



กรมเจ้าท่า
กระทรวงคมนาคม

เอกสารรายการคำนวณโครงสร้างงานท่าเทียบเรือ งานก่อสร้างท่าเทียบเรือท่ามะลิ่ง จังหวัดสตูล


กุมภาพันธ์ 2544

เสนอโดย

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CONSULTING ENGINEERS

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988015


(นายอรุณ รัตพันธุ์)

เอกสารรายการคำนวณโครงสร้างงานทำเทียบเรือ
โครงการสำรวจออกแบบเพื่อการก่อสร้างทำเทียบเรือท่ามะลิ
จังหวัดสตูล

1. รายการคำนวณโครงสร้างทำเทียบเรือเนกประสงค์
2. รายการคำนวณโครงสร้างทำเทียบเรือท่องเที่ยว
3. รายการคำนวณโครงสร้างทำจุดเรือพักคอยและทำจุดเรือเล็ก
4. รายการคำนวณโครงสร้างทำเทียบเรือท่าลาดสำหรับลากเรือขึ้นลง
5. รายการคำนวณโครงสร้างหินทิ้ง Riprap

ร่างเอกสารรายการคำนวณโครงสร้างงานทำเทียบเรือ
โครงการสำรวจออกแบบเพื่อก่อสร้างทำเทียบเรือท่ามะลิ่ง
จังหวัดสตูล

1. รายการคำนวณโครงสร้างทำเทียบเรืออเนกประสงค์
2. รายการคำนวณโครงสร้างทำเทียบเรือท่องเที่ยว
3. รายการคำนวณโครงสร้างทำจุดเรือพักคอยและทำจุดเรือเล็ก
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5. รายการคำนวณโครงสร้างหินทิ้ง Riprap

รายการคำนวณโครงสร้าง
ทำเทียบเรือเนกประสงค์

Project TammalangSheet 1 of _____Subject Cargo Berth Design.

Date _____

Worked by ศิวะชัย

Checked by _____

1. Design Criteria

1.1 Vessel Size

Gross Registered Tonnage (GRT) = 400 GRT

Dead Weight Tonnage (DWT) = 535 DWT

Length overall (LOA) = 45.00 m

Beam width = 8.00 m

Depth = 4.50 m

Draft (Full loaded) = 3.50 m

Draft (Ballasted) = 1.80 m

1.2 Berthing Conditions

Berthing velocity = 0.30 m/sec

Berthing Angle = 10° Berthing method = $\frac{1}{4}$ point

1.3 Dimensions at quay

Quay length = 55.00 m

Crest Elevation = +2.20 m MSL

Planned water depth = -6.74 m MSL

Design water depth = -7.54 m MSL

(Depth for structural calcula)

1.4 Loads

Dead load = t/m^2

Uniform live load = 1.50 t/m

Concentrated load (live) = 10^T mobile crane load

Project _____

Sheet 2 of _____

Subject _____

Date _____

Worked by စိုးဝင်း

Checked by _____

Current velocity = 1.00 m/sec

Wind speed = 25.00 knots

Reaction from anchor = 30.00 TONS.

1.5 Water Levels

Highest Astronomical Tide (HAT) = +1.90 m MSL

Mean Higher High water (MHHW) = +0.56 m MSL

Lowest Astronomical Tide (LAT) = -2.24 m MSL

1.6 Service life of quay structure

50 years.

Project _____

Sheet 3 of _____

Subject _____

Date _____

Worked by _____

Checked by _____

Gross Registered Tonnage (GRT) = 100.00 GRT

Dead Weight Tonnage (DWT) = 143.00 DWT

Length Overall (LOA) = 28.00 m

Beam width = 6.30 m

Depth = 3.50 m

Draft (Full loaded) = 2.70 m

Draft (Ballasted) = 1.30 m

Project _____

Sheet 4 of _____Subject Top deck & parallel body positions
Cargo port

Date _____

Worked by Pratik

Checked by _____

2. TOP DECK and parallel Body position of vessels.
- 2.1 The elevation of top deck of vessels as shown in Figure 1 varies from +4.60 to -1.24 m MSL.

Figure 2 indicates the parallel body position of vessels under various tidal conditions. The parallel body positions have been drawn for two size of vessels - 400 GRT and 100 GRT.

Considering the large range of parallel body position double fenders or one long fender covering the whole range can be employed. Single long fender will be expensive and therefore, double fender system as shown in Figures 1 and 2 is employed.

The upper fender for cases 3, 4, 7, and 8

The lower fender for cases 1, 2, 5 and 6.

2.2 Berthing Energy.

Berthing energy was computed to be 2.5 t-m.

2.3 Energy Absorption of Rubber Fenders

For computation of coping concrete, Sunitama's rubber fender is selected. However, of course, equivalent fender can be used.

Project Terminal

Sheet 5 of

Subject Cargo PM

Date

Worked by Ph 9/191

Checked by

| <u>Berthing angle</u> | <u>Energy absorption (t-m)</u> | <u>Reaction (t)</u> |
|-----------------------|--------------------------------------|---|
| 0° berthing | 4.00 | 30 Sumisto |
| 10° berthing | $E_a' = 4.0 \times 0.75$ $= 3.00$ | 30×0.80 $= 24$ 2V 40DH CV2 rate deflect 252 |

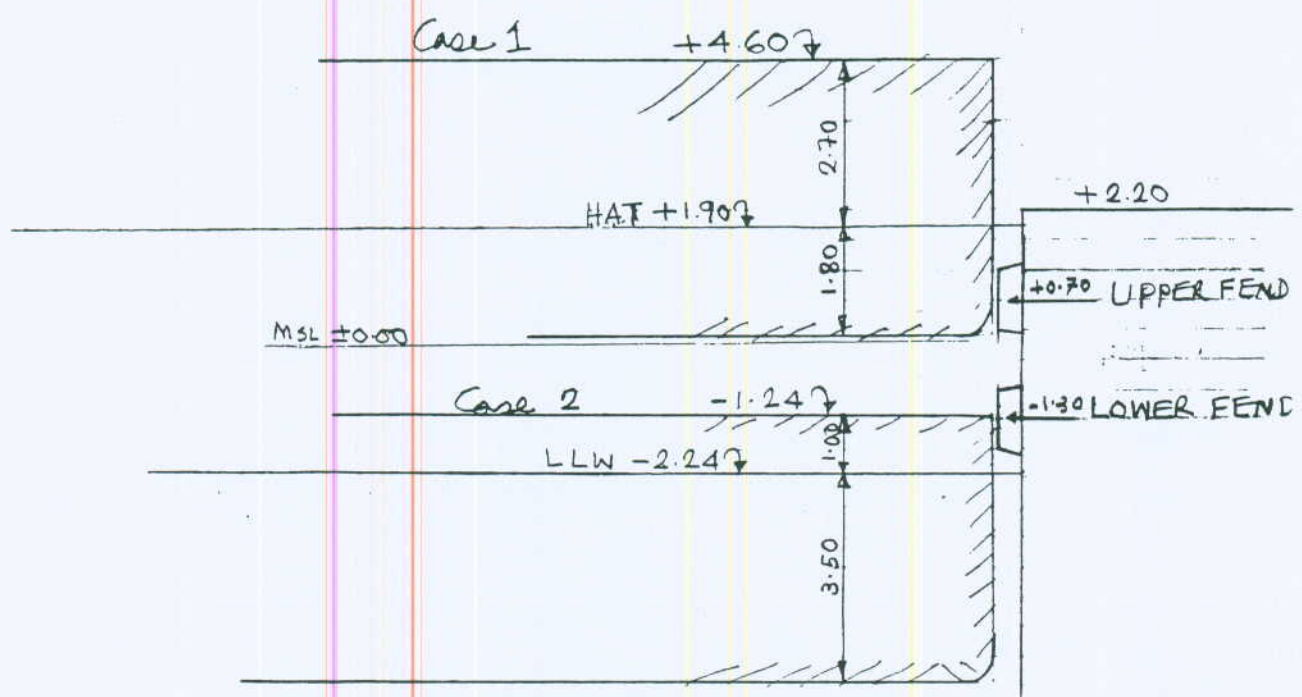
The berthing energy will be absorbed by 1.0 m subject forward.

$$E_f = 2.50 \text{ t.m} < E_a' = 3.0 \text{ t.m} \quad \text{O.K}$$

Project Tammalang
 Subject Fender Installation Position
Cargo

Sheet 6 of _____
 Date _____
 Worked by [Signature]
 Checked by _____

Fig.1



Case 1: Highest Top Deck Position: HAT +1.90; Ballasted, 400 GR

Case 2: Lowest Top Deck position: LLW -2.24; Full Loaded, 4

| GRT (±) | Mold depth (m) | Draft (m) | | Free board (m) | |
|---------|----------------|-------------|-----------|----------------|-----------|
| | | Full Loaded | Ballasted | Full Loaded | Ballasted |
| 400 | 4.50 | 3.50 | 1.80 | 1.00 | 2.70 |

Project _____

Sheet 7 of _____

Subject parallel body position of vessels

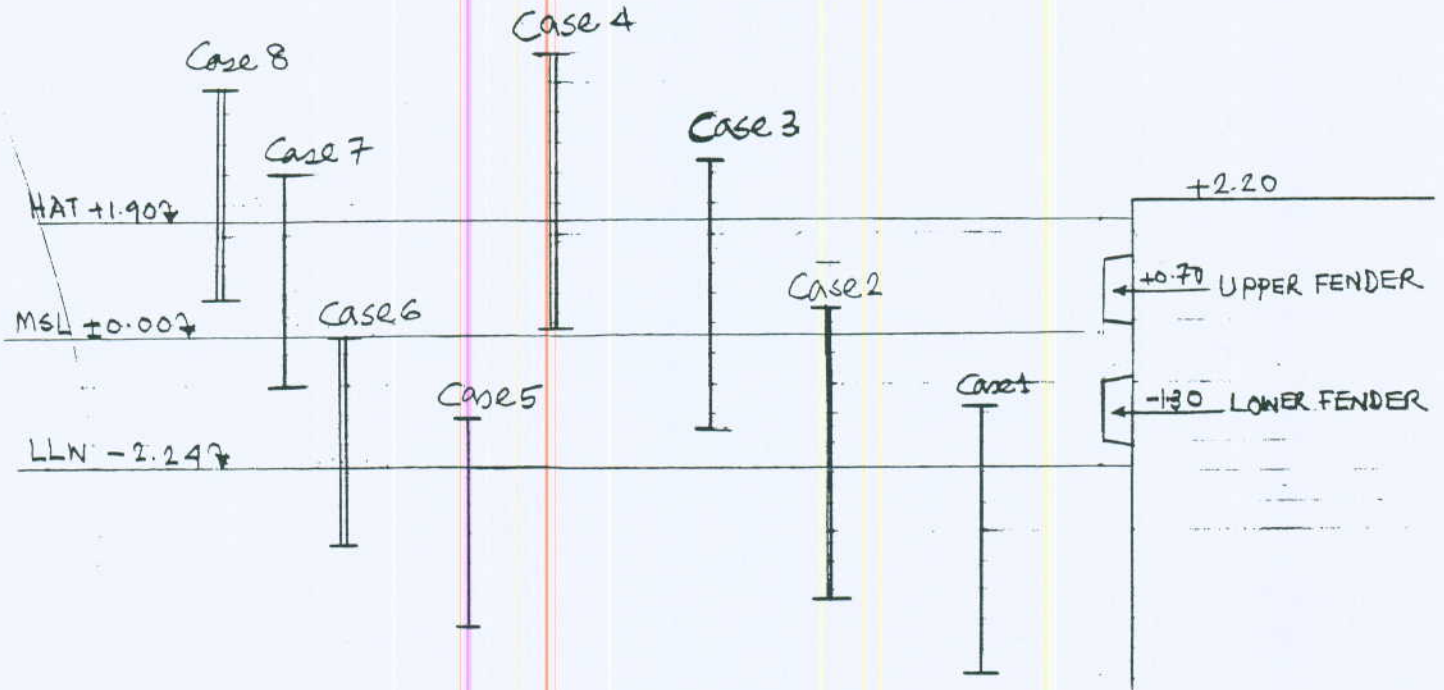
Date _____

Worked by _____

Checked by _____

Cargo

Fig. 2



| Case | Vessel | Tidal Condition | Load Condition | Elevation of Parallel body of v. |
|--------|---------|-----------------|----------------|----------------------------------|
| Case 1 | 400 GRT | LLW | Full | -1.24 ~ -5.74 |
| Case 2 |) | LLW | Ballasted | +0.46 ~ -4.04 |
| Case 3 |) | HAT | Full | +2.90 ~ -1.60 |
| Case 4 |) | HAT | Ballasted | +4.60 ~ +0.10 |
| Case 5 | 100 GRT | LLW | Full | -1.44 ~ -4.94 |
| Case 6 |) | LLW | Ballasted | -0.04 ~ -3.54 |
| Case 7 |) | HAT | Full | +2.70 ~ -0.80 |
| Case 8 |) | HAT | Ballasted | +4.10 ~ +0.6 |

Properties & Criteria

Conc. strength

$$f'_c := 280 \cdot \text{kg} \cdot \text{cm}^{-2}$$

Allow. strength of conc.

$$f_c := 0.45 \cdot f'_c$$

$$f_c = 126 \text{ kg} \cdot \text{cm}^{-2}$$

Yield stress of steel

$$f_y := 4200 \cdot \text{kg} \cdot \text{cm}^{-2}$$

Allow. stress of steel

$$f_s := \begin{cases} 0.5 \cdot f_y & \text{if } 0.5 \cdot f_y \leq 1700 \cdot \text{kg} \cdot \text{cm}^{-2} \\ 1700 \cdot \text{kg} \cdot \text{cm}^{-2} & \text{otherwise} \end{cases}$$

$$f_s = 1700 \text{ kg} \cdot \text{cm}^{-2}$$

Modulus of elasticity of steel

$$E_s := 2.04 \cdot 10^6 \cdot \text{kg} \cdot \text{cm}^{-2}$$

Modulus of elasticity of conc.

$$E_c := (15210 \cdot \text{kg}^{0.5} \cdot \text{cm}^{-1}) \cdot \sqrt{f'_c}$$

$$E_c = 2.545 \times 10^5 \text{ kg} \cdot \text{cm}^{-2}$$

Allow. shear stress of conc.

$$v_c := (0.29 \cdot \text{kg}^{0.5} \cdot \text{cm}^{-1}) \cdot \sqrt{f'_c}$$

$$v_c = 4.853 \text{ kg} \cdot \text{cm}^{-2}$$

Specific weight of conc.

$$\gamma_c := 24 \cdot \text{tonne} \cdot \text{m}^{-3}$$

Ratio of modulus of elasticity

$$n := \frac{E_s}{E_c}$$

$$n = 8.015$$

RC. constant

$$k := \frac{n \cdot f_c}{n \cdot f_c + f_s}$$

$$j := 1 - \frac{k}{3}$$

$$R := \frac{1}{2} \cdot f_c \cdot k \cdot j$$

$$k = 0.373$$

$$j = 0.876$$

$$R = 20.562 \text{ kg} \cdot \text{cm}^{-2}$$

Design transverse beam

Dimension and Load

Depth of beam

$$t := 0.6 \cdot \text{m}$$

Span length

$$L := 3.6 \cdot \text{m}$$

Width of beam

$$b := 0.5 \cdot \text{m}$$

Covering

$$d' := 0.07 \cdot \text{m}$$

Dead load

$$w_d := \gamma_c \cdot b \cdot t$$

Bottom steel

Positive moment

$$M := 13.50 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot b \cdot (t - d')^2$$

$$M_c = 28.879 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (t - d')}$$

$$A_s = 17.109 \text{ cm}^2$$

Use 4-DB25

$$A_s = 19.63 \cdot \text{cm}^2$$

Top steel

Negative moment

$$M := 13.56 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot b \cdot (t - d')^2$$

$$M_c = 28.879 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (t - d')}$$

$$A_s = 17.185 \text{ cm}^2$$

Use 4-DB25

$$A_s = 19.63 \cdot \text{cm}^2$$

Transverse moment

Max. moment

$$M := 6.09 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot t \cdot (b - d')^2$$

$$M_c = 22.812 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (b - d')}$$

$$A_s = 9.513 \text{ cm}^2$$

Use 2-DB25

$$A_s = 9.82 \cdot \text{cm}^2$$

Check shear

Effective depth

$$d := t - d'$$

$$d = 0.53 \text{ m}$$

Max. Shear force

$$V := 22.18 \text{ tonne}$$

Shear force resisted by conc.

