

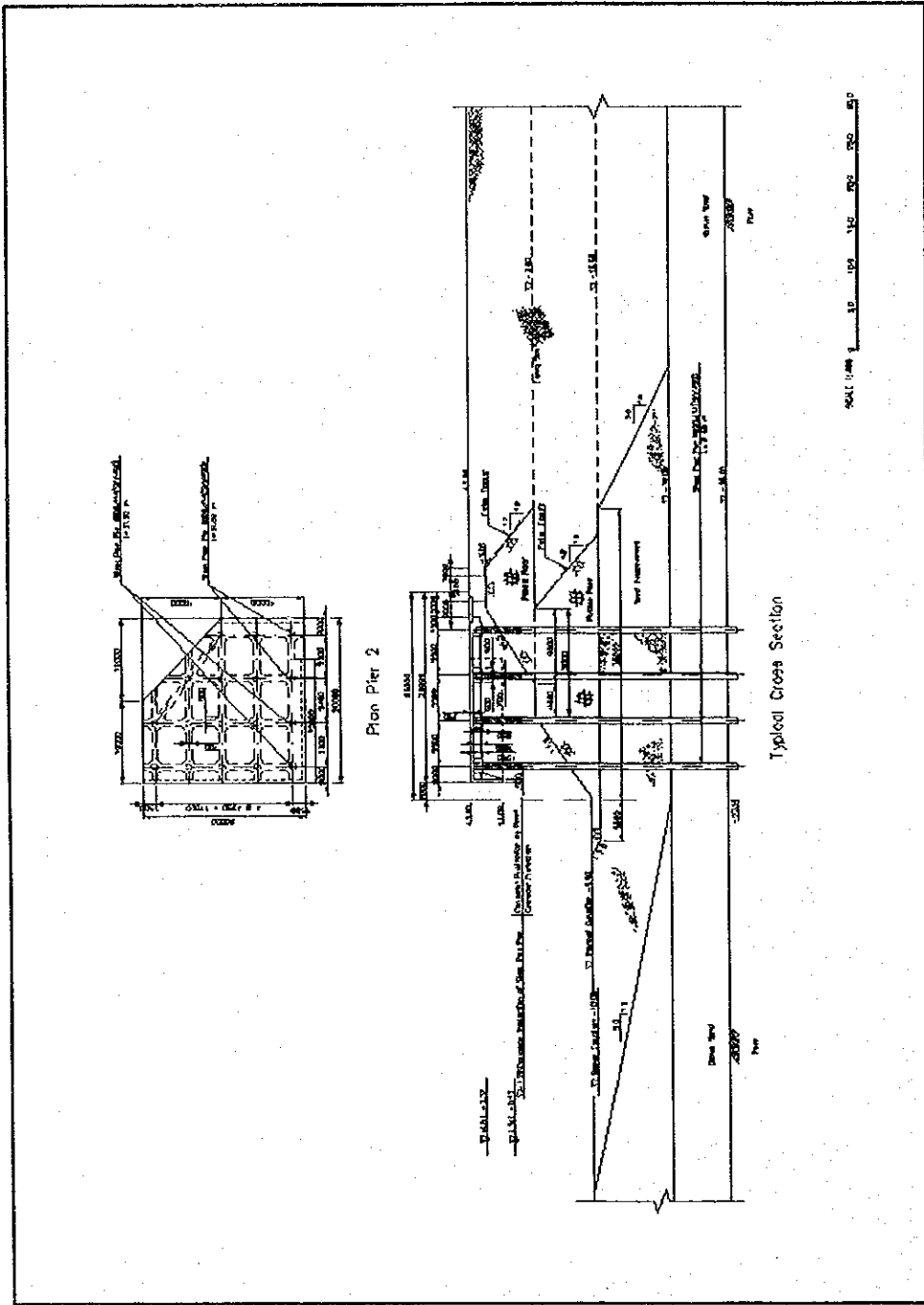
| DESIGN CALCULATION COVER SHEET                    |  |   |              |                     |            |                    |          |                        |
|---|--|---|--------------|---------------------|------------|--------------------|----------|------------------------|
| <b>Project</b>                                    | Detailed Design on Port Reactivation Project<br>in La Union Province |   |              | <b>Project Code</b> | JC1N004    |                    |          |                        |
| <b>Section</b>                                    | Civil  |   |              | Calc. File No.      |            |                    |          |                        |
| <b>Sub-Section</b>                                | Quaywall   |   |              | Calc. Index No.     |            |                    |          |                        |
| <b>Subject:</b>                                   | Passenger Berth  |   |              |                     |            |                    |          |                        |
| <b>Calculation Objective:</b>                     |  |   |              |                     |            |                    |          |                        |
| Stability of Platform 2.                          |  |   |              |                     |            |                    |          |                        |
| <b>References, Calculation Notes and Comments</b> |  |   |              |                     |            |                    |          |                        |
| Refer to drawings                                 |  | QW-02-001, QW-02-003                      |              |                     |            |                    |          |                        |
| Calculation based on                              |  |   |              |                     |            |                    |          |                        |
| TECHNICAL STANDERDS AND COMMENTARIES              |  |   |              |                     |            |                    |          |                        |
| FOR   |  |   |              |                     |            |                    |          |                        |
| PORT AND HARBOUR FACILITIES IN JAPAN              |  |   |              |                     |            |                    |          |                        |
| Design condition                                  |  | Refer to Design Condotions of this report |              |                     |            |                    |          |                        |
| Rev   | Prepared   |   | No. of Pages | Checked             |            | Reviewed           |          | Superseded by Calc No. |
|   | by   | Date                                      |              | by                  | Date       | by                 | Date     |                        |
| O   | <i>[Signature]</i>   | 26/07/02                                  | 69           | <i>[Signature]</i>  | 26 July 02 | <i>[Signature]</i> | 26/08/02 |                        |
| A   |  |   |              |                     |            |                    |          |                        |
| B   |  |   |              |                     |            |                    |          |                        |
| C   |  |   |              |                     |            |                    |          |                        |

File in Calc. File

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
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| <b>Subject</b> | Quaywall   | Page No.        | Rev. |

References/  
Notes

4. Basic Design of Platform2 (Passenger Berth)  
1) Outline structure of a platform 2



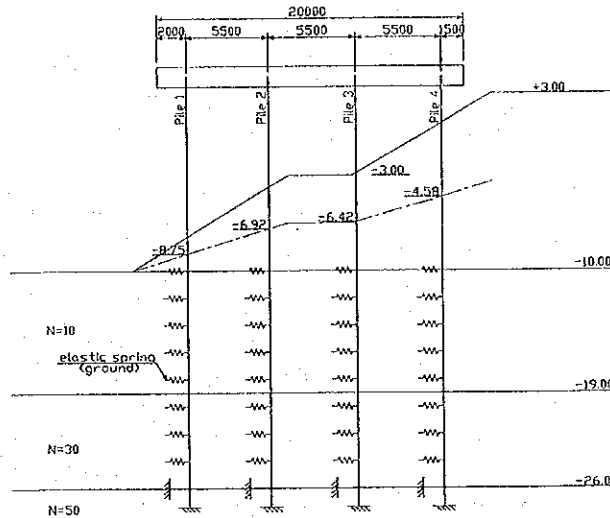
|  |             |                |            |              |
|--|-------------|----------------|------------|--------------|
|  | Prepared by | <i>Y. Ando</i> | Checked by | R. NISHIMURA |
|  |             | 26107/2002     |            | 08/08/2002   |

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References/  
Notes

2) Analysis model

Member forces acting on individual piles are calculated in 3-dimensional analysis.



Analysis model outline figure (Frame model)

An analysis model is taken as frame structure. (in which the ground is evaluated as an elastic spring.)

A transverse direction spring constant of ground (Kh) is computed using the following formulas.

$$Kh = kh \times D \quad (N/cm^2) \quad kh : \text{coefficient of horizontal subgrade reaction}(N/cm^3)$$

$$D : \text{pile width (cm)}$$

| Ground level           | Average N-value | kh(N/cm <sup>3</sup> ) | pile width(m) | Kh(kN/m <sup>2</sup> ) |
|------------------------|-----------------|------------------------|---------------|------------------------|
| Virtual ground surface |                 | 3.5                    | 0.70          | 2,450                  |
| -10.00                 | 10              | 15                     | 0.70          | 10,500                 |
| -19.00                 | 30              | 45                     | 0.70          | 31,500                 |
| -26.00                 |                 |                        |               |                        |

○Dimensions of Steel Pipe Pile

φ 800×t14 Section area A = 345.7 cm<sup>2</sup> (Corrosion consideration A' = 320.6 cm<sup>2</sup>)

Geometrical moment of inertia I = 267,050 cm<sup>4</sup>

(Corrosion consideration I' = 247,019 cm<sup>4</sup>)

Section modulus Z = 6,686 cm<sup>3</sup>

Type of Steel : SKK490 (Design Yield Strength 315 N/mm<sup>2</sup>)

|  |             |             |            |              |
|--|-------------|-------------|------------|--------------|
|  | Prepared by | Y. Ando     | Checked by | R. NISHIMURA |
|  |             | 261 07/2002 |            | 08/08/2002   |

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|--|--|----------------------|----------------------|------------------|---------------------|---------------------------|-----------|------------------------|-----------|------------------|---------------------|---------------------|-----------|------------------|--------|------------|----------|----------|----------|---------------|----------|------|--------|------------|----------|----------|----------|---------------|----------|------|--------|------------|----------|----------|----------|---------------|---------------------------|------|
| <b>Section</b>   | Civil  | Calc. Index No.      |                      |                  |                     |                           |           |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
| <b>Subject</b>   | Quaywall   | Page No. 3           | Rev.                 |                  |                     |                           |           |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
|  |  |                      | References/<br>Notes |                  |                     |                           |           |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
| <p>3) Calculation of Load</p> <p>The external forces acting on a platform 1 is shown below.</p> <p style="text-align: center;">· Deadweight    · Surcharge    · Earthquake Force</p> <p>(1) Calculation of Deadweight of the superstructure</p> <p>Volume of superstructure    :    304.95 m<sup>3</sup></p> <p>Weight of superstructure    : 上部工全重量 7,318.8 → 7,320.0 kN</p> <p style="text-align: center;">conversion to equivalent uniform distribution load</p> <p style="text-align: center;"><math>w' = 7,320 / (20.0 \times 20.0 - (10.0 \times 10.0 / 2)) = 20.91 \text{ kN/m}^2</math></p> <p>(2) Surcharge</p> <p>Surcharge    <math>w = 10.0 \text{ kN/m}^2</math></p> <p>Total of Surcharge    <math>W' = 10.0 \times (20.0 \times 20.0 - (10.0 \times 10.0 / 2)) = 3,500 \text{ kN}</math></p> <p>(3) Calculation of Earthquake Force</p> <p style="text-align: center;"><math>P = (7,320 + 3,500) \times 0.20 = 2,165.0 \text{ kN}</math></p> <p>4) Examination case</p> <p>The load generalization table of each examination case</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th rowspan="2">Case</th> <th rowspan="2"></th> <th colspan="2">Vertical Forces (kN)</th> <th>Horizontal Forces (kN)</th> <th rowspan="2">Condition</th> <th rowspan="2">Action direction</th> <th rowspan="2">Premium coefficient</th> </tr> <tr> <th>Deadweight</th> <th>Surcharge</th> <th>Earthquake Force</th> </tr> </thead> <tbody> <tr> <td>case 1</td> <td>Earthquake</td> <td>7,320.00</td> <td>3,500.00</td> <td>2,165.00</td> <td>Extraordinary</td> <td>Sea→Land</td> <td>1.50</td> </tr> <tr> <td>case 2</td> <td>Earthquake</td> <td>7,320.00</td> <td>3,500.00</td> <td>2,165.00</td> <td>Extraordinary</td> <td>Land→Sea</td> <td>1.50</td> </tr> <tr> <td>case 3</td> <td>Earthquake</td> <td>7,320.00</td> <td>3,500.00</td> <td>2,165.00</td> <td>Extraordinary</td> <td>Parallel to the face line</td> <td>1.50</td> </tr> </tbody> </table> |  |                      |                      | Case             |                     | Vertical Forces (kN)      |           | Horizontal Forces (kN) | Condition | Action direction | Premium coefficient | Deadweight          | Surcharge | Earthquake Force | case 1 | Earthquake | 7,320.00 | 3,500.00 | 2,165.00 | Extraordinary | Sea→Land | 1.50 | case 2 | Earthquake | 7,320.00 | 3,500.00 | 2,165.00 | Extraordinary | Land→Sea | 1.50 | case 3 | Earthquake | 7,320.00 | 3,500.00 | 2,165.00 | Extraordinary | Parallel to the face line | 1.50 |
| Case   |  | Vertical Forces (kN) |                      |                  |                     | Horizontal Forces (kN)    | Condition | Action direction       |           |                  |                     | Premium coefficient |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
|  |  | Deadweight           | Surcharge            | Earthquake Force |                     |                           |           |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
| case 1   | Earthquake   | 7,320.00             | 3,500.00             | 2,165.00         | Extraordinary       | Sea→Land                  | 1.50      |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
| case 2   | Earthquake   | 7,320.00             | 3,500.00             | 2,165.00         | Extraordinary       | Land→Sea                  | 1.50      |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
| case 3   | Earthquake   | 7,320.00             | 3,500.00             | 2,165.00         | Extraordinary       | Parallel to the face line | 1.50      |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
|  |  | Prepared by          | <i>Y. Ando</i>       | Checked by       | <i>Z. NISHIMURA</i> |                           |           |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |
|  |  |                      | 26 / 07 / 2002       |                  | 08 / 08 / 2002      |                           |           |                        |           |                  |                     |                     |           |                  |        |            |          |          |          |               |          |      |        |            |          |          |          |               |          |      |        |            |          |          |          |               |                           |      |

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|--|--|--------------------------|----------------------|---------------------------|--------------------|--------------------------|-------------------|---------------------------|--------------------|---------------------------------|-------------------|-------|-------|-------|-----|--------|-------|-------|-------|--------|---------|---------|---------|--------------------|---------|---------|---------|---------------------------------|-------------------|-------|-------|-------|-----|--------|---------|-------|-------|--------|---------|-------|-------|--------------------|---------|-------|-------|--|-------------------|-------|-------|-------|------|--------|-------|---------|---------|--------|-------|---------|---------|--------------------|---------|-------|-------|
| <b>Section</b>   | Civil  | Calc. Index No.          |                      |                           |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
| <b>Subject</b>   | Quaywall   | Page No. $\swarrow$      | Rev.                 |                           |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  |  |                          | References/<br>Notes |                           |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
| <p>5) Section Force of Pile</p> <p>Computed section force acting on pile is shown below as a result of analysis.</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Case</th> <th>Pile</th> <th>Maximum Moment<br/>kN · m</th> <th>Axial force<br/>kN</th> <th>Maximum Axial force<br/>kN</th> <th>Displacement<br/>cm</th> </tr> </thead> <tbody> <tr> <td rowspan="4">case1<br/>Earthquake<br/>Sea→Land</td> <td>Pile 1 (Sea side)</td> <td>861.7</td> <td>410.8</td> <td>482.7</td> <td rowspan="4">9.1</td> </tr> <tr> <td>Pile 2</td> <td>968.7</td> <td>862.4</td> <td>934.3</td> </tr> <tr> <td>Pile 3</td> <td>1,025.1</td> <td>1,000.3</td> <td>1,072.2</td> </tr> <tr> <td>Pile 4 (Land side)</td> <td>1,202.2</td> <td>1,027.8</td> <td>1,099.7</td> </tr> <tr> <td rowspan="4">case2<br/>Earthquake<br/>Land→Sea</td> <td>Pile 1 (Sea side)</td> <td>862.4</td> <td>787.8</td> <td>859.7</td> <td rowspan="4">9.1</td> </tr> <tr> <td>Pile 2</td> <td>1,013.1</td> <td>612.3</td> <td>684.2</td> </tr> <tr> <td>Pile 3</td> <td>1,031.8</td> <td>594.6</td> <td>666.5</td> </tr> <tr> <td>Pile 4 (Land side)</td> <td>1,201.7</td> <td>363.1</td> <td>435.0</td> </tr> <tr> <td rowspan="4">case3<br/>Earthquake<br/>Parallel to<br/>the<br/>face line</td> <td>Pile 1 (Sea side)</td> <td>959.6</td> <td>806.8</td> <td>878.7</td> <td rowspan="4">10.3</td> </tr> <tr> <td>Pile 2</td> <td>989.7</td> <td>1,064.2</td> <td>1,135.1</td> </tr> <tr> <td>Pile 3</td> <td>931.8</td> <td>1,084.0</td> <td>1,155.9</td> </tr> <tr> <td>Pile 4 (Land side)</td> <td>1,014.1</td> <td>918.2</td> <td>990.1</td> </tr> </tbody> </table> <p>※The moment compounded the moment about the parallel direction to the face line, and the moment about the right-angled direction to the face line.</p> <p>The following cases perform the stress examination of piles from the result of analysis.</p> <p>Pile 1 : case3 (Earthquake, Action direction Parallel to the face line)</p> <p>Pile 2 : case3 (Earthquake, Action direction Parallel to the face line)</p> <p>Pile 3 : case1 (Earthquake, Action direction Sea→Land)</p> <p>Pile 4 : case1 (Earthquake, Action direction Sea→Land)</p> |  |                          |                      | Case                      | Pile               | Maximum Moment<br>kN · m | Axial force<br>kN | Maximum Axial force<br>kN | Displacement<br>cm | case1<br>Earthquake<br>Sea→Land | Pile 1 (Sea side) | 861.7 | 410.8 | 482.7 | 9.1 | Pile 2 | 968.7 | 862.4 | 934.3 | Pile 3 | 1,025.1 | 1,000.3 | 1,072.2 | Pile 4 (Land side) | 1,202.2 | 1,027.8 | 1,099.7 | case2<br>Earthquake<br>Land→Sea | Pile 1 (Sea side) | 862.4 | 787.8 | 859.7 | 9.1 | Pile 2 | 1,013.1 | 612.3 | 684.2 | Pile 3 | 1,031.8 | 594.6 | 666.5 | Pile 4 (Land side) | 1,201.7 | 363.1 | 435.0 | case3<br>Earthquake<br>Parallel to<br>the<br>face line | Pile 1 (Sea side) | 959.6 | 806.8 | 878.7 | 10.3 | Pile 2 | 989.7 | 1,064.2 | 1,135.1 | Pile 3 | 931.8 | 1,084.0 | 1,155.9 | Pile 4 (Land side) | 1,014.1 | 918.2 | 990.1 |
| Case   | Pile   | Maximum Moment<br>kN · m | Axial force<br>kN    | Maximum Axial force<br>kN | Displacement<br>cm |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
| case1<br>Earthquake<br>Sea→Land  | Pile 1 (Sea side)  | 861.7                    | 410.8                | 482.7                     | 9.1                |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 2   | 968.7                    | 862.4                | 934.3                     |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 3   | 1,025.1                  | 1,000.3              | 1,072.2                   |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 4 (Land side)                                       | 1,202.2                  | 1,027.8              | 1,099.7                   |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
| case2<br>Earthquake<br>Land→Sea  | Pile 1 (Sea side)  | 862.4                    | 787.8                | 859.7                     | 9.1                |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 2   | 1,013.1                  | 612.3                | 684.2                     |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 3   | 1,031.8                  | 594.6                | 666.5                     |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 4 (Land side)                                       | 1,201.7                  | 363.1                | 435.0                     |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
| case3<br>Earthquake<br>Parallel to<br>the<br>face line   | Pile 1 (Sea side)  | 959.6                    | 806.8                | 878.7                     | 10.3               |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 2   | 989.7                    | 1,064.2              | 1,135.1                   |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 3   | 931.8                    | 1,084.0              | 1,155.9                   |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  | Pile 4 (Land side)                                       | 1,014.1                  | 918.2                | 990.1                     |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  |  | Prepared by              | Y. Ando              |                           |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  |  | Checked by               | R. NISHIMURA         |                           |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
|  |  |                          | 261 6712002          |                           |                    |                          |                   |                           |                    |                                 |                   |       |       |       |     |        |       |       |       |        |         |         |         |                    |         |         |         |                                 |                   |       |       |       |     |        |         |       |       |        |         |       |       |                    |         |       |       |  |                   |       |       |       |      |        |       |         |         |        |       |         |         |                    |         |       |       |
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| 6) Stress Examination of Piles  |  |                 |  |
| Passenger Berth , Platform 2 <span style="float: right;">ϕ 800*t14</span> |  |                 |  |
| Stress Calculation (Case3) Pile 1   |  |                 |  |
| Pile  | Dimension  | $\phi 800*t14$  | SKK 490  |
|   | Cross-sectional Area                                     | A=              | 345.7 cm <sup>2</sup>                              |
|   | Section modulus  | Z=              | 6,676 cm <sup>3</sup>                              |
|   | Radius of gyration of area                               | r=              | 27.8 cm  |
|   | Buckling length  | l=              | 1300 cm  |
|   |  | l/r=            | 46.8   |
| Section force   | Bending Moment   | M=              | 959.6 kN·m   |
|   | Axial Force  | N=              | 806.8 kN   |
| Stress  | Allowable Bending Stress                                 | $\sigma_{ba} =$ | 185 N/mm <sup>2</sup>                              |
|   | Allowable Axial Compressive Stress                       | $\sigma_{ca} =$ | 148 N/mm <sup>2</sup>                              |
|   | Premium Coefficient                                      |                 | 1.5  |
|   | Bending Stress   | $\sigma_b =$    | 144 N/mm <sup>2</sup> < 278 N/mm <sup>2</sup> O.K. |
|   | Axial Compressive Stress                                 | $\sigma_c =$    | 23 N/mm <sup>2</sup> < 222 N/mm <sup>2</sup> O.K.  |
|   | Examination of members simultaneously subject to axial   |                 | 0.62   |
|   |  | Prepared by     | Y. Ando  |
|   |  | Checked by      | D. NISHIMURA                                       |
|   |  | 261 07/2002     | 08 108/2002  |

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| Passenger Berth , Platform 2 <span style="float: right;">φ 800*t14</span> |  |  | References/<br>Notes           |
| Stress Calculation (Case3) Pile 2   |  |  |                                |
| Pile  | Dimension  | φ 800*t14  | SKK 490                        |
|   | Cross-sectional Area                                     | A= 345.7 cm <sup>2</sup>                                       |                                |
|   | Section modulus  | Z= 6,676 cm <sup>3</sup>                                       |                                |
|   | Radius of gyration of area                               | r= 27.8 cm   |                                |
|   | Bulking length   | l= 1123 cm   |                                |
|   |  | l/r= 40.4  |                                |
| Section force   | Bending Moment   | M= 989.7 kN·m  |                                |
|   | Axial Force  | N= 1,064.2 kN  |                                |
| Stress  | Allowable Bending Stress                                 | σ <sub>ba</sub> = 185 N/mm <sup>2</sup>                        |                                |
|   | Allowable Axial Compressive Stress                       | σ <sub>ca</sub> = 156 N/mm <sup>2</sup>                        |                                |
|   | Premium Coefficient                                      | 1.5  |                                |
|   | Bending Stress   | σ <sub>b</sub> = 148 N/mm <sup>2</sup> < 278 N/mm <sup>2</sup> | O.K.                           |
|   | Axial Compressive Stress                                 | σ <sub>c</sub> = 31 N/mm <sup>2</sup> < 234 N/mm <sup>2</sup>  | O.K.                           |
|   | Examination of members simultaneously subject to axial   | 0.67   | O.K.                           |
|   |  | Prepared by <i>Y. Ando</i>                                     | Checked by <i>E. NISHIMURA</i> |
|   |  | 2610712002   | 0810812002                     |

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| Passenger Berth ,Platform 2 <span style="float: right;">φ 800*t14</span> |  |  | References/<br>Notes           |
| Stress Calculation (Case1) Pile 3  |  |  |                                |
| Pile   | Dimension  | φ 800*t14  | SKK 490                        |
|  | Cross-sectional Area                                     | A= 345.7 cm <sup>2</sup>                                       |                                |
|  | Section modulus  | Z= 6,676 cm <sup>3</sup>                                       |                                |
|  | Radius of gyration of area                               | r= 27.8 cm   |                                |
|  | Bulking length   | l= 1075 cm   |                                |
|  |  | l/r= 38.7  |                                |
| Section force  | Bending Moment   | M= 1,025.1 kN·m  |                                |
|  | Axial Force  | N= 1,000.3 kN  |                                |
| Stress   | Allowable Bending Stress                                 | σ <sub>ba</sub> = 185 N/mm <sup>2</sup>                        |                                |
|  | Allowable Axial Compressive Stress                       | σ <sub>ca</sub> = 158 N/mm <sup>2</sup>                        |                                |
|  | Premium Coefficient                                      | 1.5  |                                |
|  | Bending Stress   | σ <sub>b</sub> = 154 N/mm <sup>2</sup> < 278 N/mm <sup>2</sup> | O.K.                           |
|  | Axial Compressive Stress                                 | σ <sub>c</sub> = 29 N/mm <sup>2</sup> < 237 N/mm <sup>2</sup>  | O.K.                           |
|  | Examination of members simultaneously subject to axial   | 0.68   | O.K.                           |
|  |  | Prepared by <i>Y. Ando</i>                                     | Checked by <b>R. NISHIMURA</b> |
|  |  | 261 07/2002  | 08 / 08 /2002                  |



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|  |  |  | References/<br>Notes           |
| Passenger Berth , Platform 2 <span style="float: right;">φ 800*t14</span><br><br>Stress Calculation (Case1) Pile 4 |  |  |                                |
| Pile   | Dimension  | φ 800*t14  | SKK 490                        |
|  | Cross-sectional Area                                     | A= 345.7 cm <sup>2</sup>                                       |                                |
|  | Section modulus  | Z= 6,676 cm <sup>3</sup>                                       |                                |
|  | Radius of gyration of area                               | r= 27.8 cm   |                                |
|  | Bulking length   | l= 900 cm  |                                |
|  |  | l/r= 32.4  |                                |
| Section force  | Bending Moment   | M= 1,202.2 kN·m  |                                |
|  | Axial Force  | N= 1,027.8 kN  |                                |
| Stress   | Allowable Bending Stress                                 | σ <sub>ba</sub> = 185 N/mm <sup>2</sup>                        |                                |
|  | Allowable Axial Compressive Stress                       | σ <sub>ca</sub> = 165 N/mm <sup>2</sup>                        |                                |
|  | Premium Coefficient                                      | 1.5  |                                |
|  | Bending Stress   | σ <sub>b</sub> = 180 N/mm <sup>2</sup> < 278 N/mm <sup>2</sup> | O. K.                          |
|  | Axial Compressive Stress                                 | σ <sub>c</sub> = 30 N/mm <sup>2</sup> < 248 N/mm <sup>2</sup>  | O. K.                          |
|  | Examination of members simultaneously subject to axial   | 0.77   | O. K.                          |
|  |  | Prepared by <i>Y. Ando</i>                                     | Checked by <i>E. NISHIMURA</i> |
|  |  | 2610712002   | 0810812002                     |

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7) Examination of Bearing Capacity of Pile

Ultimate bearing capacity (Ru) is computed using the following formulas.

$$R_u = 300 \times q \times N \times A_p + N' \times A_s \quad (\text{kN})$$

Where q : Closed area ratio of pile

N : N-value of the ground around pile toe

$$N = (N_1 + N_2) / 2$$

N1 : N-value at the toe of pile

N2 : mean N-value in the range from the toe of pile to the level 4B above

B : diameter or width of pile (m)

N' : mean N-value for total penetration length of pile

A<sub>p</sub> : toe area of pile (m<sup>2</sup>)

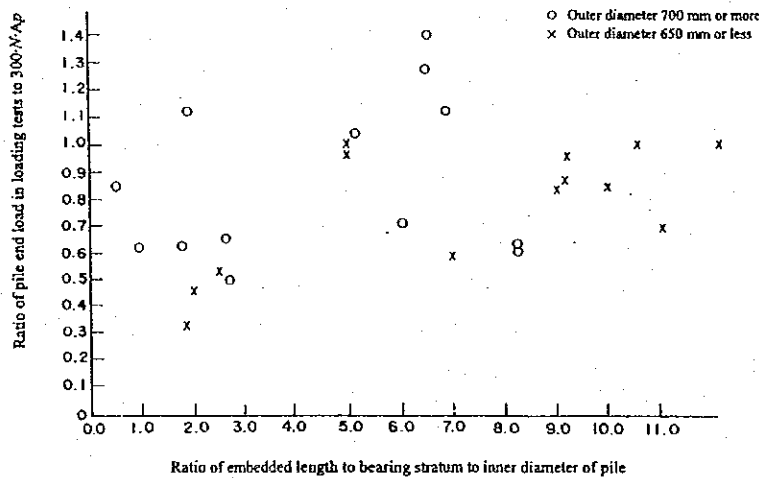
A<sub>s</sub> : total circumferential area of pile (m<sup>2</sup>)

※ The pile installation method assumes from Soil Condition that it is the pile installation by inner excavation. Therefore, the 2nd term of the upper formula is made into "N×A<sub>s</sub>." (see "Highway Bridge Specifications and the Commentary(in Japan)") (According to the standard, it is "2×N×A<sub>s</sub>".)

(1) Closed area ratio of pile

The piles shall drive only the length of pile diameter into the bearing stratum (below -26m).

