I ～III : Before correction Slab of a middle part
Notes) I' ～III' : After correction Slab of side wall corner



Serviceability limit state

Sidewall(parallel to centerline:landside)—Horizontal outside steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{lim}$(cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 83.386 | 31.0 | D22, D16 | 10.0 | 29.29 | 102.821 | 0.0195 | |
| | 6 | 81.429 | 31.0 | D22, D16 | 10.0 | 29.29 | 100.408 | 0.0190 | 0.0035×8.0 |
| | 5 | 84.199 | 31.0 | D22, D16 | 10.0 | 29.29 | 103.824 | 0.0197 | =0.0280 |
| | 4 | 87.038 | 31.0 | D22, D16 | 10.0 | 29.29 | 107.324 | 0.0203 | |
| | 3 | 88.855 | 31.0 | D22, D16 | 10.0 | 29.29 | 109.565 | 0.0208 | |
| | 2 | 71.394 | 31.0 | D22, D16 | 10.0 | 29.29 | 88.034 | 0.0167 | |
| | 1 | 7.658 | 37.6 | D22, D16 | 10.0 | 29.29 | 7.715 | 0.0015 | |
| II | 7 | 20.125 | 31.0 | D22 | 20.0 | 19.36 | 36.851 | 0.0082 | |
| | 6 | 20.426 | 31.0 | D22 | 20.0 | 19.36 | 37.402 | 0.0083 | 0.0035×8.0 |
| | 5 | 21.023 | 31.0 | D22 | 20.0 | 19.36 | 38.496 | 0.0086 | =0.0280 |
| | 4 | 21.847 | 31.0 | D22 | 20.0 | 19.36 | 40.004 | 0.0089 | |
| | 3 | 22.930 | 31.0 | D22 | 20.0 | 19.36 | 41.987 | 0.0093 | |
| | 2 | 22.659 | 31.0 | D22 | 20.0 | 19.36 | 41.491 | 0.0092 | |
| | 1 | 4.614 | 37.6 | D22 | 20.0 | 19.36 | 6.912 | 0.0015 | |
| III | 7 | 0.738 | 37.6 | D22 | 20.0 | 19.36 | 1.106 | 0.0002 | |
| | 6 | 10.703 | 37.6 | D22 | 20.0 | 19.36 | 16.033 | 0.0036 | 0.0035×8.0 |
| | 5 | 25.005 | 37.6 | D22 | 20.0 | 19.36 | 37.457 | 0.0083 | =0.0280 |
| | 4 | 39.492 | 37.6 | D22 | 20.0 | 19.36 | 59.158 | 0.0131 | |
| | 3 | 53.794 | 37.6 | D22 | 20.0 | 19.36 | 80.582 | 0.0179 | |
| | 2 | 54.809 | 37.6 | D22 | 20.0 | 19.36 | 82.102 | 0.0182 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |
| I' | 7 | 86.262 | 31.0 | D22, D16 | 10.0 | 29.29 | 106.368 | 0.0201 | |
| | 6 | 84.276 | 31.0 | D22, D16 | 10.0 | 29.29 | 103.919 | 0.0197 | 0.0035×8.0 |
| | 5 | 87.153 | 31.0 | D22, D16 | 10.0 | 29.29 | 107.466 | 0.0204 | =0.0280 |
| | 4 | 90.102 | 31.0 | D22, D16 | 10.0 | 29.29 | 111.103 | 0.0210 | |
| | 3 | 91.775 | 31.0 | D22, D16 | 10.0 | 29.29 | 113.166 | 0.0214 | |
| | 2 | 72.546 | 31.0 | D22, D16 | 10.0 | 29.29 | 89.455 | 0.0169 | |
| | 1 | 7.658 | 37.6 | D22, D16 | 10.0 | 29.29 | 7.715 | 0.0015 | |
| III' | 7 | 0.460 | 37.6 | D22 | 20.0 | 19.36 | 0.689 | 0.0002 | |
| | 6 | 10.117 | 37.6 | D22 | 20.0 | 19.36 | 15.155 | 0.0034 | 0.0035×8.0 |
| | 5 | 23.942 | 37.6 | D22 | 20.0 | 19.36 | 35.864 | 0.0080 | =0.0280 |
| | 4 | 37.986 | 37.6 | D22 | 20.0 | 19.36 | 56.902 | 0.0126 | |
| | 3 | 51.894 | 37.6 | D22 | 20.0 | 19.36 | 77.736 | 0.0173 | |
| | 2 | 53.826 | 37.6 | D22 | 20.0 | 19.36 | 80.630 | 0.0179 | |
| | 1 | 0.000 | 37.6 | D22 | 20.0 | 19.36 | 0.000 | 0.0000 | |

Notes) I ~III : Before correction Slab of a middle part

Notes) I' ~III' : After correction Slab of side wall corner

| CALCULATION | | |
|---|---|---|
| Detailed Design on Port Reactivation Project in La Union Province | | |
| CALC FILE No.: | | |
| CALC INDEX No.: | | PAGE 165 |
| | INITIAL | DATE |
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | E. NISHIHUDA | 09/08/2002 |

Ultimate limit state (Under ordinary conditions)
Sidewall(parallel to centerline:landside)--Perpendicular inner side steel reinforcement