$$V_c := v_c \cdot b \cdot d$$

$$V_c = 12.859 \text{ tonne}$$

Shear force resisted by steel

$$V' := V - V_c$$

$$V' = 9.321 \text{ tonne}$$

Use 2 legs of DB12 stirrup

$$A_v := 2.26 \cdot \text{cm}^2$$

$$f_v := 1700 \cdot \text{kg} \cdot \text{cm}^{-2}$$

Spacing of stirrup

$$s := \frac{A_v \cdot f_v \cdot d}{V'}$$

$$s = 0.218 \text{ m}$$

Check bond

D := 25 mm

$$\Sigma O := (4 \cdot 7.857) \cdot \text{cm}$$

$$V = 22.18 \text{ tonne}$$

Allow. bond stress

$$u := \begin{cases} 25 \cdot \text{kg} \cdot \text{cm}^{-2} & \text{if } \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f'_c}}{D} \geq 25 \cdot \text{kg} \cdot \text{cm}^{-2} \\ \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f'_c}}{D} & \text{otherwise} \end{cases}$$

$$u = 15.328 \text{ kg} \cdot \text{cm}^{-2}$$

Bond stress

$$\frac{V}{\Sigma O \cdot j \cdot d} = 15.205 \text{ kg} \cdot \text{cm}^{-2}$$

Design crane beam

Dimension and Load

Depth of beam

$$t := 1.0 \cdot \text{m}$$

Span length

$$L := 3.2 \cdot \text{m}$$

Width of beam

$$b := 0.90 \cdot \text{m}$$

Covering

$$d' := 0.07 \cdot \text{m}$$

Dead load

$$\omega_d := \gamma_c \cdot b \cdot t$$

Bottom steel

Positive moment

$$M := 20.20 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot b \cdot (t - d')^2$$

$$M_c = 160.057 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (t - d')}$$

$$A_s = 14.589 \text{ cm}^2$$

Use 6-DB25

$$A_s := 29.45 \cdot \text{cm}^2$$

Top steel

Negative moment

$$M := 17.02 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot b \cdot (t - d')^2$$

$$M_c = 160.057 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (t - d')}$$

$$A_s = 12.292 \text{ cm}^2$$

Use 6-DB25

$$A_s := 29.45 \cdot \text{cm}^2$$

Transverse moment

Max. moment

$$M := 5.21 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot t \cdot (b - d')^2$$

$$M_c = 141.652 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (b - d')}$$

$$A_s = 4.216 \text{ cm}^2$$

Use 2-DB25

$$A_s := 9.82 \cdot \text{cm}^2$$

Check shear

Effective depth

$$d := t - d'$$

$$d = 0.93 \text{ m}$$

Max. Shear force

$$V := 25.47 \cdot \text{tonne}$$

Shear force resisted by conc.

$$V_c := v_c \cdot b \cdot d$$

$$V_c = 40.616 \text{ tonne}$$

Check bond

$D := 25 \text{ mm}$

$$\Sigma O := (6 \cdot 7.857) \cdot \text{cm}$$

$$V = 25.47 \text{ tonne}$$

Allow. bond stress

$$u := \begin{cases} 25 \cdot \text{kg} \cdot \text{cm}^{-2} & \text{if } \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f'_c}}{D} \geq 25 \cdot \text{kg} \cdot \text{cm}^{-2} \\ \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f'_c}}{D} & \text{otherwise} \end{cases}$$

$$u = 15.328 \text{ kg cm}^{-2}$$

Bond stress

$$\frac{V}{\Sigma O \cdot j \cdot d} = 6.634 \text{ kg cm}^{-2}$$

Design cope beam

Dimension and Load

Depth of beam

$$t := 1.0 \cdot \text{m}$$

Span length

$$L := 3.2 \cdot \text{m}$$

Width of beam

$$b := 0.90 \cdot \text{m}$$

Covering

$$d' := 0.07 \cdot \text{m}$$

Dead load

$$\omega_d := \gamma_c \cdot b \cdot t$$

Bottom steel

Positive moment

$$M := 10.04 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot b \cdot (t - d')^2$$

$$M_c = 160.057 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (t - d')}$$

$$A_s = 7.251 \text{ cm}^2$$

Use 4-DB25

$$A_s := 19.64 \cdot \text{cm}^2$$

Top steel

Negative moment

$$M := 4.77 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot b \cdot (t - d')^2$$

$$M_c = 160.057 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (t - d')}$$

$$A_s = 3.445 \text{ cm}^2$$

Use 4-DB25

$$A_s := 19.64 \cdot \text{cm}^2$$

Transverse moment

Max. moment

$$M := 6.85 \cdot \text{tonne} \cdot \text{m}$$

$$M_c := R \cdot t \cdot (b - d')^2$$

$$M_c = 141.652 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (b - d')}$$

$$A_s = 5.543 \text{ cm}^2$$

Use 2-DB25

$$A_s := 9.82 \cdot \text{cm}^2$$

Check shear

Effective depth

$$d := t - d'$$

$$d = 0.93 \text{ m}$$

Max. Shear force

$$V := 9.6 \cdot \text{tonne}$$

Shear force resisted by conc.

$$V_c := v_c \cdot b \cdot d$$

$$V_c = 40.616 \text{ tonne}$$

Check bond

$D := 25 \text{ mm}$

$$\Sigma O := (4 \cdot 7.857) \cdot \text{cm}$$

$$V = 9.6 \text{ tonne}$$

Allow. bond stress

$$u := \begin{cases} 25 \cdot \text{kg} \cdot \text{cm}^{-2} & \text{if } \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f_c}}{D} \geq 25 \cdot \text{kg} \cdot \text{cm}^{-2} \\ \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f_c}}{D} & \text{otherwise} \end{cases}$$

$$u = 15.328 \text{ kg cm}^{-2}$$

Bond stress

$$\frac{V}{\Sigma O \cdot j \cdot d} = 3.75 \text{ kg cm}^{-2}$$

Design fender beam

Dimension and Load

Depth of beam

$$t := 0.45 \cdot \text{m}$$

Span length

$$L := 2.15 \cdot \text{m}$$

Width of beam

$$b := 3 \cdot t$$

Covering

$$d' := 0.07 \cdot \text{m}$$

Dead load

$$w_d := \gamma_c \cdot b \cdot t$$

Outside steel

Positive moment

$$M := (1.5 \cdot 18.36) \cdot \text{tonne} \cdot \text{m}$$

$$M = 27.54 \text{ m tonne}$$

$$M_c := R \cdot b \cdot (t - d')^2$$

$$M_c = 40.084 \text{ tonne} \cdot \text{m}$$

Steel required

$$A_s := \frac{M}{f_s \cdot j \cdot (t - d')}$$

$$A_s = 48.679 \text{ cm}^2$$

Use DB25 @ 0.10

$$A_s := 49.10 \cdot \text{cm}^2$$

Check shear

Effective depth

$$d := t - d'$$

$$d = 0.38 \text{ m}$$

Max. Shear force

$$V := 18.36 \cdot \text{tonne}$$

Shear force resisted by conc.

$$V_c := v_c \cdot b \cdot d$$

$$V_c = 24.894 \text{ tonne}$$

Check bond

D := 25 mm

$$\Sigma O := \left(\frac{1.0}{0.10} \cdot 7.857 \right) \cdot \text{cm}$$

$$V = 18.36 \text{ tonne}$$

Allow. bond stress

$$u := \begin{cases} 25 \cdot \text{kg} \cdot \text{cm}^{-2} & \text{if } \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f'_c}}{D} \geq 25 \cdot \text{kg} \cdot \text{cm}^{-2} \\ \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f'_c}}{D} & \text{otherwise} \end{cases}$$

$$u = 15.328 \text{ kg cm}^{-2}$$

Bond stress

$$\frac{V}{\Sigma O \cdot j \cdot d} = 7.022 \text{ kg cm}^{-2}$$

Tammalang Port

Berthing Energy and I

Main Berthing

Density of sea water

$$\gamma_w := 1.03 \cdot \text{tonne} \cdot \text{r}$$

Draught of ships

$$d := 3.5 \cdot \text{m}$$

Beam of ships

$$b := 8.0 \cdot \text{m}$$

Length between perpendicular

$$L := 40.0 \cdot \text{m}$$

Ship displacement 535 DWT)

$$D := 700 \cdot \text{tonne}$$

Berthing velocity

$$v_b := 0.3 \cdot \text{m} \cdot \text{s}^{-1}$$

Block factor

$$C_b := \frac{D}{L \cdot b \cdot d \cdot \gamma_w}$$

$$C_b = 0.607$$

Berthing angle

$$\alpha := 10 \cdot \text{deg}$$

Dist. from contact point to center of mass (approx.)

$$R := \left[\left(\frac{b}{2} \right)^2 + \left(\frac{L}{4} \right)^2 \right]^{0.5}$$

$$R = 10.77 \text{ m}$$

$$\theta := \arccos \left(\frac{L}{4 \cdot R} \right)$$

$$\theta = 21.801 \text{ deg}$$

$$\beta := \frac{\pi}{2} - (\alpha + \theta)$$

$$\beta = 58.199 \text{ deg}$$

$$\lambda := \cos^2 \beta$$

$$\lambda = 0.278$$

Radius of gyration of ships

$$K := (0.19 \cdot C_b + 0.11) \cdot L$$

$$K = 9.012 \text{ m}$$

Added mass factor

$$C_m := 1 + 2 \cdot \frac{d}{b}$$

$$C_m = 1.875$$

Eccentricity factor

$$C_e := \frac{K^2 + \lambda \cdot R^2}{K^2 + R^2}$$

$$C_e = 0.575$$

Softness factor

$$C_s := 0.9$$

; soft fenders

Berth configuration coefficient

$$C_c := 1.0$$

; open piled

Factor of safety

$$FS := 1.5$$

Kinetic energy of berthing

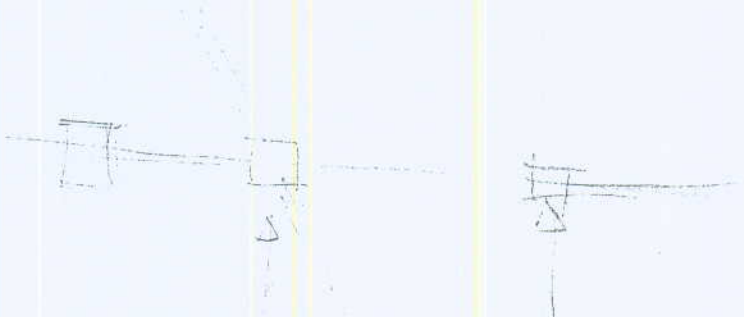
$$E := FS \cdot D \cdot C_m \cdot C_e \cdot C_s \cdot C_c \cdot \frac{(v_b)^2}{2 \cdot g}$$