The Closed area ratio is set to "q=0.6" from the following figures.



|  |             |                      |            |                       |
|--|-------------|----------------------|------------|-----------------------|
|  | Prepared by | <i>Y. Ando</i>       | Checked by | <i>Z. NISHIMURA</i>   |
|  |             | <i>261 07 1200 2</i> |            | <i>08 / 08 1200 2</i> |

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|   |  |                 | References/<br>Notes |
| <p>(2) Calculation of ultimate bearing capacity</p> $N2 = (0.8 \times 50 + 3 \times 0.8 \times 30) / (4 \times 0.8) = 35$ $N = (50 + 35) / 2 = 42.5 \rightarrow 42$ $A_p = 0.8^2 \times \pi / 4 = 0.503 \text{ m}^2$ <p>Circumferential area of pile per 1m <math>A_s' = 0.8 \times \pi = 2.51 \text{ m}^2/\text{m}</math></p> $R_u = 300 \times 0.6 \times 42 \times 0.503 + (9.5 \times 10 + 6.0 \times 30) \times 2.51$ $= 4,492.93 \text{ kN}$ <p>(3) Examination of Bearing Capacity</p> <p>The allowable bearing capacity is calculated using the following formulas.</p> $R_a = R_u / F$ <p>where</p> <p><math>R_a</math> : allowable bearing capacity<br/> <math>R_u</math> : ultimate bearing capacity<br/> <math>F</math> : safety factor (= 1.50 : earthquake condition)</p> <p>a) Examination of Bearing Capacity(Earthquake Condition)</p> <p>Allowable bearing capacity <math>R_a = 4,493 / 1.5 = 2,995 \text{ kN} \geq 1,135 \text{ kN}</math>    O.K</p> <p>(Maximum Axial Force case3 (Earthquake Condition,<br/> Action direction : Parallel to face line, Pile3)</p> |  |                 |                      |
|   |  | Prepared by     | <i>Y. Ando</i>       |
|   |  | Checked by      | <i>E. NISHIMURA</i>  |
|   |  |                 | <i>261 07 12002</i>  |
|   |  |                 | <i>08 108 12002</i>  |

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8) Examination of Earthquake-Resistant Performance

The examination of earthquake-resistant is performed by the "simplified method" from the following things.

- An object institution does not have complicated structure.
- A raking pile is not included.

The simplified method evaluates the load carrying capacity of pier by summing up the strength of the steel pipe piles, while assuming that the pier superstructure is a rigid body.

(1) Determination of seismic coefficient for examination

The seismic coefficient for examinations is obtained for the different regional classification in a structure installation position and the natural periods of the ground and the pile-supported section. Regional classification is set as region category A.

a) Natural Period of the Ground

The natural period of the ground is computed using the following formulas.

$$T_g = 4 \sum H_i / V_{si}$$

$T_g$  ; natural period of the ground (s)

$H_i$  ; thickness of the i-th layer (m)

$V_{si}$  ; shear wave velocity in the i-th layer  $V_{si} = \sqrt{(G_0 g / \gamma_t)}$  (m/s)

$G_0$  ; shear modulus (kN/m<sup>2</sup>)

• sandy ground  $G_0 = 14,400N^{0.68}$  (kN/m<sup>2</sup>)

$g$  ; gravitational acceleration (=9.8m/s<sup>2</sup>)

$\gamma_t$  ; wet unit weight (kN/m<sup>3</sup>)

$N$  ; standard penetration test value

The natural period of the ground is computed for the engineering foundation.

The crown height of rubble is set as -6.33m(virtual ground surface). Therefore, it is aimed at the -6.33m ~ -26m foundation.

| Level      | $H_i$ (m) | soil  | N    | $\gamma_t$ (kN/m <sup>3</sup> ) | $G_0$ (kN/m <sup>2</sup> ) | $V_{si}$ (m/s) |
|------------|-----------|-------|------|---------------------------------|----------------------------|----------------|
| -6.33~10.0 | 3.50      | sandy | 2.33 | 20.0                            | 25,596                     | 112.05         |
| -10.0~20.0 | 10.0      | sandy | 10   | 20.0                            | 68,923                     | 183.87         |
| -20.0~26.0 | 6.0       | sandy | 30   | 20.0                            | 145,481                    | 267.13         |

• Natural Period of the Ground

$$T_g = 4 \times (3.50/112.05 + 10.0/183.87 + 6.0/267.13) = 0.432s$$

|  |             |             |            |              |
|--|-------------|-------------|------------|--------------|
|  | Prepared by | Y. Ando     | Checked by | R. NISHIMURA |
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b) Natural Period of Platform 2

The coefficient of horizontal subgrade reaction and the characteristic value of a pile are computed using the following formulas.

- coefficient of horizontal subgrade reaction  $k_h = 2 \times 1.5N$  ( $N/cm^3$ )
- characteristic value of a pile  $\beta = \sqrt[4]{(k_h D / (4EI))}$  ( $cm^{-1}$ )
- horizontal spring constant  $K_H = 12 \times EI / (L_i^3)$  ( $kN/m$ )
- natural period of a Platform 1  $T_s = 2 \times \pi \times \sqrt{(W / (g \times K_H))}$  (s)

where  $N$  : average  $N$ -value of the ground down to a depth of about  $1/\beta$

$D$  : diameter or width of the pile (=0.80m)

$L_i$  : free length of a pile  $= h_i + 1/\beta$

$h_i$  : vertical distance between the pile head and the virtual ground surface

$W$  : sum of deadweight and surcharge during an earthquake (=10,820 kN)

The calculation result of the spring constant of individual pile

|        | D<br>(cm) | thickness<br>of pile(cm) | I<br>( $cm^4$ ) | $h_i$<br>(m) | N    | $k_h$ | $\beta$<br>( $cm^{-1}$ ) | $1/\beta$<br>(m) | $L_i$<br>(m) | $K_H$<br>( $kN/m$ ) |
|--------|-----------|--------------------------|-----------------|--------------|------|-------|--------------------------|------------------|--------------|---------------------|
| Pile 1 | 79.8      | 1.3                      | 247,020         | 13.00        | 7.08 | 21.24 | 0.00304                  | 3.29             | 16.29        | 1,372               |
| Pile 2 | 79.8      | 1.3                      | 247,020         | 11.23        | 3.92 | 11.76 | 0.00262                  | 3.81             | 15.04        | 1,743               |
| Pile 3 | 79.8      | 1.3                      | 247,020         | 10.75        | 3.27 | 9.81  | 0.00251                  | 3.99             | 14.74        | 1,853               |
| Pile 4 | 79.8      | 1.3                      | 247,020         | 9.00         | 2.33 | 7.00  | 0.00231                  | 4.34             | 13.34        | 2,498               |

The number of piles of individual pile rows is as follows.

Pile 1 and Pile 2 : 5 , Pile 3 : 4 , Pile 4 : 3

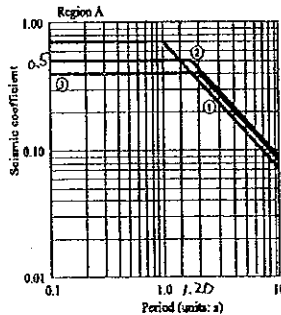
sum of horizontal spring constant

$$\Sigma K_H = (5 \times 1,372 + 5 \times 1,743 + 4 \times 1,853 + 3 \times 2,498) = 30,482 \text{ kN/m}$$

natural period of a Platform 2  $T_s = 2 \times \pi \times \sqrt{(10,820 / (9.81 \times 30,482))} = 1.20 \text{ s}$

c) Determination of seismic coefficient for examination

From the following figures, seismic coefficient for examination by reference is set to "kh=0.5".



Legend

- ①  $T_g < 0.1s$
- ②  $0.1s \leq T_g < 0.5s$
- ③  $0.5s \leq T_g$

$T_g$  ; natural period of the ground calculated with equation(s)

|  |                            |                                |
|--|----------------------------|--------------------------------|
|  | Prepared by <i>Y. Ando</i> | Checked by <i>R. NISHIMURA</i> |
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|   |  |                 | References/<br>Notes |
| <p>(2) Examination of Load Carrying Capacity Using Simplified Method</p> <p>In the examination of the load carrying capacity of pier using the simplified method, the pile-supported section shall be represented with a frame structure model and the horizontal displacement ductility factor of the pile-supported section shall be used. Examination is performed using the following formulas.</p> $R_a \geq k_h W$ $R_a = \sqrt{(2\mu_a - 1 + \theta(\mu_a - 1)^2) \times P_y}$ <p><math>R_a</math> ; load carrying capacity during an earthquake (kN)<br/> <math>k_h</math> ; seismic coefficient derived<br/> <math>W</math> ; deadweight of pier and surcharge acting during an earthquake (kN)<br/> <math>\mu_a</math> ; allowable displacement ductility factor (=1.3 ; Class A)<br/> <math>\theta</math> ; =0 (see "TECHNICAL STANDARDS AND COMMENTARIES FOR PORT AND HARBOUR FACILITIES IN JAPAN")<br/> <math>P_y</math> ; the horizontal force corresponding to the elastic limit =0.82<math>P_{uall}</math> (kN)<br/> <math>P_{uall}</math> ; the horizontal load level at which the bending moment of all piles of the wharf reach the fully plastic state moments both at the pile heads and underground virtual fix points =<math>\Sigma 2M_{pi}/L_i</math> (kN)<br/> <math>M_p</math> ; fully plastic state moment =<math>M_{p0} \cdot \cos(\alpha \pi/2)</math> (kN·m)<br/> <math>L_i</math> ; The length of individual pile =<math>h_i + 1/\beta</math> (m)<br/> <math>M_{p0}</math> ; fully plastic state moment of steel pipe pile when no axial force is acting =<math>Z_p f_y</math> (kN·m)<br/> <math>Z_p</math> ; plastic sectional modulus of steel pipe pile =<math>4/3 \times (r^3 - (r-t)^3)</math> (mm<sup>3</sup>)<br/> <math>f_y</math> ; design yield strength of steel pipe pile (N/mm<sup>2</sup>)<br/>                           SKK490 ; 315 N/mm<sup>2</sup><br/> <math>r</math> ; radius of steel pipe pile (mm)<br/> <math>t</math> ; thickness of steel pipe pile (mm)<br/> <math>\alpha</math> ; ratio of the acting axial force N to the yield axial force <math>N_0 (=A \times f_y)</math> when no bending moment is acting =<math>N/N_0</math><br/> <math>A</math> ; cross-sectional area of steel pipe pile (mm<sup>2</sup>)</p> <p>The case where the examination of load carrying capacity is performed is the case where load acts on land from the sea.</p> |  |                 |                      |
|   |  | Prepared by     | <i>Y. Ando</i>       |
|   |  | Checked by      | <i>E. NISHIMURA</i>  |
|   |  | 261 07/2002     | 08/08/2002           |

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a) Calculation of Member Forces Acting on Individual Piles

Earthquake force of using for examination of load carrying capacity

$$P = 10,820 \times 0.50 = 5,410 \text{ kN}$$

The horizontal force acting on the heads of individual piles may be calculated using following formula.

$$H_i = (K_{Hi} / \sum K_{Hi}) \times P \quad (\text{kN})$$

$K_{Hi}$  : horizontal spring constant of individual piles

|        | free length of a pile $L_i$ (m) | number of pile  | $K_{Hi}$ | $K_{Hi} / \sum K_{Hi}$ | $H_i$ (kN/piese) |
|--------|---------------------------------|-----------------|----------|------------------------|------------------|
| Pile 1 | 16.29                           | 5.0             | 6,862    | 0.225128               | 1,217.943        |
| Pile 2 | 15.04                           | 5.0             | 8,714    | 0.285880               | 1,546.610        |
| Pile 3 | 14.74                           | 4.0             | 7,411    | 0.243121               | 1,315.287        |
| Pile 4 | 13.34                           | 3.0             | 7,495    | 0.245871               | 1,330.160        |
|        |                                 | $\sum K_{Hi} =$ | 30,482   |                        |                  |

The pile head moments ( $M_i$ ) of individual piles may be calculated using following formula.

$$M_i = (1/2) \times L_i \times H_i \quad (\text{kN} \cdot \text{m})$$

|        | free length of a pile $L_i$ | $H_i$     | $M_i$     |
|--------|-----------------------------|-----------|-----------|
| Pile 1 | 16.29                       | 1,217.943 | 9,917.70  |
| Pile 2 | 15.04                       | 1,546.610 | 11,630.02 |
| Pile 3 | 14.74                       | 1,315.287 | 9,691.03  |
| Pile 4 | 13.34                       | 1,330.160 | 8,871.14  |

The axial force of individual piles may be calculated using following formula.

$$N_i = ((M_{i-1,i} + M_{i,i-1}) / L_{i-1,i}) - ((M_{i,i+1} + M_{i+1,i}) / L_{i,i+1})$$

where

$M_{i-1,i}$  : bending moment acting on the head of the (i-1)-th pile due to the horizontal force of the side beam of the i-th pile (kN · m)

$M_{i,i-1}$  : bending moment acting on the head of the i-th pile due to the horizontal force of the side beam of the (i-1)-th pile (kN · m)

$M_{i,i+1}$  : bending moment acting on the head of the i-th pile due to the horizontal force of the side beam of the (i+1)-th pile (kN · m)

$M_{i+1,i}$  : bending moment acting on the head of the (i+1)-th pile due to the horizontal force of the side beam of the i-th pile (kN · m)

$L_{i-1,i}$  : The interval of the pile of the (i-1)-th pile and i-th pile.

|  |                            |                                |  |
|--|----------------------------|--------------------------------|--|
|  | Prepared by <i>Y. Ando</i> | Checked by <i>E. NISHIMURA</i> |  |
|  | 2610712002                 | 0810812002                     |  |

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|--|--|-----------------|----------------------|------------|--------------|--------|--------|--------|--------------------------------------|----------|----------|----------|----------|----|-----------|--------|--------|----------|------------|---------|----------|----------|----------|
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| <b>Subject</b>   | Quaywall   | Page No. 15     | Rev.                 |            |              |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |
|  |  |                 | References/<br>Notes |            |              |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |
| <p><math>L_{i,i+1}</math> : The interval of the pile of the <math>i</math>-th pile and <math>(i+1)</math>-th pile.</p> <p>Since a pile interval is 3 spans, it is bending moment by the following formulas.</p> $M_{1,2} = 1.0 \times M_1 = 1.0 \times 10,284.35 = 9,917.70 \text{ kN} \cdot \text{m}$ $M_{2,1} = 0.5 \times M_2 = 0.5 \times 12,059.96 = 5,815.01 \text{ kN} \cdot \text{m}$ $M_{2,3} = 0.7 \times M_2 = 0.7 \times 12,059.96 = 8,141.01 \text{ kN} \cdot \text{m}$ $M_{3,2} = 0.7 \times M_3 = 0.7 \times 10,049.30 = 6,783.72 \text{ kN} \cdot \text{m}$ $M_{3,4} = 0.5 \times M_3 = 0.5 \times 10,049.30 = 4,845.52 \text{ kN} \cdot \text{m}$ $M_{4,3} = 1.0 \times M_4 = 1.0 \times 9,199.09 = 8,871.14 \text{ kN} \cdot \text{m}$ <p>The interval of each pile is as follows.</p> <p>Pile 1~Pile 2 : 5.30m , Pile 2~Pile 3 : 5.40m , Pile 3~Pile 4 : 5.30m.</p> <p>The axial force of individual piles is as follows.</p> $N_1 = -(9,917.70 + 5,815.01) / 5.30 = -2,968.44 \text{ kN}$ $N_2 = ((9,917.70 + 5,815.01) / 5.30) - ((8,141.01 + 6,783.72) / 5.40) = 204.60 \text{ kN}$ $N_3 = ((8,141.01 + 6,783.72) / 5.40) - ((4,845.52 + 8,871.14) / 5.30) = 175.79 \text{ kN}$ $N_4 = ((4,845.52 + 8,871.14) / 5.30) = 2,588.05 \text{ kN}$ <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th></th> <th>Pile 1</th> <th>Pile 2</th> <th>Pile 3</th> <th>Pile 4</th> </tr> </thead> <tbody> <tr> <td>Deadweight + Surcharge<sup>*1</sup></td> <td style="text-align: center;">2,855.96</td> <td style="text-align: center;">3,397.08</td> <td style="text-align: center;">2,852.29</td> <td style="text-align: center;">1,825.83</td> </tr> <tr> <td style="text-align: center;">Ni</td> <td style="text-align: center;">-2,968.44</td> <td style="text-align: center;">204.60</td> <td style="text-align: center;">175.79</td> <td style="text-align: center;">2,588.05</td> </tr> <tr> <td style="text-align: center;">Total (Ni)</td> <td style="text-align: center;">-112.48</td> <td style="text-align: center;">3,601.68</td> <td style="text-align: center;">3,028.08</td> <td style="text-align: center;">4,413.88</td> </tr> </tbody> </table> <p><sup>*1</sup> : It computes in static analysis.</p> <p>b) Calculation of the element characteristics of a pile</p> <p>The element characteristics of a pile consider corrosion.</p> <p>(i) Sectional modulus of steel pipe pile in elastic domain</p> $Z_p = 4/3 \times (r^3 - (r-t)^3) = 4/3 \times (399^3 - (399-13)^3) = 8,011,657.33 \text{ mm}^3$ <p>(ii) Fully plastic state moment of steel pipe pile when no axial force acting (<math>M_{po}</math>) and The yield axial force (<math>N_o</math>)</p> <p>Cross-section area of steel pipe pile <math>A' = 32,059.95 \text{ mm}^2</math></p> $M'_{po} = Z_p f_y = 8,011,657.33 \times 315 / 1,000,000 = 2,523.67 \text{ kN} \cdot \text{m}$ $N'_o = A' f_y = 32,059.95 \times 315 / 1,000 = 10,098.89 \text{ kN}$ |  |                 |                      |            | Pile 1       | Pile 2 | Pile 3 | Pile 4 | Deadweight + Surcharge <sup>*1</sup> | 2,855.96 | 3,397.08 | 2,852.29 | 1,825.83 | Ni | -2,968.44 | 204.60 | 175.79 | 2,588.05 | Total (Ni) | -112.48 | 3,601.68 | 3,028.08 | 4,413.88 |
|  | Pile 1   | Pile 2          | Pile 3               | Pile 4     |              |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |
| Deadweight + Surcharge <sup>*1</sup>   | 2,855.96   | 3,397.08        | 2,852.29             | 1,825.83   |              |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |
| Ni   | -2,968.44  | 204.60          | 175.79               | 2,588.05   |              |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |
| Total (Ni)   | -112.48  | 3,601.68        | 3,028.08             | 4,413.88   |              |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |
|  |  | Prepared by     | Y. Ando              | Checked by | E. NISHIMURA |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |
|  |  |                 | 261 07/2002          |            | 08/08/2002   |        |        |        |                                      |          |          |          |          |    |           |        |        |          |            |         |          |          |          |



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c) Calculation of Fully Plastic State Moment ( $M_p$ )

(i) Calculation of " $\alpha (=N/N_0)$ "

| No.    | N (kN)   | $N_0$ (kN) | $\alpha (=N/N_0)$ |
|--------|----------|------------|-------------------|
| Pile 1 | 112.48   | 50,494.43  | 0.00222750        |
| Pile 2 | 3,601.68 | 50,494.43  | 0.0713282         |
| Pile 3 | 3,028.08 | 40,395.54  | 0.0749608         |
| Pile 4 | 4,413.88 | 30,296.66  | 0.1456886         |

※ $N_0$  is the value which multiplied  $N$  by the number of each pile.

(ii) Calculation of fully plastic state moment ( $M_p$ )

Fully plastic state moments are computed using the following formulas.

$$M_p = M_{p0} \times \cos(\alpha \times \pi/2) \quad (\text{kN} \cdot \text{m})$$

| No.    | $M_{p0}$ (kN·m) | $M_p$ (kN·m) | 杭頭モーメント (kN·m) |
|--------|-----------------|--------------|----------------|
| Pile 1 | 12,618.36       | 12,618.28    | > 9,917.70     |
| Pile 2 | 12,618.36       | 12,539.24    | > 11,630.02    |
| Pile 3 | 10,094.69       | 10,024.79    | < 9,691.03     |
| Pile 4 | 7,571.02        | 7,373.63     | < 8,871.14     |

※ $M_{p0}$  is the value which multiplied  $M'_p$  by the number of each pile.

d) Calculation of the Horizontal Force ( $P_y$ ) Corresponding to the Elastic Limit

The horizontal force ( $P_y$ ) corresponding to the elastic limit is computed using the following formulas.

$$P_y = 0.82 \times P_{uall}$$

where  $P_{uall}$  : the horizontal load level at which the bending moments of all the piles of the pier reach the fully plastic state moments

$$(\sum H_j \text{ (kN)})$$

$H_j$  : the horizontal load level at which the bending moments of individual piles reach the fully plastic state moments

$$(\sum 2 \times M_{pi} / L_i) \text{ (kN)}$$

$M_{pi}$  : fully plastic state moment of individual pile

| No.          | $L_i$ (m) | $M_{pi}$ (kN·m) | $H_i$ (kN) |
|--------------|-----------|-----------------|------------|
| Pile 1       | 16.29     | 12,618.28       | 1,549.59   |
| Pile 2       | 15.04     | 12,539.24       | 1,667.52   |
| Pile 3       | 14.74     | 10,024.79       | 1,360.58   |
| Pile 4       | 13.34     | 7,373.63        | 1,105.62   |
| $P_{uall} =$ |           |                 | 5,683.31   |

|  |                            |                                |            |
|--|----------------------------|--------------------------------|------------|
|  | Prepared by <i>Y. Ando</i> | Checked by <i>E. NISHIMURA</i> |            |
|  | 26/07/2002                 |                                | 08/08/2002 |

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The pile head moment of "Pile 3" and "Pile 4" exceeds the fully plastic state moment. Therefore, other piles shall share a part of horizontal load of acting on "Pile 3" and "Pile 4".

a') Calculation of Member Forces Acting on Individual Piles

The redistributed horizontal load is shown below.

|        | free length of a pile $L_i$ (m) | number of pile    | $K_{Hi}$ | $K_{Hi} / \Sigma K_{Hi}$ | $H_i$ (kN/piese) |
|--------|---------------------------------|-------------------|----------|--------------------------|------------------|
| Pile 1 | 16.29                           | 5.0               | 6,862    | 0.225128                 | 1,340.000        |
| Pile 2 | 15.04                           | 5.0               | 8,714    | 0.285880                 | 1,660.000        |
| Pile 3 | 14.74                           | 4.0               | 7,411    | 0.243121                 | 1,330.000        |
| Pile 4 | 13.34                           | 3.0               | 7,495    | 0.245871                 | 1,080.000        |
|        |                                 | $\Sigma K_{Hi} =$ | 30,482   |                          |                  |

The pile head moments ( $M_i$ ) of individual piles are shown below.

|        | free length of a pile $L_i$ (m) | $H_i$     | $M_i$     |
|--------|---------------------------------|-----------|-----------|
| Pile 1 | 16.29                           | 1,340.000 | 10,911.61 |
| Pile 2 | 15.04                           | 1,660.000 | 12,482.67 |
| Pile 3 | 14.74                           | 1,330.000 | 9,799.44  |
| Pile 4 | 13.34                           | 1,080.000 | 7,202.77  |

Since a pile interval is 3 spans, it is bending moment by the following formulas.

$$M_{1,2} = 1.0 \times M_1 = 1.0 \times 10,911.61 = 10,911.61 \text{ kN} \cdot \text{m}$$

$$M_{2,1} = 0.5 \times M_2 = 0.5 \times 12,482.67 = 6,241.34 \text{ kN} \cdot \text{m}$$

$$M_{2,3} = 0.7 \times M_2 = 0.7 \times 12,482.67 = 8,737.87 \text{ kN} \cdot \text{m}$$

$$M_{3,2} = 0.7 \times M_3 = 0.7 \times 9,799.44 = 6,859.61 \text{ kN} \cdot \text{m}$$

$$M_{3,4} = 0.5 \times M_3 = 0.5 \times 9,799.44 = 4,899.72 \text{ kN} \cdot \text{m}$$

$$M_{4,3} = 1.0 \times M_4 = 1.0 \times 7,202.77 = 7,202.77 \text{ kN} \cdot \text{m}$$

|  |             |                |            |               |
|--|-------------|----------------|------------|---------------|
|  | Prepared by | <i>Y. Ando</i> | Checked by | R. NISHIMURA  |
|  |             | 261 07/2002    |            | 08 108 1200 2 |

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The interval of each pile is as follows.

Pile 1~Pile 2 : 5.30m 、 Pile 2~Pile 3 : 5.40m 、 Pile 3~Pile 4 : 5.30m.

The axial force of individual piles is as follows.

$$N_1 = -(10,911.61 + 6,241.34) / 5.30 = -3,236.41 \text{ kN}$$

$$N_2 = ((10,911.61 + 6,241.34) / 5.30) - ((8,737.87 + 6,859.61) / 5.40) = 347.98 \text{ kN}$$

$$N_3 = ((8,737.87 + 6,859.61) / 5.40) - ((4,899.72 + 7,202.77) / 5.30) = 604.93 \text{ kN}$$

$$N_4 = ((4,899.72 + 7,202.77) / 5.30) = 2,283.49 \text{ kN}$$

|                                      | Pile 1         | Pile 2          | Pile 3          | Pile 4          |
|--------------------------------------|----------------|-----------------|-----------------|-----------------|
| Deadweight + Surcharge <sup>※1</sup> | 2,855.96       | 3,397.08        | 2,852.29        | 1,825.83        |
| N <sub>i</sub>                       | -3,236.41      | 347.98          | 604.93          | 2,283.49        |
| <b>Total (N<sub>i</sub>)</b>         | <b>-380.45</b> | <b>3,745.06</b> | <b>3,457.22</b> | <b>4,109.32</b> |

※1 : It computes in static analysis.

c') Calculation of Fully Plastic State Moment (M<sub>p</sub>)

(i) Calculation of "α (=N/N<sub>0</sub>)"

| No.    | N (kN)   | N <sub>0</sub> (kN) | α (=N/N <sub>0</sub> ) |
|--------|----------|---------------------|------------------------|
| Pile 1 | -380.45  | 50,494.43           | -0.0075344             |
| Pile 2 | 3,745.06 | 50,494.43           | 0.0741679              |
| Pile 3 | 3,457.22 | 40,395.54           | 0.0855843              |
| Pile 4 | 4,109.32 | 30,296.66           | 0.1356360              |

※N<sub>0</sub> is the value which multiplied N'<sub>0</sub> by the number of each pile.

(ii) Calculation of fully plastic state moment (M<sub>p</sub>)

| No.    | M <sub>p0</sub> (kN·m) | M <sub>p</sub> (kN·m) | 杭頭モーメント (kN·m) |
|--------|------------------------|-----------------------|----------------|
| Pile 1 | 12,618.36              | 12,617.48             | > 10,911.61    |
| Pile 2 | 12,618.36              | 12,532.82             | > 12,482.67    |
| Pile 3 | 10,094.69              | 10,003.61             | > 9,799.44     |
| Pile 4 | 7,571.02               | 7,399.83              | > 7,202.77     |

※M<sub>p0</sub> is the value which multiplied M'<sub>p0</sub> by the number of each pile.

|  |                            |                                |
|--|----------------------------|--------------------------------|
|  | Prepared by <i>Y. Ando</i> | Checked by <i>2. NISHIMURA</i> |
|  | 26107/2002                 | 08/08/2002                     |

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|---|--|------------------------|----------------------|-----|--------|------------------------|---------------------|--------|-------|-----------|----------|--------|-------|-----------|----------|--------|-------|-----------|----------|--------|-------|----------|----------|---------------------|--|--|----------|
| <b>Section</b>  | Civil  | Calc. Index No.        |                      |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
| <b>Subject</b>  | Quaywall   | Page No. / 9           | Rev.                 |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
|   |  |                        | References/<br>Notes |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
| <p>d') Calculation of the Horizontal Force (Py) Corresponding to the Elastic Limit</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 15%;">No.</th> <th style="width: 20%;">Li (m)</th> <th style="width: 20%;">M<sub>pi</sub> (kN·m)</th> <th style="width: 45%;">H<sub>i</sub> (kN)</th> </tr> </thead> <tbody> <tr> <td>Pile 1</td> <td style="text-align: center;">16.29</td> <td style="text-align: center;">12,617.48</td> <td style="text-align: center;">1,549.49</td> </tr> <tr> <td>Pile 2</td> <td style="text-align: center;">15.04</td> <td style="text-align: center;">12,532.82</td> <td style="text-align: center;">1,666.67</td> </tr> <tr> <td>Pile 3</td> <td style="text-align: center;">14.74</td> <td style="text-align: center;">10,003.61</td> <td style="text-align: center;">1,357.71</td> </tr> <tr> <td>Pile 4</td> <td style="text-align: center;">13.34</td> <td style="text-align: center;">7,399.83</td> <td style="text-align: center;">1,109.55</td> </tr> <tr> <td colspan="3" style="text-align: center;">P<sub>uall</sub> =</td> <td style="text-align: center;">5,683.42</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Calculation of the horizontal force (Py) corresponding to the elastic limit<br/> <math display="block">P_y = 0.82 P_{uall} = 0.82 \times 5,683.42 = 4,660.40 \text{ kN}</math> </li> </ul> <p>e) Examination of Earthquake-Resistant Performance</p> <p>As for the allowable displacement ductility factor (<math>\mu_a</math>), importance level adopts the value 1.30 of the class-A.</p> <ul style="list-style-type: none"> <li>• Calculation of the Load Carrying Capacity of the Pile-Supported Section during an Earthquake(R<sub>a</sub>) of Platform 2<br/> <math display="block">R_a = \sqrt{(2\mu_a - 1)} \times P_y = \sqrt{(2 \times 1.3 - 1)} \times 4,660.40 = 5,894.99 \text{ kN}</math> </li> <li>• Earthquake force of using for examination of load carrying capacity<br/> <math display="block">k_h W = 0.50 \times 10,820 = 5,410 \text{ kN} \leq R_a \quad \text{O.K}</math> </li> </ul> |  |                        |                      | No. | Li (m) | M <sub>pi</sub> (kN·m) | H <sub>i</sub> (kN) | Pile 1 | 16.29 | 12,617.48 | 1,549.49 | Pile 2 | 15.04 | 12,532.82 | 1,666.67 | Pile 3 | 14.74 | 10,003.61 | 1,357.71 | Pile 4 | 13.34 | 7,399.83 | 1,109.55 | P <sub>uall</sub> = |  |  | 5,683.42 |
| No.   | Li (m)   | M <sub>pi</sub> (kN·m) | H <sub>i</sub> (kN)  |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
| Pile 1  | 16.29  | 12,617.48              | 1,549.49             |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
| Pile 2  | 15.04  | 12,532.82              | 1,666.67             |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
| Pile 3  | 14.74  | 10,003.61              | 1,357.71             |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
| Pile 4  | 13.34  | 7,399.83               | 1,109.55             |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
| P <sub>uall</sub> =   |  |                        | 5,683.42             |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
|   |  | Prepared by            | <i>Y. Ando</i>       |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
|   |  | Checked by             | E. NISHIHURA         |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |
|   |  | 26/07/2002             | 08/08/2002           |     |        |                        |                     |        |       |           |          |        |       |           |          |        |       |           |          |        |       |          |          |                     |  |  |          |

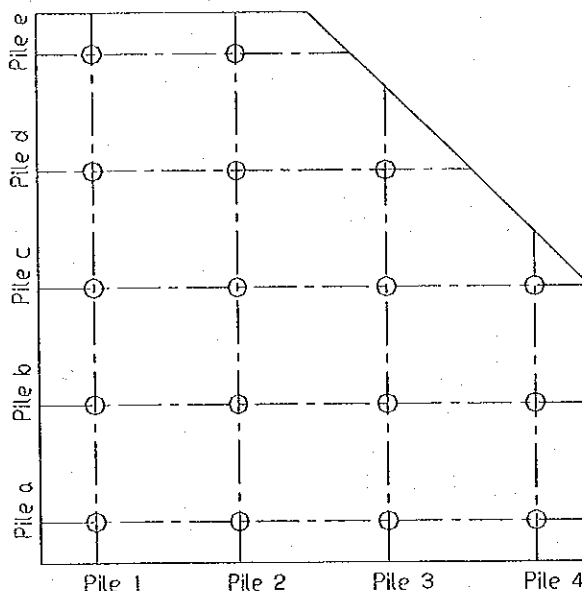
|                |  |                 |      |
|----------------|--|-----------------|------|
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<Appending Data>

1) Cross-Section Force Figure

The number of the pile shown in a cross-sectional force figure is shown in the following figures.



