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*          STAAD.Pro V8i SELECTseries6          *
*          Version  20.07.11.33                 *
*          Proprietary Program of              *
*          Bentley Systems, Inc.                *
*          Date=    MAR 12, 2023                *
*          Time=    20:58:21                    *
*
*          USER ID:                             *
*****
    
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1. STAAD SPACE
- INPUT FILE: C:\Users\Liliana\Downloads\TRABE TR4.STD
2. START JOB INFORMATION
3. ENGINEER DATE 08-MAR-23
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT METER KG
7. JOINT COORDINATES
8. 1 0 3 0; 2 2.5 3 0; 3 5 3 0
9. MEMBER INCIDENCES
10. 1 1 2; 2 2 3
11. DEFINE MATERIAL START
12. ISOTROPIC CONCRETE
13. E 2.21467E+009
14. POISSON 0.17
15. DENSITY 2402.62
16. ALPHA 1E-005
17. DAMP 0.05
18. TYPE CONCRETE
19. STRENGTH FCU 2.81228E+006
20. END DEFINE MATERIAL
21. MEMBER PROPERTY
22. 1 2 PRIS YD 0.2 ZD 0.15
23. CONSTANTS
24. MATERIAL CONCRETE ALL
25. SUPPORTS
26. 1 TO 3 PINNED
27. LOAD 1 LOADTYPE NONE TITLE CM+CV
28. SELFWEIGHT Y -1 LIST ALL
29. MEMBER LOAD
30. 1 UNI GY -950
31. 2 UNI GY -1800
32. PERFORM ANALYSIS

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

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|                    |   |                    |   |
|--------------------|---|--------------------|---|
| NUMBER OF JOINTS   | 3 | NUMBER OF MEMBERS  | 2 |
| NUMBER OF PLATES   | 0 | NUMBER OF SOLIDS   | 0 |
| NUMBER OF SURFACES | 0 | NUMBER OF SUPPORTS | 3 |

SOLVER USED IS THE IN-CORE ADVANCED MATH SOLVER

TOTAL        PRIMARY LOAD CASES =        1, TOTAL DEGREES OF FREEDOM =        9  
TOTAL LOAD COMBINATION CASES =        0 SO FAR.

\*\*\*WARNING - INSTABILITY AT JOINT        2        DIRECTION = MX  
PROBABLE CAUSE SINGULAR-ADDING WEAK SPRING  
K-MATRIX DIAG= 7.9841086E+03 L-MATRIX DIAG= 8.1707927E-11 EQN NO        4  
\*\*\*NOTE - VERY WEAK SPRING ADDED FOR STABILITY

\*\*\*NOTE\*\* STAAD DETECTS INSTABILITIES AS EXCESSIVE LOSS OF SIGNIFICANT DIGITS  
DURING DECOMPOSITION. WHEN SIGNIFICANT DIGITS LOST IS GREATER THAN 9  
STAAD PRINTS A SINGULARITY NOTICE.

THE ABOVE CONDITIONS COULD ALSO BE CAUSED BY VERY STIFF OR VERY WEAK  
ELEMENTS AS WELL AS TRUE SINGULARITIES.

- 33. START CONCRETE DESIGN
- 34. CODE MEXICAN
- 35. FC 2.00014E+006 ALL
- 36. FYMAIN 4.2003E+007 ALL
- 37. TRACK 2 ALL
- 38. DESIGN BEAM 1 2

**BEAM NO. 1 DESIGN RESULTS - FLEXURE**

PER CODE NTC FOR THE DESIGN AND CONSTRUCTION OF CONCRETE STRUCTURES,DDF

LEN - 2500.00 (mm) FY - 412. FC - 20. SIZE - 150.00 X 200.00 (mm)

| LEVEL | HEIGHT (mm) | BAR INFO | FROM (mm) | TO (mm) | ANCHOR |     |
|-------|-------------|----------|-----------|---------|--------|-----|
|       |             |          |           |         | STA    | END |

|  |     |          |    |       |     |    |
|--|-----|----------|----|-------|-----|----|
| 1  | 42. | 2 - 2.MM | 0. | 1636. | YES | NO |
| -----  |     |          |    |       |     |    |
| CRITICAL POS MOMENT= 3.28 kNm AT 833.33 (mm) LOAD 1          |     |          |    |       |     |    |
| REQD STEEL= 58.18 (mm2) ROW=0.0025 ROWMX=0.0152 ROWMN=0.0018 |     |          |    |       |     |    |
| REQD COMP STEEL= 0.00 (mm2)                                  |     |          |    |       |     |    |
| MAX/MIN/ACTUAL BAR SPACING= 66.22/ 37.90/ 66.22 (mm)         |     |          |    |       |     |    |
| COMP MAX/MIN/ACTUAL BAR SPACING= 0.00/ 0.00/ 0.00 (mm)       |     |          |    |       |     |    |
| BASIC/REQD. DEVELOPMENT LENGTH = 199.09/ 178.32 (mm)         |     |          |    |       |     |    |
| -----  |     |          |    |       |     |    |