$$E = 4.676 \text{ tonne} \cdot \text{m}$$

Use Fentrek SCN 500-1.4; E = 4.7 tonne·m, R = 20.4 tonne

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*****  
*  
*          S T A A D - III          *  
*          Revision 22.3            *  
*          Proprietary Program of   *  
*          RESEARCH ENGINEERS, Inc. *  
*          Date=    APR 4, 2000     *  
*          Time=    9:59:28         *  
*  
*          USER ID: SEATEC GROUP: BEST *  
*****
```

1. STAAD SPACE MAIN QUAY STRUCTURE
2. INPUT WIDTH 72
3. UNIT METER MTON
4. JOINT COORDINATES
5. 1 0. 1.8 0.
6. 2 2.15 1.8 0.; R 2 3.2 0. 0.
7. 5 12.15 1.8 0.; R 1 3.65 0. 0.
8. 7 19.4 1.8 0.
9. P A 17 0. 0. 3.2
10. 127 0. -6.0 0.; 128 2.15 -5.47 0.; 129 5.35 -4.55 0.; 130 8.55 -3.64 0.
11. 131 12.15 -2.61 0.; 132 15.8 -1.58 0.; 133 19.4 -.54 0.
12. P A 17 0. 0. 3.2
13. MEMBER INCIDENCES
14. 101 1 2 106; R 17 6 7
15. 301 1 8; R 16 1 7
16. 401 2 9; R 16 1 7
17. 451 4 11; R 16 1 7
18. 501 7 14; R 16 1 7
19. 601 1 127; R 17 1 7
20. 626 2 128; R 17 1 7
21. 651 3 129; R 17 1 7
22. 676 4 130; R 17 1 7
23. 701 5 131; R 17 1 7
24. 726 6 132; R 17 1 7
25. 751 7 133; R 17 1 7
26. START GROUP DEFINITION
27. _COPEBEAM 301 TO 317
28. _CRNEBEAM 401 TO 417 451 TO 467
29. _LANDBEAM 501 TO 517
30. _TRNVBEAM 101 TO 208
31. _R1FILE 601 TO 618
32. _R2FILE 626 TO 643
33. _R3FILE 651 TO 668
34. _R4FILE 676 TO 693
35. _R5FILE 701 TO 718
36. _R6FILE 726 TO 743
37. _R7FILE 751 TO 768
38. END
39. MEMBER PROPERTY AMERICAN
40. _COPEBEAM PRI YD 1. ZD .9
41. _CRNEBEAM PRI YD 1. ZD .9



MAIN QUAY STRUCTURE

- 42. _LANDBEAM PRI YD 1. ZD .8
- 43. _TRNVBEAM PRI YD 1. ZD .6
- 44. _PROFILE TABLE ST PIPE OD .4 ID .25
- 45. _PROFILE TABLE ST PIPE OD .5 ID .32
- 46. _PROFILE TABLE ST PIPE OD .4 ID .25
- 47. _PROFILE TABLE ST PIPE OD .5 ID .32
- 48. _PROFILE TABLE ST PIPE OD .4 ID .25
- 49. _PROFILE TABLE ST PIPE OD .4 ID .25
- 50. _PROFILE TABLE ST PIPE OD .4 ID .25
- 51. CONSTANT
- 52. E CONCRETE ALL
- 53. DENSITY CONCRETE ALL
- 54. POISSON CONCRETE ALL
- 55. SUPPORT
- 56. 107 TO 252 FIXED
- 57. LOAD 1 DEAD LOAD
- 58. SELFWEIGHT Y -1.
- 59. FLOOR LOAD
- 60. YR 1.6 2.0 FLOAD -1. XR -.2 19.6 ZR -.2 54.6
- 61. LOAD 2 LIVE LOAD
- 62. FLOOR LOAD
- 63. YR 1.6 2.0 FLOAD -1.5 XR -.2 19.6 ZR -.2 54.6
- 64. LOAD 3 CRANE
- 65. JOINT LOAD
- 66. 9 11 FX -48.
- 67. MEMBER LOAD
- 68. 404 484 CON GY -24. 1.1
- 69. LOAD 4 BOLLARD
- 70. JOINT LOAD
- 71. 8 FX -10.
- 72. LOAD 5 BERTH
- 73. JOINT LOAD
- 74. 9 FX 20.5
- 75. LOAD COMB 6 DL+LL
- 76. 1 1. 2 1.
- 77. LOAD COMB 7 DL+CRN
- 78. 1 1. 3 1.
- 79. LOAD COMB 8 DL+BOL
- 80. 1 1. 4 1.
- 81. LOAD COMB 9 DL+BER
- 82. 1 1. 5 1.
- 83. LOAD COMB 10 DL+LL+CRN
- 84. 1 1. 2 1. 3 1.
- 85. LOAD COMB 11 DL+LL+BOL
- 86. 1 1. 2 1. 4 1.
- 87. LOAD COMB 12 DL+LL+BER
- 88. 1 1. 2 1. 5 1.
- 89. LOAD COMB 13 DL+LL+CRN+BOL
- 90. 1 1. 2 1. 3 1. 4 1.
- 91. LOAD COMB 14 DL+LL+CRN+BER
- 92. 1 1. 2 1. 3 1. 5 1.
- 93. PERFORM ANALYSIS

P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 252/ 302/ 126
ORIGINAL/FINAL BAND-WIDTH = 126/ 15
TOTAL PRIMARY LOAD CASES = 5, TOTAL DEGREES OF FREEDOM = 756
SIZE OF STIFFNESS MATRIX = 36288 DOUBLE PREC. WORDS
REQRD/AVAIL. DISK SPACE = 12.72/ 2013.6 MB, EXMEM = 1961.7 MB

++ Processing Element Stiffness Matrix. 9:59:40
++ Processing Global Stiffness Matrix. 9:59:40
++ Processing Triangular Factorization. 9:59:41
++ Calculating Joint Displacements. 9:59:41
++ Calculating Member Forces. 9:59:41

94. LOAD LIST 6 TO 14
95. PRINT MAXFORCE ENV NSEC 12 LIST 101 TO 118

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

| MEMBR | | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
|-------|-----|-----------|--------------|----------|-----------|--------------|----------|---------|------|----|
| 101 | MAX | 2.41 | .00 | 11 | 1.29 | 2.15 | 12 | | | |
| | | 1.08 | .00 | 13 | 2.46 | .00 | 9 | 2.57 C | .00 | 14 |
| | MIN | -4.01 | 2.15 | 14 | -4.00 | .90 | 14 | | | |
| | | -2.17 | 2.15 | 9 | -2.20 | 2.15 | 9 | 1.24 T | 2.15 | 8 |
| 102 | MAX | 5.61 | .00 | 11 | 4.40 | 3.20 | 14 | | | |
| | | .06 | .00 | 9 | .15 | .00 | 13 | 4.39 C | .00 | 14 |
| | MIN | -10.59 | 3.20 | 14 | -5.89 | 1.33 | 14 | | | |
| | | -.06 | 3.20 | 13 | -.26 | .00 | 12 | 2.08 T | 3.20 | 8 |
| 103 | MAX | 8.45 | .00 | 13 | 6.33 | 3.20 | 12 | | | |
| | | .14 | .00 | 14 | .34 | 3.20 | 14 | 4.23 C | .00 | 14 |
| | MIN | -7.33 | 3.20 | 12 | -2.40 | 1.33 | 11 | | | |
| | | -.01 | 3.20 | 8 | -.12 | .00 | 14 | 1.99 T | 3.20 | 8 |
| 104 | MAX | 7.40 | .00 | 11 | 6.47 | 3.60 | 14 | | | |
| | | .04 | .00 | 9 | .49 | .00 | 13 | 4.23 C | .00 | 14 |
| | MIN | -10.15 | 3.60 | 14 | -2.99 | 1.80 | 14 | | | |
| | | -.17 | 3.60 | 13 | -.34 | .00 | 9 | 1.93 T | 3.60 | 8 |
| 105 | MAX | 10.38 | .00 | 13 | 6.42 | .00 | 13 | | | |
| | | .09 | .00 | 14 | .11 | 3.65 | 9 | 3.77 C | .00 | 14 |
| | MIN | -10.30 | 3.65 | 12 | -3.97 | 1.83 | 11 | | | |
| | | -.04 | 3.65 | 8 | -.32 | .00 | 14 | 1.68 T | 3.65 | 8 |
| 106 | MAX | 11.59 | .00 | 13 | 5.67 | .00 | 13 | | | |
| | | .22 | .00 | 14 | .79 | 3.60 | 14 | 2.77 C | .00 | 14 |
| | MIN | -6.52 | 3.60 | 12 | -6.78 | 2.10 | 11 | | | |
| | | .01 | 3.60 | 8 | -.25 | .00 | 13 | 1.16 T | 3.60 | 8 |
| 107 | MAX | 12.70 | .00 | 13 | 5.58 | .00 | 13 | | | |
| | | .75 | .00 | 12 | .73 | 2.15 | 12 | 14.66 C | .00 | 14 |
| | MIN | -5.13 | 2.15 | 12 | -12.48 | 2.15 | 7 | | | |
| | | -.34 | 2.15 | 8 | -.88 | .00 | 12 | 7.11 T | 2.15 | 8 |
| 108 | MAX | 9.54 | .00 | 11 | 11.55 | 3.20 | 14 | | | |
| | | .46 | .00 | 12 | .71 | .00 | 8 | 9.14 C | .00 | 14 |
| | MIN | -20.55 | 3.20 | 14 | -11.00 | .80 | 14 | | | |
| | | -.22 | 3.20 | 8 | -1.50 | .00 | 12 | 4.36 T | 3.20 | 8 |
| 109 | MAX | 17.27 | .00 | 13 | 11.43 | .00 | 13 | | | |
| | | .49 | .00 | 12 | 1.53 | 3.20 | 12 | 8.99 C | .00 | 14 |

MAIN BODY STRUCTURE

| | | | | | | | | | | | |
|-----|-----|--------|------|----|-------|------|----|--------|------|----|--|
| | MIN | -11.88 | 3.20 | 12 | -4.40 | 2.93 | 7 | | | | |
| | | -.22 | 3.20 | 8 | -.70 | 3.20 | 8 | 4.28 T | 3.20 | 8 | |
| 110 | MAX | 12.03 | .00 | 11 | 13.60 | 3.60 | 14 | | | | |
| | | .22 | .00 | 9 | .61 | .00 | 11 | 5.47 C | .00 | 12 | |
| | MIN | -19.85 | 3.60 | 14 | -7.31 | 1.50 | 14 | | | | |
| | | -.13 | 3.60 | 11 | -1.20 | .00 | 14 | 2.61 T | 3.60 | 8 | |
| 111 | MAX | 18.33 | .00 | 13 | 13.40 | .00 | 13 | | | | |
| | | .23 | .00 | 14 | .39 | 3.65 | 14 | 5.06 C | .00 | 12 | |
| | MIN | -17.69 | 3.65 | 12 | -7.03 | 1.83 | 11 | | | | |
| | | -.10 | 3.65 | 8 | -.43 | .00 | 14 | 2.39 T | 3.65 | 8 | |
| 112 | MAX | 18.90 | .00 | 13 | 10.11 | .00 | 13 | | | | |
| | | .26 | .00 | 14 | 1.33 | 3.60 | 14 | 4.12 C | .00 | 12 | |
| | MIN | -10.54 | 3.60 | 12 | -9.04 | 2.10 | 11 | | | | |
| | | -.10 | 3.60 | 8 | -.55 | 3.60 | 8 | 1.92 T | 3.60 | 8 | |
| 113 | MAX | 4.31 | .00 | 13 | 1.79 | 2.15 | 12 | | | | |
| | | 3.83 | .00 | 12 | 3.91 | 2.15 | 12 | 2.01 C | .00 | 14 | |
| | MIN | -5.30 | 2.15 | 12 | -4.70 | 1.08 | 14 | | | | |
| | | -1.85 | 2.15 | 8 | -4.33 | .00 | 12 | .94 T | 2.15 | 8 | |
| 114 | MAX | 8.94 | .00 | 11 | 8.12 | 3.20 | 14 | | | | |
| | | .87 | .00 | 14 | 1.32 | .00 | 8 | 3.13 C | .00 | 14 | |
| | MIN | -17.57 | 3.20 | 14 | -8.25 | 1.33 | 14 | | | | |
| | | -.41 | 3.20 | 8 | -2.79 | .00 | 14 | 1.43 T | 3.20 | 8 | |
| 115 | MAX | 14.91 | .00 | 13 | 9.39 | 3.20 | 12 | | | | |
| | | .87 | .00 | 12 | 2.77 | 3.20 | 12 | 3.02 C | .00 | 14 | |
| | MIN | -11.25 | 3.20 | 12 | -3.90 | 1.33 | 11 | | | | |
| | | -.43 | 3.20 | 13 | -1.33 | 3.20 | 13 | 1.37 T | 3.20 | 8 | |
| 116 | MAX | 11.59 | .00 | 11 | 11.10 | 3.60 | 14 | | | | |
| | | .40 | .00 | 14 | .93 | .00 | 8 | 3.14 C | .00 | 14 | |
| | MIN | -17.71 | 3.60 | 14 | -5.50 | 1.80 | 14 | | | | |
| | | -.17 | 3.60 | 8 | -2.06 | .00 | 14 | 1.40 T | 3.60 | 8 | |
| 117 | MAX | 17.76 | .00 | 13 | 11.03 | .00 | 13 | | | | |
| | | .35 | .00 | 12 | .67 | 3.65 | 14 | 2.80 C | .00 | 12 | |
| | MIN | -17.52 | 3.65 | 12 | -6.65 | 1.83 | 11 | | | | |
| | | -.17 | 3.65 | 8 | -.64 | .00 | 12 | 1.22 T | 3.65 | 8 | |
| 118 | MAX | 18.88 | .00 | 13 | 9.67 | .00 | 13 | | | | |
| | | .38 | .00 | 12 | 1.99 | 3.60 | 12 | 2.07 C | .00 | 12 | |
| | MIN | -10.01 | 3.60 | 12 | -9.35 | 2.10 | 11 | | | | |
| | | -.20 | 3.60 | 13 | -.98 | 3.60 | 13 | .85 T | 3.60 | 8 | |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

86. PRINT MAXFORCE ENV NSEC 12 LIST 301 TO 306

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

| MEMB | | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
|------|-----|-----------|--------------|----------|-----------|--------------|----------|--------|------|----|
| 301 | MAX | 7.81 | .00 | 14 | .11 | .00 | 9 | | | |
| | | 2.63 | .00 | 9 | 5.96 | 3.20 | 9 | 2.22 C | .00 | 14 |
| | MIN | -6.20 | 3.20 | 11 | -10.04 | 1.87 | 13 | | | |
| | | -1.30 | 3.20 | 13 | -2.93 | 3.20 | 13 | 1.06 T | 3.20 | 11 |
| 302 | MAX | 5.32 | .00 | 12 | 4.10 | 3.20 | 13 | | | |
| | | 1.55 | .00 | 8 | 6.85 | .00 | 12 | 1.51 C | .00 | 14 |
| | MIN | -9.60 | 3.20 | 13 | -7.92 | .80 | 13 | | | |
| | | -3.19 | 3.20 | 12 | -3.37 | 3.20 | 14 | .73 T | 3.20 | 11 |
| 303 | MAX | 6.57 | .00 | 14 | 4.94 | .00 | 14 | | | |
| | | .56 | .00 | 8 | 1.32 | 3.20 | 8 | 1.13 C | .00 | 8 |