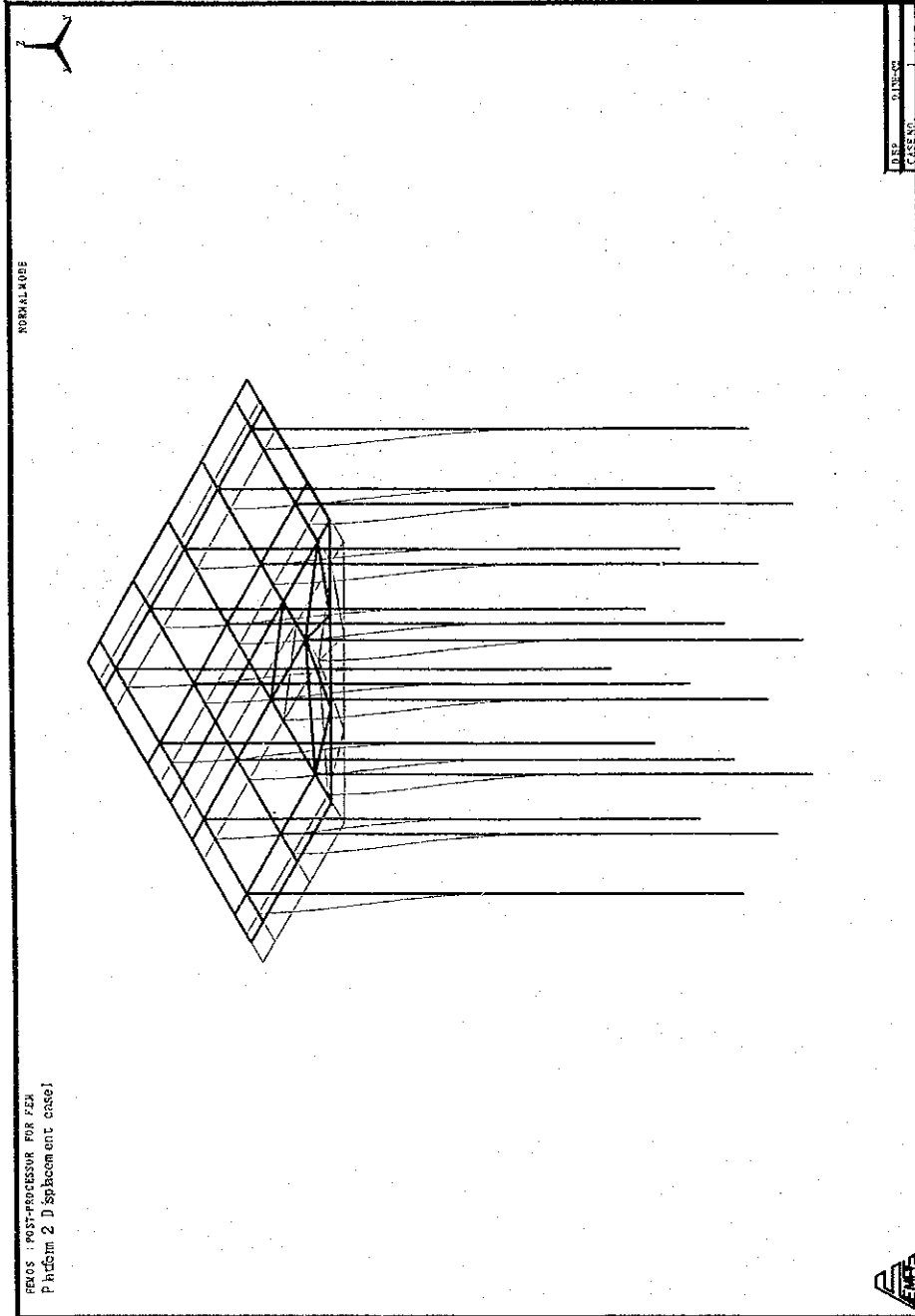
|  |             |                |            |                     |
|--|-------------|----------------|------------|---------------------|
|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>E. NISHIMURA</i> |
|  |             | 26 / 07 / 2002 |            | 08 / 08 / 2002      |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |          |
| <b>Section</b> | Civil  | Calc. Index No. |          |
| <b>Subject</b> | Quaywall   | Page No.        | 2 / Rev. |

References/  
Notes

(1) case1 (Earthquake Sea→Land)

• Displacement



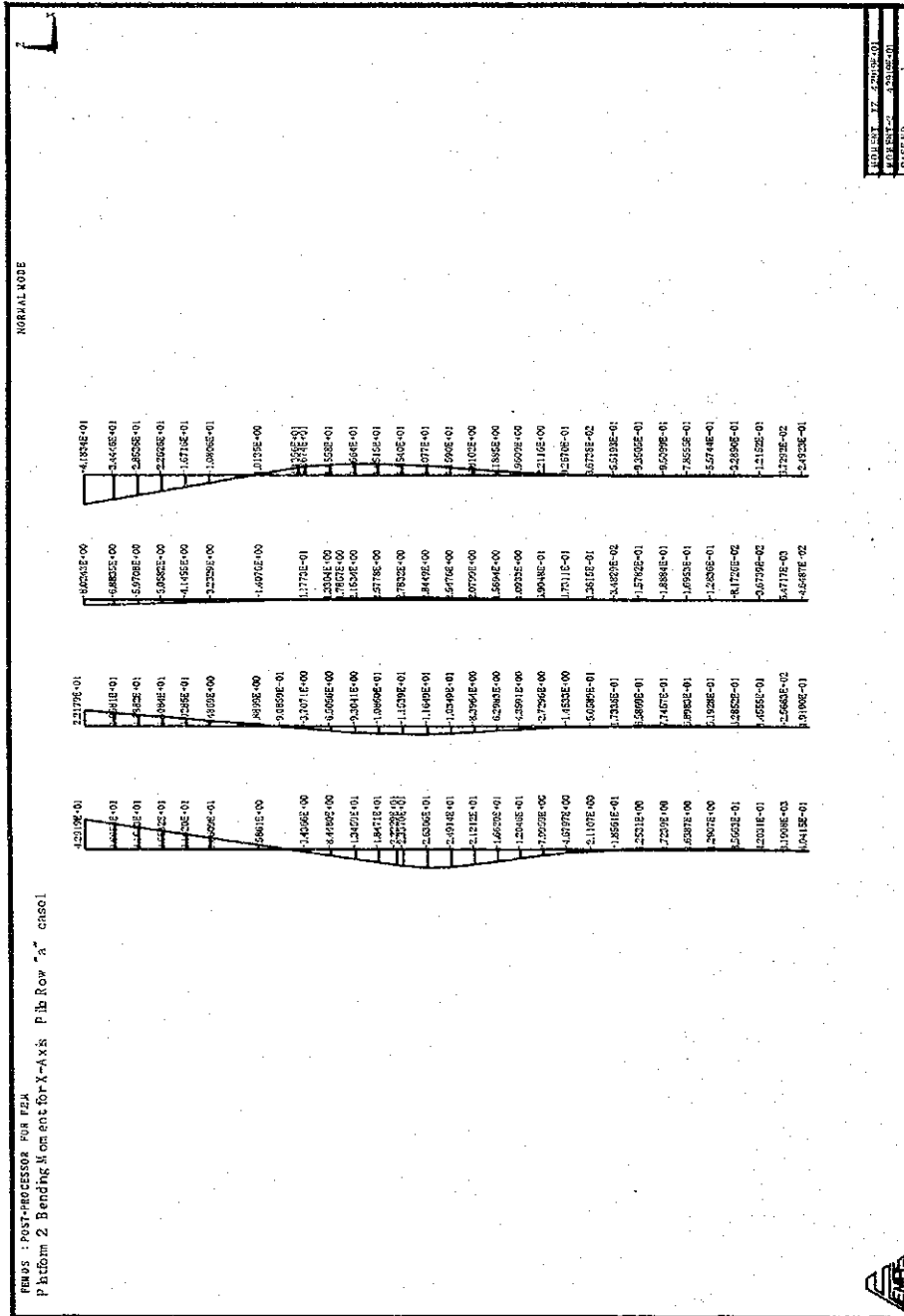
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|  | Prepared by | <i>Y. Ando</i> | Checked by | R. NISHIMURA   |
|  |             | 26 / 07 / 2002 |            | 08 / 08 / 2002 |

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| <b>Project</b>  | Detailed Design on Port Reactivation Project In La Union | Calc. File No.  |                      |
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| <b>Subject</b>  | Quaywall   | Page No.        | 22 Rev.              |
|   |  |                 | References/<br>Notes |
| <p>Bending Moment for Y-Axis (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))</p> <p> <small>PLANS: POST-PROCESSOR FOR EXEN</small><br/>             Bending Moment for Y-Axis Pile Row "a" case1         </p> |  |                 |                      |
| Prepared by   |  | Checked by      |                      |
| Y. Ando   |  | E. NISHIMURA    |                      |
| 261 07 1200Z  |  | 08 108 1200Z    |                      |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| References/<br>Notes |
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• Bending Moment for X-Axis (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))



FEBUS : POST-PROCESSOR FOR FEA  
Platform 2 Bending Moment for X-Axis Pile Row "a" case 1

|             |                |            |                     |
|-------------|----------------|------------|---------------------|
| Prepared by | <i>Y. Ando</i> | Checked by | <i>E. NISHIMURA</i> |
|             | 2610712002     |            | 0810812002          |

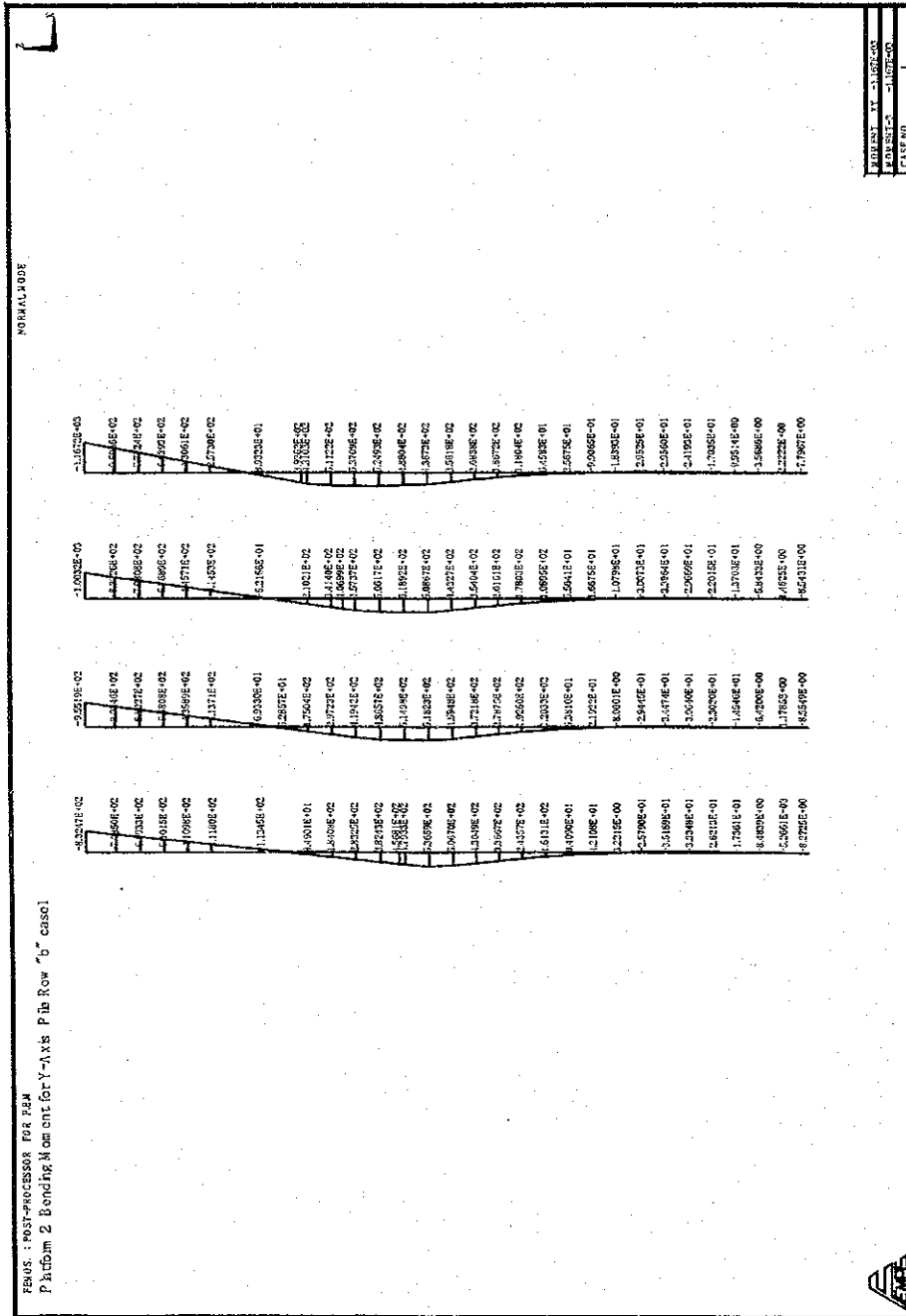


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| <b>Project</b>   | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |                      |
| <b>Section</b>   | Civil  | Calc. Index No. |                      |
| <b>Subject</b>   | Quaywall   | Page No. 24     | Rev.                 |
|  |  |                 | References/<br>Notes |
| <p>• Axial Force (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))</p> |  |                 |                      |
| REBUS POST-PROCESSOR FOR PDM<br>P:\admom 2 \axialLoad Pile Row "a" case1   |  | Prepared by     | Y. Ando              |
|  |  | Checked by      | R. NISHIMURA         |
|  |  |                 | 2616712002           |
|  |  |                 | 08/08/2002           |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
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References/  
Notes

• Bending Moment for Y-Axis (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))

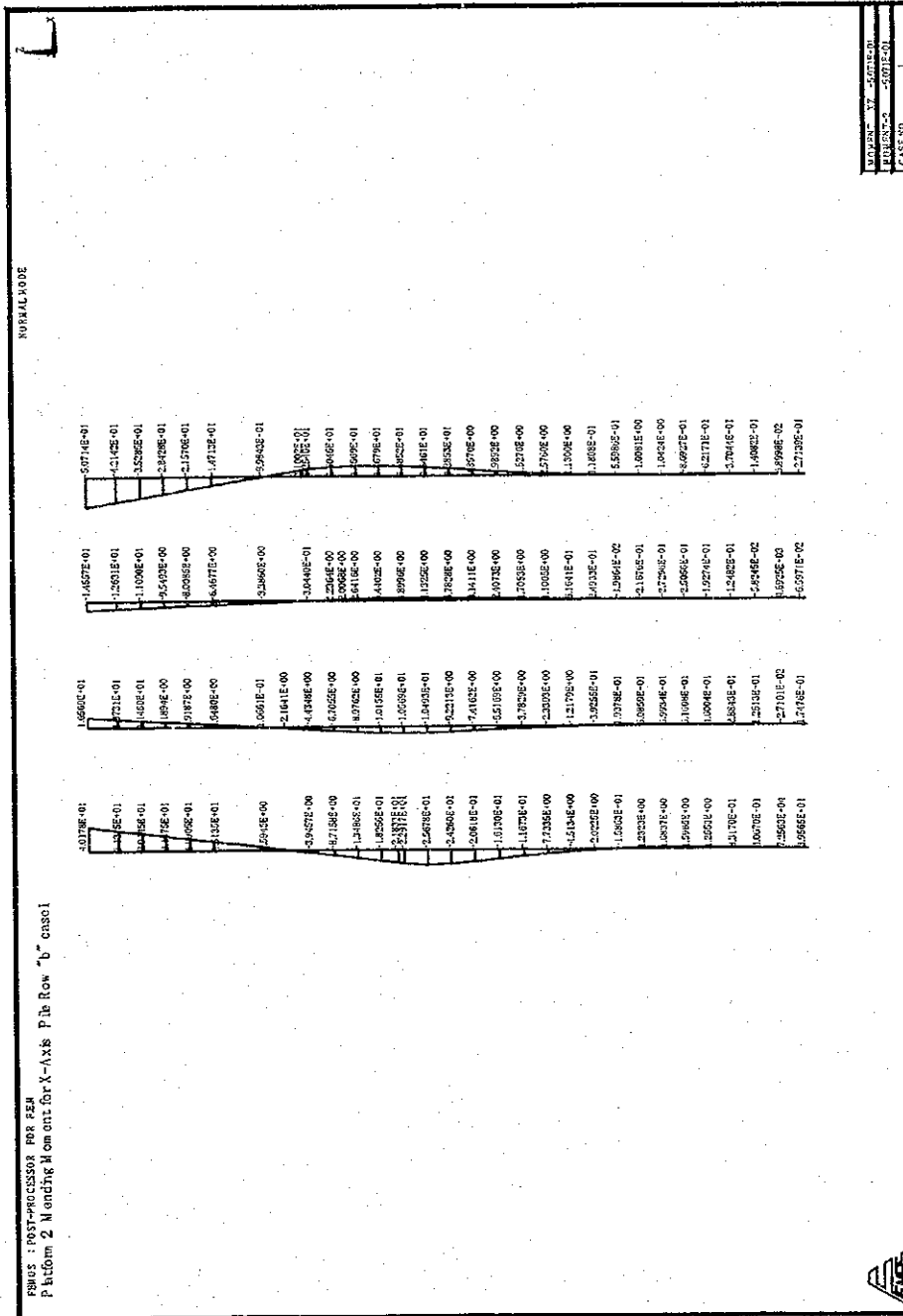


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|-------------|----------------|------------|---------------------|
| Prepared by | <i>Y. Ando</i> | Checked by | <i>E. NISHIMURA</i> |
|             | 2610712002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 26 Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))



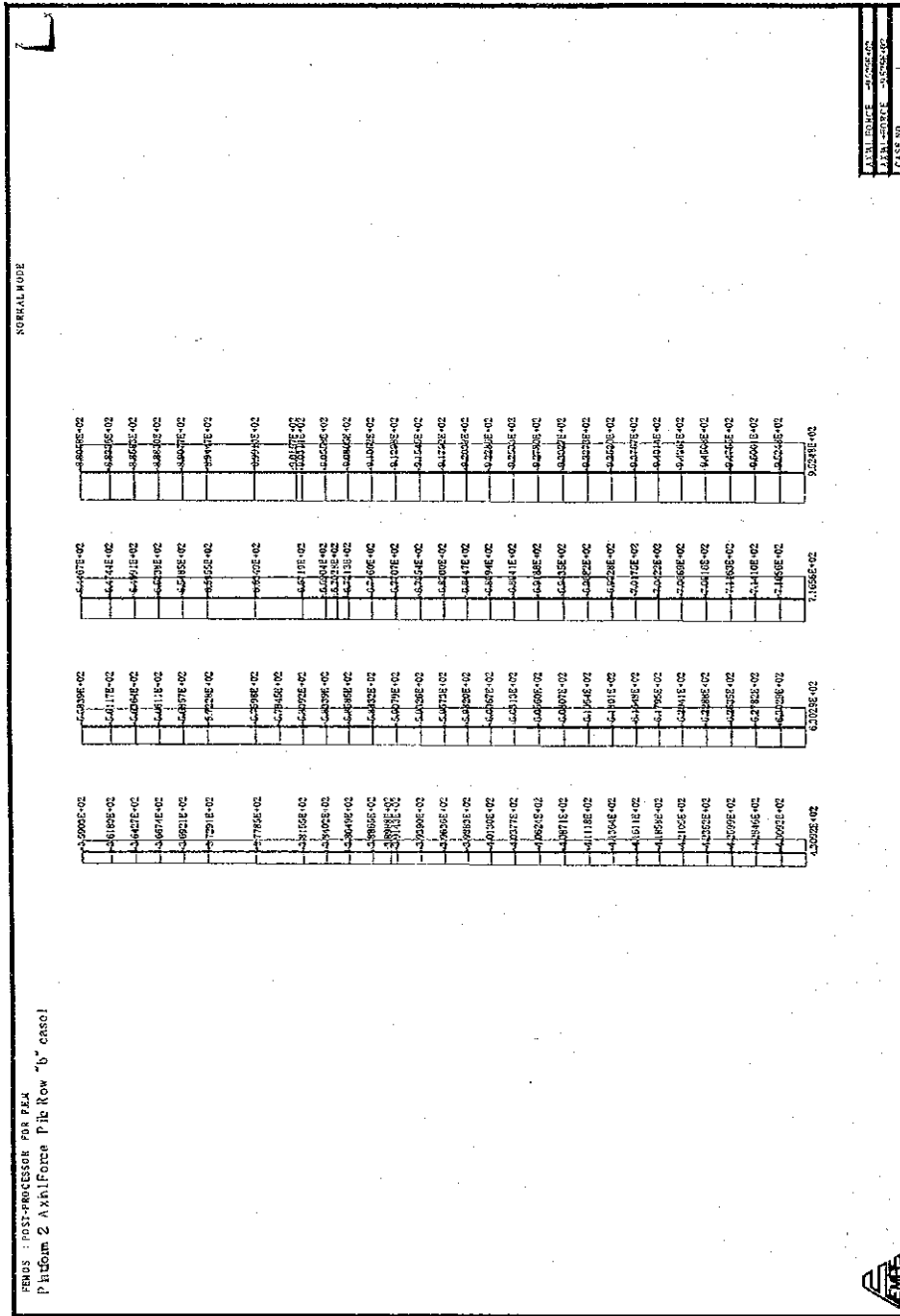
FBUS : POST-PROCESSOR FOR PEM  
 P.iform 2 Bending Moment for X-Axis P.ile Row "b" case1

|  |             |                |            |                     |
|--|-------------|----------------|------------|---------------------|
|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>R. NISHIMURA</i> |
|  |             | 2616912002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| <b>Subject</b> | Quaywall   | Page No.        | 27 Rev. |

References/  
Notes

• Axial Force (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))

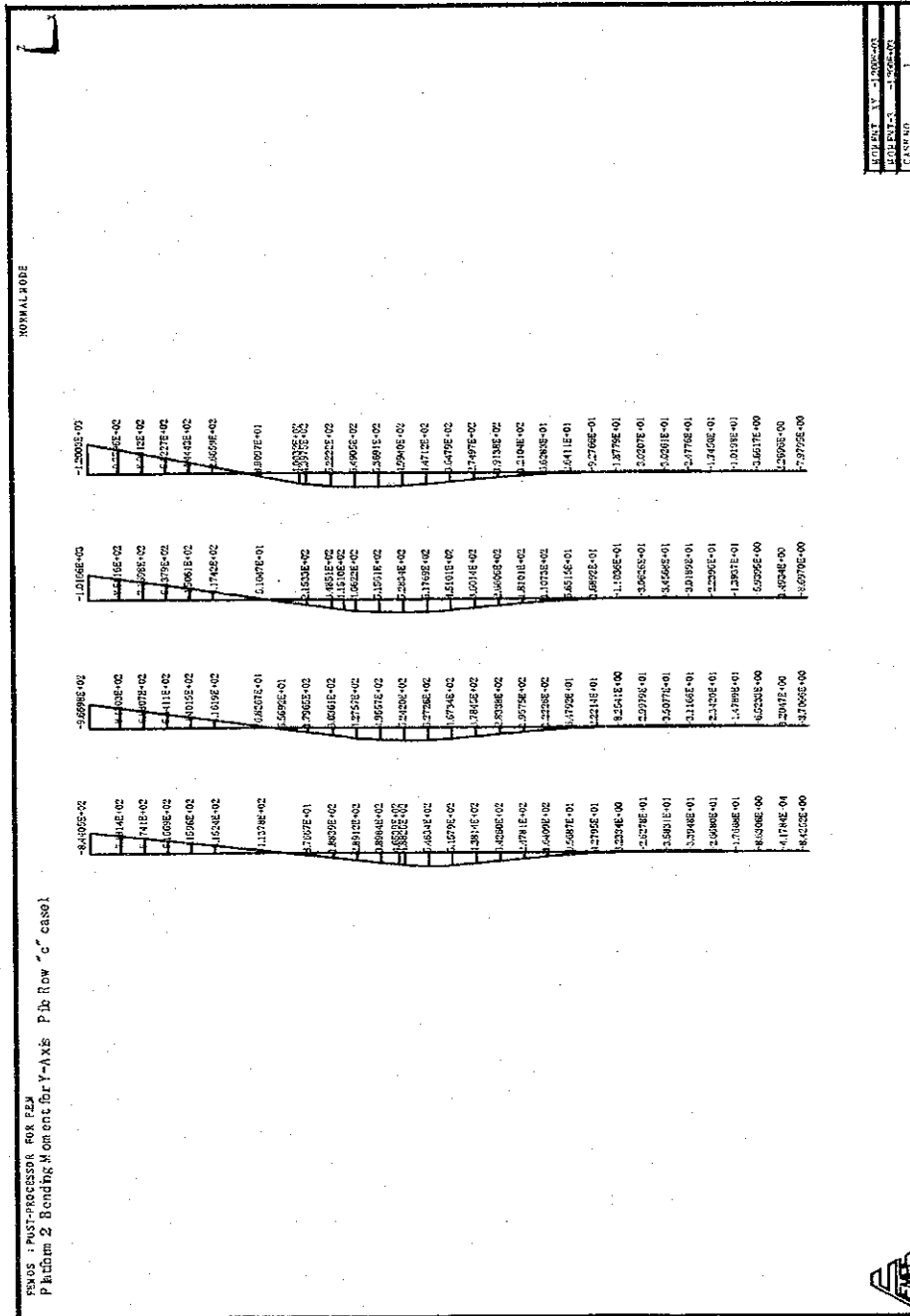


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| Prepared by |  | Y. Ando    | Checked by |  | E. NISHIMURA |
|             |  | 2610712002 |            |  | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
| <b>Section</b> | Civil  | Calc. Index No. |      |
| <b>Subject</b> | Quaywall   | Page No. 28     | Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))