Cracked Moment of Inertia Iz at above location =0.13657E+08 mm<sup>4</sup>

|   |      |         |       |       |    |     |
|---|------|---------|-------|-------|----|-----|
| 2   | 156. | 2 - 4MM | 1280. | 2500. | NO | YES |
| -----   |      |         |       |       |    |     |
| CRITICAL NEG MOMENT= 11.04 kNm AT 2500.00 (mm) LOAD 1         |      |         |       |       |    |     |
| REQD STEEL= 224.55 (mm2) ROW=0.0096 ROWMX=0.0152 ROWMN=0.0018 |      |         |       |       |    |     |
| REQD COMP STEEL= 0.00 (mm2)                                   |      |         |       |       |    |     |
| MAX/MIN/ACTUAL BAR SPACING= 61.42/ 42.70/ 61.42 (mm)          |      |         |       |       |    |     |
| COMP MAX/MIN/ACTUAL BAR SPACING= 0.00/ 0.00/ 0.00 (mm)        |      |         |       |       |    |     |
| BASIC/REQD. DEVELOPMENT LENGTH = 320.06/ 286.66 (mm)          |      |         |       |       |    |     |
| -----   |      |         |       |       |    |     |

Cracked Moment of Inertia Iz at above location =0.28193E+08 mm<sup>4</sup>

REQUIRED REINF. STEEL SUMMARY :

| SECTION ( MM ) | REINF STEEL (+VE/-VE) (SQ. MM ) |        | MOMENTS (+VE/-VE) (KNS-MET ) |       | LOAD (+VE/-VE) |   |
|----------------|---------------------------------|--------|------------------------------|-------|----------------|---|
| 0.00           | 0.00/                           | 0.00   | 0./                          | 0.00  | 0/             | 1 |
| 208.33         | 39.28/                          | 0.00   | 1./                          | 0.00  | 1/             | 0 |
| 416.67         | 50.56/                          | 0.00   | 3./                          | 0.00  | 1/             | 0 |
| 625.00         | 61.44/                          | 0.00   | 3./                          | 0.00  | 1/             | 0 |
| 833.33         | 64.92/                          | 0.00   | 3./                          | 0.00  | 1/             | 0 |
| 1041.67        | 59.39/                          | 0.00   | 3./                          | 0.00  | 1/             | 0 |
| 1250.00        | 50.56/                          | 0.00   | 2./                          | 0.00  | 1/             | 0 |
| 1458.33        | 50.56/                          | 0.00   | 1./                          | 0.00  | 1/             | 0 |
| 1666.67        | 0.00/                           | 50.56  | 0./                          | 0.40  | 0/             | 1 |
| 1875.00        | 0.00/                           | 50.56  | 0./                          | 2.41  | 0/             | 1 |
| 2083.33        | 0.00/                           | 98.42  | 0./                          | 4.85  | 0/             | 1 |
| 2291.67        | 0.00/                           | 165.41 | 0./                          | 7.73  | 0/             | 1 |
| 2500.00        | 0.00/                           | 255.01 | 0./                          | 11.04 | 0/             | 1 |

**BEAM NO. 1 DESIGN RESULTS - SHEAR**

AT START SUPPORT - Vu= 0.01 KN Vc= 0.00 KN Vs= 0.00 KN  
 Tu= 0.00 Kn Me Tc= 0.00 Kn Me Ts= 0.00 Kn Me LOAD 1  
 STIRRUPS ARE NOT REQUIRED.  
 AT END SUPPORT - Vu= 0.03 KN Vc= 0.00 KN Vs= 0.00 KN  
 Tu= 0.00 Kn Me Tc= 0.00 Kn Me Ts= 0.00 Kn Me LOAD 1  
 STIRRUPS ARE NOT REQUIRED.