| | MIN | -6.73 | 3.20 | 11 | -2.42 | 1.60 | 12 | | | |
| | | -1.17 | 3.20 | 12 | -2.75 | 3.20 | 12 | 2.33 T | 3.20 | 12 |
| 304 | MAX | 6.42 | .00 | 14 | 3.94 | 3.20 | 11 | | | |
| | | .31 | .00 | 13 | .92 | 3.20 | 8 | 2.35 C | .00 | 8 |
| | MIN | -6.34 | 3.20 | 11 | -2.55 | 1.60 | 14 | | | |
| | | -.62 | 3.20 | 12 | -1.92 | 3.20 | 12 | 4.84 T | 3.20 | 12 |
| 305 | MAX | 6.38 | .00 | 12 | 4.64 | 3.20 | 13 | | | |
| | | .08 | .00 | 13 | .51 | 3.20 | 13 | 2.91 C | .00 | 8 |
| | MIN | -6.57 | 3.20 | 13 | -1.87 | 1.60 | 12 | | | |
| | | -.15 | 3.20 | 9 | -1.06 | 3.20 | 12 | 6.00 T | 3.20 | 12 |
| 306 | MAX | 6.57 | .00 | 14 | 4.77 | .00 | 14 | | | |
| | | .11 | .00 | 14 | .38 | .00 | 8 | 3.01 C | .00 | 8 |
| | MIN | -6.31 | 3.20 | 11 | -1.97 | 1.60 | 12 | | | |
| | | -.05 | 3.20 | 8 | -.80 | .00 | 12 | 6.18 T | 3.20 | 12 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

97. PRINT MAXFORCE ENV NSEC 12 LIST 401 TO 405 451 TO 456

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

| MEMB | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
|------|-----------|--------------|----------|-----------|--------------|----------|----|------|----------|
| 401 | MAX | 16.12 | .00 | 14 | 3.25 | .00 | 14 | | |
| | | 2.02 | .00 | 9 | 4.53 | 3.20 | 9 | 1.33 | C .00 13 |
| | MIN | -9.26 | 3.20 | 11 | -19.10 | 2.40 | 14 | | |
| | | -1.00 | 3.20 | 11 | -2.24 | 3.20 | 11 | 2.14 | T 3.20 9 |
| 402 | MAX | 8.15 | .00 | 12 | 15.33 | 3.20 | 13 | | |
| | | 1.62 | .00 | 8 | 6.79 | .00 | 12 | 1.24 | C .00 13 |
| | MIN | -19.81 | 3.20 | 13 | -17.62 | .00 | 13 | | |
| | | -3.36 | 3.20 | 14 | -3.95 | 3.20 | 14 | 1.81 | T 3.20 9 |
| 403 | MAX | 11.44 | .00 | 14 | 14.29 | .00 | 14 | | |
| | | 1.02 | .00 | 8 | 2.80 | .00 | 12 | 1.34 | C .00 14 |
| | MIN | -9.87 | 3.20 | 11 | -3.55 | 1.60 | 12 | | |
| | | -2.13 | 3.20 | 12 | -4.00 | 3.20 | 12 | .42 | T 3.20 8 |
| 404 | MAX | 25.14 | .00 | 14 | 9.68 | 3.20 | 13 | | |
| | | .56 | .00 | 8 | 1.30 | 3.20 | 8 | 3.20 | C .00 14 |
| | MIN | -17.95 | 3.20 | 13 | -15.42 | 1.07 | 13 | | |
| | | -1.15 | 3.20 | 12 | -2.71 | 3.20 | 12 | 1.32 | T 3.20 8 |
| 405 | MAX | 9.75 | .00 | 14 | 8.61 | .00 | 14 | | |
| | | .24 | .00 | 8 | .73 | 3.20 | 8 | 3.89 | C .00 14 |
| | MIN | -9.49 | 3.20 | 11 | -3.18 | 1.60 | 12 | | |
| | | -.48 | 3.20 | 12 | -1.52 | 3.20 | 12 | 1.69 | T 3.20 8 |
| 451 | MAX | 16.69 | .00 | 14 | 2.97 | .00 | 14 | | |
| | | .59 | .00 | 14 | 2.42 | 3.20 | 9 | .56 | C .00 14 |
| | MIN | -9.48 | 3.20 | 11 | -20.20 | 2.40 | 14 | | |
| | | -.25 | 3.20 | 8 | -1.18 | 3.20 | 11 | .15 | C 3.20 8 |
| 452 | MAX | 8.24 | .00 | 12 | 17.02 | 3.20 | 13 | | |
| | | 1.13 | .00 | 8 | 5.21 | .00 | 14 | .90 | C .00 14 |
| | MIN | -20.96 | 3.20 | 13 | -18.50 | .00 | 13 | | |
| | | -2.38 | 3.20 | 14 | -2.50 | .00 | 8 | .08 | C 3.20 8 |
| 453 | MAX | 12.30 | .00 | 14 | 16.25 | .00 | 14 | | |
| | | .88 | .00 | 8 | 2.47 | .00 | 14 | 1.28 | C .00 14 |
| | MIN | -10.12 | 3.20 | 11 | -3.54 | 1.60 | 12 | | |
| | | -1.84 | 3.20 | 14 | -3.41 | 3.20 | 12 | .18 | T 3.20 8 |
| 454 | MAX | 25.47 | .00 | 14 | 9.47 | 3.20 | 13 | | |
| | | .50 | .00 | 8 | 1.26 | 3.20 | 8 | 1.75 | C .00 14 |

MAIN WAY STRUCTURE

| | | | | | | | | | | |
|-----|-----|--------|------|----|--------|------|----|--------|------|----|
| | MIN | -18.28 | 3.20 | 13 | -15.97 | 1.07 | 13 | | | |
| | | -1.05 | 3.20 | 14 | -2.65 | 3.20 | 14 | .38 T | 3.20 | 8 |
| 455 | MAX | 10.07 | .00 | 14 | 8.86 | .00 | 14 | | | |
| | | .29 | .00 | 8 | .84 | 3.20 | 8 | 1.89 C | .00 | 14 |
| | MIN | -9.84 | 3.20 | 11 | -3.45 | 1.60 | 12 | | | |
| | | -.61 | 3.20 | 14 | -1.77 | 3.20 | 14 | .50 T | 3.20 | 8 |
| 456 | MAX | 10.46 | .00 | 14 | 8.08 | .00 | 14 | | | |
| | | .14 | .00 | 8 | .51 | 3.20 | 8 | 1.97 C | .00 | 14 |
| | MIN | -9.87 | 3.20 | 11 | -3.49 | 1.60 | 12 | | | |
| | | -.29 | 3.20 | 14 | -1.06 | 3.20 | 14 | .56 T | 3.20 | 8 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

99. PRINT MAXFORCE ENV NSEC 12 LIST 501 TO 505

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

| MEMB | | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | | FX | DIST | LD |
|------|-----|-----------|--------------|----------|-----------|--------------|----------|--|--------|------|----|
| 501 | MAX | 5.83 | .00 | 11 | 1.78 | 3.20 | 14 | | | | |
| | | .26 | .00 | 9 | 1.42 | 3.20 | 9 | | .32 C | .00 | 13 |
| | MIN | -6.96 | 3.20 | 14 | -5.18 | 1.60 | 14 | | | | |
| | | -.28 | 3.20 | 13 | -.82 | 3.20 | 13 | | .14 C | 3.20 | 9 |
| 502 | MAX | 5.66 | .00 | 13 | 3.92 | 3.20 | 12 | | | | |
| | | .54 | .00 | 13 | 2.75 | .00 | 12 | | .50 C | .00 | 14 |
| | MIN | -7.01 | 3.20 | 12 | -3.15 | 1.60 | 14 | | | | |
| | | -1.12 | 3.20 | 12 | -1.34 | .00 | 13 | | .13 C | 3.20 | 8 |
| 503 | MAX | 6.28 | .00 | 13 | 4.05 | 3.20 | 14 | | | | |
| | | .46 | .00 | 8 | 1.25 | .00 | 9 | | .74 C | .00 | 14 |
| | MIN | -6.33 | 3.20 | 12 | -2.00 | 1.60 | 11 | | | | |
| | | -.94 | 3.20 | 12 | -1.79 | 3.20 | 14 | | .02 T | 3.20 | 8 |
| 504 | MAX | 6.33 | .00 | 13 | 3.92 | .00 | 11 | | | | |
| | | .23 | .00 | 8 | .71 | 3.20 | 13 | | .99 C | .00 | 14 |
| | MIN | -6.27 | 3.20 | 12 | -2.11 | 1.60 | 13 | | | | |
| | | -.48 | 3.20 | 12 | -1.47 | 3.20 | 12 | | .14 T | 3.20 | 8 |
| 505 | MAX | 6.34 | .00 | 13 | 3.90 | .00 | 13 | | | | |
| | | .14 | .00 | 13 | .50 | 3.20 | 13 | | 1.11 C | .00 | 14 |
| | MIN | -6.30 | 3.20 | 12 | -2.10 | 1.60 | 11 | | | | |
| | | -.27 | 3.20 | 12 | -1.03 | 3.20 | 12 | | .21 T | 3.20 | 8 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

99. PRINT MAXFORCE ENV NSEC 12 LIST 601 TO 603 651 TO 653

MAIN QUAY STRUCTURE

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

| MEMB | | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
|------|-----|-----------|--------------|----------|-----------|--------------|----------|---------|------|----|
| 601 | MAX | .08 | .00 | 9 | .31 | .00 | 9 | | | |
| | | -.01 | .00 | 8 | .32 | .00 | 14 | 11.58 C | 7.80 | 13 |
| | MIN | -.08 | 7.80 | 13 | -.36 | .00 | 13 | | | |
| | | -.07 | 7.80 | 14 | -.19 | 7.80 | 14 | 6.18 C | .00 | 9 |
| 601 | MAX | .08 | .00 | 9 | .33 | 7.80 | 13 | | | |
| | | .00 | .00 | 8 | .15 | .00 | 14 | 22.02 C | 7.80 | 13 |
| | MIN | -.10 | 7.80 | 13 | -.46 | .00 | 13 | | | |
| | | -.03 | 7.80 | 14 | -.11 | 7.80 | 14 | 10.46 C | .00 | 9 |
| 603 | MAX | .06 | .00 | 9 | .25 | 7.80 | 13 | | | |
| | | .02 | .00 | 13 | .07 | .00 | 12 | 21.86 C | 7.80 | 13 |
| | MIN | -.08 | 7.80 | 13 | -.34 | .00 | 13 | | | |
| | | -.02 | 7.80 | 12 | -.07 | 7.80 | 12 | 11.51 C | .00 | 9 |
| 651 | MAX | .16 | .00 | 9 | .52 | .00 | 9 | | | |
| | | -.02 | .00 | 8 | .48 | .00 | 14 | 19.74 C | 6.35 | 13 |
| | MIN | -.09 | 6.35 | 11 | -.52 | 6.35 | 9 | | | |
| | | -.11 | 6.35 | 14 | -.25 | 6.35 | 14 | 9.25 C | .00 | 9 |
| 652 | MAX | .15 | .00 | 9 | .49 | .00 | 14 | | | |
| | | .00 | .00 | 8 | .11 | .00 | 14 | 38.57 C | 6.35 | 13 |
| | MIN | -.08 | 6.35 | 11 | -.48 | 6.35 | 9 | | | |
| | | -.03 | 6.35 | 12 | -.07 | 6.35 | 12 | 14.24 C | .00 | 9 |
| 653 | MAX | .12 | .00 | 9 | .38 | .00 | 14 | | | |
| | | .03 | .00 | 13 | .07 | 6.35 | 13 | 33.32 C | 6.35 | 13 |
| | MIN | -.06 | 6.35 | 11 | -.37 | 6.35 | 9 | | | |
| | | -.01 | 6.35 | 9 | -.12 | .00 | 13 | 14.75 C | .00 | 9 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

100. PRINT MAXFORCE ENV NSEC 12 LIST 626 TO 628 676 TO 678

MAIN CURV STRUCTURE

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

| MEMB | | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | | FX | DIST | LD |
|------|-----|-----------|--------------|----------|-----------|--------------|----------|---------|------|------|----|
| 626 | MAX | .24 | .00 | 9 | .86 | .00 | 9 | | | | |
| | | -.04 | .00 | 8 | 1.08 | .00 | 14 | 25.78 C | 7.27 | 13 | |
| | MIN | -.19 | 7.27 | 13 | -.90 | 7.27 | 9 | | | | |
| | | -.23 | 7.27 | 14 | -.58 | 7.27 | 14 | 11.94 C | .00 | 9 | |
| 627 | MAX | .22 | .00 | 9 | .80 | .00 | 9 | | | | |
| | | -.01 | .00 | 8 | .30 | .00 | 14 | 52.08 C | 7.27 | 13 | |
| | MIN | -.22 | 7.27 | 13 | -.90 | .00 | 13 | | | | |
| | | -.07 | 7.27 | 14 | -.20 | 7.27 | 14 | 18.88 C | .00 | 9 | |
| 628 | MAX | .17 | .00 | 9 | .60 | .00 | 9 | | | | |
| | | .06 | .00 | 13 | .17 | 7.27 | 13 | 44.36 C | 7.27 | 13 | |
| | MIN | -.17 | 7.27 | 13 | -.68 | .00 | 13 | | | | |
| | | -.03 | 7.27 | 12 | -.27 | .00 | 13 | 20.17 C | .00 | 9 | |
| 676 | MAX | .60 | .00 | 9 | 1.63 | .00 | 9 | | | | |
| | | -.08 | .00 | 8 | 1.34 | .00 | 14 | 30.70 C | 5.44 | 14 | |
| | MIN | -.33 | 5.44 | 11 | -1.62 | 5.44 | 9 | | | | |
| | | -.37 | 5.44 | 14 | -.66 | 5.44 | 14 | 14.51 C | .00 | 8 | |
| 677 | MAX | .56 | .00 | 14 | 1.55 | .00 | 14 | | | | |
| | | -.02 | .00 | 8 | .25 | .00 | 12 | 66.08 C | 5.44 | 13 | |
| | MIN | -.30 | 5.44 | 11 | -1.49 | 5.44 | 9 | | | | |
| | | -.07 | 5.44 | 12 | -.14 | 5.44 | 12 | 22.72 C | .00 | 9 | |
| 678 | MAX | .43 | .00 | 9 | 1.18 | .00 | 14 | | | | |
| | | .10 | .00 | 13 | .18 | 5.44 | 13 | 53.90 C | 5.44 | 13 | |
| | MIN | -.24 | 5.44 | 11 | -1.15 | 5.44 | 9 | | | | |
| | | -.01 | 5.44 | 9 | -.34 | .00 | 13 | 23.79 C | .00 | 9 | |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

101. PRINT MAXFORCE ENV NSEC 12 LIST 701 TO 703 726 TO 728 751 TO 753