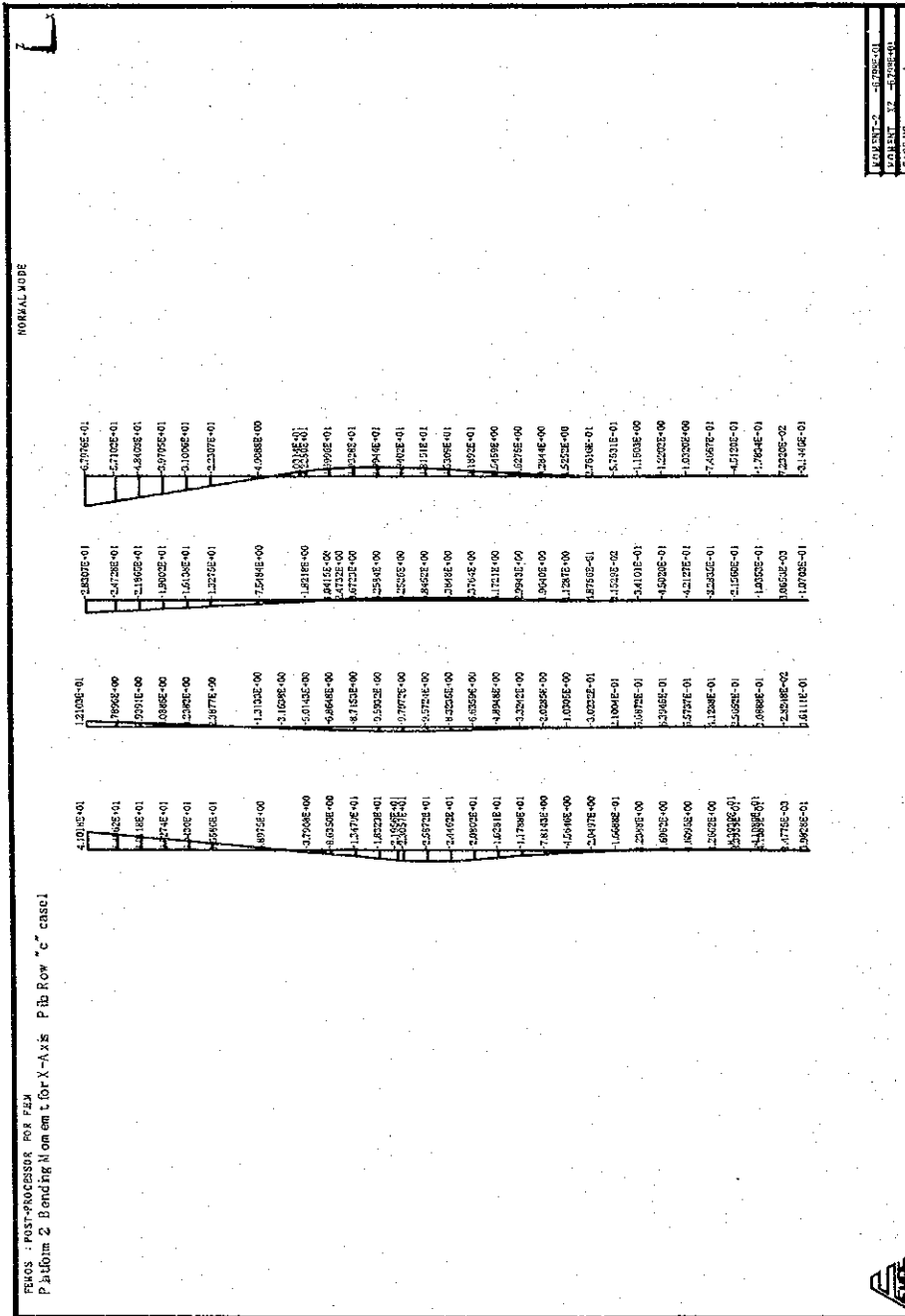


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| Prepared by | Y. Ando     | Checked by | R. NISHIMURA |
|             | 261 07/2002 |            | 08 / 08/2002 |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| <b>Subject</b> | Quaywall   | Page No.        | 29 Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))

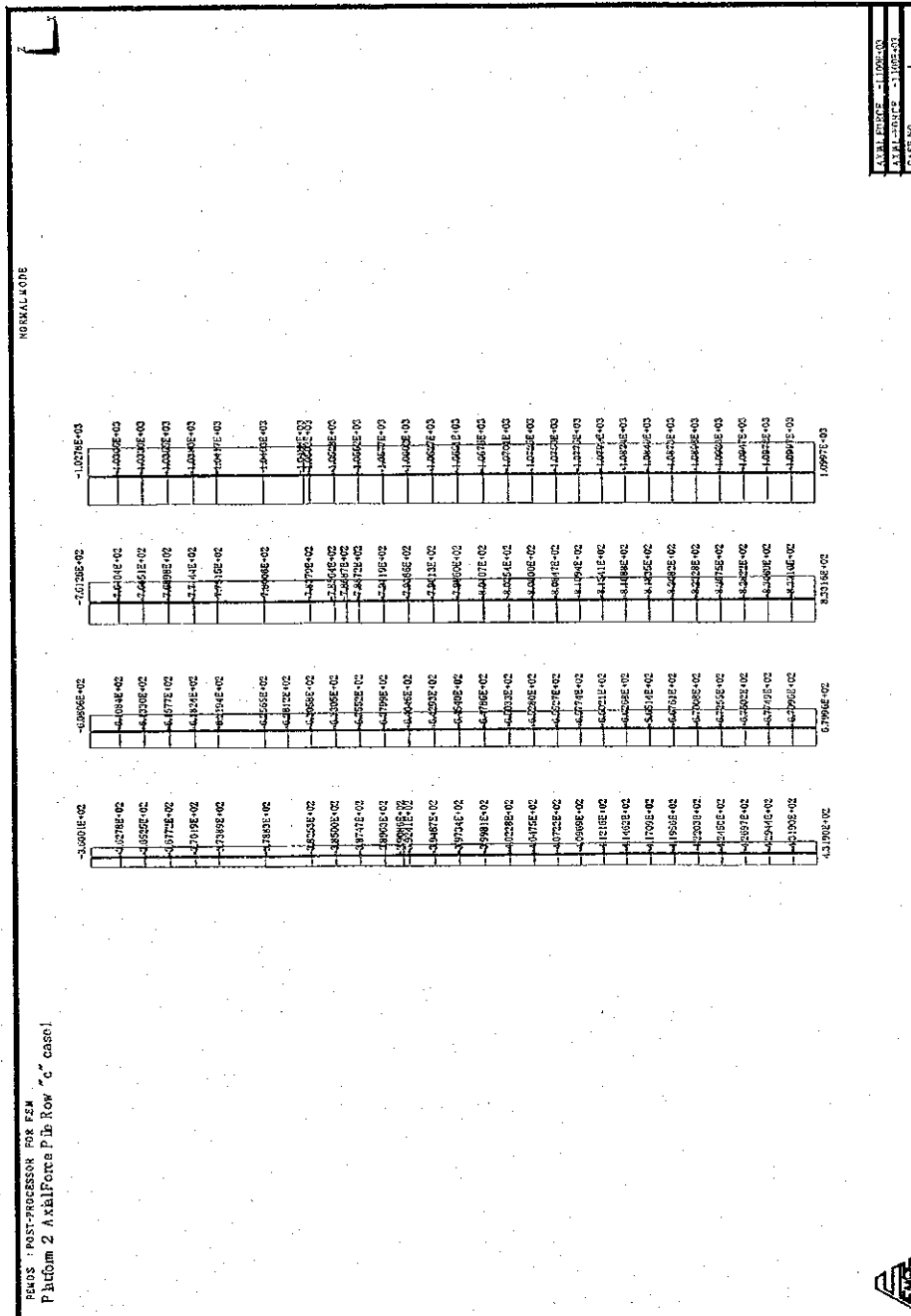


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| Prepared by | <i>Y. Ando</i> | Checked by | <i>R. NISHIMURA</i> |
|             | 261 07 12002   |            | 08 1 08 12002       |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
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| <b>Subject</b> | Quaywall   | Page No. 30     | Rev. |

References/  
Notes

• Axial Force (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))

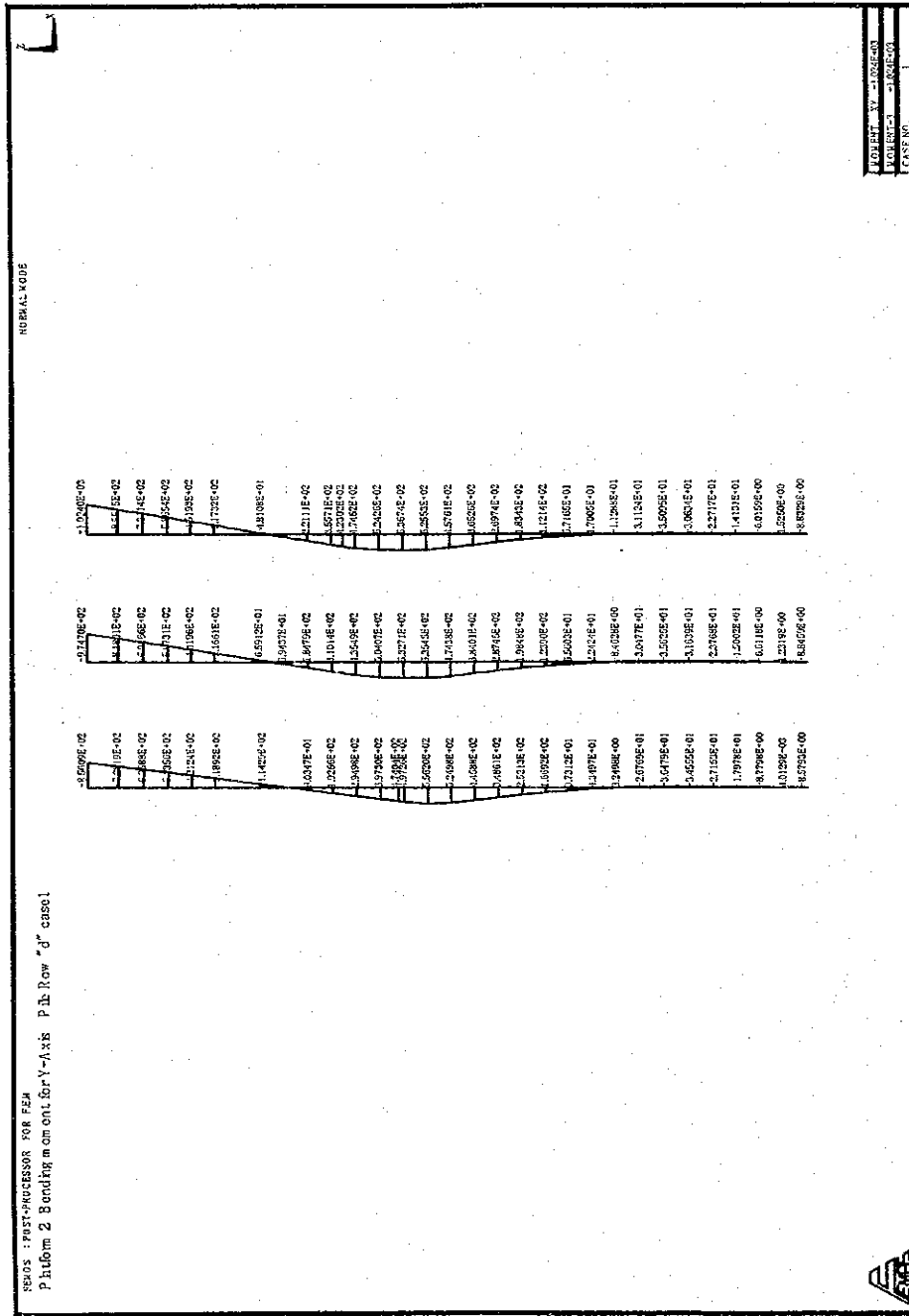


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| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2610712002 |            | 08/08/2002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |          |
| <b>Section</b> | Civil  | Calc. Index No. |          |
| <b>Subject</b> | Quaywall   | Page No.        | 3 / Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))



REVISED : POST-PROCESSOR FOR FEM  
Platform 2 Bending moment for Y-Axis Pile Row "d" case1

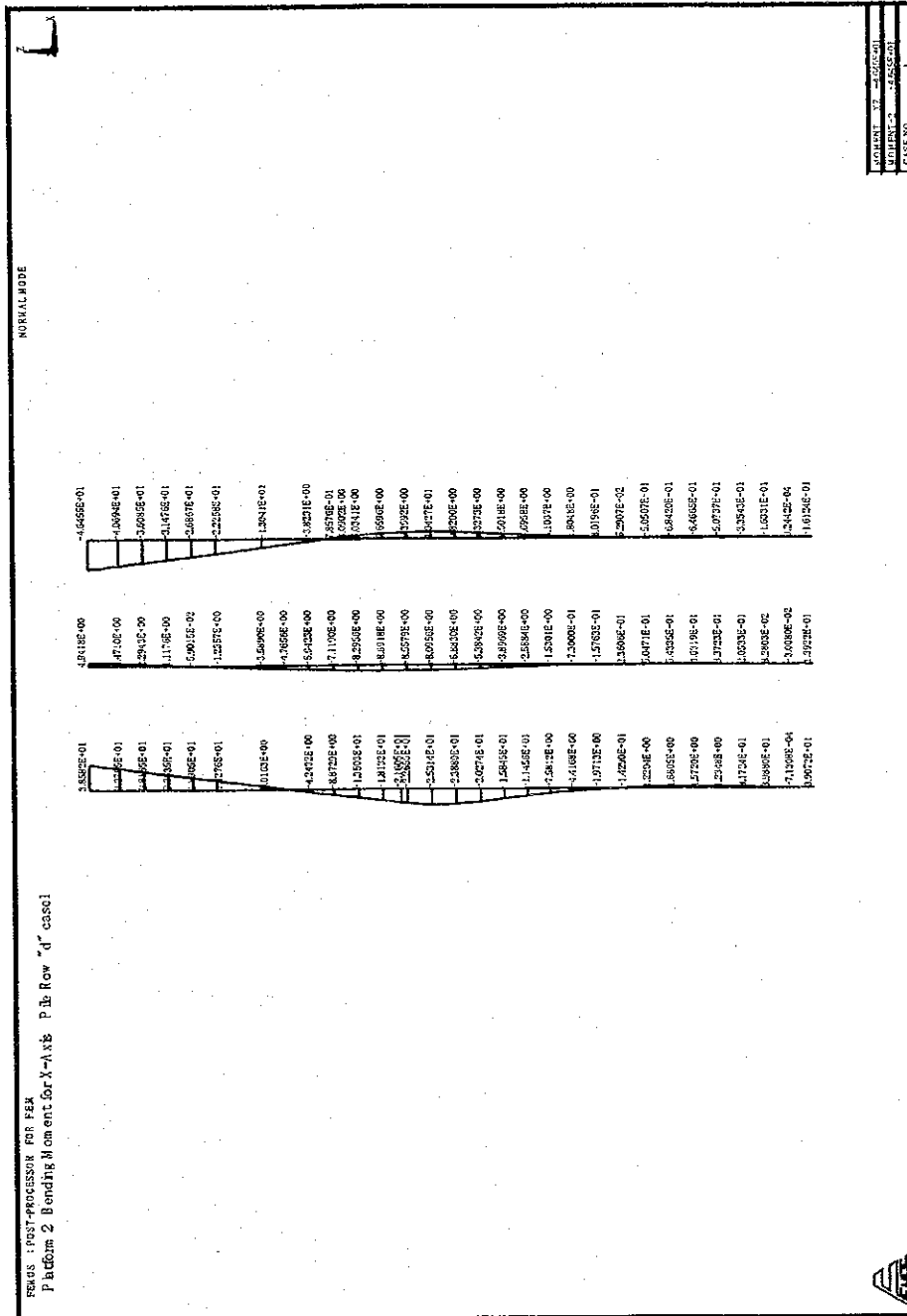
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|--|-------------|--------------|------------|--------------|
|  | Prepared by | Y. Ando      | Checked by | R. NISHIMURA |
|  |             | 261 07 12002 |            | 08 108 12002 |



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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
| <b>Section</b> | Civil  | Calc. Index No. |      |
| <b>Subject</b> | Quaywall   | Page No. 32     | Rev. |

References/  
Notes

• Bending moment for X-Axis (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))

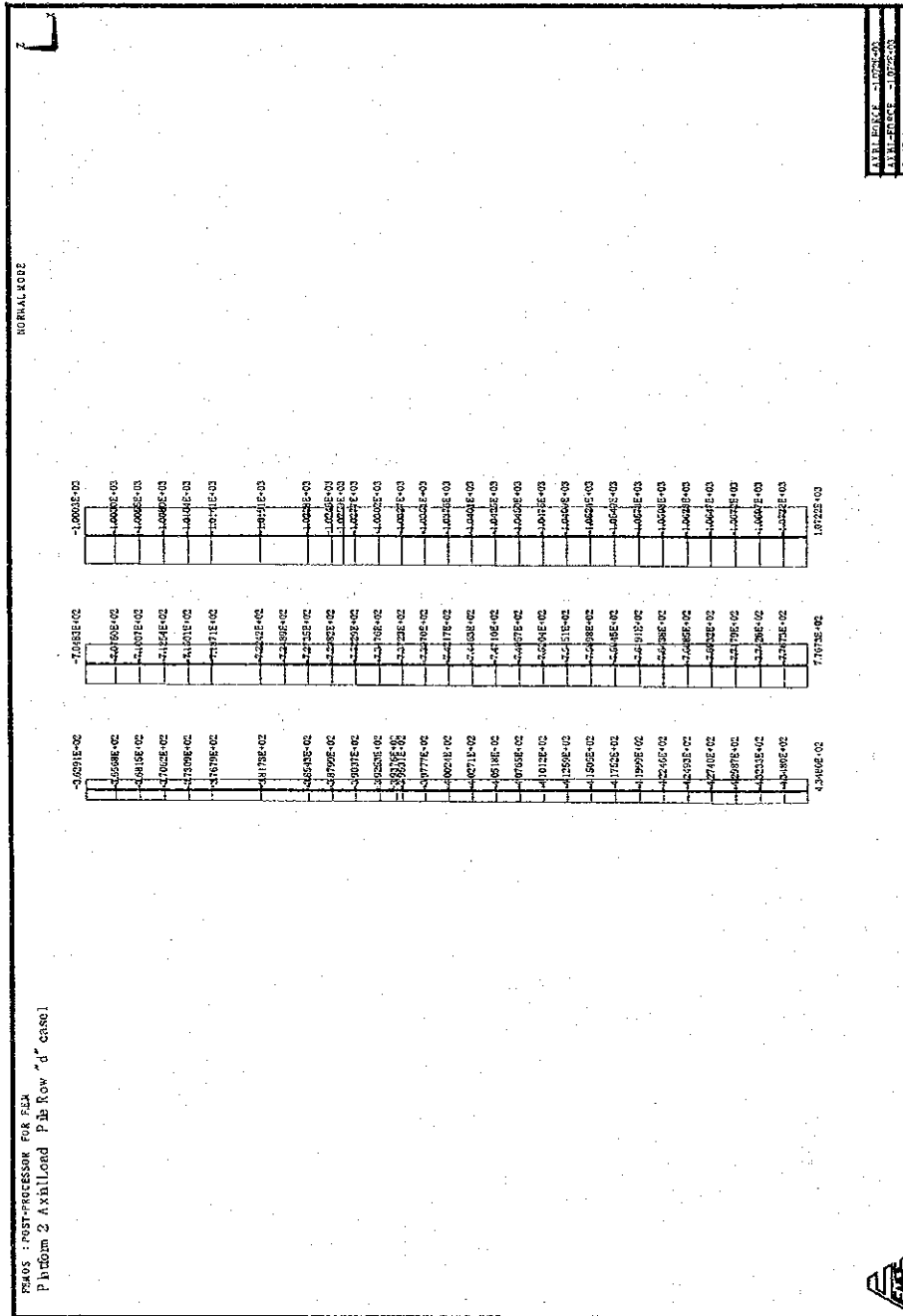


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| Prepared by | Y. Ando      | Checked by | R. NISHIMURA   |
|             | 261 07 12002 |            | 08 1 08 1200 2 |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
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| <b>Subject</b> | Quaywall   | Page No. 33     | Rev. |

References/  
Notes

• Axial Load (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))



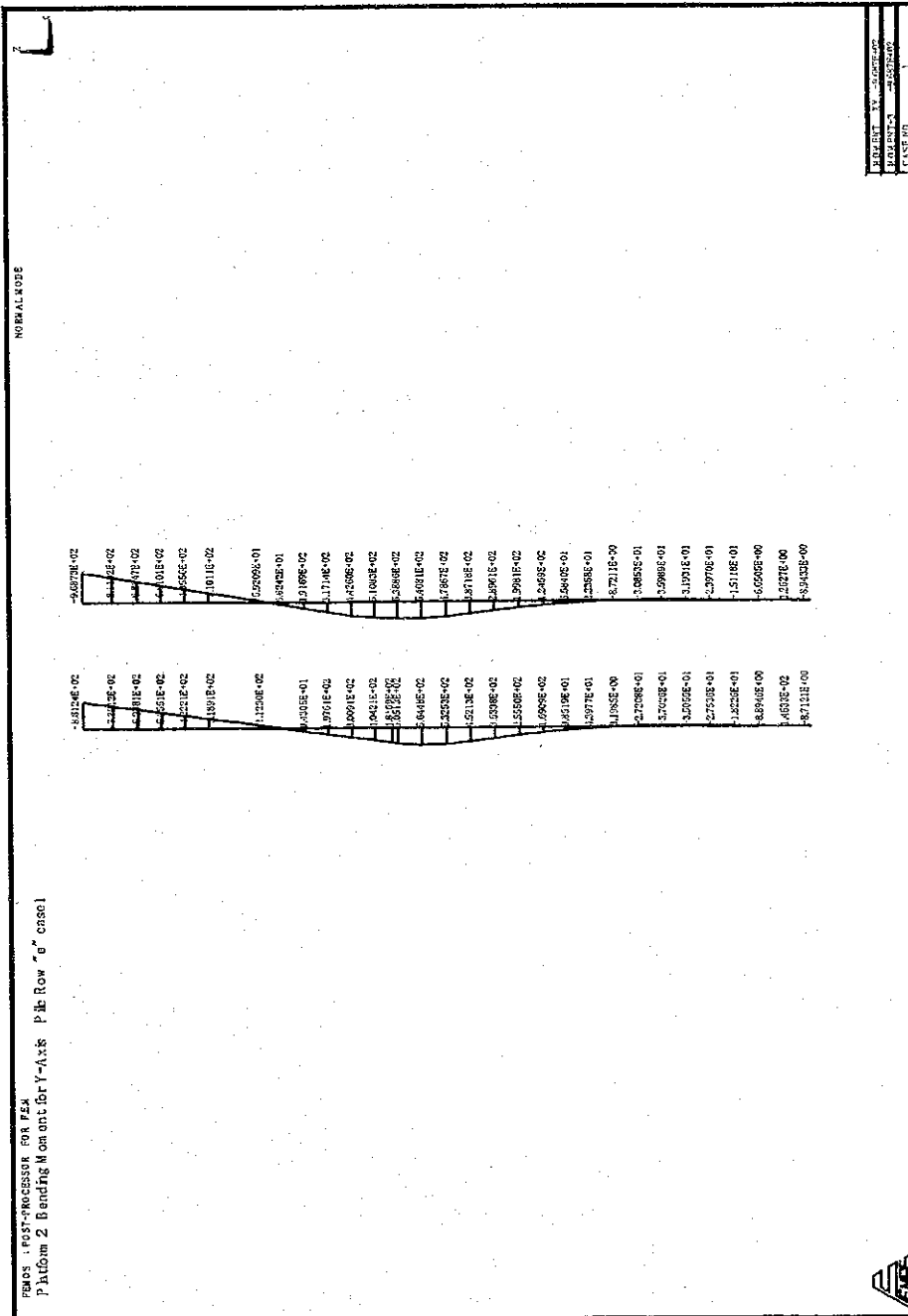
PS405 : POST-PROCESSOR FOR EXA  
 Program 2 AxialLoad Pile Row "d" case1

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| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| <b>Subject</b> | Quaywall   | Page No.        | 28 Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))

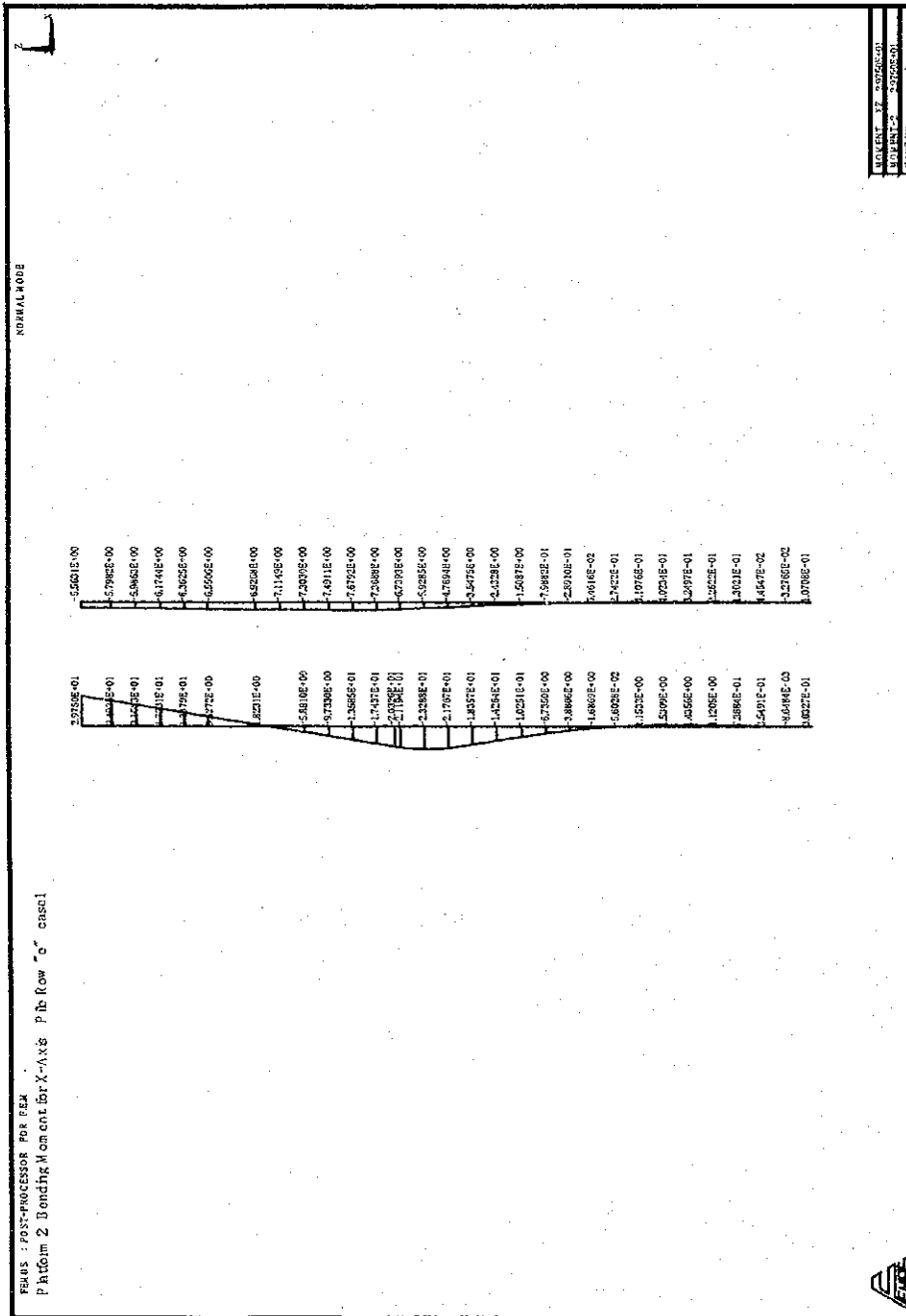


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|  | Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|  |             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| <b>Subject</b> | Quaywall   | Page No.        | 25 Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))



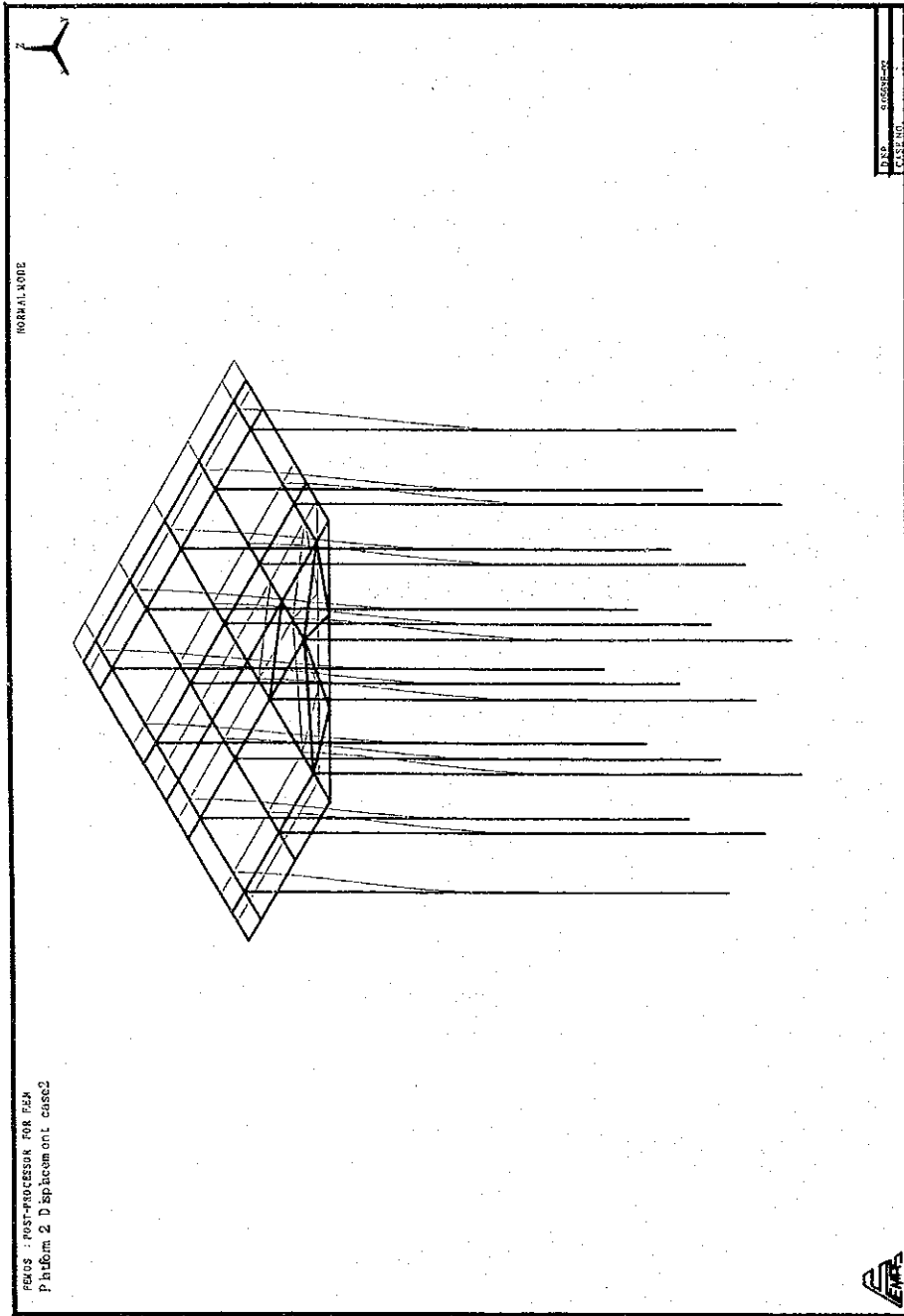
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| Prepared by | Y. Ando    | Checked by | P. NISHIMURA |
|             | 2610712002 |            | 0810812002   |