B = 100cm

| NO | | Md (kN·m) | d (cm) | Asn ($cm^2$) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | Mud (kN·m) | γi·Md/Mud | |
|---|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 1.624 | 31.0 | 0.19 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 5 | 4.466 | 31.0 | 0.53 | D16 | 40.0 | 4.97 | 45.410 | 0.11 | |
| | 4 | 7.105 | 31.0 | 0.84 | D16 | 40.0 | 4.97 | 45.410 | 0.17 | |
| | 3 | 11.977 | 31.0 | 1.42 | D16 | 40.0 | 4.97 | 45.410 | 0.29 | |
| | 2 | 24.970 | 31.0 | 2.98 | D16 | 40.0 | 4.97 | 45.410 | 0.60 | |
| | 1 | 137.658 | 31.0 | 17.35 | D16,D25 | 10.0 | 35.27 | 287.063 | 0.53 | ※ |
| II | 7 | 0.000 | 31.0 | 0.00 | D16 | 40.0 | 4.97 | 45.410 | 0.00 | |
| | 6 | 0.406 | 31.0 | 0.05 | D16 | 40.0 | 4.97 | 45.410 | 0.01 | |
| | 5 | 1.015 | 31.0 | 0.12 | D16 | 40.0 | 4.97 | 45.410 | 0.02 | |
| | 4 | 1.624 | 31.0 | 0.19 | D16 | 40.0 | 4.97 | 45.410 | 0.04 | |
| | 3 | 3.654 | 31.0 | 0.43 | D16 | 40.0 | 4.97 | 45.410 | 0.09 | |
| | 2 | 11.774 | 31.0 | 1.40 | D16 | 40.0 | 4.97 | 45.410 | 0.29 | |
| | 1 | 82.555 | 31.0 | 10.13 | D16,D16 | 10.0 | 19.86 | 171.711 | 0.53 | ※ |
| III | 7 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |
| | 6 | 30.306 | 31.0 | 3.63 | D16 | 20.0 | 9.93 | 89.107 | 0.37 | |
| | 5 | 31.310 | 31.0 | 3.75 | D16 | 20.0 | 9.93 | 89.107 | 0.39 | |
| | 4 | 32.315 | 31.0 | 3.88 | D16 | 20.0 | 9.93 | 89.107 | 0.40 | |
| | 3 | 33.528 | 31.0 | 4.02 | D16 | 20.0 | 9.93 | 89.107 | 0.41 | |
| | 2 | 28.992 | 31.0 | 3.47 | D16 | 20.0 | 9.93 | 89.107 | 0.36 | |
| | 1 | 0.000 | 31.0 | 0.00 | D16 | 20.0 | 9.93 | 89.107 | 0.00 | |

※ It determines from serviceability limit state.

| CALCULATION | | |
|---|---|---|
| Detailed Design on Port Reactivation Project in La Union Province | | |
| CALC FILE No.: | | |
| CALC INDEX No.: | | PAGE 166 |
| | INITIAL | DATE |
| PREPARED BY | Y. Ando | 26/07/02 |
| CHECKED BY | E. NISHIHIGUCHI | 09/08/2002 |

Serviceability limit state

Sidewall(parallel to centerline:landside)—Perpendicular inner side steel reinforcement

B = 100cm

| NO | | Ms (kN·m) | d (cm) | Diameter (mm) | Pitch (cm) | As ($cm^2$) | σse ($N/mm^2$) | Crack width W(cm) | Permission crack width $W_{all}$ (cm) |
|---|---|---|---|---|---|---|---|---|---|
| I | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.738 | 31.0 | D16 | 40.0 | 4.97 | 5.038 | 0.0015 | 0.0040×8.0 |
| | 5 | 2.030 | 31.0 | D16 | 40.0 | 4.97 | 13.858 | 0.0041 | =0.0320 |
| | 4 | 3.229 | 31.0 | D16 | 40.0 | 4.97 | 22.043 | 0.0065 | |
| | 3 | 5.444 | 31.0 | D16 | 40.0 | 4.97 | 37.165 | 0.0109 | |
| | 2 | 11.349 | 31.0 | D16 | 40.0 | 4.97 | 77.476 | 0.0228 | |
| | 1 | 125.148 | 31.0 | D16,D25 | 10.0 | 35.27 | 129.347 | 0.0245 | |
| II | 7 | 0.000 | 31.0 | D16 | 40.0 | 4.97 | 0.000 | 0.0000 | |
| | 6 | 0.185 | 31.0 | D16 | 40.0 | 4.97 | 1.263 | 0.0004 | 0.0040×8.0 |
| | 5 | 0.461 | 31.0 | D16 | 40.0 | 4.97 | 3.147 | 0.0009 | =0.0320 |
| | 4 | 0.738 | 31.0 | D16 | 40.0 | 4.97 | 5.038 | 0.0015 | |
| | 3 | 1.661 | 31.0 | D16 | 40.0 | 4.97 | 11.339 | 0.0033 | |
| | 2 | 5.352 | 31.0 | D16 | 40.0 | 4.97 | 36.537 | 0.0108 | |
| | 1 | 75.052 | 31.0 | D16,D16 | 10.0 | 19.86 | 134.112 | 0.0254 | |
| III | 7 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |
| | 6 | 27.551 | 31.0 | D16 | 20.0 | 9.93 | 95.966 | 0.0215 | 0.0040×8.0 |
| | 5 | 28.465 | 31.0 | D16 | 20.0 | 9.93 | 99.150 | 0.0223 | =0.0320 |
| | 4 | 29.378 | 31.0 | D16 | 20.0 | 9.93 | 102.330 | 0.0230 | |
| | 3 | 30.481 | 31.0 | D16 | 20.0 | 9.93 | 106.172 | 0.0238 | |
| | 2 | 26.358 | 31.0 | D16 | 20.0 | 9.93 | 91.810 | 0.0206 | |
| | 1 | 0.000 | 31.0 | D16 | 20.0 | 9.93 | 0.000 | 0.0000 | |