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

| MEMBR | | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
|-------|-----|-----------|--------------|----------|-----------|--------------|----------|---------|------|----|
| 701 | MAX | .47 | .00 | 9 | 1.04 | .00 | 9 | | | |
| | | -.04 | .00 | 9 | .42 | .00 | 13 | 20.83 C | 4.41 | 13 |
| | MIN | -.27 | 4.41 | 11 | -1.03 | 4.41 | 9 | | | |
| | | -.14 | 4.41 | 13 | -.19 | 4.41 | 13 | 10.80 C | .00 | 9 |
| 702 | MAX | .47 | .00 | 14 | 1.10 | .00 | 14 | | | |
| | | .00 | .00 | 9 | .08 | .00 | 11 | 38.53 C | 4.41 | 13 |
| | MIN | -.25 | 4.41 | 11 | -.99 | 4.41 | 14 | | | |
| | | -.03 | 4.41 | 11 | -.04 | 4.41 | 11 | 16.58 C | .00 | 9 |
| 703 | MAX | .34 | .00 | 14 | .78 | .00 | 14 | | | |
| | | .05 | .00 | 14 | .09 | 4.41 | 14 | 35.92 C | 4.41 | 13 |
| | MIN | -.20 | 4.41 | 11 | -.73 | 4.41 | 9 | | | |
| | | -.01 | 4.41 | 8 | -.14 | .00 | 14 | 16.81 C | .00 | 9 |
| 724 | MAX | 1.02 | .00 | 9 | 1.73 | .00 | 9 | | | |
| | | -.05 | .00 | 8 | .32 | .00 | 14 | 21.89 C | 3.38 | 11 |
| | MIN | -.55 | 3.38 | 13 | -1.71 | 3.38 | 9 | | | |
| | | -.13 | 3.38 | 14 | -.13 | 3.38 | 14 | 11.00 C | .00 | 9 |
| 727 | MAX | .95 | .00 | 14 | 1.65 | .00 | 14 | | | |
| | | -.01 | .00 | 8 | .08 | .00 | 12 | 36.34 C | 3.38 | 11 |
| | MIN | -.47 | 3.38 | 8 | -1.56 | 3.38 | 9 | | | |
| | | -.04 | 3.38 | 12 | -.05 | 3.38 | 12 | 16.99 C | .00 | 7 |
| 728 | MAX | .73 | .00 | 14 | 1.28 | .00 | 14 | | | |
| | | .04 | .00 | 13 | .05 | 3.38 | 13 | 36.51 C | 3.38 | 11 |
| | MIN | -.38 | 3.38 | 8 | -1.21 | 3.38 | 9 | | | |
| | | -.03 | 3.38 | 9 | -.08 | .00 | 13 | 17.23 C | .00 | 9 |
| 751 | MAX | 2.95 | .00 | 12 | 3.55 | .00 | 12 | | | |
| | | -.01 | .00 | 9 | .35 | .00 | 13 | 12.72 C | 2.34 | 12 |
| | MIN | -1.35 | 2.34 | 8 | -3.36 | 2.34 | 9 | | | |
| | | -.23 | 2.34 | 13 | -.18 | 2.34 | 13 | 6.93 C | .00 | 8 |
| 752 | MAX | 2.79 | .00 | 12 | 3.42 | .00 | 12 | | | |
| | | .08 | .00 | 9 | .11 | .00 | 11 | 23.29 C | 2.34 | 12 |
| | MIN | -1.19 | 2.34 | 8 | -3.11 | 2.34 | 12 | | | |
| | | -.08 | 2.34 | 11 | -.08 | .00 | 9 | 13.14 C | .00 | 8 |
| 753 | MAX | 2.24 | .00 | 12 | 2.80 | .00 | 12 | | | |
| | | .12 | .00 | 14 | .13 | 2.34 | 14 | 23.67 C | 2.34 | 12 |

MAIN MEMBER STRUCTURE

| | | | | | | | | | | |
|-----|------|------|---|-------|------|----|---------|-----|---|--|
| MEM | -.92 | 2.34 | 8 | -2.45 | 2.34 | 12 | | | | |
| | -.04 | 2.34 | 8 | -.14 | .00 | 14 | 13.54 C | .00 | 8 | |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

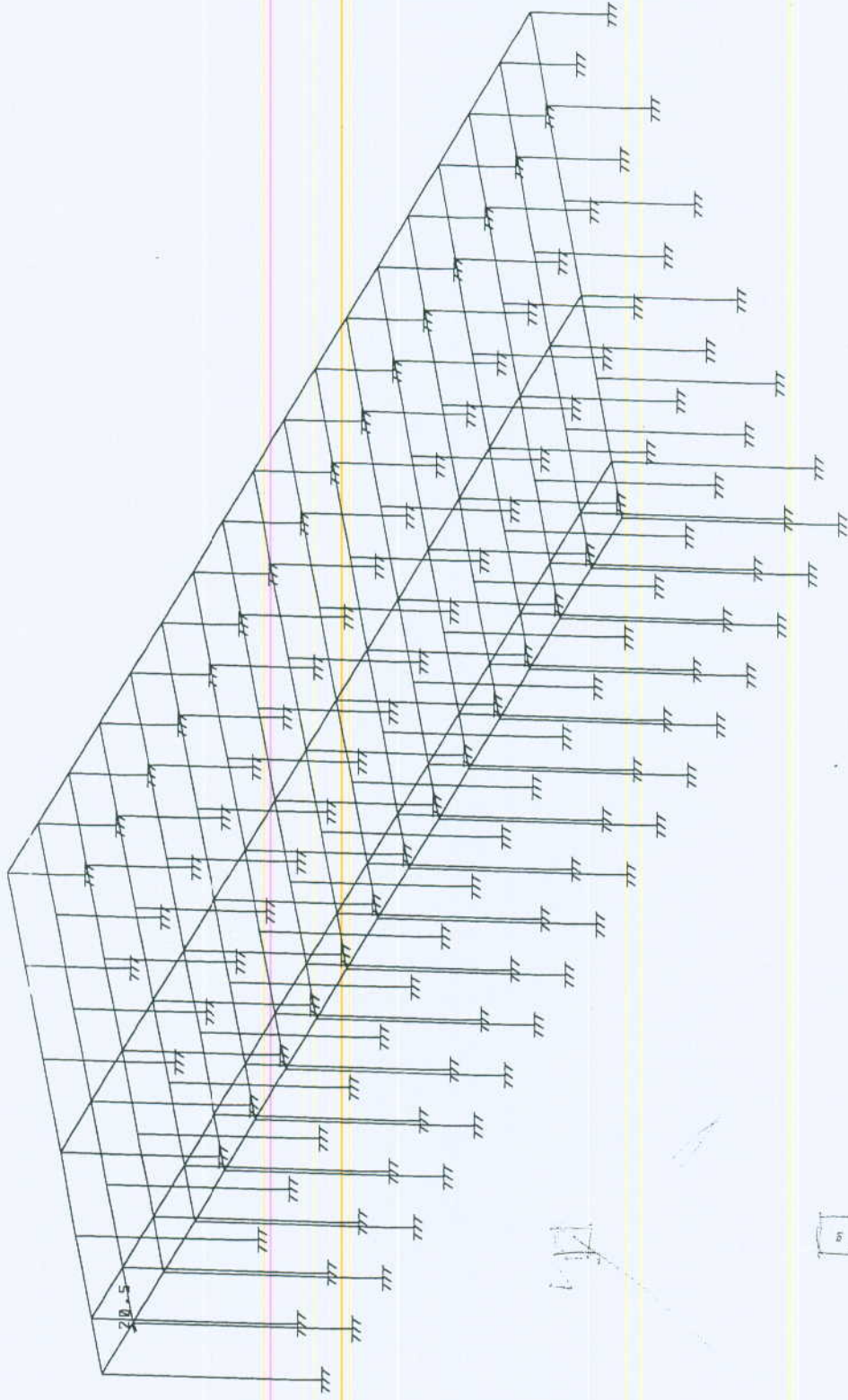
102. FINISH

***** END OF STAAD-III *****

**** DATE= APR 4,2000 TIME= 10: 0:46 ****

.....
For questions on STAAD-III/ISDS, contact: *
RESEARCH ENGINEERS, Inc at *
Ph: (714) 974-2500 Fax: (714) 921-2543 *
.....

LN= 5 MN/ELEM



STRUCTURE DATA
TYPE = SPACE
NJ = 252
NM = 302
NE = 0
NS = 0
NRJ = 126
NL = 14
XMAX = 19.4
YMAX = 7.8
ZMAX = 54.4

J=252, M=302

UNIT: METERS

DATE: APR 4, 2000

STADPOST - PLOT (REV: 22.3)

TITLE: MAIN QUAY STRUCTURE

Properties & Criteria

| | | |
|--------------------------------|--|---|
| Conc. strength | $f'_c := 280 \cdot \text{kg} \cdot \text{cm}^{-2}$ | |
| Allow. strength of conc. | $f_c := 0.45 \cdot f'_c$ | $f_c = 126 \text{ kg} \cdot \text{cm}^{-2}$ |
| Yield stress of steel | $f_y := 4200 \cdot \text{kg} \cdot \text{cm}^{-2}$ | |
| Allow. stress of steel | $f_s := \begin{cases} 0.5 \cdot f_y & \text{if } 0.5 \cdot f_y \leq 1700 \cdot \text{kg} \cdot \text{cm}^{-2} \\ 1700 \cdot \text{kg} \cdot \text{cm}^{-2} & \text{otherwise} \end{cases}$ | $f_s = 1700 \text{ kg} \cdot \text{cm}^{-2}$ |
| Modulus of elasticity of steel | $E_s := 2.04 \cdot 10^6 \cdot \text{kg} \cdot \text{cm}^{-2}$ | |
| Modulus of elasticity of conc. | $E_c := (15210 \cdot \text{kg}^{0.5} \cdot \text{cm}^{-1}) \cdot \sqrt{f'_c}$ | $E_c = 2.545 \times 10^5 \text{ kg} \cdot \text{cm}^{-2}$ |
| Allow. shear stress of conc. | $v_c := (0.29 \cdot \text{kg}^{0.5} \cdot \text{cm}^{-1}) \cdot \sqrt{f'_c}$ | $v_c = 4.853 \text{ kg} \cdot \text{cm}^{-2}$ |
| Specific weight of conc. | $\gamma_c := 2.4 \cdot \text{tonne} \cdot \text{m}^{-3}$ | |
| Ratio of modulus of elasticity | $n := \frac{E_s}{E_c}$ | $n = 8.015$ |
| RC. constant | $k := \frac{n \cdot f_c}{n \cdot f_c + f_s}$ | $j := 1 - \frac{k}{3}$ |
| | $k = 0.373$ | $j = 0.876$ |
| | | $R := \frac{1}{2} \cdot f_c \cdot k \cdot j$ |
| | | $R = 20.562 \text{ kg} \cdot \text{cm}^{-2}$ |

Dimension and Load

| | | | |
|----------------------------|---|-------------|--|
| Thickness of precast slab | $t_g := 0.2 \cdot \text{m}$ | Span length | $L := 3.2 \cdot \text{m}$ |
| Width of precast slab | $b := 0.5 \cdot \text{m}$ | | |
| Thickness of situ concrete | $t_c := 0.2 \cdot \text{m}$ | Covering | $d' := 0.07 \cdot \text{m}$ |
| Wt. of precast slab | $\omega_g := \gamma_c \cdot b \cdot t_g$ | | $\omega_g = 0.24 \text{ tonne} \cdot \text{m}^{-1}$ |
| Wt. of situ conc. | $\omega_i := \gamma_c \cdot b \cdot t_c$ | | $\omega_i = 0.24 \text{ tonne} \cdot \text{m}^{-1}$ |
| Total dead load | $\omega_d := \omega_g + \omega_i$ | | $\omega_d = 0.48 \text{ tonne} \cdot \text{m}^{-1}$ |
| Contruccion load | $\omega_c := (0.15 \cdot \text{tonne} \cdot \text{m}^{-2}) \cdot b$ | | $\omega_c = 0.075 \text{ tonne} \cdot \text{m}^{-1}$ |
| Live load | $LL := (1.0 \cdot \text{tonne} \cdot \text{m}^{-2}) \cdot b$ | | $LL = 0.5 \text{ tonne} \cdot \text{m}^{-1}$ |

Design deck slab

Case I : Uniform load

Bottom steel

| | | |
|---------------------------|--|---|
| Moment after installation | $M_d := 0.125 \cdot (\omega_d + \omega_c) \cdot L^2$ | $M_d = 0.71 \text{ tonne}\cdot\text{m}$ |
| | $M_c := R \cdot b \cdot (t_g - d')^2$ | $M_c = 1.737 \text{ tonne}\cdot\text{m}$ |
| Moment at service | $M_1 := 0.5 \cdot \text{tonne}\cdot\text{m}$ | $M_1 = 0.5 \text{ tonne}\cdot\text{m}$ |
| | $M_c := R \cdot b \cdot (t_g + t_c - d')^2$ | $M_c = 11.196 \text{ tonne}\cdot\text{m}$ |
| Steel required | $A_s := \frac{M_d}{f_s \cdot j \cdot (t_g - d')} + \frac{M_1}{f_s \cdot j \cdot (t_g + t_c - d')}$ | |
| | $A_s = 4.688 \text{ cm}^2$ | |

Top steel

| | | |
|---------------------------|--|---|
| Moment after installation | $M_d := 0 \cdot \text{tonne}\cdot\text{m}$ | |
| | $M_c := R \cdot b \cdot (t_g - d')^2$ | $M_c = 1.737 \text{ tonne}\cdot\text{m}$ |
| Moment at service | $M_1 := 0.6 \cdot \text{tonne}\cdot\text{m}$ | $M_1 = 0.6 \text{ tonne}\cdot\text{m}$ |
| | $M_c := R \cdot b \cdot (t_g + t_c - d')^2$ | $M_c = 11.196 \text{ tonne}\cdot\text{m}$ |
| Steel required | $A_s := \frac{M_d}{f_s \cdot j \cdot (t_g - d')} + \frac{M_1}{f_s \cdot j \cdot (t_g + t_c - d')}$ | |
| | $A_s = 1.221 \text{ cm}^2$ | |
| Max. shear force | $V := 1.43 \cdot \text{tonne}$ | |

Case II : Wheel load due to HMK 60 H mobile crane

Distribution factor

$$\delta := 0.345$$

Bottom steel

Moment after installation

$$M_d := 0.125 \cdot (\omega_d + \omega_c) \cdot L^2$$

$$M_d = 0.71 \text{ tonne}\cdot\text{m}$$

$$M_c := R \cdot b \cdot (t_g - d')^2$$

$$M_c = 1.737 \text{ tonne}\cdot\text{m}$$

Moment at service

$$M_1 := \delta \cdot (12.23) \cdot \text{tonne}\cdot\text{m}$$

$$M_1 = 4.219 \text{ tonne}\cdot\text{m}$$

$$M_c := R \cdot b \cdot (t_g + t_c - d')^2$$

$$M_c = 11.196 \text{ tonne}\cdot\text{m}$$

Steel required

$$A_s := \frac{M_d}{f_s \cdot j \cdot (t_g - d')} + \frac{M_1}{f_s \cdot j \cdot (t_g + t_c - d')}$$

$$A_s = 12.258 \text{ cm}^2$$

Use 4-DB20

$$A_s := 12.57 \cdot \text{cm}^2$$

Top steel

Moment after installation

$$M_d := 0 \cdot \text{tonne}\cdot\text{m}$$

$$M_c := R \cdot b \cdot (t_g - d')^2$$

$$M_c = 1.737 \text{ tonne}\cdot\text{m}$$

Moment at service

$$M_1 := (\delta \cdot 5.61) \cdot \text{tonne}\cdot\text{m}$$

$$M_1 = 1.935 \text{ tonne}\cdot\text{m}$$

$$M_c := R \cdot b \cdot (t_g + t_c - d')^2$$

$$M_c = 11.196 \text{ tonne}\cdot\text{m}$$

Steel required

$$A_s := \frac{M_d}{f_s \cdot j \cdot (t_g - d')} + \frac{M_1}{f_s \cdot j \cdot (t_g + t_c - d')}$$

$$A_s = 3.939 \text{ cm}^2$$

Use 2.5-DB20

$$A_s := 7.85 \cdot \text{cm}^2$$

; DB 20 @ 0.20

Max. shear force

$$V := (\delta \cdot 18.42) \cdot \text{tonne}$$

$$V = 6.355 \text{ tonne}$$

Check shear

Effective depth

$$d := t_g + t_c - d'$$

$$d = 0.33 \text{ m}$$

Shear force due to dead load

$$V_d := 0.575 \cdot \omega_d \cdot (L)$$

$$V_d = 0.883 \text{ tonne}$$

Shear force due to HMK60 H

$$V_1 := (\delta \cdot 18.42) \cdot \text{tonne}$$

$$V_1 = 6.355 \text{ tonne}$$

Total shear

$$V := V_d + V_1$$

$$V = 7.238 \text{ tonne}$$

Max. shear resisted by conc.

$$V_c := v_c \cdot b \cdot d$$

$$V_c = 8.007 \text{ tonne}$$

Check bond

$D := 20 \text{ mm}$

$$\Sigma O := (2.5 \cdot 6.290) \cdot \text{cm}$$

$$V = 7.238 \text{ tonne}$$

Allow. bond stress

$$u := \begin{cases} 25 \cdot \text{kg} \cdot \text{cm}^{-2} & \text{if } \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f_c}}{D} \geq 25 \cdot \text{kg} \cdot \text{cm}^{-2} \\ \frac{(2.29 \cdot \text{kg}^{0.5}) \cdot \sqrt{f_c}}{D} & \text{otherwise} \end{cases}$$

$$u = 19.16 \text{ kg cm}^{-2}$$

Bond stress

$$\frac{V}{\Sigma O \cdot j \cdot d} = 15.927 \text{ kg cm}^{-2}$$