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| <b>Project</b>  | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |                      |
| <b>Section</b>  | Civil  | Calc. Index No. |                      |
| <b>Subject</b>  | Quaywall   | Page No. 26     | Rev.                 |
|   |  |                 | References/<br>Notes |
| <p>• Axial Force (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))</p> <div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">NORMAL MODE</p> <p style="font-size: small;">             1. AXIAL FORCE - 0.95E+02<br/>             2. AXIAL FORCE - 0.95E+02<br/>             3. CASE NO.         </p> </div> <p style="font-size: x-small; margin-top: 10px;">             PERIOD : POST-PROCESSOR FOR P.24<br/>             Platform 2 AxialForce Pile Row "e" case1         </p> |  |                 |                      |
| Prepared by   |  | Checked by      |                      |
| Y. Ando   |  | R. NISHIMURA    |                      |
| 2610712002  |  | 0810812002      |                      |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
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| <b>Subject</b> | Quaywall   | Page No. 27     | Rev. |

References/  
Notes

(2) case2 (Earthquake Land→Sea)



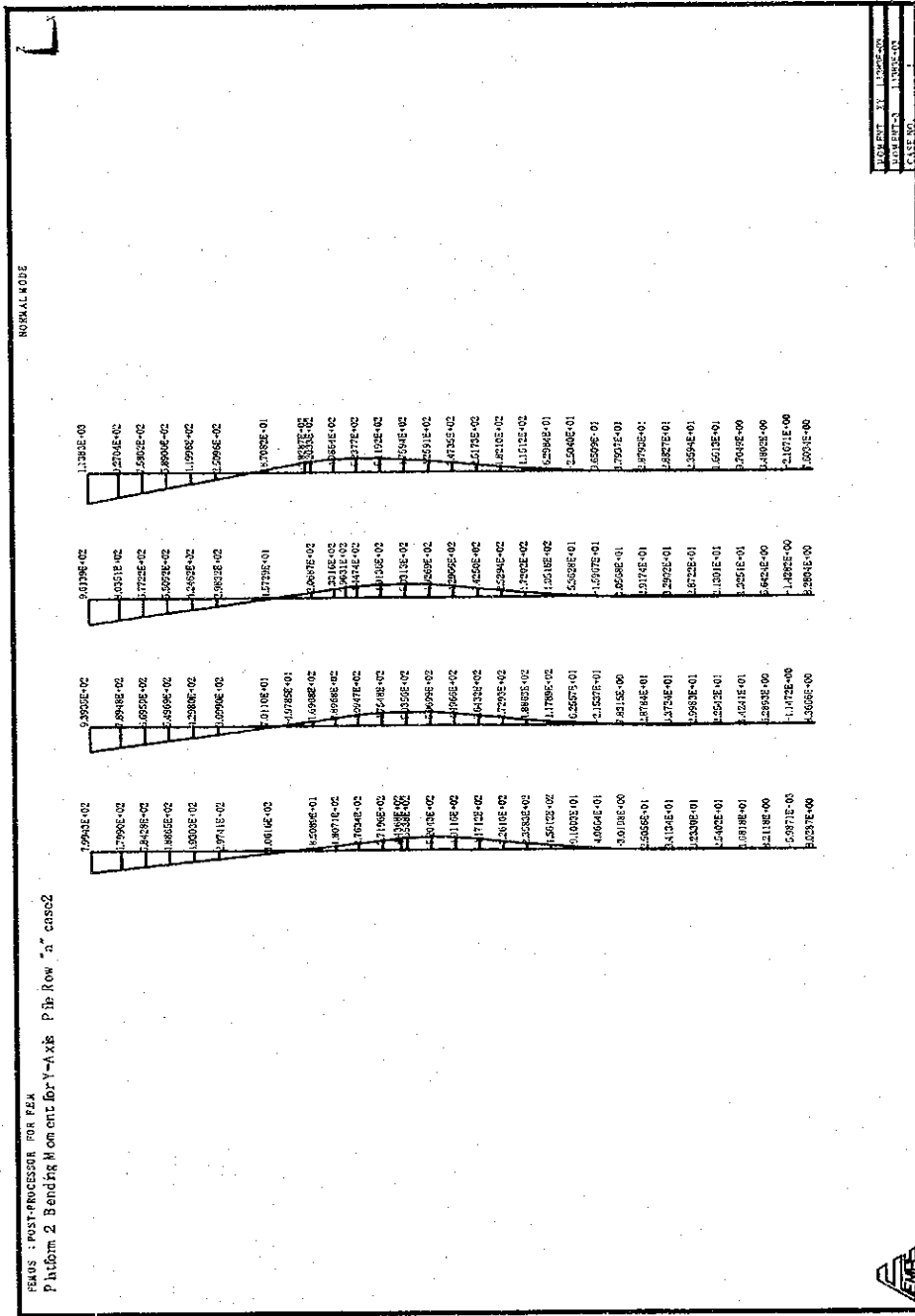
• Displacement

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|--|-------------|-------------------|------------|---------------------|
|  | Prepared by | <i>Y. Ando</i>    | Checked by | <i>P. NISHIMURA</i> |
|  |             | <i>26/07/2002</i> |            | <i>08/08/2002</i>   |

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References/  
Notes

• Bending Moment for Y-Axis (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))



|  |                            |                                |
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|  | Prepared by <i>Y. Ando</i> | Checked by <i>R. NISHIMURA</i> |
|  | 2610712002                 | 0810812002                     |

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| <b>Project</b>   | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |                      |
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|  |  |                 | References/<br>Notes |
| <p>• Bending Moment for X-Axis (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))</p> <div style="border: 1px solid black; padding: 10px;"> <p style="text-align: right; font-size: small;">UNIT: W/420150N<br/>UNIT: M<sup>2</sup>/420150N<br/>CONS: 1000</p> <p style="font-size: x-small;">Pile 1 (Left Side) ~ Pile 4 (Right Side)</p> </div> |  |                 |                      |
| <p>PEMS : POST-PROCESSOR FOR FEA<br/>         Platform 2 Bending Moment for X-Axis Pile Row "a" case2</p>  |  | Prepared by     | Y. Ando              |
|  |  | Checked by      | R. NISHIMURA         |
|  |  |                 | 2610712002           |
|  |  |                 | 0810812002           |

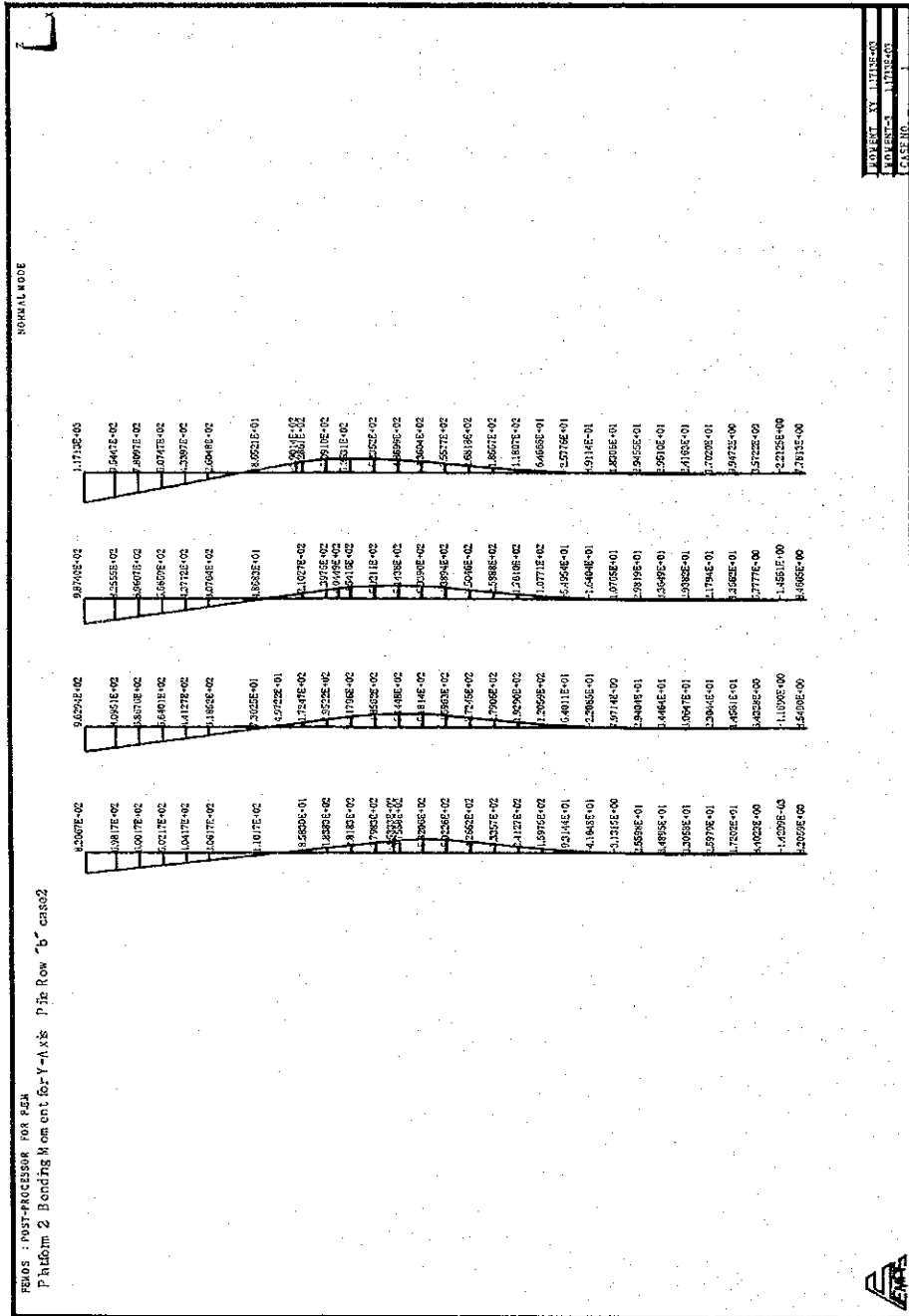


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| <b>Project</b>  | Detailed Design on Port Reactivation Project in La Union | Calc. File No.                 |                  |
| <b>Section</b>  | Civil  | Calc. Index No.                |                  |
| <b>Subject</b>  | Quaywall   | Page No.                       | 40 Rev.          |
| Axial Force (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side)) |  |                                | References/Notes |
|   |  |                                |                  |
| Prepared by <i>Y. Ando</i>  |  | Checked by <i>R. NISHIMURA</i> |                  |
| 2610712002  |  | 0810812002                     |                  |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |           |
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References/  
Notes

• Bending Moment for Y-Axis (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))



PK05 : POST-PROCESSOR FOR FEM  
P-Problem 2 Bending Moment for Y-Axis Pile Row "b" case2

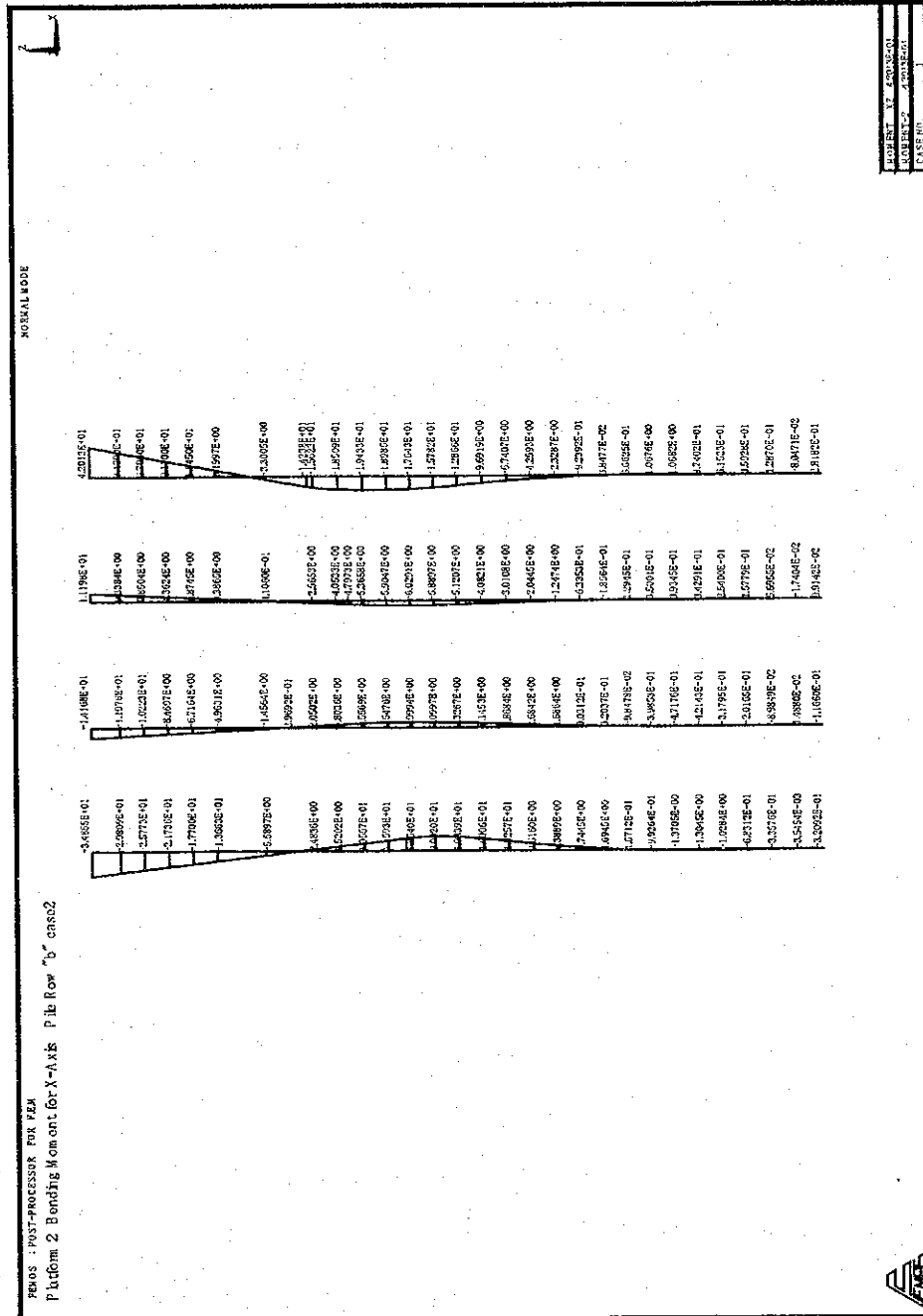


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|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>R. NISHIMURA</i> |
|  |             | 2010712002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
| <b>Section</b> | Civil  | Calc. Index No. |      |
| <b>Subject</b> | Quaywall   | Page No. 82     | Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))



PK005 : POST-PROCESSOR FOR FEA  
Platform 2 Bending Moment for X-Axis Pile Row "b" case2

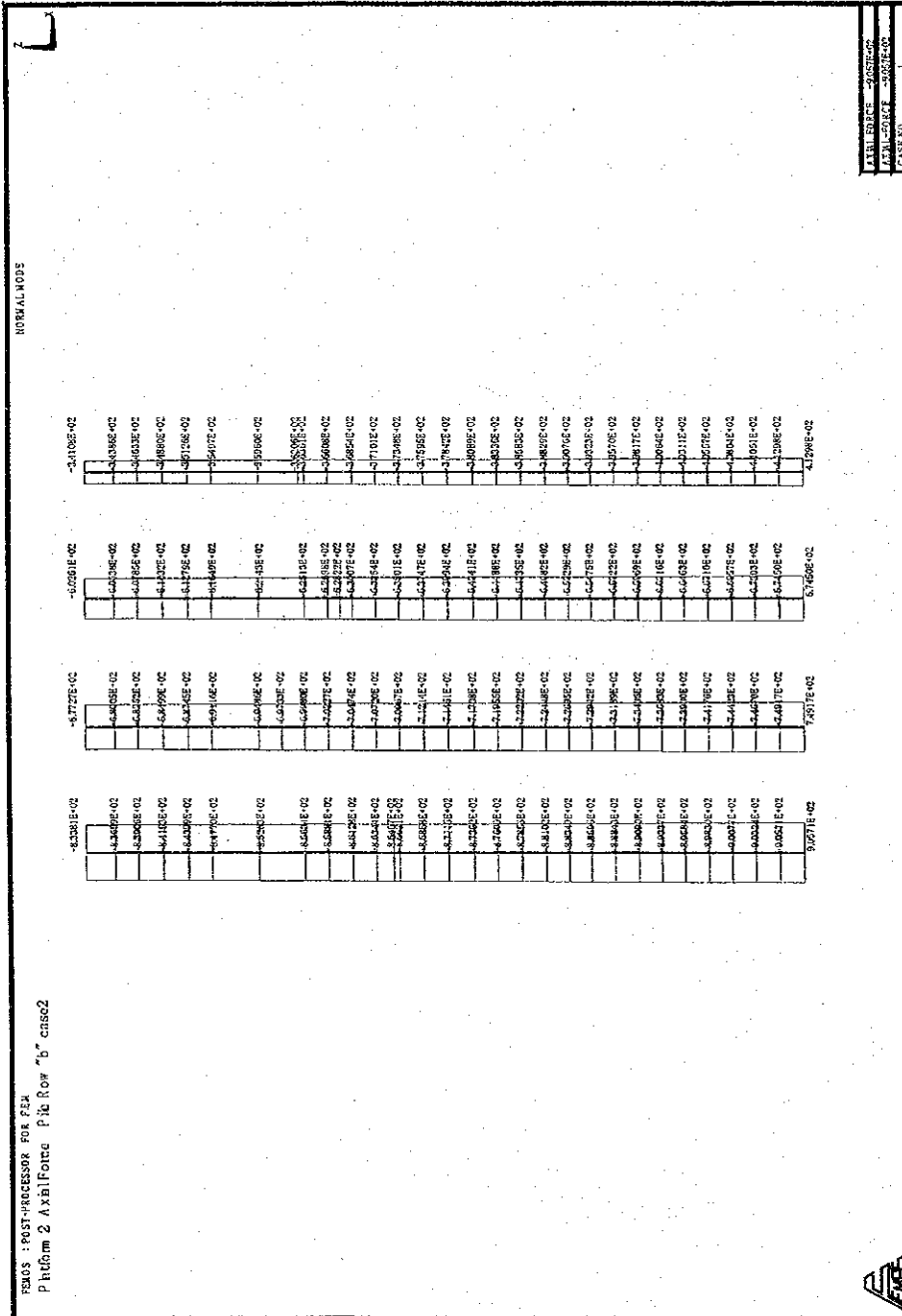


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| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2616712002 |            | 08/08/2002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| <b>Subject</b> | Quaywall   | Page No.        | 83 Rev. |

References/  
Notes

• Axial Force (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))

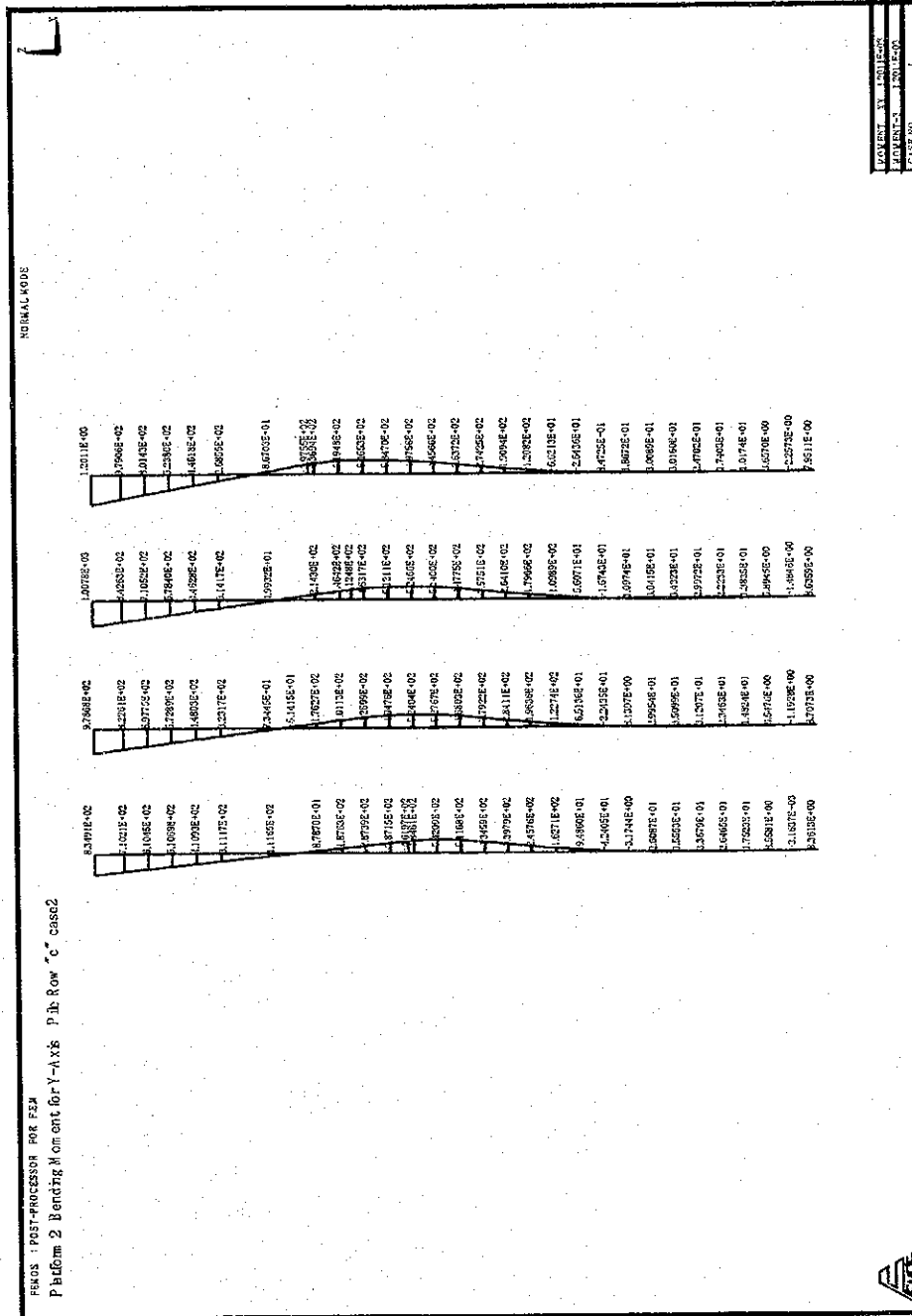


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|  | Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|  |             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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References/  
Notes

• Bending Moment for Y-Axis (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))



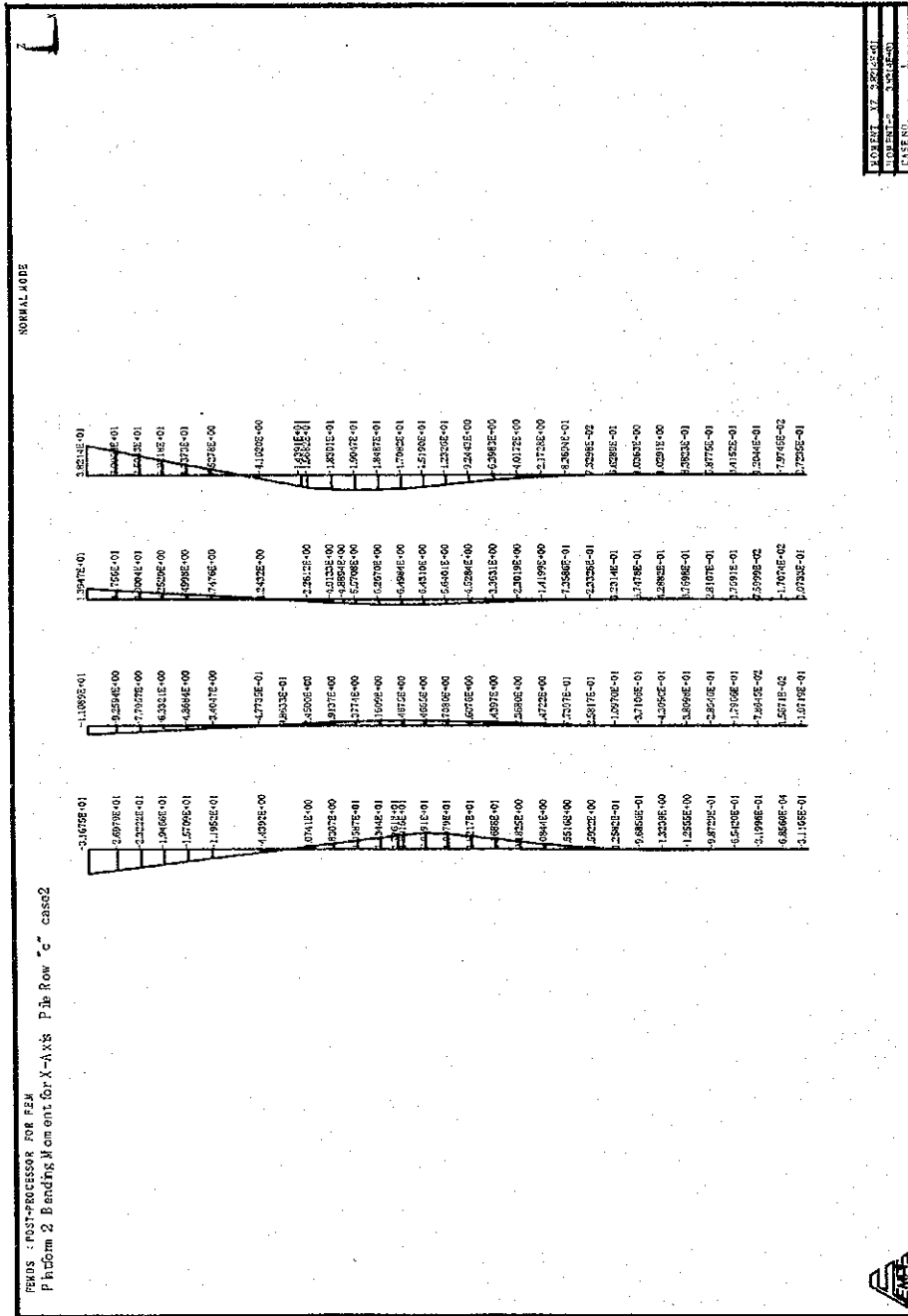
PKOS : POST-PROCESSOR FOR FEM  
Pile Row 2 Bending Moment for Y-Axis Pile Row "c" case2

|  |             |            |            |              |
|--|-------------|------------|------------|--------------|
|  | Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|  |             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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References/  
Notes

• Bending Moment for X-Axis (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))