```
*****  
*  
*          S T A A D - III          *  
*      Revision 22.3                *  
*      Proprietary Program of      *  
*      RESEARCH ENGINEERS, Inc.    *  
*      Date=   JAN 20, 2000        *  
*      Time=   15:58:28            *  
*  
*      USER ID: SEATEC GROUP: BEST *  
*****
```

1. STAAD PLANE UNIFORM LOAD ON DECK SPAN 3.2 M.
2. INPUT WIDTH 72
3. UNIT METER MTON
4. JOINT COORDINATES
5. 1 0. 0. 0.; R 4 3.2 0. 0.
6. MEMBER INCIDENCES
7. 1 1 2 4
8. MEMBER PROPERTY JAPANESE
9. 1 TO 4 PRI YD .4 ZD .5
10. CONSTANT
11. E CONCRETE ALL
12. DENSITY CONCRETE ALL
13. POISSON CONCRETE ALL
14. SUPPORT
15. 1 TO 4 PINNED
16. 5 FIXED
17. LOAD 1 LL ON 1ST SPAN
18. MEMBER LOAD
19. 1 UNI GY -.5
20. LOAD 2 LL ON 2ND SPAN
21. MEMBER LOAD
22. 2 UNI GY -.5
23. LOAD 3 LL ON 3RD SPAN
24. MEMBER LOAD
25. 3 UNI GY -.5
26. LOAD 4 LL ON 4TH SPAN
27. MEMBER LOAD
28. 4 UNI GY -.5
29. LOAD 5 TOPPING
30. MEMBER LOAD
31. 1 TO 4 UNI GY -.24
32. LOAD 6 PRECAST
33. MEMBER LOAD
34. 1 TO 4 UNI GY -.24
35. LOAD COMB 7 FULL LOAD
36. 1 1. 2 1. 3 1. 4 1. 5 1.
37. LOAD COMB 8 LL MAX. NEGATIVE
38. 1 1. 2 1. 4 1.
39. LOAD COMB 9 LL MAX. POSITIVE
40. 1 1. 3 1.
41. PERFORM ANALYSIS

P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 5/ 4/ 5
ORIGINAL/FINAL BAND-WIDTH = 1/ 1
TOTAL PRIMARY LOAD CASES = 6, TOTAL DEGREES OF FREEDOM = 4
SIZE OF STIFFNESS MATRIX = 8 DOUBLE PREC. WORDS
REQD/AVAIL. DISK SPACE = 12.01/ 2043.4 MB, EXMEM = 1961.6 MB

++ Processing Element Stiffness Matrix. 15:58:29
++ Processing Global Stiffness Matrix. 15:58:29
++ Processing Triangular Factorization. 15:58:29
++ Calculating Joint Displacements. 15:58:29
++ Calculating Member Forces. 15:58:29

42. LOAD LIST 5

43. PRINT FORCE ENVELOPE NSECTION 8 ALL

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

| MEMB | DISTANCE | | FY | LD | MZ | LD | FZ | LD | MY | LD |
|------|----------|------|------|-----|------|-----|-----|-----|-----|----|
| 1 | .00 | MAX. | .30 | 5 | .00 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .30 | 5 | .00 | 5 | .00 | 5 | .00 | 5 |
| | .40 | MAX. | .21 | 5 | -.10 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .21 | 5 | -.10 | 5 | .00 | 5 | .00 | 5 |
| | .80 | MAX. | .11 | 5 | -.17 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .11 | 5 | -.17 | 5 | .00 | 5 | .00 | 5 |
| | 1.20 | MAX. | .02 | 5 | -.19 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .02 | 5 | -.19 | 5 | .00 | 5 | .00 | 5 |
| | 1.60 | MAX. | -.08 | 5 | -.18 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.08 | 5 | -.18 | 5 | .00 | 5 | .00 | 5 |
| | 2.00 | MAX. | -.18 | 5 | -.13 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.18 | 5 | -.13 | 5 | .00 | 5 | .00 | 5 |
| | 2.40 | MAX. | -.27 | 5 | -.04 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.27 | 5 | -.04 | 5 | .00 | 5 | .00 | 5 |
| | 2.80 | MAX. | -.37 | 5 | .09 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.37 | 5 | .09 | 5 | .00 | 5 | .00 | 5 |
| 3.20 | MAX. | -.46 | 5 | .26 | 5 | .00 | 5 | .00 | 5 | |
| | MIN. | -.46 | 5 | .26 | 5 | .00 | 5 | .00 | 5 | |

| MAX/MIN FORCES FOR MEMBER | | | | 1, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .30 | .00 | 5 | .26 | 3.20 | 5 | | | |
| | .00 | .00 | 5 | .00 | .00 | 5 | .00 | .00 | 5 |
| MIN. | -.46 | 3.20 | 5 | -.19 | 1.20 | 5 | | | |
| | .00 | 3.20 | 5 | .00 | 3.20 | 5 | .00 | 3.20 | 5 |

| | | | | | | | | | | |
|---|------|------|------|---|------|---|-----|---|-----|---|
| 2 | .00 | MAX. | .40 | 5 | .26 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .40 | 5 | .26 | 5 | .00 | 5 | .00 | 5 |
| | .40 | MAX. | .31 | 5 | .12 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .31 | 5 | .12 | 5 | .00 | 5 | .00 | 5 |
| | .80 | MAX. | .21 | 5 | .01 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .21 | 5 | .01 | 5 | .00 | 5 | .00 | 5 |
| | 1.20 | MAX. | .12 | 5 | -.06 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .12 | 5 | -.06 | 5 | .00 | 5 | .00 | 5 |
| | 1.60 | MAX. | .02 | 5 | -.08 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .02 | 5 | -.08 | 5 | .00 | 5 | .00 | 5 |
| | 2.00 | MAX. | -.08 | 5 | -.07 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.08 | 5 | -.07 | 5 | .00 | 5 | .00 | 5 |

| | | | | | | | | | |
|------|------|------|---|------|---|-----|---|-----|---|
| 2.40 | MAX. | -.17 | 5 | -.02 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | -.17 | 5 | -.02 | 5 | .00 | 5 | .00 | 5 |
| 2.80 | MAX. | -.27 | 5 | .06 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | -.27 | 5 | .06 | 5 | .00 | 5 | .00 | 5 |
| 3.20 | MAX. | -.36 | 5 | .19 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | -.36 | 5 | .19 | 5 | .00 | 5 | .00 | 5 |

| MAX/MIN FORCES FOR MEMBER | | | | 2, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|--------------|----------|-------------------------------|--------------|----------|-----|------|----|
| | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
| MAX. | .40 | .00 | 5 | -.26 | .00 | 5 | | | |
| | .00 | .00 | 5 | .00 | .00 | 5 | .00 | .00 | 5 |
| MIN. | -.36 | 3.20 | 5 | -.08 | 1.60 | 5 | | | |
| | .00 | 3.20 | 5 | .00 | 3.20 | 5 | .00 | 3.20 | 5 |

| | | | | | | | | | | |
|---|------|------|------|---|------|---|-----|---|-----|---|
| 3 | .00 | MAX. | .38 | 5 | .19 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .38 | 5 | .19 | 5 | .00 | 5 | .00 | 5 |
| | .40 | MAX. | .28 | 5 | .06 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .28 | 5 | .06 | 5 | .00 | 5 | .00 | 5 |
| | .80 | MAX. | .19 | 5 | -.04 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .19 | 5 | -.04 | 5 | .00 | 5 | .00 | 5 |
| | 1.20 | MAX. | .09 | 5 | -.09 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .09 | 5 | -.09 | 5 | .00 | 5 | .00 | 5 |
| | 1.60 | MAX. | -.01 | 5 | -.11 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.01 | 5 | -.11 | 5 | .00 | 5 | .00 | 5 |
| | 2.00 | MAX. | -.10 | 5 | -.09 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.10 | 5 | -.09 | 5 | .00 | 5 | .00 | 5 |
| | 2.40 | MAX. | -.20 | 5 | -.03 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.20 | 5 | -.03 | 5 | .00 | 5 | .00 | 5 |
| | 2.80 | MAX. | -.29 | 5 | .07 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.29 | 5 | .07 | 5 | .00 | 5 | .00 | 5 |
| | 3.20 | MAX. | -.39 | 5 | .21 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | -.39 | 5 | .21 | 5 | .00 | 5 | .00 | 5 |

| MAX/MIN FORCES FOR MEMBER | | | | 3, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|--------------|----------|-------------------------------|--------------|----------|-----|------|----|
| | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
| MAX. | .38 | .00 | 5 | .21 | 3.20 | 5 | | | |
| | .00 | .00 | 5 | .00 | .00 | 5 | .00 | .00 | 5 |
| MIN. | -.39 | 3.20 | 5 | -.11 | 1.60 | 5 | | | |
| | .00 | 3.20 | 5 | .00 | 3.20 | 5 | .00 | 3.20 | 5 |

| | | | | | | | | | | |
|---|-----|------|-----|---|-----|---|-----|---|-----|---|
| 4 | .00 | MAX. | .39 | 5 | .21 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .39 | 5 | .21 | 5 | .00 | 5 | .00 | 5 |
| | .40 | MAX. | .29 | 5 | .07 | 5 | .00 | 5 | .00 | 5 |
| | | MIN. | .29 | 5 | .07 | 5 | .00 | 5 | .00 | 5 |

| | | | | | | | | | |
|------|------|------|---|------|---|-----|---|-----|---|
| .80 | MAX. | .19 | 5 | -.02 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | .19 | 5 | -.02 | 5 | .00 | 5 | .00 | 5 |
| 1.20 | MAX. | .10 | 5 | -.08 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | .10 | 5 | -.08 | 5 | .00 | 5 | .00 | 5 |
| 1.60 | MAX. | .00 | 5 | -.10 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | .00 | 5 | -.10 | 5 | .00 | 5 | .00 | 5 |
| 2.00 | MAX. | -.09 | 5 | -.08 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | -.09 | 5 | -.08 | 5 | .00 | 5 | .00 | 5 |
| 2.40 | MAX. | -.19 | 5 | -.03 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | -.19 | 5 | -.03 | 5 | .00 | 5 | .00 | 5 |
| 2.80 | MAX. | -.29 | 5 | .07 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | -.29 | 5 | .07 | 5 | .00 | 5 | .00 | 5 |
| 3.20 | MAX. | -.38 | 5 | .20 | 5 | .00 | 5 | .00 | 5 |
| | MIN. | -.38 | 5 | .20 | 5 | .00 | 5 | .00 | 5 |

| MAX/MIN FORCES FOR MEMBER | | | | 4, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .39 | .00 | 5 | .21 | .00 | 5 | | | |
| | .00 | .00 | 5 | .00 | .00 | 5 | .00 | .00 | 5 |
| MIN. | -.38 | 3.20 | 5 | -.10 | 1.60 | 5 | | | |
| | .00 | 3.20 | 5 | .00 | 3.20 | 5 | .00 | 3.20 | 5 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

44. LOAD LIST 6

45. PRINT FORCE ENVELOPE NSECTION 8 ALL

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

| MEMB | DISTANCE | | FY | LD | MZ | LD | FZ | LD | MY | LD |
|------|----------|------|------|-----|------|-----|-----|-----|-----|----|
| 1 | .00 | MAX. | .30 | 6 | .00 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .30 | 6 | .00 | 6 | .00 | 6 | .00 | 6 |
| | .40 | MAX. | .21 | 6 | -.10 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .21 | 6 | -.10 | 6 | .00 | 6 | .00 | 6 |
| | .80 | MAX. | .11 | 6 | -.17 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .11 | 6 | -.17 | 6 | .00 | 6 | .00 | 6 |
| | 1.20 | MAX. | .02 | 6 | -.19 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .02 | 6 | -.19 | 6 | .00 | 6 | .00 | 6 |
| | 1.60 | MAX. | -.08 | 6 | -.18 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.08 | 6 | -.18 | 6 | .00 | 6 | .00 | 6 |
| | 2.00 | MAX. | -.18 | 6 | -.13 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.18 | 6 | -.13 | 6 | .00 | 6 | .00 | 6 |
| | 2.40 | MAX. | -.27 | 6 | -.04 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.27 | 6 | -.04 | 6 | .00 | 6 | .00 | 6 |
| | 2.80 | MAX. | -.37 | 6 | .09 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.37 | 6 | .09 | 6 | .00 | 6 | .00 | 6 |
| 3.20 | MAX. | -.46 | 6 | .26 | 6 | .00 | 6 | .00 | 6 | |
| | MIN. | -.46 | 6 | .26 | 6 | .00 | 6 | .00 | 6 | |

| MAX/MIN FORCES FOR MEMBER | | | | 1, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .30 | .00 | 6 | .26 | 3.20 | 6 | | | |
| | .00 | .00 | 6 | .00 | .00 | 6 | .00 | .00 | 6 |
| MIN. | -.46 | 3.20 | 6 | -.19 | 1.20 | 6 | | | |
| | .00 | 3.20 | 6 | .00 | 3.20 | 6 | .00 | 3.20 | 6 |

| | | | | | | | | | | |
|---|------|------|------|---|------|---|-----|---|-----|---|
| 2 | .00 | MAX. | .40 | 6 | .26 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .40 | 6 | .26 | 6 | .00 | 6 | .00 | 6 |
| | .40 | MAX. | .31 | 6 | .12 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .31 | 6 | .12 | 6 | .00 | 6 | .00 | 6 |
| | .80 | MAX. | .21 | 6 | .01 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .21 | 6 | .01 | 6 | .00 | 6 | .00 | 6 |
| | 1.20 | MAX. | .12 | 6 | -.06 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .12 | 6 | -.06 | 6 | .00 | 6 | .00 | 6 |
| | 1.60 | MAX. | .02 | 6 | -.08 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .02 | 6 | -.08 | 6 | .00 | 6 | .00 | 6 |
| | 2.00 | MAX. | -.08 | 6 | -.07 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.08 | 6 | -.07 | 6 | .00 | 6 | .00 | 6 |

UNIFORM LOAD ON DECK SPAN 3.2 M.

| | | | | | | | | | |
|------|------|------|---|------|---|-----|---|-----|---|
| 0.40 | MAX. | -.17 | 6 | -.02 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | -.17 | 6 | -.02 | 6 | .00 | 6 | .00 | 6 |
| 0.80 | MAX. | -.27 | 6 | .06 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | -.27 | 6 | .06 | 6 | .00 | 6 | .00 | 6 |
| 3.20 | MAX. | -.36 | 6 | .19 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | -.36 | 6 | .19 | 6 | .00 | 6 | .00 | 6 |

| MAX/MIN FORCES FOR MEMBER | | | | 2, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .40 | .00 | 6 | .26 | .00 | 6 | | | |
| | .00 | .00 | 6 | .00 | .00 | 6 | .00 | .00 | 6 |
| MIN. | -.36 | 3.20 | 6 | -.08 | 1.60 | 6 | | | |
| | .00 | 3.20 | 6 | .00 | 3.20 | 6 | .00 | 3.20 | 6 |

| | | | | | | | | | | |
|---|------|------|------|---|------|---|-----|---|-----|---|
| 3 | .00 | MAX. | .38 | 6 | .19 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .38 | 6 | .19 | 6 | .00 | 6 | .00 | 6 |
| | .40 | MAX. | .28 | 6 | .06 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .28 | 6 | .06 | 6 | .00 | 6 | .00 | 6 |
| | .80 | MAX. | .19 | 6 | -.04 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .19 | 6 | -.04 | 6 | .00 | 6 | .00 | 6 |
| | 1.20 | MAX. | .09 | 6 | -.09 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .09 | 6 | -.09 | 6 | .00 | 6 | .00 | 6 |
| | 1.60 | MAX. | -.01 | 6 | -.11 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.01 | 6 | -.11 | 6 | .00 | 6 | .00 | 6 |
| | 2.00 | MAX. | -.10 | 6 | -.09 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.10 | 6 | -.09 | 6 | .00 | 6 | .00 | 6 |
| | 2.40 | MAX. | -.20 | 6 | -.03 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.20 | 6 | -.03 | 6 | .00 | 6 | .00 | 6 |
| | 2.80 | MAX. | -.29 | 6 | .07 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.29 | 6 | .07 | 6 | .00 | 6 | .00 | 6 |
| | 3.20 | MAX. | -.39 | 6 | .21 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | -.39 | 6 | .21 | 6 | .00 | 6 | .00 | 6 |

| MAX/MIN FORCES FOR MEMBER | | | | 3, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .38 | .00 | 6 | .21 | 3.20 | 6 | | | |
| | .00 | .00 | 6 | .00 | .00 | 6 | .00 | .00 | 6 |
| MIN. | -.39 | 3.20 | 6 | -.11 | 1.60 | 6 | | | |
| | .00 | 3.20 | 6 | .00 | 3.20 | 6 | .00 | 3.20 | 6 |

| | | | | | | | | | | |
|---|-----|------|-----|---|-----|---|-----|---|-----|---|
| 4 | .00 | MAX. | .39 | 6 | .21 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .39 | 6 | .21 | 6 | .00 | 6 | .00 | 6 |
| | .40 | MAX. | .29 | 6 | .07 | 6 | .00 | 6 | .00 | 6 |
| | | MIN. | .29 | 6 | .07 | 6 | .00 | 6 | .00 | 6 |

| | | | | | | | | | |
|------|------|------|---|------|---|-----|---|-----|---|
| 1.80 | MAX. | .19 | 6 | -.02 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | .19 | 6 | -.02 | 6 | .00 | 6 | .00 | 6 |
| 1.20 | MAX. | .10 | 6 | -.08 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | .10 | 6 | -.08 | 6 | .00 | 6 | .00 | 6 |
| 1.60 | MAX. | .00 | 6 | -.10 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | .00 | 6 | -.10 | 6 | .00 | 6 | .00 | 6 |
| 2.00 | MAX. | -.09 | 6 | -.08 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | -.09 | 6 | -.08 | 6 | .00 | 6 | .00 | 6 |
| 1.40 | MAX. | -.19 | 6 | -.03 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | -.19 | 6 | -.03 | 6 | .00 | 6 | .00 | 6 |
| 1.80 | MAX. | -.29 | 6 | .07 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | -.29 | 6 | .07 | 6 | .00 | 6 | .00 | 6 |
| 3.20 | MAX. | -.38 | 6 | .20 | 6 | .00 | 6 | .00 | 6 |
| | MIN. | -.38 | 6 | .20 | 6 | .00 | 6 | .00 | 6 |

| MAX/MIN FORCES FOR MEMBER | | | | 4, AMONGST ALL SECT LOCATIONS | | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | | FX | DIST | LD |
| MAX. | .39 | .00 | 6 | .21 | .00 | 6 | | | | |
| | .00 | .00 | 6 | .00 | .00 | 6 | .00 | .00 | 6 | |
| MIN. | -.38 | 3.20 | 6 | -.10 | 1.60 | 6 | | | | |
| | .00 | 3.20 | 6 | .00 | 3.20 | 6 | .00 | 3.20 | 6 | |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

- 46. LOAD LIST 7
- 47. PRINT FORCE ENVELOPE NSECTION 8 ALL

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

| MEMB | DISTANCE | | FY | LD | MZ | LD | FZ | LD | MY | LD |
|------|----------|-------|------|------|------|-----|-----|-----|-----|----|
| 1 | .00 | MAX. | .94 | 7 | .00 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .94 | 7 | .00 | 7 | .00 | 7 | .00 | 7 |
| | .40 | MAX. | .64 | 7 | -.31 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .64 | 7 | -.31 | 7 | .00 | 7 | .00 | 7 |
| | .80 | MAX. | .34 | 7 | -.51 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .34 | 7 | -.51 | 7 | .00 | 7 | .00 | 7 |
| | 1.20 | MAX. | .05 | 7 | -.59 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .05 | 7 | -.59 | 7 | .00 | 7 | .00 | 7 |
| | 1.60 | MAX. | -.25 | 7 | -.55 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -.25 | 7 | -.55 | 7 | .00 | 7 | .00 | 7 |
| | 2.00 | MAX. | -.54 | 7 | -.39 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -.54 | 7 | -.39 | 7 | .00 | 7 | .00 | 7 |
| 2.40 | MAX. | -.84 | 7 | -.11 | 7 | .00 | 7 | .00 | 7 | |
| | MIN. | -.84 | 7 | -.11 | 7 | .00 | 7 | .00 | 7 | |
| 2.80 | MAX. | -1.14 | 7 | .28 | 7 | .00 | 7 | .00 | 7 | |
| | MIN. | -1.14 | 7 | .28 | 7 | .00 | 7 | .00 | 7 | |
| 3.20 | MAX. | -1.43 | 7 | .80 | 7 | .00 | 7 | .00 | 7 | |
| | MIN. | -1.43 | 7 | .80 | 7 | .00 | 7 | .00 | 7 | |

| MAX/MIN FORCES FOR MEMBER 1, AMONGST ALL SECT LOCATIONS | | | | | | | | | |
|---|-----------|------|----|-----------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .94 | .00 | 7 | .80 | 3.20 | 7 | | | |
| | .00 | .00 | 7 | .00 | .00 | 7 | .00 | .00 | 7 |
| MIN. | -1.43 | 3.20 | 7 | -.59 | 1.20 | 7 | | | |
| | .00 | 3.20 | 7 | .00 | 3.20 | 7 | .00 | 3.20 | 7 |

| | | | | | | | | | | |
|---|------|------|------|---|------|---|-----|---|-----|---|
| 2 | .00 | MAX. | 1.25 | 7 | .80 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | 1.25 | 7 | .80 | 7 | .00 | 7 | .00 | 7 |
| | .40 | MAX. | .95 | 7 | .36 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .95 | 7 | .36 | 7 | .00 | 7 | .00 | 7 |
| | .80 | MAX. | .66 | 7 | .03 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .66 | 7 | .03 | 7 | .00 | 7 | .00 | 7 |
| | 1.20 | MAX. | .36 | 7 | -.17 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .36 | 7 | -.17 | 7 | .00 | 7 | .00 | 7 |
| | 1.60 | MAX. | .06 | 7 | -.26 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .06 | 7 | -.26 | 7 | .00 | 7 | .00 | 7 |
| | 2.00 | MAX. | -.23 | 7 | -.22 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -.23 | 7 | -.22 | 7 | .00 | 7 | .00 | 7 |

| | | | | | | | | | |
|------|------|-------|---|------|---|-----|---|-----|---|
| 2.40 | MAX. | -.53 | 7 | -.07 | 7 | .00 | 7 | .00 | 7 |
| | MIN. | -.53 | 7 | -.07 | 7 | .00 | 7 | .00 | 7 |
| 2.80 | MAX. | -.82 | 7 | .20 | 7 | .00 | 7 | .00 | 7 |
| | MIN. | -.82 | 7 | .20 | 7 | .00 | 7 | .00 | 7 |
| 3.20 | MAX. | -1.12 | 7 | .59 | 7 | .00 | 7 | .00 | 7 |
| | MIN. | -1.12 | 7 | .59 | 7 | .00 | 7 | .00 | 7 |

MAX/MIN FORCES FOR MEMBER 2, AMONGST ALL SECT LOCATIONS

| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
|------|-----------|------|----|-----------|------|----|-----|------|----|
| MAX. | 1.25 | .00 | 7 | .80 | .00 | 7 | | | |
| | .00 | .00 | 7 | .00 | .00 | 7 | .00 | .00 | 7 |
| MIN. | -1.12 | 3.20 | 7 | -.26 | 1.60 | 7 | | | |
| | .00 | 3.20 | 7 | .00 | 3.20 | 7 | .00 | 3.20 | 7 |

| | | | | | | | | | | |
|---|------|------|-------|---|------|---|-----|---|-----|---|
| 3 | .00 | MAX. | 1.17 | 7 | .59 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | 1.17 | 7 | .59 | 7 | .00 | 7 | .00 | 7 |
| | .40 | MAX. | .87 | 7 | .18 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .87 | 7 | .18 | 7 | .00 | 7 | .00 | 7 |
| | .80 | MAX. | .57 | 7 | -.11 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .57 | 7 | -.11 | 7 | .00 | 7 | .00 | 7 |
| | 1.20 | MAX. | .28 | 7 | -.28 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .28 | 7 | -.28 | 7 | .00 | 7 | .00 | 7 |
| | 1.60 | MAX. | -.02 | 7 | -.33 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -.02 | 7 | -.33 | 7 | .00 | 7 | .00 | 7 |
| | 2.00 | MAX. | -.31 | 7 | -.27 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -.31 | 7 | -.27 | 7 | .00 | 7 | .00 | 7 |
| | 2.40 | MAX. | -.61 | 7 | -.08 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -.61 | 7 | -.08 | 7 | .00 | 7 | .00 | 7 |
| | 2.80 | MAX. | -.91 | 7 | .22 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -.91 | 7 | .22 | 7 | .00 | 7 | .00 | 7 |
| | 3.20 | MAX. | -1.20 | 7 | .64 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | -1.20 | 7 | .64 | 7 | .00 | 7 | .00 | 7 |

MAX/MIN FORCES FOR MEMBER 3, AMONGST ALL SECT LOCATIONS

| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
|------|-----------|------|----|-----------|------|----|-----|------|----|
| MAX. | 1.17 | .00 | 7 | .64 | 3.20 | 7 | | | |
| | .00 | .00 | 7 | .00 | .00 | 7 | .00 | .00 | 7 |
| MIN. | -1.20 | 3.20 | 7 | -.33 | 1.60 | 7 | | | |
| | .00 | 3.20 | 7 | .00 | 3.20 | 7 | .00 | 3.20 | 7 |

| | | | | | | | | | | |
|---|-----|------|------|---|-----|---|-----|---|-----|---|
| 4 | .00 | MAX. | 1.19 | 7 | .64 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | 1.19 | 7 | .64 | 7 | .00 | 7 | .00 | 7 |
| | .40 | MAX. | .89 | 7 | .23 | 7 | .00 | 7 | .00 | 7 |
| | | MIN. | .89 | 7 | .23 | 7 | .00 | 7 | .00 | 7 |

| | | | | | | | | | |
|------|------|-------|---|------|---|-----|---|-----|--|
| 1.80 | MAX. | .60 | 7 | -.07 | 7 | .00 | 7 | .00 | |
| | MIN. | .60 | 7 | -.07 | 7 | .00 | 7 | .00 | |
| 1.20 | MAX. | .30 | 7 | -.25 | 7 | .00 | 7 | .00 | |
| | MIN. | .30 | 7 | -.25 | 7 | .00 | 7 | .00 | |
| 1.60 | MAX. | .01 | 7 | -.31 | 7 | .00 | 7 | .00 | |
| | MIN. | .01 | 7 | -.31 | 7 | .00 | 7 | .00 | |
| 2.00 | MAX. | -.29 | 7 | -.26 | 7 | .00 | 7 | .00 | |
| | MIN. | -.29 | 7 | -.26 | 7 | .00 | 7 | .00 | |
| 2.40 | MAX. | -.59 | 7 | -.08 | 7 | .00 | 7 | .00 | |
| | MIN. | -.59 | 7 | -.08 | 7 | .00 | 7 | .00 | |
| 2.80 | MAX. | -.88 | 7 | .21 | 7 | .00 | 7 | .00 | |
| | MIN. | -.88 | 7 | .21 | 7 | .00 | 7 | .00 | |
| 3.20 | MAX. | -1.18 | 7 | .63 | 7 | .00 | 7 | .00 | |
| | MIN. | -1.18 | 7 | .63 | 7 | .00 | 7 | .00 | |

| MAX/MIN FORCES FOR MEMBER | | | | 4, AMONGST ALL SECT LOCATIONS | | | | | | |
|---------------------------|-----------|--------------|----------|-------------------------------|--------------|----------|-----|------|----|--|
| | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD | |
| MAX. | 1.19 | .00 | 7 | .64 | .00 | 7 | | | | |
| | .00 | .00 | 7 | .00 | .00 | 7 | .00 | .00 | 7 | |
| MIN. | -1.18 | 3.20 | 7 | -.31 | 1.60 | 7 | | | | |
| | .00 | 3.20 | 7 | .00 | 3.20 | 7 | .00 | 3.20 | 7 | |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

- 48. LOAD LIST 8
- 49. PRINT FORCE ENVELOPE NSECTION 8 ALL

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

| MEMB | DISTANCE | | FY | LD | MZ | LD | FZ | LD | MY | LD |
|------|----------|------|------|----|------|----|-----|----|-----|----|
| 1 | .00 | MAX. | .61 | 8 | .00 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .61 | 8 | .00 | 8 | .00 | 8 | .00 | 8 |
| | .40 | MAX. | .41 | 8 | -.20 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .41 | 8 | -.20 | 8 | .00 | 8 | .00 | 8 |
| | .80 | MAX. | .21 | 8 | -.33 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .21 | 8 | -.33 | 8 | .00 | 8 | .00 | 8 |
| | 1.20 | MAX. | .01 | 8 | -.37 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .01 | 8 | -.37 | 8 | .00 | 8 | .00 | 8 |
| | 1.60 | MAX. | -.19 | 8 | -.34 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | -.19 | 8 | -.34 | 8 | .00 | 8 | .00 | 8 |
| | 2.00 | MAX. | -.39 | 8 | -.22 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | -.39 | 8 | -.22 | 8 | .00 | 8 | .00 | 8 |
| | 2.40 | MAX. | -.59 | 8 | -.03 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | -.59 | 8 | -.03 | 8 | .00 | 8 | .00 | 8 |
| | 2.80 | MAX. | -.79 | 8 | .25 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | -.79 | 8 | .25 | 8 | .00 | 8 | .00 | 8 |
| | 3.20 | MAX. | -.99 | 8 | .60 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | -.99 | 8 | .60 | 8 | .00 | 8 | .00 | 8 |

| MAX/MIN FORCES FOR MEMBER | | | | 1, AMONGST ALL SECT LOCATIONS | | | | | | |
|---------------------------|------|------|----|-------------------------------|------|----|-----|------|----|--|
| | FY/ | DIST | LD | MZ/ | DIST | LD | | | | |
| | FZ | DIST | LD | MY | DIST | LD | FX | DIST | LD | |
| MAX. | .61 | .00 | 8 | .60 | 3.20 | 8 | | | | |
| | .00 | .00 | 8 | .00 | .00 | 8 | .00 | .00 | 8 | |
| MIN. | -.99 | 3.20 | 8 | -.37 | 1.20 | 8 | | | | |
| | .00 | 3.20 | 8 | .00 | 3.20 | 8 | .00 | 3.20 | 8 | |

| | | | | | | | | | | |
|---|------|------|------|---|------|---|-----|---|-----|---|
| 2 | .00 | MAX. | .95 | 8 | .60 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .95 | 8 | .60 | 8 | .00 | 8 | .00 | 8 |
| | .40 | MAX. | .75 | 8 | .26 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .75 | 8 | .26 | 8 | .00 | 8 | .00 | 8 |
| | .80 | MAX. | .55 | 8 | .00 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .55 | 8 | .00 | 8 | .00 | 8 | .00 | 8 |
| | 1.20 | MAX. | .35 | 8 | -.17 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .35 | 8 | -.17 | 8 | .00 | 8 | .00 | 8 |
| | 1.60 | MAX. | .15 | 8 | -.27 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .15 | 8 | -.27 | 8 | .00 | 8 | .00 | 8 |
| | 2.00 | MAX. | -.05 | 8 | -.29 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | -.05 | 8 | -.29 | 8 | .00 | 8 | .00 | 8 |

UNIFORM LOAD ON DECK SPAN 3.2 M.

| | | | | | | | | | |
|------|------|------|---|------|---|-----|---|-----|---|
| 2.40 | MAX. | -.25 | 8 | -.23 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.25 | 8 | -.23 | 8 | .00 | 8 | .00 | 8 |
| 2.80 | MAX. | -.45 | 8 | -.09 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.45 | 8 | -.09 | 8 | .00 | 8 | .00 | 8 |
| 3.20 | MAX. | -.65 | 8 | .13 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.65 | 8 | .13 | 8 | .00 | 8 | .00 | 8 |

| MAX/MIN FORCES FOR MEMBER | | | | 2, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|--------------|----------|-------------------------------|--------------|----------|-----|------|----|
| | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
| MAX. | .95 | .00 | 8 | .60 | .00 | 8 | | | |
| | .00 | .00 | 8 | .00 | .00 | 8 | .00 | .00 | 8 |
| MIN. | -.65 | 3.20 | 8 | -.29 | 2.00 | 8 | | | |
| | .00 | 3.20 | 8 | .00 | 3.20 | 8 | .00 | 3.20 | 8 |

| | | | | | | | | | | |
|---|------|------|-----|---|-----|---|-----|---|-----|---|
| 3 | .00 | MAX. | .00 | 8 | .13 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .13 | 8 | .00 | 8 | .00 | 8 |
| | .40 | MAX. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | .80 | MAX. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | 1.20 | MAX. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | 1.60 | MAX. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | 2.00 | MAX. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | 2.40 | MAX. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .14 | 8 | .00 | 8 | .00 | 8 |
| | 2.80 | MAX. | .00 | 8 | .15 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .15 | 8 | .00 | 8 | .00 | 8 |
| | 3.20 | MAX. | .00 | 8 | .15 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .00 | 8 | .15 | 8 | .00 | 8 | .00 | 8 |

| MAX/MIN FORCES FOR MEMBER | | | | 3, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|--------------|----------|-------------------------------|--------------|----------|-----|------|----|
| | FY/ FZ | DIST DIST | LD LD | MZ/ MY | DIST DIST | LD LD | FX | DIST | LD |
| MAX. | .00 | .00 | 8 | .15 | 3.20 | 8 | | | |
| | .00 | .00 | 8 | .00 | .00 | 8 | .00 | .00 | 8 |
| MIN. | .00 | 3.20 | 8 | .13 | .00 | 8 | | | |
| | .00 | 3.20 | 8 | .00 | 3.20 | 8 | .00 | 3.20 | 8 |

| | | | | | | | | | | |
|---|-----|------|-----|---|------|---|-----|---|-----|---|
| 4 | .00 | MAX. | .67 | 8 | .15 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .67 | 8 | .15 | 8 | .00 | 8 | .00 | 8 |
| | .40 | MAX. | .47 | 8 | -.08 | 8 | .00 | 8 | .00 | 8 |
| | | MIN. | .47 | 8 | -.08 | 8 | .00 | 8 | .00 | 8 |

| | | | | | | | | | |
|------|------|------|---|------|---|-----|---|-----|---|
| 0.80 | MAX. | .27 | 8 | -.23 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | .27 | 8 | -.23 | 8 | .00 | 8 | .00 | 8 |
| 1.20 | MAX. | .07 | 8 | -.30 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | .07 | 8 | -.30 | 8 | .00 | 8 | .00 | 8 |
| 1.60 | MAX. | -.13 | 8 | -.29 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.13 | 8 | -.29 | 8 | .00 | 8 | .00 | 8 |
| 2.00 | MAX. | -.33 | 8 | -.19 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.33 | 8 | -.19 | 8 | .00 | 8 | .00 | 8 |
| 2.40 | MAX. | -.53 | 8 | -.02 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.53 | 8 | -.02 | 8 | .00 | 8 | .00 | 8 |
| 2.80 | MAX. | -.73 | 8 | .23 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.73 | 8 | .23 | 8 | .00 | 8 | .00 | 8 |
| 3.20 | MAX. | -.93 | 8 | .56 | 8 | .00 | 8 | .00 | 8 |
| | MIN. | -.93 | 8 | .56 | 8 | .00 | 8 | .00 | 8 |

| MAX/MIN FORCES FOR MEMBER | | | | 4, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .67 | .00 | 8 | .56 | 3.20 | 8 | | | |
| | .00 | .00 | 8 | .00 | .00 | 8 | .00 | .00 | 8 |
| MIN. | -.93 | 3.20 | 8 | -.30 | 1.20 | 8 | | | |
| | .00 | 3.20 | 8 | .00 | 3.20 | 8 | .00 | 3.20 | 8 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

50. LOAD LIST 9

51. PRINT FORCE ENVELOPE NSECTION 8 ALL

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

| MEMB | DISTANCE | | FY | LD | MZ | LD | FZ | LD | MY | LD |
|------|----------|------|------|-----|------|-----|-----|-----|-----|----|
| 1 | .00 | MAX. | .71 | 9 | .00 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .71 | 9 | .00 | 9 | .00 | 9 | .00 | 9 |
| | .40 | MAX. | .51 | 9 | -.25 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .51 | 9 | -.25 | 9 | .00 | 9 | .00 | 9 |
| | .80 | MAX. | .31 | 9 | -.41 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .31 | 9 | -.41 | 9 | .00 | 9 | .00 | 9 |
| | 1.20 | MAX. | .11 | 9 | -.50 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .11 | 9 | -.50 | 9 | .00 | 9 | .00 | 9 |
| | 1.60 | MAX. | -.09 | 9 | -.50 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.09 | 9 | -.50 | 9 | .00 | 9 | .00 | 9 |
| | 2.00 | MAX. | -.29 | 9 | -.43 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.29 | 9 | -.43 | 9 | .00 | 9 | .00 | 9 |
| | 2.40 | MAX. | -.49 | 9 | -.27 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.49 | 9 | -.27 | 9 | .00 | 9 | .00 | 9 |
| | 2.80 | MAX. | -.69 | 9 | -.04 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.69 | 9 | -.04 | 9 | .00 | 9 | .00 | 9 |
| 3.20 | MAX. | -.89 | 9 | .27 | 9 | .00 | 9 | .00 | 9 | |
| | MIN. | -.89 | 9 | .27 | 9 | .00 | 9 | .00 | 9 | |

| MAX/MIN FORCES FOR MEMBER | | | | 1, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .71 | .00 | 9 | .27 | 3.20 | 9 | | | |
| | .00 | .00 | 9 | .00 | .00 | 9 | .00 | .00 | 9 |
| MIN. | -.89 | 3.20 | 9 | -.50 | 1.60 | 9 | | | |
| | .00 | 3.20 | 9 | .00 | 3.20 | 9 | .00 | 3.20 | 9 |

| | | | | | | | | | | |
|---|------|------|-----|---|-----|---|-----|---|-----|---|
| 2 | .00 | MAX. | .03 | 9 | .27 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .03 | 9 | .27 | 9 | .00 | 9 | .00 | 9 |
| | .40 | MAX. | .03 | 9 | .26 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .03 | 9 | .26 | 9 | .00 | 9 | .00 | 9 |
| | .80 | MAX. | .03 | 9 | .25 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .03 | 9 | .25 | 9 | .00 | 9 | .00 | 9 |
| | 1.20 | MAX. | .03 | 9 | .24 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .03 | 9 | .24 | 9 | .00 | 9 | .00 | 9 |
| | 1.60 | MAX. | .03 | 9 | .22 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .03 | 9 | .22 | 9 | .00 | 9 | .00 | 9 |
| | 2.00 | MAX. | .03 | 9 | .21 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .03 | 9 | .21 | 9 | .00 | 9 | .00 | 9 |

| | | | | | | | | | |
|------|------|-----|---|-----|---|-----|---|-----|---|
| 2.40 | MAX. | .03 | 9 | .20 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .03 | 9 | .20 | 9 | .00 | 9 | .00 | 9 |
| 2.80 | MAX. | .03 | 9 | .19 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .03 | 9 | .19 | 9 | .00 | 9 | .00 | 9 |
| 3.20 | MAX. | .03 | 9 | .17 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .03 | 9 | .17 | 9 | .00 | 9 | .00 | 9 |

| MAX/MIN FORCES FOR MEMBER | | | | 2, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .03 | .00 | 9 | .27 | .00 | 9 | | | |
| | .00 | .00 | 9 | .00 | .00 | 9 | .00 | .00 | 9 |
| MIN. | .03 | 3.20 | 9 | .17 | 3.20 | 9 | | | |
| | .00 | 3.20 | 9 | .00 | 3.20 | 9 | .00 | 3.20 | 9 |

| | | | | | | | | | | |
|---|------|------|------|---|------|---|-----|---|-----|---|
| 3 | .00 | MAX. | .76 | 9 | .17 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .76 | 9 | .17 | 9 | .00 | 9 | .00 | 9 |
| | .40 | MAX. | .56 | 9 | -.09 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .56 | 9 | -.09 | 9 | .00 | 9 | .00 | 9 |
| | .80 | MAX. | .36 | 9 | -.27 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .36 | 9 | -.27 | 9 | .00 | 9 | .00 | 9 |
| | 1.20 | MAX. | .16 | 9 | -.37 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .16 | 9 | -.37 | 9 | .00 | 9 | .00 | 9 |
| | 1.60 | MAX. | -.04 | 9 | -.40 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.04 | 9 | -.40 | 9 | .00 | 9 | .00 | 9 |
| | 2.00 | MAX. | -.24 | 9 | -.34 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.24 | 9 | -.34 | 9 | .00 | 9 | .00 | 9 |
| | 2.40 | MAX. | -.44 | 9 | -.20 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.44 | 9 | -.20 | 9 | .00 | 9 | .00 | 9 |
| | 2.80 | MAX. | -.64 | 9 | .01 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.64 | 9 | .01 | 9 | .00 | 9 | .00 | 9 |
| | 3.20 | MAX. | -.84 | 9 | .31 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | -.84 | 9 | .31 | 9 | .00 | 9 | .00 | 9 |

| MAX/MIN FORCES FOR MEMBER | | | | 3, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .76 | .00 | 9 | .31 | 3.20 | 9 | | | |
| | .00 | .00 | 9 | .00 | .00 | 9 | .00 | .00 | 9 |
| MIN. | -.84 | 3.20 | 9 | -.40 | 1.60 | 9 | | | |
| | .00 | 3.20 | 9 | .00 | 3.20 | 9 | .00 | 3.20 | 9 |

| | | | | | | | | | | |
|---|-----|------|-----|---|-----|---|-----|---|-----|---|
| 4 | .00 | MAX. | .14 | 9 | .31 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .14 | 9 | .31 | 9 | .00 | 9 | .00 | 9 |
| | .40 | MAX. | .14 | 9 | .25 | 9 | .00 | 9 | .00 | 9 |
| | | MIN. | .14 | 9 | .25 | 9 | .00 | 9 | .00 | 9 |

UNIFORM LOAD ON DECK SPAN 3.2 M.

| | | | | | | | | | |
|------|------|-----|---|------|---|-----|---|-----|---|
| .80 | MAX. | .14 | 9 | .20 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .14 | 9 | .20 | 9 | .00 | 9 | .00 | 9 |
| 1.20 | MAX. | .14 | 9 | .14 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .14 | 9 | .14 | 9 | .00 | 9 | .00 | 9 |
| 1.60 | MAX. | .14 | 9 | .08 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .14 | 9 | .08 | 9 | .00 | 9 | .00 | 9 |
| 2.00 | MAX. | .14 | 9 | .02 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .14 | 9 | .02 | 9 | .00 | 9 | .00 | 9 |
| 2.40 | MAX. | .14 | 9 | -.04 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .14 | 9 | -.04 | 9 | .00 | 9 | .00 | 9 |
| 2.80 | MAX. | .14 | 9 | -.09 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .14 | 9 | -.09 | 9 | .00 | 9 | .00 | 9 |
| 3.20 | MAX. | .14 | 9 | -.15 | 9 | .00 | 9 | .00 | 9 |
| | MIN. | .14 | 9 | -.15 | 9 | .00 | 9 | .00 | 9 |

| MAX/MIN FORCES FOR MEMBER | | | | 4, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|----|-------------------------------|------|----|-----|------|----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | .14 | .00 | 9 | .31 | .00 | 9 | | | |
| | .00 | .00 | 9 | .00 | .00 | 9 | .00 | .00 | 9 |
| MIN. | .14 | 3.20 | 9 | -.15 | 3.20 | 9 | | | |
| | .00 | 3.20 | 9 | .00 | 3.20 | 9 | .00 | 3.20 | 9 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

52. FINISH

***** END OF STAAD-III *****

**** DATE= JAN 20, 2000 TIME= 15:58:29 ****

 * For questions on STAAD-III/ISDS, contact: *
 * RESEARCH ENGINEERS, Inc at *
 * Ph: (714) 974-2500 Fax: (714) 921-2543 *

LN= 7 MN/ELEM

STRUCTURE DATA

TYPE = PLANE

NJ = 5

NM = 4

NE = 0

NS = 0

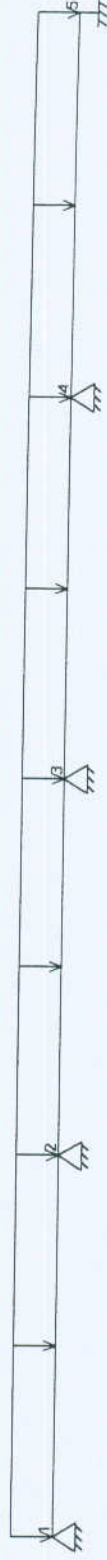
NRJ = 5

NL = 9

XMAX = 12.8

YMAX = .0

ZMAX = .0



J=5, M=4

UNIT MET HIG

S T A A D P O S T - P L O T (REV: 22.3)

DATE: APR 4. 2000

TITLE: 1.5 UNIFORM LOAD ON DECK SPAN 3.2 M.