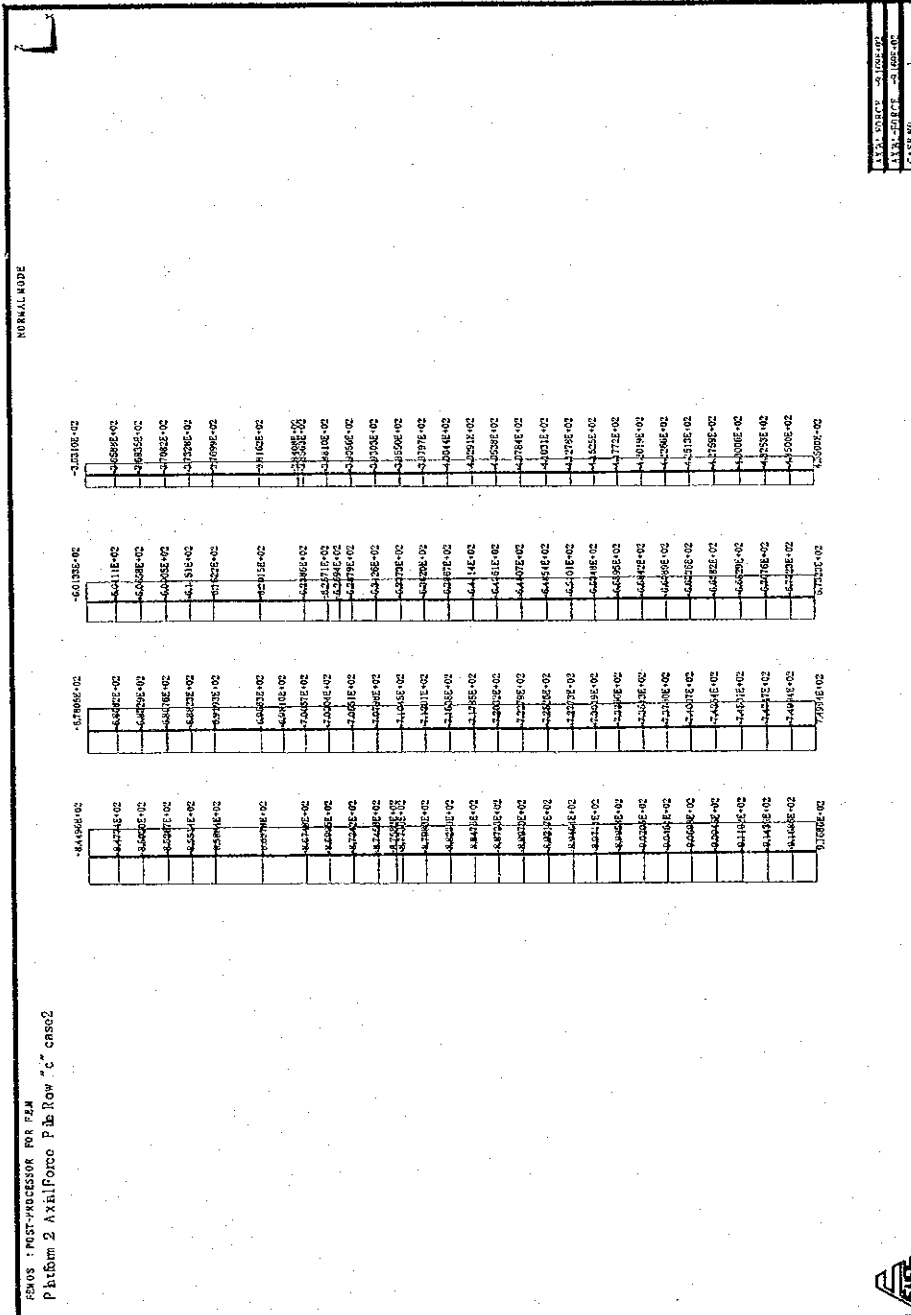


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|--|-------------|----------------|------------|---------------------|
|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>E. NISHIHURA</i> |
|  |             | 2610712002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| <b>Subject</b> | Quaywall   | Page No.        | 22 Rev. |

References/  
Notes

• Axial Force (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))



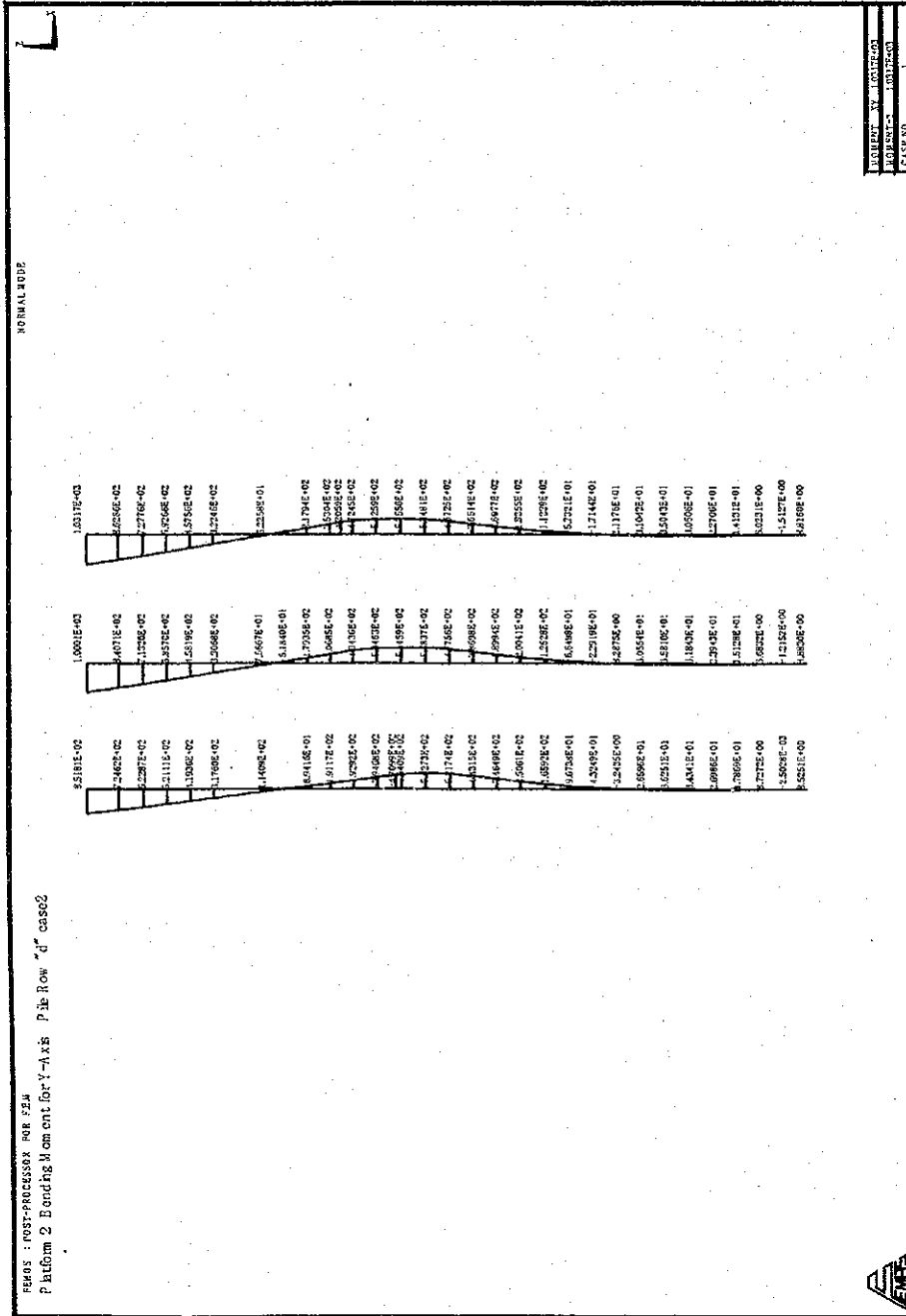
Prepared by *Y. Ando*  
2610712002

Checked by *P. NISHIMURA*  
0810612002

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
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References/  
Notes

• Bending Moment for Y-Axis (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))



FEH05 : POST-PROCESSOR FOR FEM  
Platform 2 Bending Moment for Y-Axis Pile Row "d" case2

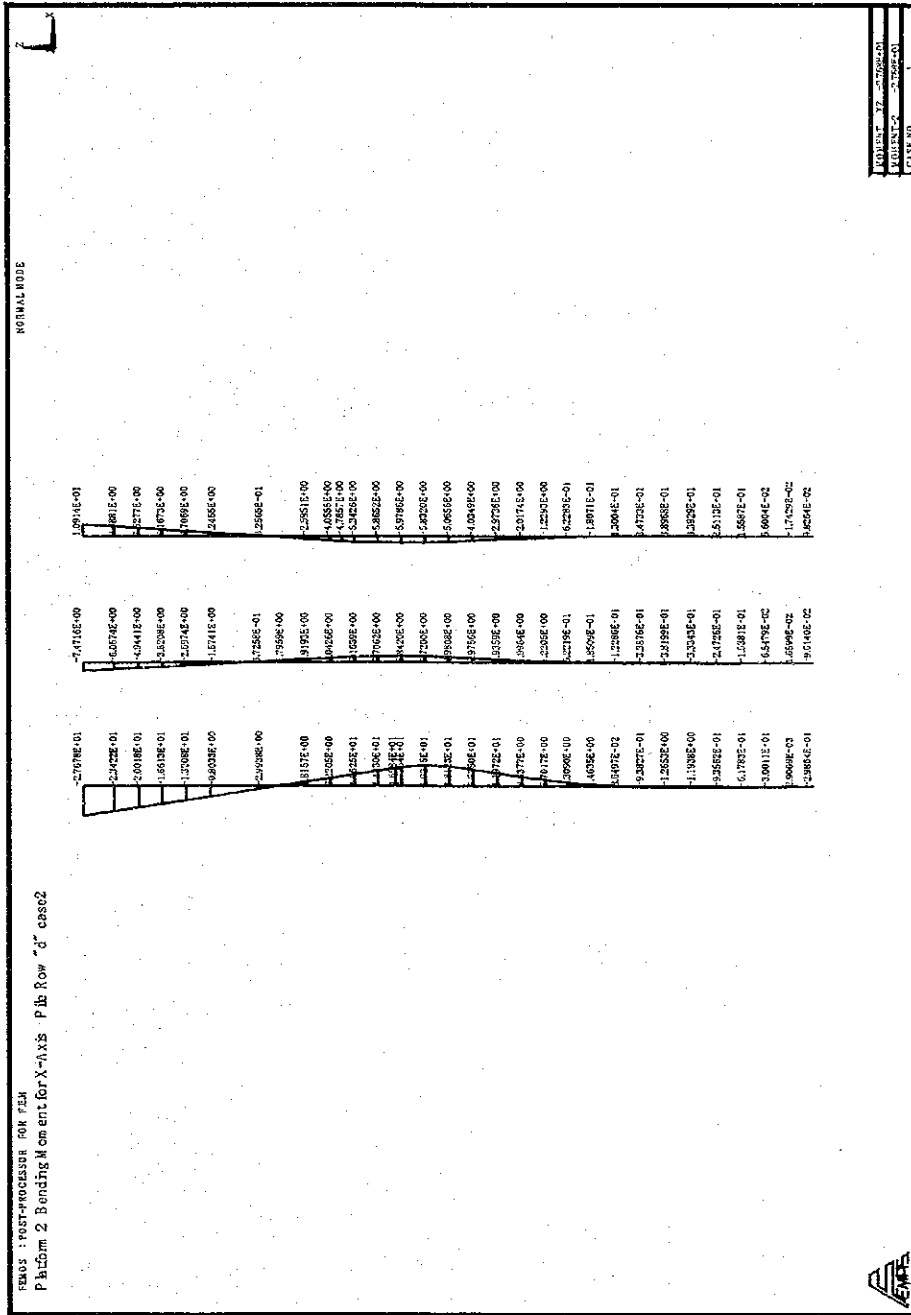
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|-------------|------------|------------|--------------|
| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2610712002 |            | 0810812002   |



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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 48 Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))

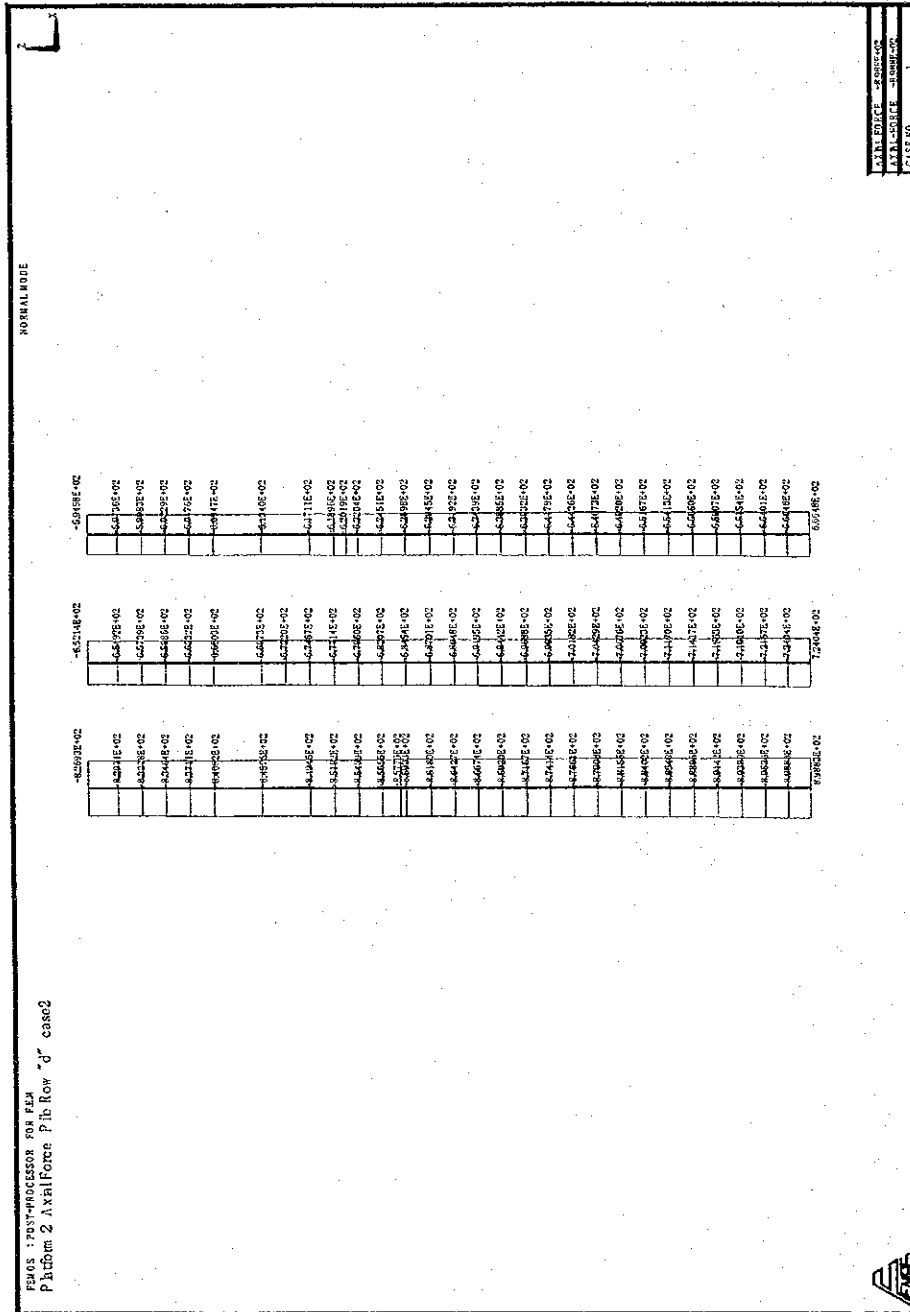


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| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 89 Rev. |

References/  
Notes

• Axial Force (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))

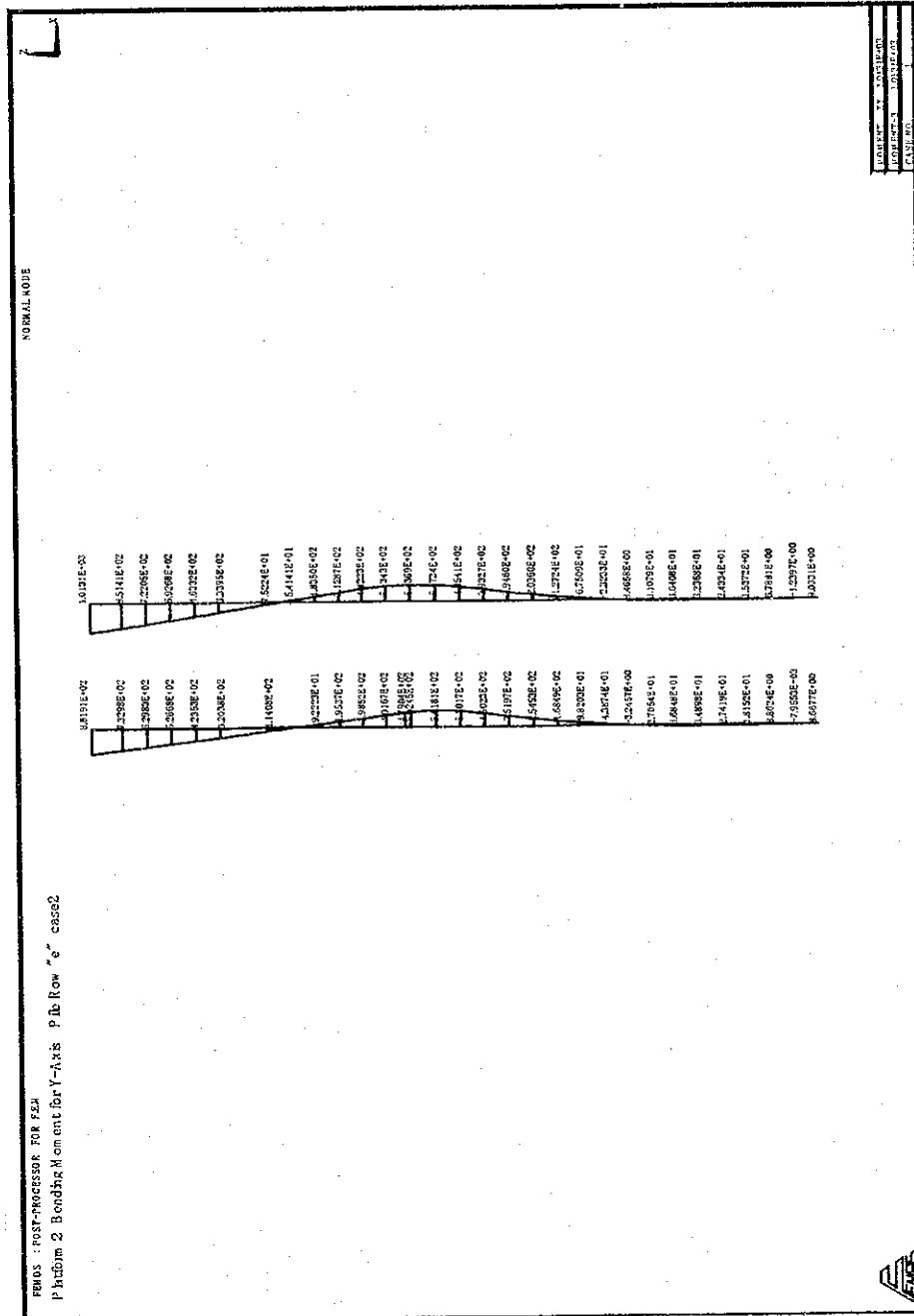


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|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>Z. NISHIMURA</i> |
|  |             | 2616712002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 50 Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))

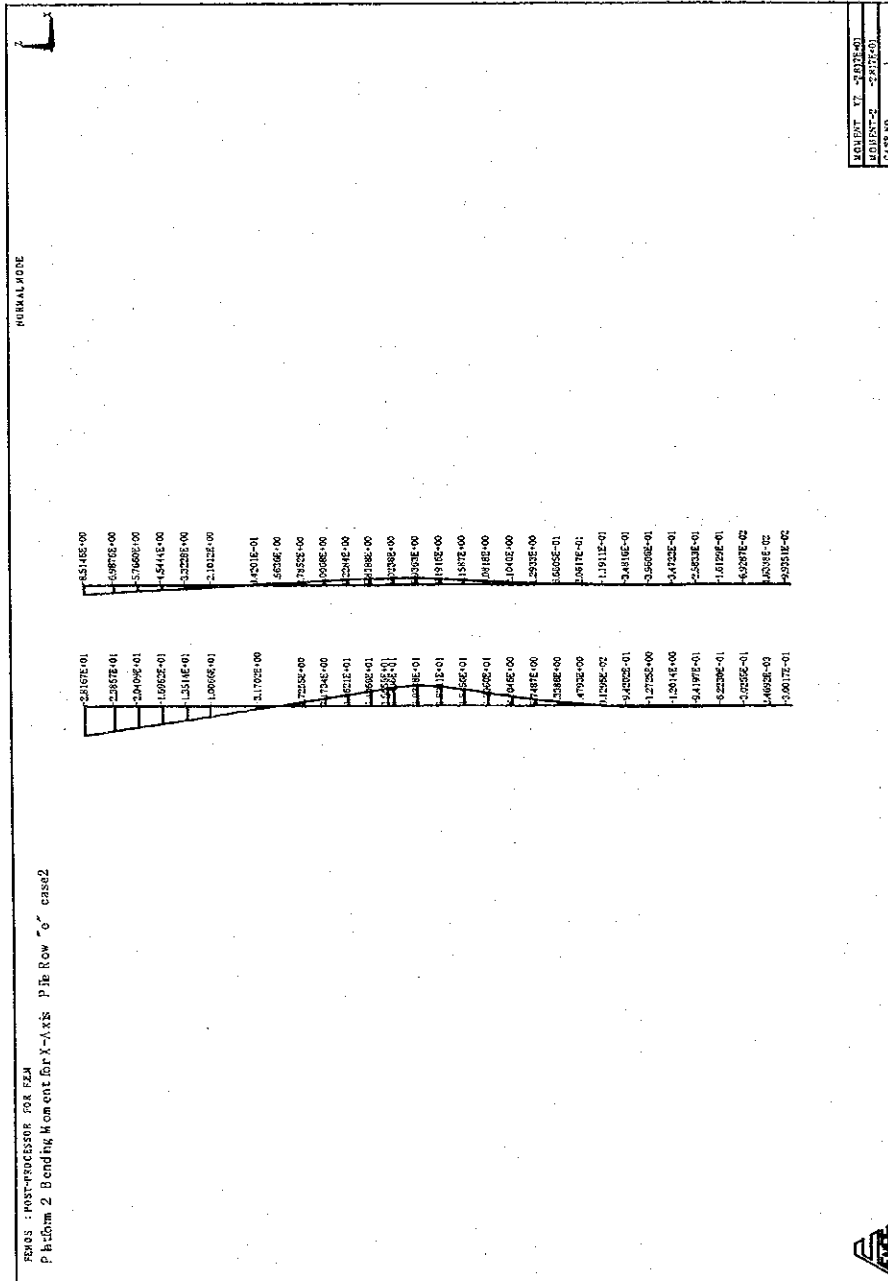


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|  | Prepared by | Y. Ando    | Checked by | E. NISHIHURA |
|  |             | 26/07/2002 |            | 08/08/2002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 57 Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))

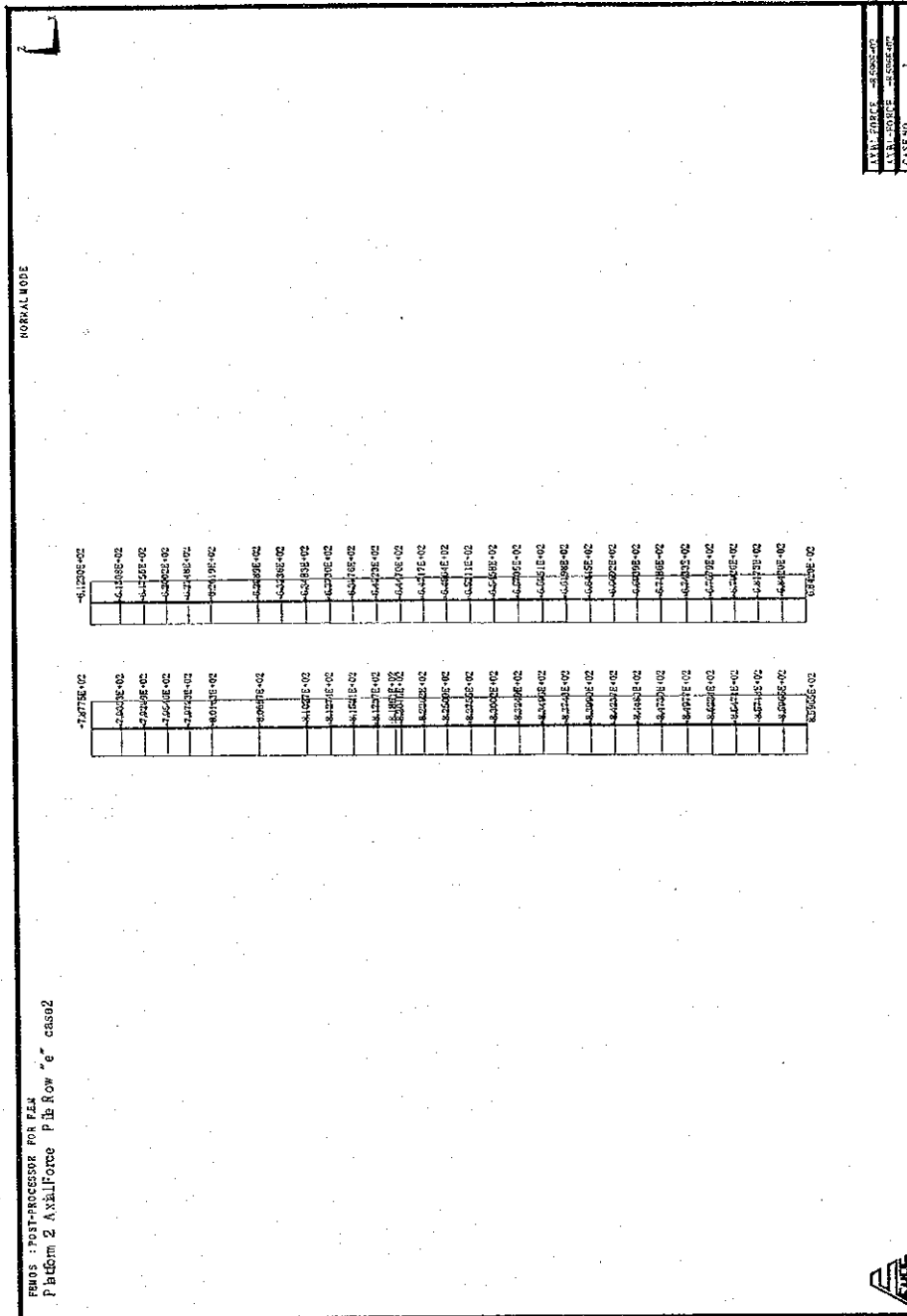


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| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 52 Rev. |

References/  
Notes

• Axial Force (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))

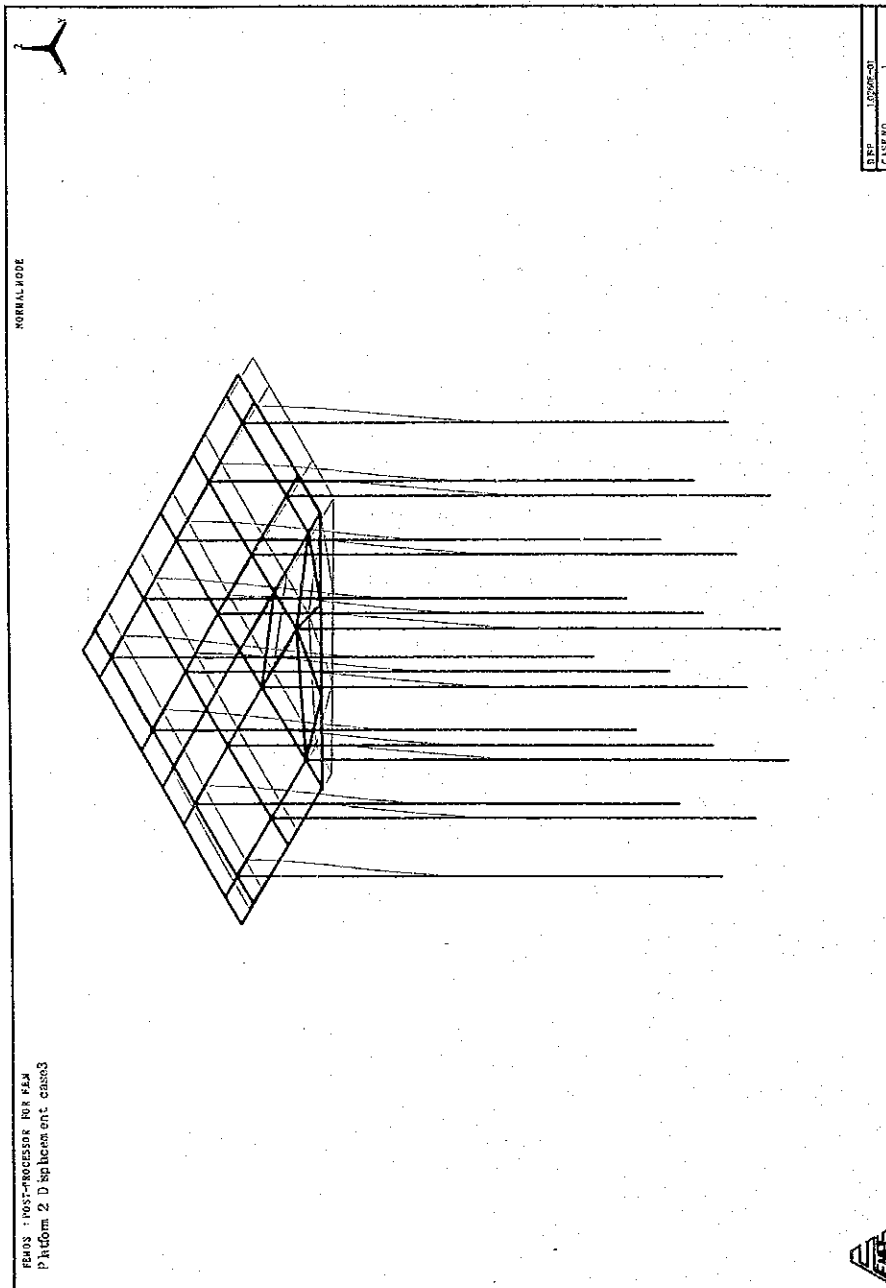


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| Prepared by | Y. Ando        | Checked by | R. NISHIMURA   |
|             | 26 / 07 / 2002 |            | 08 / 08 / 2002 |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
| <b>Section</b> | Civil  | Calc. Index No. |      |
| <b>Subject</b> | Quaywall   | Page No. 53     | Rev. |

References/  
Notes

(3) case3 (Earthquake The Parallel Direction to the Face Line)

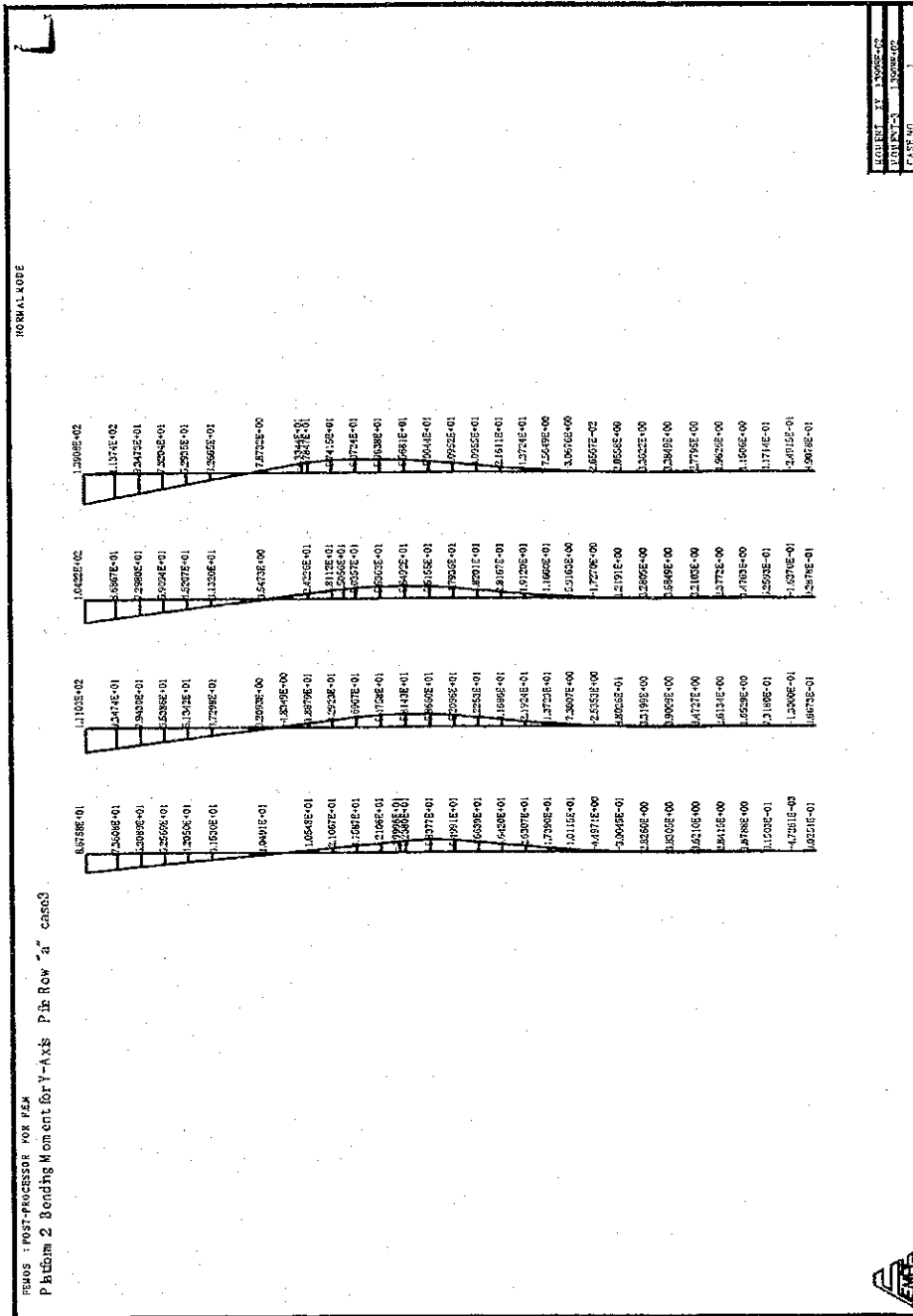


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|--------------|-------------|----------------|------------|---------------------|
| Displacement | Prepared by | <i>Y. Ando</i> | Checked by | <i>R. NISHIMURA</i> |
|              |             | 2610712002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 54 Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))



PHOTOS: POST-PROCESSOR FOR PEA  
Platform 2 Bending Moment for Y-Axis Pile Row "a" case3

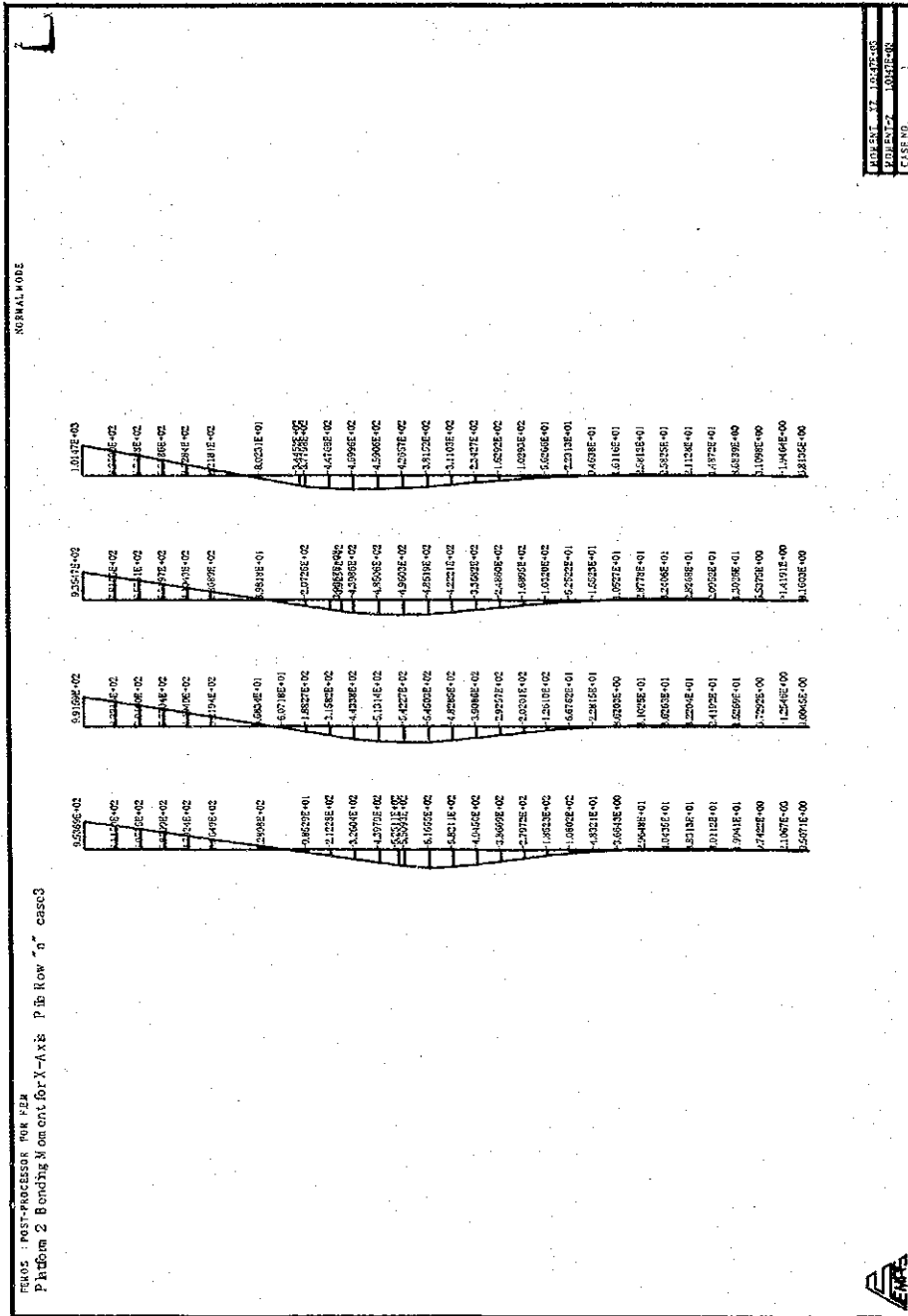


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|-------------|------------|------------|--------------|
| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2610712002 |            | 0310812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 55 Rev. |

References/  
Notes

Bending Moment for X-Axis (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))



REVISED PROCESSOR FOR P&A  
Problem 2 Bending Moment for X-Axis Pile Row "a" case03

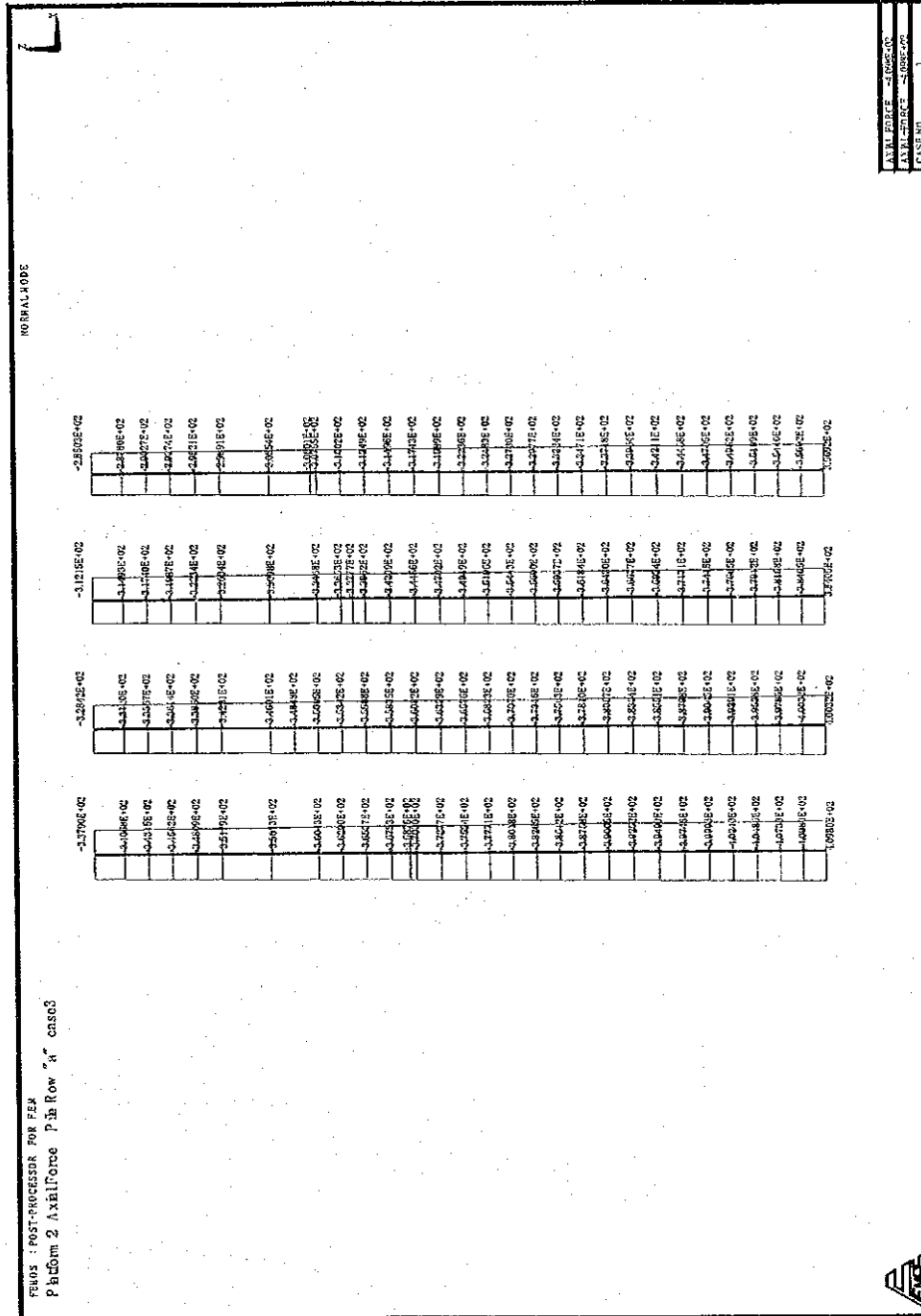
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|-------------|---------------|------------|---------------|
| Prepared by | Y. Ando       | Checked by | R. NISHIMURA  |
|             | 26 1 07 12002 |            | 08 1 08 12002 |



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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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References/  
Notes

• Axial Force (Pile Row "a" Pile 1 (Left Side)~Pile 4 (Right Side))



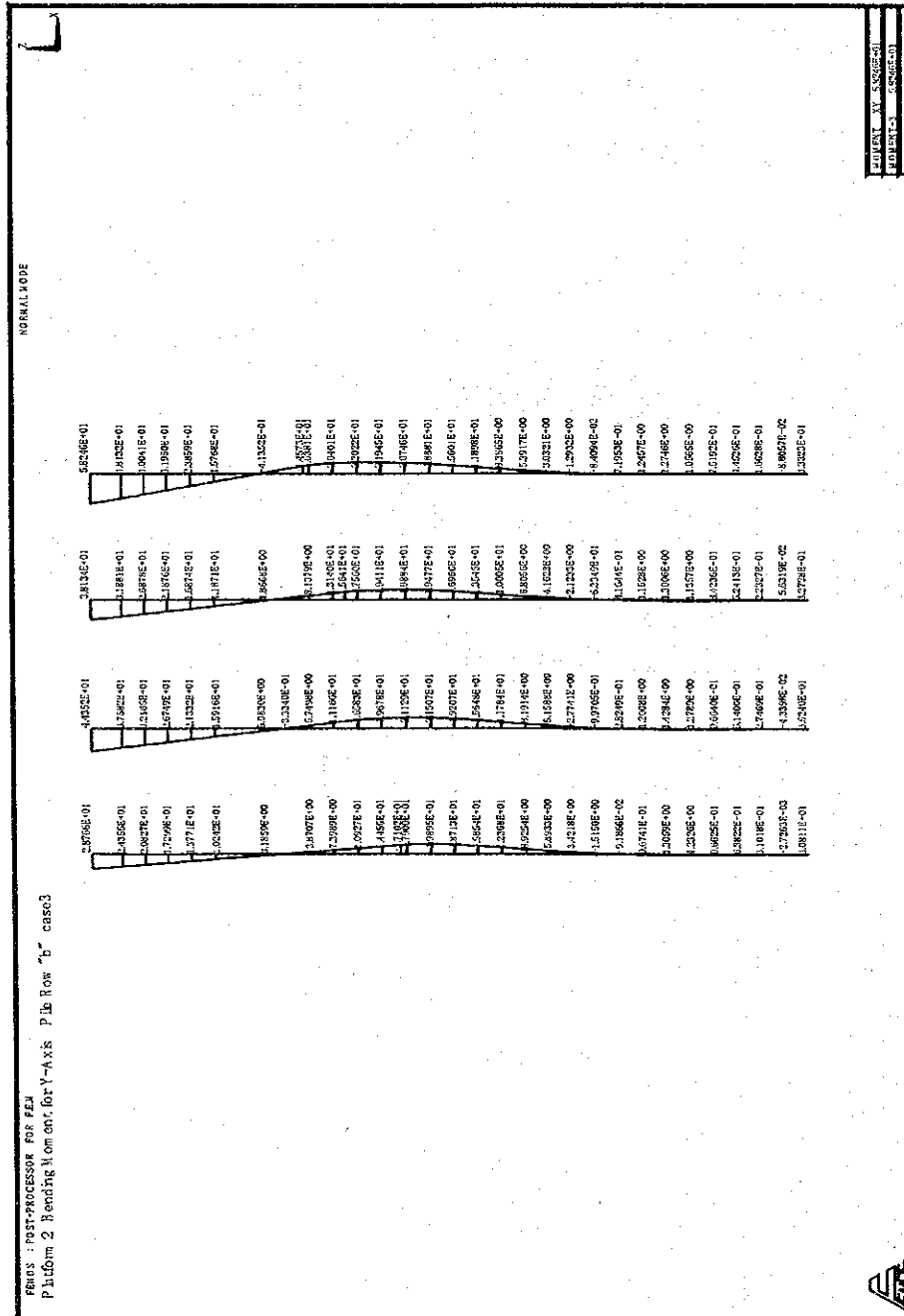
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AXIAL FORCE -1005E+00  
CASE 3

|  |             |            |            |              |
|--|-------------|------------|------------|--------------|
|  | Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|  |             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |      |
| <b>Section</b> | Civil  | Calc. index No. |      |
| <b>Subject</b> | Quaywall   | Page No. 57     | Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))



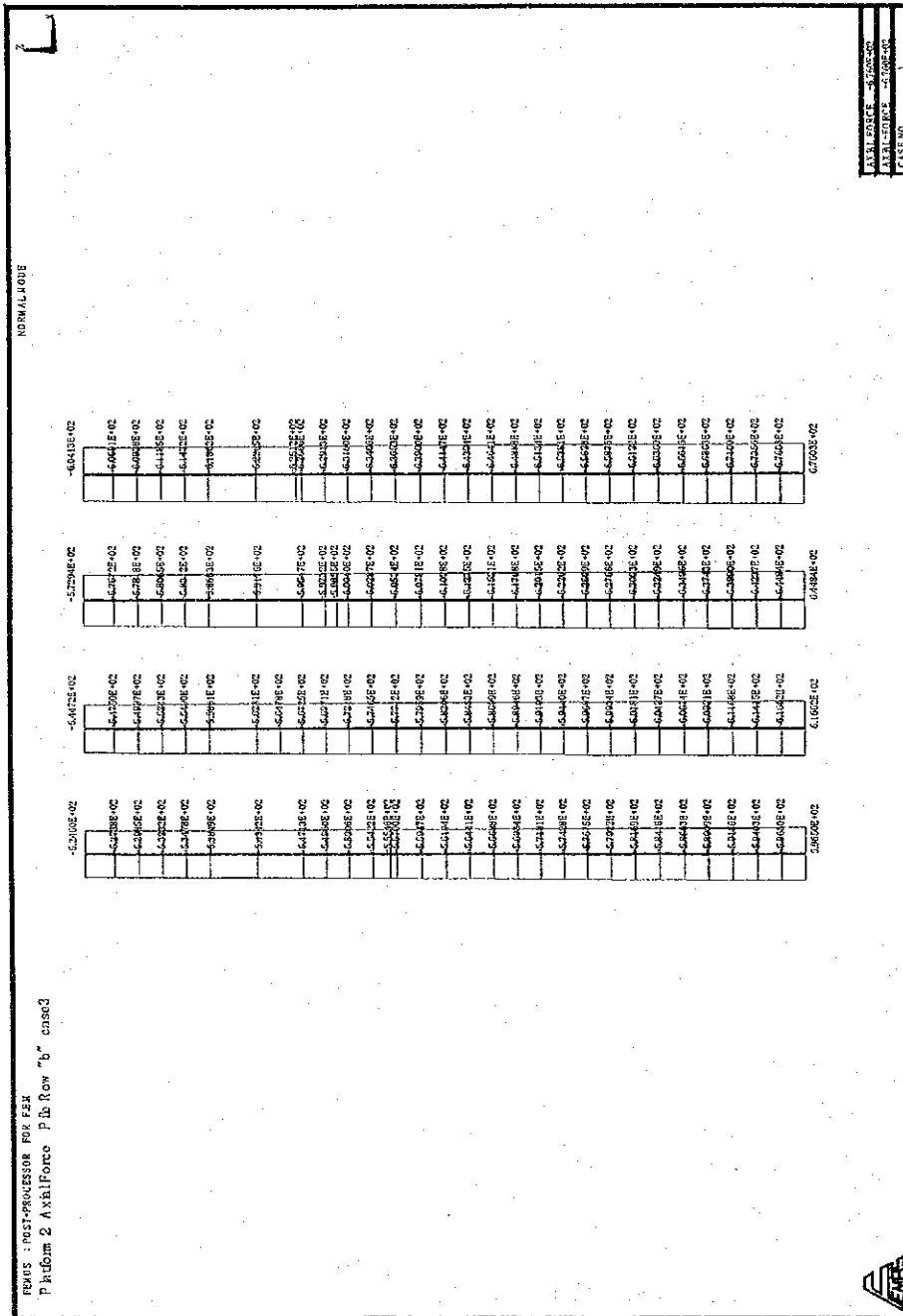
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|  | Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|  |             | 2610712002 |            | 0810812002   |

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| <b>Project</b>  | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |                      |
| <b>Section</b>  | Civil  | Calc. Index No. |                      |
| <b>Subject</b>  | Quaywall   | Page No. 58     | Rev.                 |
|   |  |                 | References/<br>Notes |
| <p>• Bending Moment for X-Axis (Pile ROW "b" Pile 1 (Left Side)~Pile 4 (Right Side))</p>  |  |                 |                      |
|   |  |                 |                      |
| PEROS : POST-PROCESSOR FOR FEM<br>Platform 2 Bending Moment for X-Axis Pile Row "b" case3 |  |                 |                      |
| Prepared by   |  | Checked by      |                      |
| Y. Ando   |  | R. NISHIMURA    |                      |
| 261 07 12002.   |  | 08 108 12002    |                      |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 59 Rev. |

References/  
Notes

• Axial Force (Pile Row "b" Pile 1 (Left Side)~Pile 4 (Right Side))

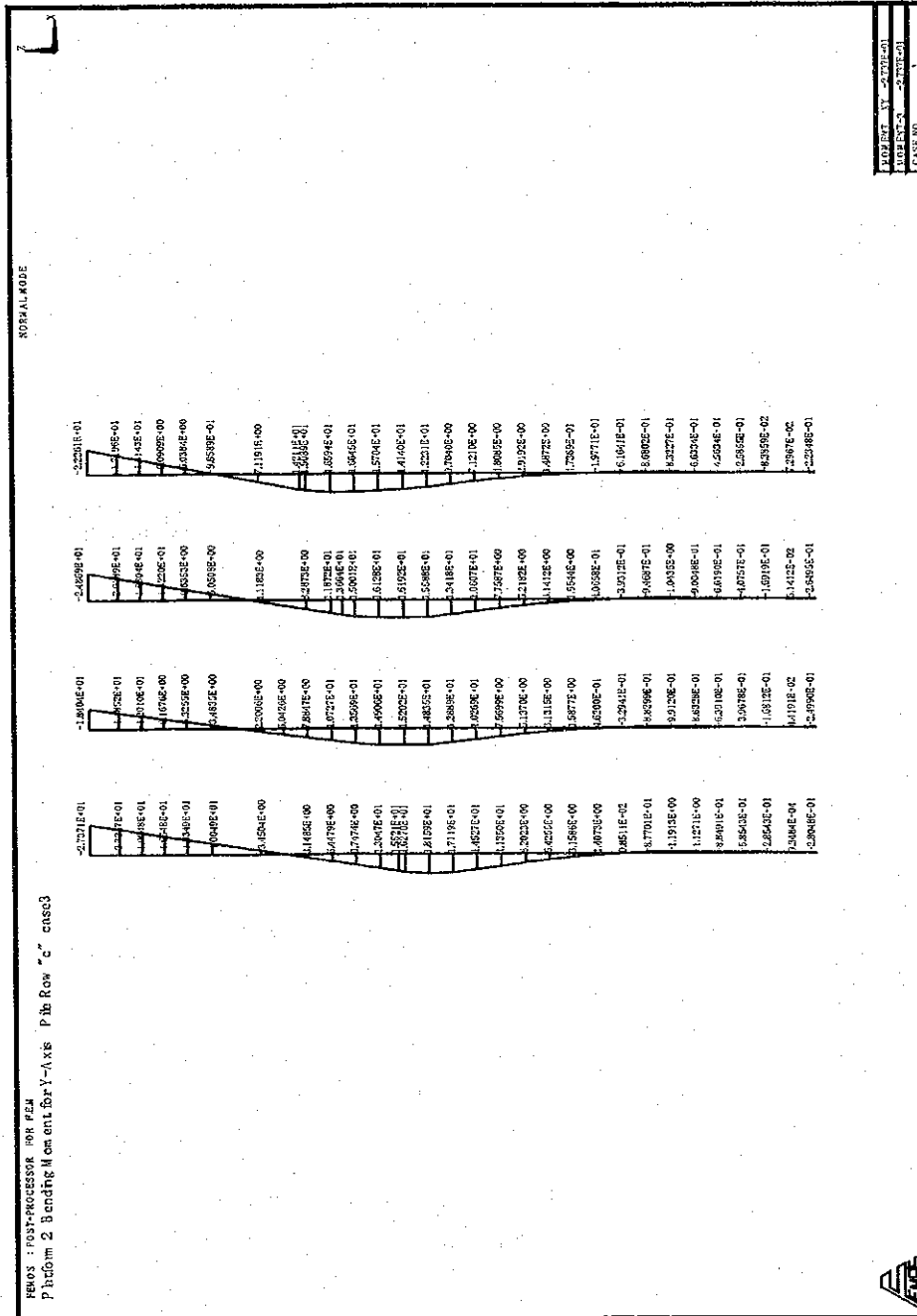


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|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>E. NISHIMURA</i> |
|  |             | 2610912002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 60 Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))



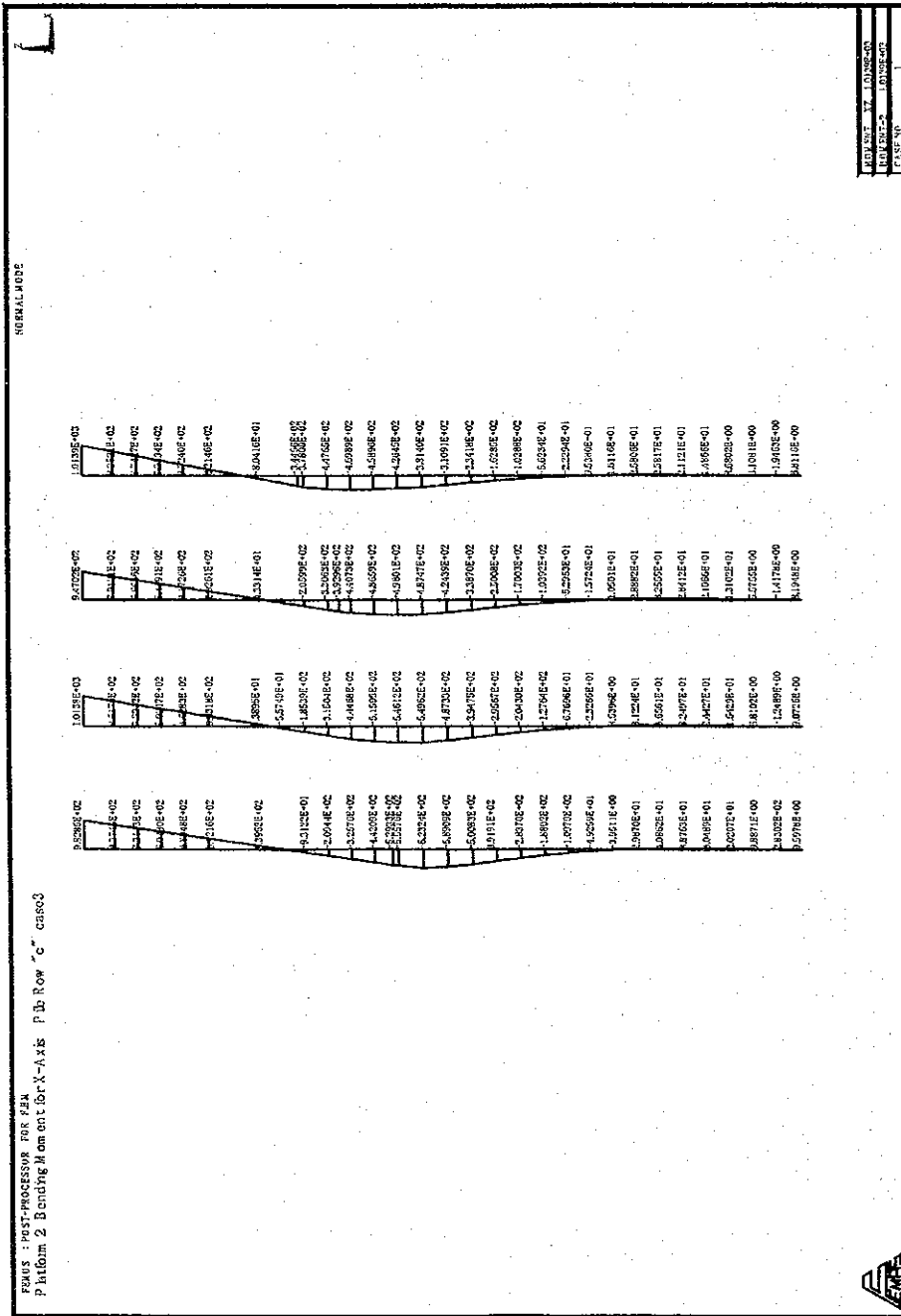
REVISED BY: Y. ANDO  
 P: BCDom 2 Bending M on ent for Y-Axis Pile Row "c" cross3

|  |             |            |            |              |
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|  | Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|  |             | 2610712002 |            | 08/06/2002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |          |
| <b>Section</b> | Civil  | Calc. Index No. |          |
| <b>Subject</b> | Quaywall   | Page No.        | 6 / Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))