```
*****  
*  
*          S T A A D - III          *  
*      Revision 22.3                *  
*      Proprietary Program of      *  
*      RESEARCH ENGINEERS, Inc.    *  
*      Date=   APR  4, 2000        *  
*      Time=   9:11:34             *  
*  
*      USER ID: SEATEC GROUP: BEST *  
*  
*****
```

1. STRAD PLANE HMK 60 H ON DECK SPAN 3.2 M.
2. INPUT WIDTH 72
3. UNIT METER MTON
4. JOINT COORDINATES
5. 1 0. 0. 0.; R 4 3.2 0. 0.
6. MEMBER INCIDENCES
7. 1 1 2 4
8. MEMBER PROPERTY JAPANESE
9. 1 TO 4 PRI YD .4 ZD .5
10. CONSTANT
11. E CONCRETE ALL
12. DENSITY CONCRETE ALL
13. POISSON CONCRETE ALL
14. SUPPORT
15. 1 TO 5 PINNED
16. DEFINE MOVING LOAD
17. TYPE 1 LOAD 18.75 18.75 DIS 5.
18. LOAD GENERATION 410
19. TYPE 1 0. 0. 0. XINC .015
20. PERFORM ANALYSIS

P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 5/ 4/ 5
ORIGINAL/FINAL BAND-WIDTH = 1/ 1
TOTAL PRIMARY LOAD CASES = 410, TOTAL DEGREES OF FREEDOM = 5
SIZE OF STIFFNESS MATRIX = 10 DOUBLE PREC. WORDS
REQD/AVAIL. DISK SPACE = 12.16/ 2033.9 MB, EXMEM = 1961.8 MB

++ Processing Element Stiffness Matrix. 9:11:36
++ Processing Global Stiffness Matrix. 9:11:36
++ Processing Triangular Factorization. 9:11:36
++ Calculating Joint Displacements. 9:11:36
++ Calculating Member Forces. 9:11:37

21. PRINT FORCE ENVELOPE NSECTION 8 ALL

MEMBER FORCE ENVELOPE

ALL UNITS ARE MTON METE

| MEMB | DISTANCE | FY | LD | MZ | LD | FZ | LD | MY | LD | |
|------|----------|------|--------|-----|--------|-----|-----|-----|-----|-----|
| 1 | .00 | MAX. | 17.49 | 1 | .00 | 140 | .00 | 410 | .00 | 410 |
| | | MIN. | -1.46 | 305 | .00 | 125 | .00 | 410 | .00 | 410 |
| | .40 | MAX. | 14.85 | 28 | .58 | 305 | .00 | 410 | .00 | 410 |
| | | MIN. | -3.81 | 27 | -5.94 | 28 | .00 | 410 | .00 | 410 |
| | .80 | MAX. | 12.32 | 55 | 1.17 | 305 | .00 | 410 | .00 | 410 |
| | | MIN. | -6.34 | 54 | -9.85 | 55 | .00 | 410 | .00 | 410 |
| | 1.20 | MAX. | 9.97 | 81 | 1.75 | 305 | .00 | 410 | .00 | 410 |
| | | MIN. | -8.69 | 80 | -11.96 | 81 | .00 | 410 | .00 | 410 |
| | 1.60 | MAX. | 7.62 | 108 | 2.33 | 305 | .00 | 410 | .00 | 410 |
| | | MIN. | -11.05 | 107 | -12.18 | 108 | .00 | 410 | .00 | 410 |
| | 2.00 | MAX. | 5.39 | 135 | 2.92 | 305 | .00 | 410 | .00 | 410 |
| | | MIN. | -13.29 | 134 | -10.84 | 134 | .00 | 410 | .00 | 410 |
| | 2.40 | MAX. | 3.43 | 161 | 3.50 | 305 | .00 | 410 | .00 | 410 |
| | | MIN. | -15.25 | 160 | -8.24 | 161 | .00 | 410 | .00 | 410 |
| | 2.80 | MAX. | 1.68 | 188 | 4.08 | 305 | .00 | 410 | .00 | 410 |
| | | MIN. | -17.01 | 187 | -4.71 | 188 | .00 | 410 | .00 | 410 |
| | 3.20 | MAX. | .30 | 215 | 5.61 | 89 | .00 | 410 | .00 | 410 |
| | | MIN. | -18.40 | 214 | -1.02 | 214 | .00 | 410 | .00 | 410 |

| MAX/MIN FORCES FOR MEMBER | | | | 1, AMONGST ALL SECT LOCATIONS | | | | | | |
|---------------------------|-----------|------|-----|-------------------------------|------|-----|--|-----|------|-----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | | FX | DIST | LD |
| MAX. | 17.49 | .00 | 1 | 5.61 | 3.20 | 89 | | | | |
| | .00 | .00 | 1 | .00 | .00 | 1 | | .00 | .00 | 1 |
| MIN. | -18.40 | 3.20 | 214 | -12.18 | 1.60 | 108 | | | | |
| | .00 | 3.20 | 410 | .00 | 3.20 | 410 | | .00 | 3.20 | 410 |

| | | | | | | | | | | |
|---|------|------|--------|-----|--------|-----|-----|-----|-----|-----|
| 2 | .00 | MAX. | 17.02 | 215 | 5.61 | 89 | .00 | 410 | .00 | 410 |
| | | MIN. | -1.68 | 214 | -1.02 | 214 | .00 | 410 | .00 | 410 |
| | .40 | MAX. | 15.64 | 241 | 4.89 | 116 | .00 | 410 | .00 | 410 |
| | | MIN. | -3.05 | 240 | -4.27 | 241 | .00 | 410 | .00 | 410 |
| | .80 | MAX. | 13.84 | 268 | 4.43 | 130 | .00 | 410 | .00 | 410 |
| | | MIN. | -4.84 | 267 | -7.24 | 268 | .00 | 410 | .00 | 410 |
| | 1.20 | MAX. | 11.72 | 295 | 4.10 | 141 | .00 | 410 | .00 | 410 |
| | | MIN. | -6.94 | 294 | -9.47 | 294 | .00 | 410 | .00 | 410 |
| | 1.60 | MAX. | 9.44 | 321 | 3.89 | 150 | .00 | 410 | .00 | 410 |
| | | MIN. | -9.22 | 320 | -10.58 | 321 | .00 | 410 | .00 | 410 |
| | 2.00 | MAX. | 6.95 | 348 | 3.78 | 160 | .00 | 410 | .00 | 410 |
| | | MIN. | -11.81 | 14 | -10.10 | 348 | .00 | 410 | .00 | 410 |

| | | | | | | | | | |
|------|------|--------|-----|-------|-----|-----|-----|-----|-----|
| 2.40 | MAX. | 5.10 | 41 | 3.78 | 171 | .00 | 410 | .00 | 410 |
| | MIN. | -14.16 | 374 | -8.20 | 374 | .00 | 410 | .00 | 410 |
| 2.80 | MAX. | 3.48 | 68 | 3.93 | 186 | .00 | 410 | .00 | 410 |
| | MIN. | -16.31 | 400 | -5.15 | 401 | .00 | 410 | .00 | 410 |
| 3.20 | MAX. | 2.18 | 95 | 5.04 | 1 | .00 | 410 | .00 | 410 |
| | MIN. | -17.05 | 410 | -1.40 | 94 | .00 | 410 | .00 | 410 |

| MAX/MIN FORCES FOR MEMBER | | | | 2, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|-----|-------------------------------|------|-----|-----|------|-----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | 17.02 | .00 | 215 | 5.61 | .00 | 89 | | | |
| | .00 | .00 | 1 | .00 | .00 | 1 | .00 | .00 | 1 |
| MIN. | -17.05 | 3.20 | 410 | -10.58 | 1.60 | 321 | | | |
| | .00 | 3.20 | 410 | .00 | 3.20 | 410 | .00 | 3.20 | 410 |

| | | | | | | | | | | |
|---|------|------|--------|-----|--------|-----|-----|-----|-----|-----|
| 3 | .00 | MAX. | 18.15 | 95 | 5.04 | 1 | .00 | 410 | .00 | 410 |
| | | MIN. | -1.54 | 410 | -1.40 | 94 | .00 | 410 | .00 | 410 |
| | .40 | MAX. | 16.39 | 121 | 4.26 | 1 | .00 | 410 | .00 | 410 |
| | | MIN. | -2.29 | 120 | -5.15 | 121 | .00 | 410 | .00 | 410 |
| | .80 | MAX. | 14.16 | 148 | 3.78 | 351 | .00 | 410 | .00 | 410 |
| | | MIN. | -4.50 | 147 | -8.20 | 148 | .00 | 410 | .00 | 410 |
| | 1.20 | MAX. | 11.71 | 175 | 3.78 | 362 | .00 | 410 | .00 | 410 |
| | | MIN. | -6.95 | 174 | -10.10 | 174 | .00 | 410 | .00 | 410 |
| | 1.60 | MAX. | 9.31 | 201 | 3.89 | 372 | .00 | 410 | .00 | 410 |
| | | MIN. | -9.35 | 200 | -10.58 | 201 | .00 | 410 | .00 | 410 |
| | 2.00 | MAX. | 6.94 | 228 | 4.10 | 381 | .00 | 410 | .00 | 410 |
| | | MIN. | -11.72 | 227 | -9.47 | 228 | .00 | 410 | .00 | 410 |
| | 2.40 | MAX. | 4.84 | 255 | 4.43 | 392 | .00 | 410 | .00 | 410 |
| | | MIN. | -13.84 | 254 | -7.24 | 254 | .00 | 410 | .00 | 410 |
| | 2.80 | MAX. | 3.11 | 281 | 4.89 | 406 | .00 | 410 | .00 | 410 |
| | | MIN. | -15.58 | 280 | -4.27 | 281 | .00 | 410 | .00 | 410 |
| | 3.20 | MAX. | 1.96 | 1 | 5.50 | 410 | .00 | 410 | .00 | 410 |
| | | MIN. | -17.02 | 307 | -1.23 | 1 | .00 | 410 | .00 | 410 |

| MAX/MIN FORCES FOR MEMBER | | | | 3, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|-----|-------------------------------|------|-----|-----|------|-----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | 18.15 | .00 | 95 | 5.50 | 3.20 | 410 | | | |
| | .00 | .00 | 1 | .00 | .00 | 1 | .00 | .00 | 1 |
| MIN. | -17.02 | 3.20 | 307 | -10.58 | 1.60 | 201 | | | |
| | .00 | 3.20 | 410 | .00 | 3.20 | 410 | .00 | 3.20 | 410 |

| | | | | | | | | | | |
|---|-----|------|-------|-----|-------|-----|-----|-----|-----|-----|
| 4 | .00 | MAX. | 18.40 | 308 | 5.50 | 410 | .00 | 410 | .00 | 410 |
| | | MIN. | -.38 | 1 | -1.23 | 1 | .00 | 410 | .00 | 410 |
| | .40 | MAX. | 17.01 | 335 | 4.08 | 217 | .00 | 410 | .00 | 410 |
| | | MIN. | -1.68 | 334 | -4.71 | 334 | .00 | 410 | .00 | 410 |

| | | | | | | | | | |
|------|------|-------|-----|--------|-----|-----|-----|-----|-----|
| 1.80 | MAX. | 15.32 | 361 | 3.50 | 217 | .00 | 410 | .00 | 410 |
| | MIN. | -3.36 | 360 | -8.24 | 361 | .00 | 410 | .00 | 410 |
| 1.20 | MAX. | 13.29 | 388 | 2.92 | 217 | .00 | 410 | .00 | 410 |
| | MIN. | -5.39 | 387 | -10.84 | 388 | .00 | 410 | .00 | 410 |
| 1.60 | MAX. | 1.46 | 217 | 2.33 | 217 | .00 | 410 | .00 | 410 |
| | MIN. | -7.28 | 410 | -11.64 | 410 | .00 | 410 | .00 | 410 |
| 2.00 | MAX. | 1.46 | 217 | 1.75 | 217 | .00 | 410 | .00 | 410 |
| | MIN. | -7.28 | 410 | -8.73 | 410 | .00 | 410 | .00 | 410 |
| 1.40 | MAX. | 1.46 | 217 | 1.17 | 217 | .00 | 410 | .00 | 410 |
| | MIN. | -7.28 | 410 | -5.82 | 410 | .00 | 410 | .00 | 410 |
| 1.80 | MAX. | 1.46 | 217 | .58 | 217 | .00 | 410 | .00 | 410 |
| | MIN. | -7.28 | 410 | -2.91 | 410 | .00 | 410 | .00 | 410 |
| 3.20 | MAX. | 1.46 | 217 | .00 | 410 | .00 | 410 | .00 | 410 |
| | MIN. | -7.28 | 410 | .00 | 409 | .00 | 410 | .00 | 410 |

| MAX/MIN FORCES FOR MEMBER | | | | 4, AMONGST ALL SECT LOCATIONS | | | | | |
|---------------------------|-----------|------|-----|-------------------------------|------|-----|-----|------|-----|
| | FY/ FZ | DIST | LD | MZ/ MY | DIST | LD | FX | DIST | LD |
| MAX. | 18.40 | .00 | 308 | 5.50 | .00 | 410 | | | |
| | .00 | .00 | 1 | .00 | .00 | 1 | .00 | .00 | 1 |
| MIN. | -7.28 | 3.20 | 410 | -11.64 | 1.60 | 410 | | | |
| | .00 | 3.20 | 410 | .00 | 3.20 | 410 | .00 | 3.20 | 410 |

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

22. FINISH

***** END OF STAAD-III *****

**** DATE= APR 4,2000 TIME= 9:11:42 ****

 For questions on STAAD-III/ISDS, contact: *
 RESEARCH ENGINEERS, Inc at *
 Ph: (714) 974-2500 Fax: (714) 921-2543 *

LN= 1080 MN/ELEM

STRUCTURE DATA

TYPE = PLANE

NJ = 5

NM = 4

NE = 0

NS = 0

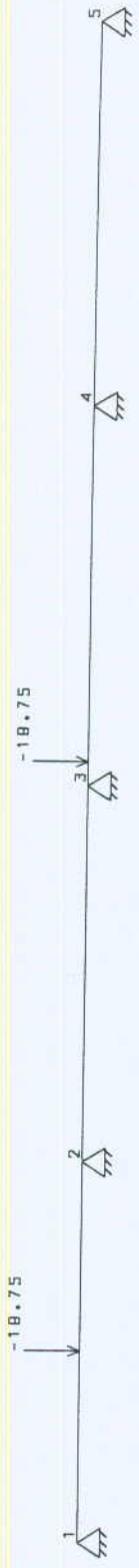
NRJ = 5

NL = 410

XMAX = 12.8

YMAX = .0

ZMAX = .0



J=5, M=4

UNIT MET MIB

STAAD POST - PLDT (REV: 22.3)

DATE: APR 4, 2000

TITLE: HMK 50 H ON DECK SPAN 3.2 M.