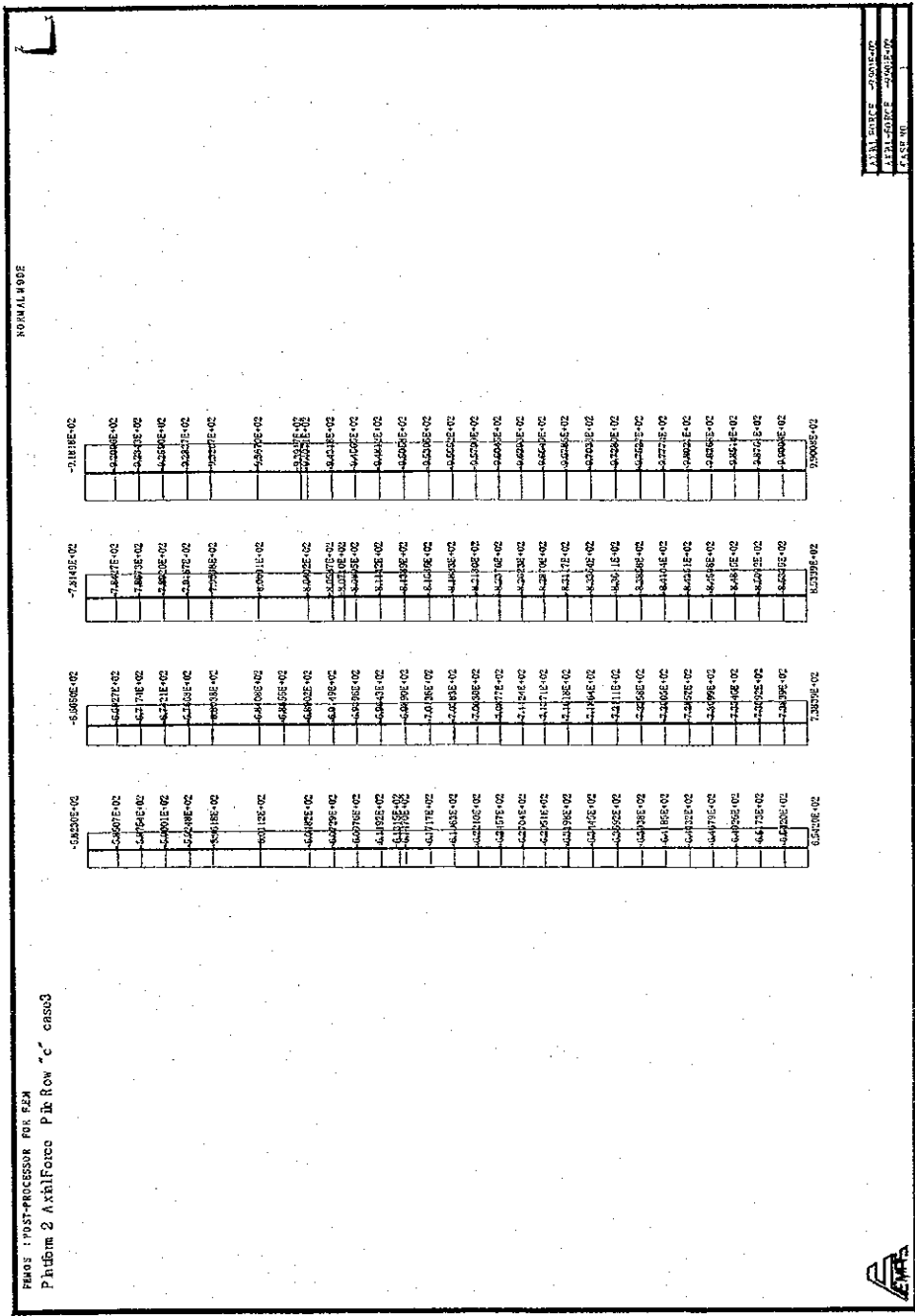
Pile Row "c" case03

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|-------------|----------------|------------|--------------|
| Prepared by | <i>Y. Ando</i> | Checked by | R. NISHIMURA |
|             | 2610712002     |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 62 Rev. |

References/  
Notes

• Axial Force (Pile Row "c" Pile 1 (Left Side)~Pile 4 (Right Side))

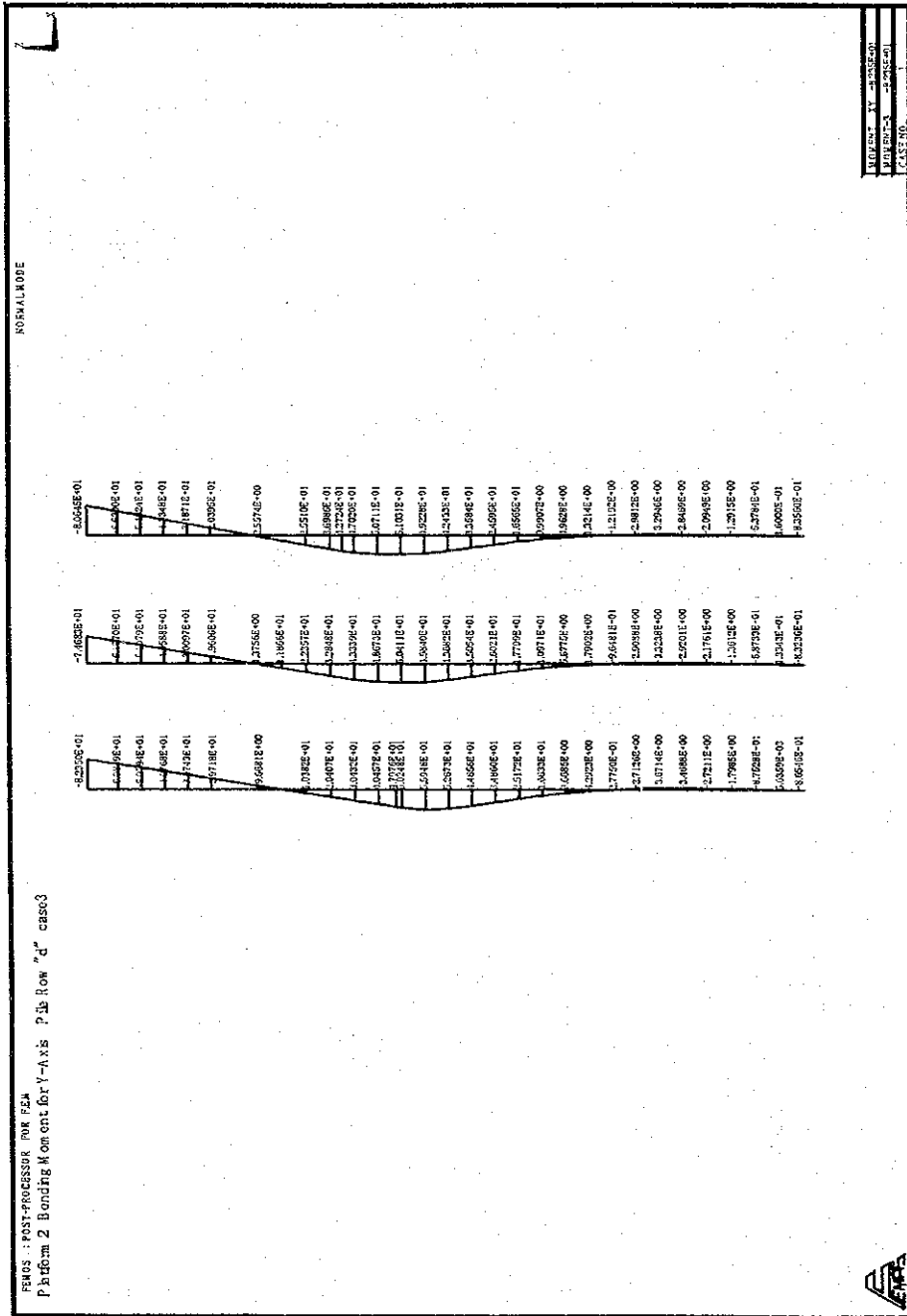


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|--|-------------|----------------|------------|---------------------|
|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>R. NISHIMURA</i> |
|  |             | 2610712002     |            | 0810812002          |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 63 Rev. |

References/  
Notes

• Bending Moment for Y-Axis (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))



PILES : POST-PROCESSOR FOR FEM  
 Problem 2 Bending Moment for Y-Axis Pile Row "d" case3

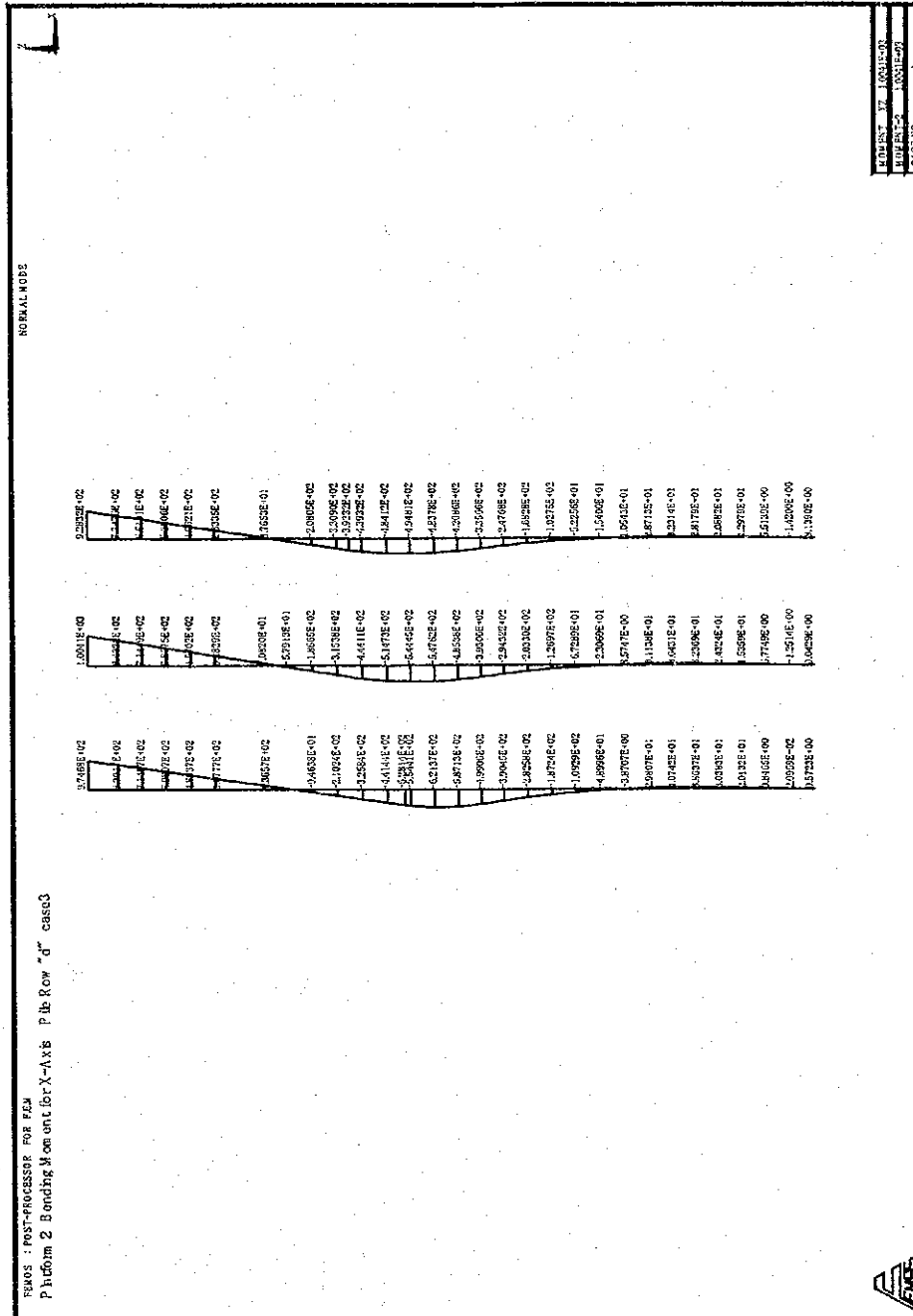
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|-------------|--------------|------------|--------------|
| Prepared by | Y. Ando      | Checked by | R. NISHIMURA |
|             | 261 07 12002 |            | 08 108 12002 |



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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 64 Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))



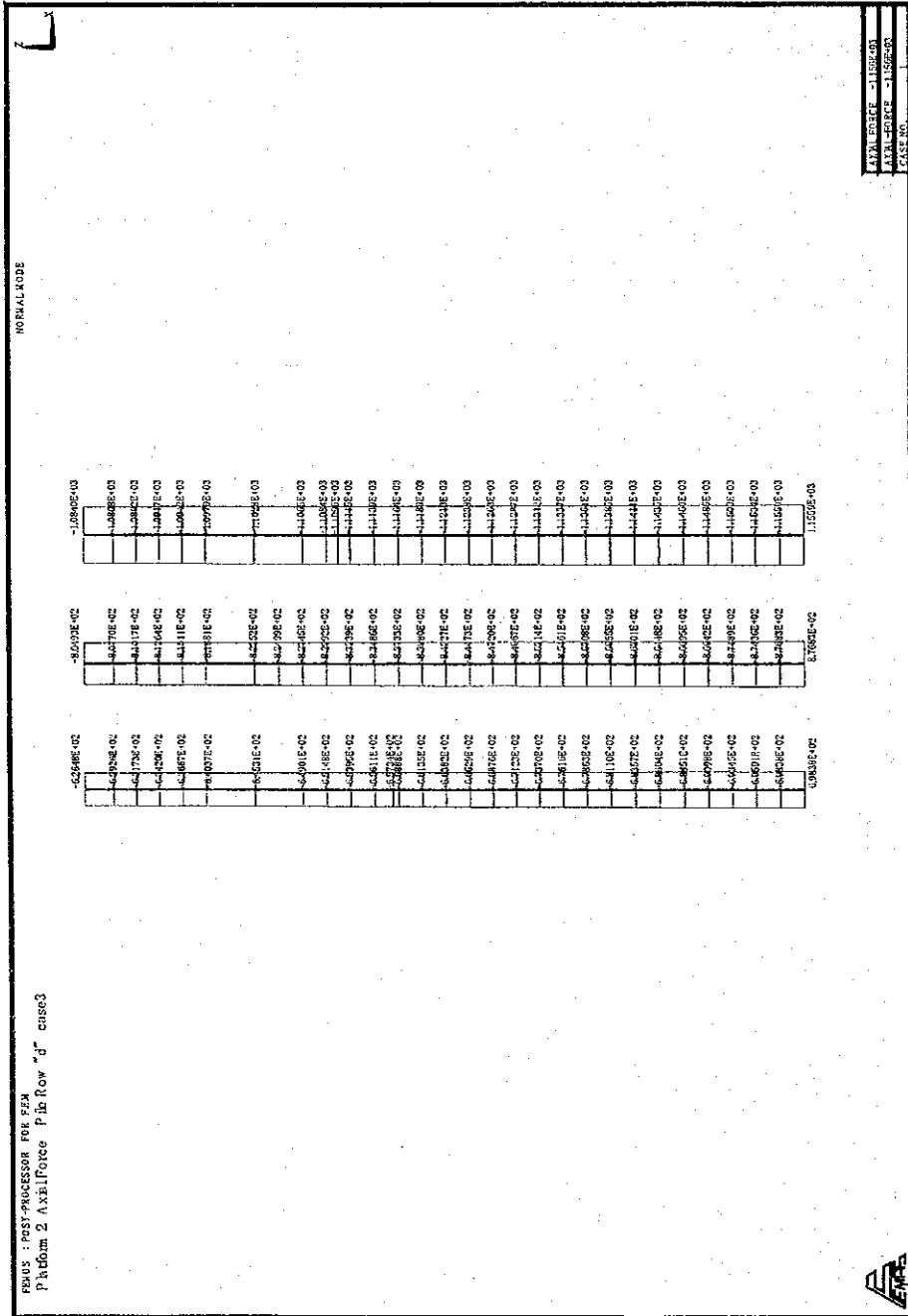
PLANS : POST-PROCESSOR FOR FEW  
Problem 2 Bending Moment for X-Axis Pile Row "d" case3

|  |             |            |            |              |
|--|-------------|------------|------------|--------------|
|  | Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|  |             | 2610712002 |            | 0810812002   |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 65 Rev. |

References/  
Notes

• Axial Force (Pile Row "d" Pile 1 (Left Side)~Pile 3 (Right Side))



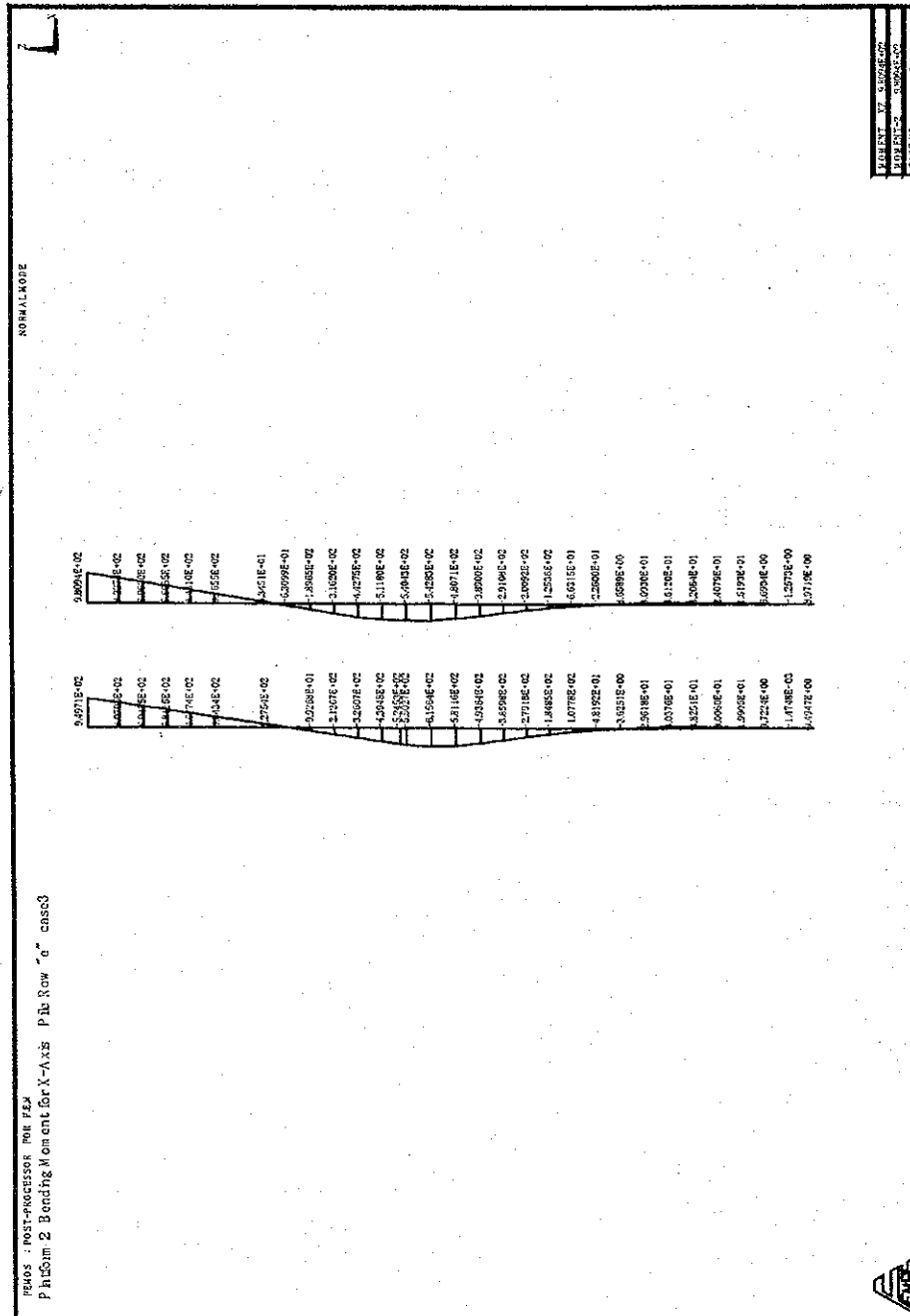
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|--|-------------|----------------|------------|---------------------|
|  | Prepared by | <i>Y. Ando</i> | Checked by | <i>P. NISHIMURA</i> |
|  |             | 26 / 07 / 2002 |            | 08 / 08 / 2002      |

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| <b>Project</b>   | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |                      |
| <b>Section</b>   | Civil  | Calc. Index No. |                      |
| <b>Subject</b>   | Quaywall   | Page No.        | 66 Rev.              |
|  |  |                 | References/<br>Notes |
| <p>• Bending Moment for Y-Axis (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))</p> <div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">NORMAL MOSE</p> <p style="font-size: small;">             POINT NO. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000         </p> </div> |  |                 |                      |
| PERIOD : POST-PRODUCTION FOR PER<br>P. Bottom 2 Bending Moment for Y-Axis P. in Row "e" case3  |  | Prepared by     | Y. Arado             |
|  |  | Checked by      | R. NISHIMURA         |
|  |  |                 | 26 1 07 12002        |
|  |  |                 | 08 1 08 12002        |

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| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
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| <b>Subject</b> | Quaywall   | Page No.        | 67 Rev. |

References/  
Notes

• Bending Moment for X-Axis (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))

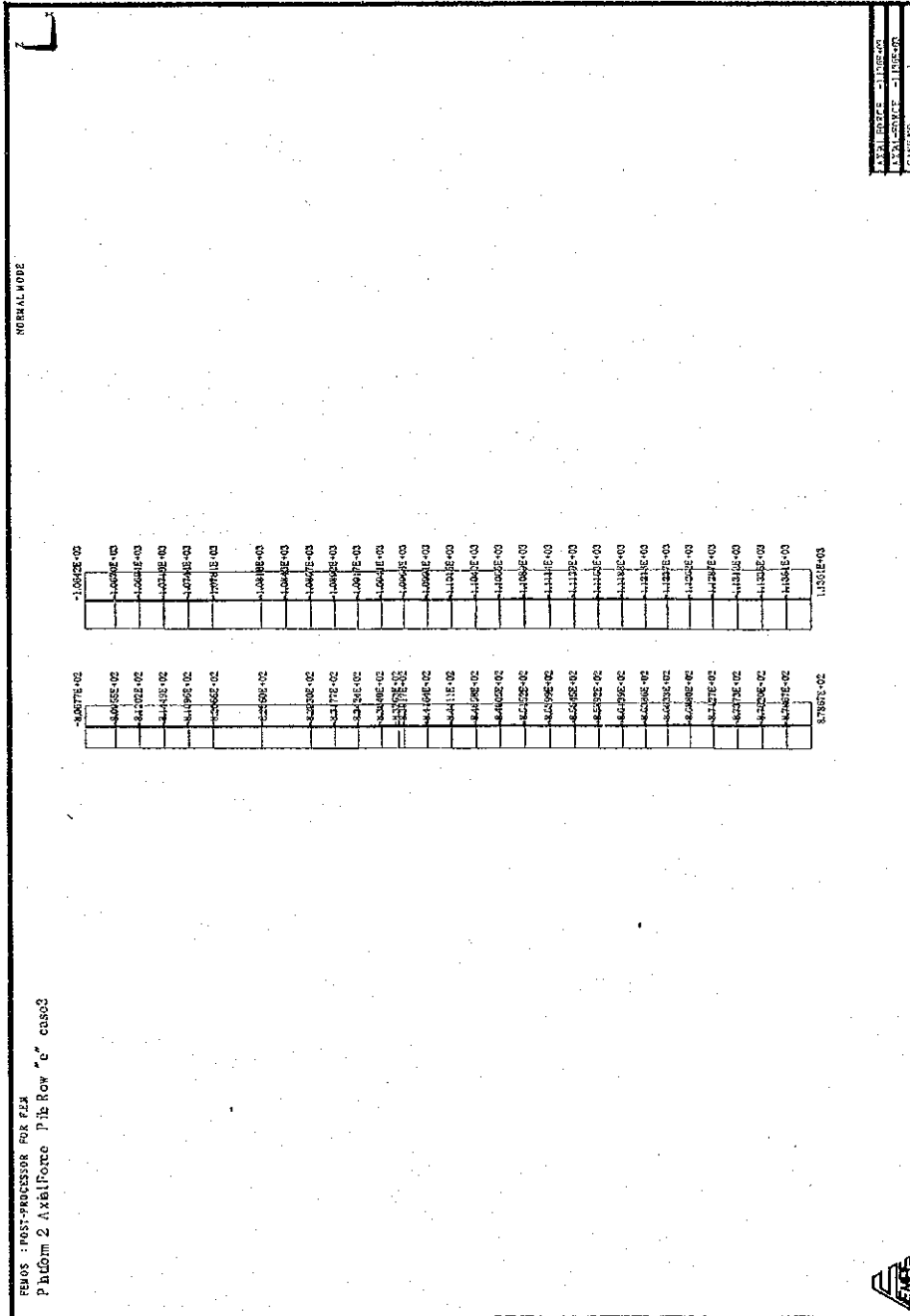


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|-------------|------------|------------|--------------|
| Prepared by | Y. Ando    | Checked by | R. NISHIMURA |
|             | 2616712002 |            | 0810812002   |

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|----------------|--|-----------------|---------|
| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
| <b>Subject</b> | Quaywall   | Page No.        | 68 Rev. |

References/  
Notes

• Axial Force (Pile Row "e" Pile 1 (Left Side)~Pile 2 (Right Side))



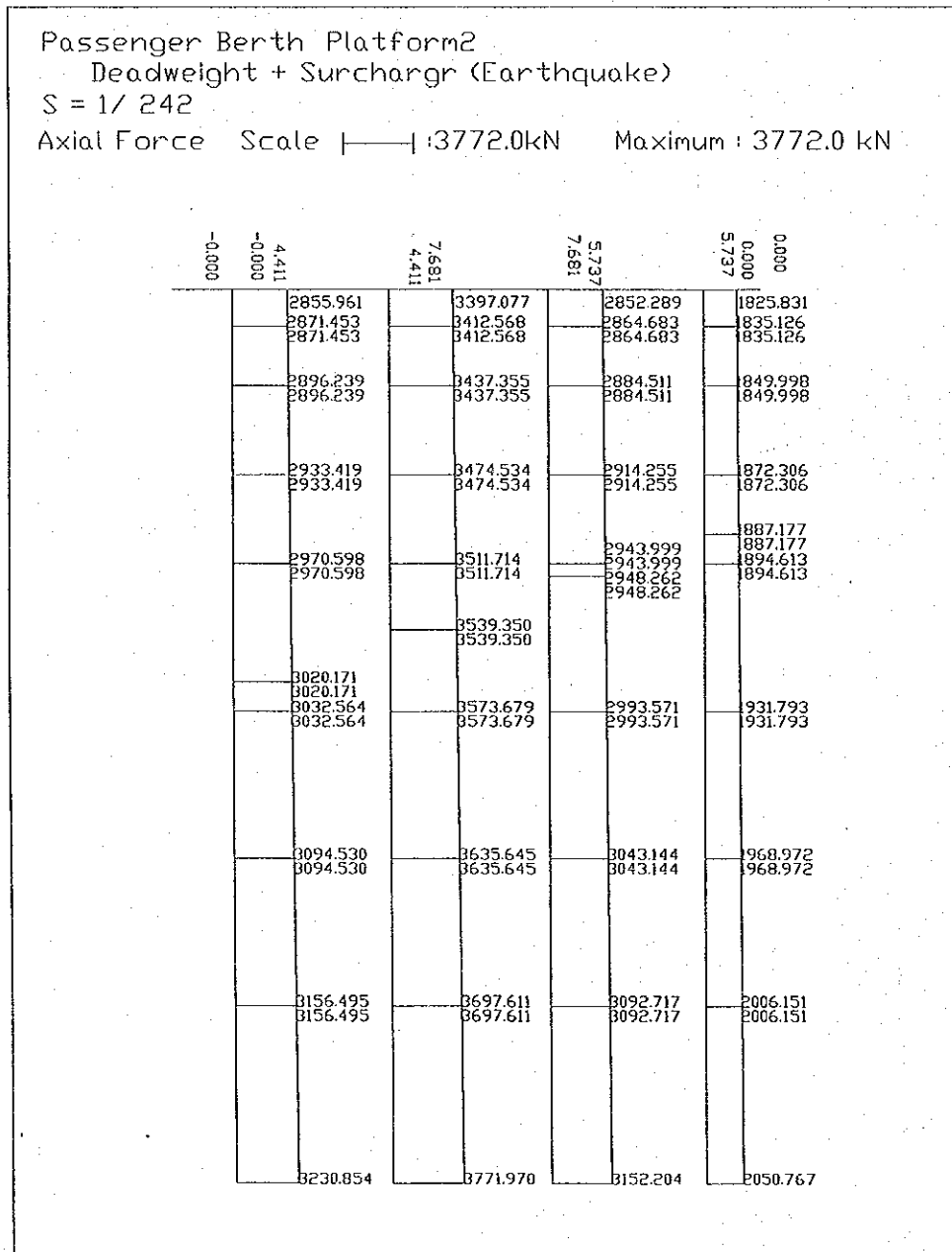
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|-------------|----------------|------------|---------------------|
| Prepared by | <i>Y. Ando</i> | Checked by | <i>R. NISHIMURA</i> |
|             | 2610712002     |            | 08 / 08 / 2002      |

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|----------------|--|-----------------|---------|
| <b>Project</b> | Detailed Design on Port Reactivation Project in La Union | Calc. File No.  |         |
| <b>Section</b> | Civil  | Calc. Index No. |         |
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References/  
Notes

(4) Earthquake Condition

Static Load (Deadweight and Surcharge) Action Condition Axial Force



(Cross-sectional force is the sum total for a pile number of each pile rows.)

|             |  |                |            |  |                |
|-------------|--|----------------|------------|--|----------------|
| Prepared by |  | Y. Ando        | Checked by |  | R. NISHIMURA   |
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