**BEAM NO. 2 DESIGN RESULTS - FLEXURE**

PER CODE NTC FOR THE DESIGN AND CONSTRUCTION OF CONCRETE STRUCTURES,DDF

LEN - 2500.00 (mm) FY - 412. FC - 20. SIZE - 150.00 X 200.00 (mm)

| LEVEL | HEIGHT (mm) | BAR INFO | FROM (mm) | TO (mm) | ANCHOR STA | ANCHOR END |
|-------|-------------|----------|-----------|---------|------------|------------|
| 1     | 43.         | 2 - 3MM  | 235.      | 2500.   | NO         | YES        |
| 1     | 43.         | 1 - 2.MM | 235.      | 2500.   |            |            |

-----|  
 | CRITICAL POS MOMENT= 9.35 kNm AT 1458.33 (mm) LOAD 1|  
 | REQD STEEL= 181.89 (mm2) ROW=0.0077 ROWMX=0.0152 ROWMN=0.0018 |  
 | REQD COMP STEEL= 0.00 (mm2) |  
 | MAX/MIN/ACTUAL BAR SPACING= 64.63/ 39.50/ 32.31 (mm) |  
 | COMP MAX/MIN/ACTUAL BAR SPACING= 0.00/ 0.00/ 0.00 (mm) |  
 | BASIC/REQD. DEVELOPMENT LENGTH = 239.42/ 285.70 (mm) |  
 |-----|

Cracked Moment of Inertia Iz at above location =0.22934E+08 mm^4

|   |      |         |    |      |     |    |
|---|------|---------|----|------|-----|----|
| 2 | 156. | 2 - 4MM | 0. | 700. | YES | NO |
|---|------|---------|----|------|-----|----|

-----|  
 | CRITICAL NEG MOMENT= 11.04 kNm AT 0.00 (mm) LOAD 1|  
 | REQD STEEL= 224.55 (mm2) ROW=0.0096 ROWMX=0.0152 ROWMN=0.0018 |  
 | REQD COMP STEEL= 0.00 (mm2) |  
 | MAX/MIN/ACTUAL BAR SPACING= 61.42/ 42.70/ 61.42 (mm) |  
 | COMP MAX/MIN/ACTUAL BAR SPACING= 0.00/ 0.00/ 0.00 (mm) |  
 | BASIC/REQD. DEVELOPMENT LENGTH = 320.06/ 286.66 (mm) |  
 |-----|

Cracked Moment of Inertia Iz at above location =0.28193E+08 mm^4

REQUIRED REINF. STEEL SUMMARY :

| SECTION<br>( MM ) | REINF STEEL (+VE/-VE)<br>(SQ. MM ) | MOMENTS (+VE/-VE)<br>(KNS-MET ) | LOAD (+VE/-VE) |
|-------------------|------------------------------------|---------------------------------|----------------|
| 0.00              | 0.00/ 255.01                       | 0./ 11.04                       | 0/ 1           |
| 208.33            | 0.00/ 118.25                       | 0./ 5.74                        | 0/ 1           |
| 416.67            | 0.00/ 50.56                        | 0./ 1.23                        | 0/ 1           |
| 625.00            | 50.56/ 0.00                        | 2./ 0.00                        | 1/ 0           |
| 833.33            | 110.46/ 0.00                       | 5./ 0.00                        | 1/ 0           |
| 1041.67           | 159.99/ 0.00                       | 8./ 0.00                        | 1/ 0           |
| 1250.00           | 193.34/ 0.00                       | 9./ 0.00                        | 1/ 0           |
| 1458.33           | 207.16/ 0.00                       | 9./ 0.00                        | 1/ 0           |
| 1666.67           | 199.81/ 0.00                       | 9./ 0.00                        | 1/ 0           |
| 1875.00           | 172.19/ 0.00                       | 8./ 0.00                        | 1/ 0           |
| 2083.33           | 127.25/ 0.00                       | 6./ 0.00                        | 1/ 0           |
| 2291.67           | 68.71/ 0.00                        | 3./ 0.00                        | 1/ 0           |
| 2500.00           | 0.00/ 0.00                         | 0./ 0.00                        | 0/ 1           |

**B E A M N O. 2 D E S I G N R E S U L T S - S H E A R**

AT START SUPPORT - Vu= 0.05 KN Vc= 0.00 KN Vs= 0.00 KN  
 Tu= 0.00 Kn Me Tc= 0.00 Kn Me Ts= 0.00 Kn Me LOAD 1  
 STIRRUPS ARE NOT REQUIRED.

AT END SUPPORT - Vu= 0.03 KN Vc= 0.00 KN Vs= 0.00 KN  
 Tu= 0.00 Kn Me Tc= 0.00 Kn Me Ts= 0.00 Kn Me LOAD 1  
 STIRRUPS ARE NOT REQUIRED.

39. END CONCRETE DESIGN  
 40. FINISH

\*\*\*\*\* END OF THE STAAD.Pro RUN \*\*\*\*\*

\*\*\*\* DATE= MAR 12,2023 TIME= 20:58:21 \*\*\*\*

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*   For technical assistance on STAAD.Pro, please visit   *  
*   http://selectservices.bentley.com/en-US/                 *  
*                                                         *  
*   Details about additional assistance from               *  
*   Bentley and Partners can be found at program menu    *  
*   Help->Technical Support                               *  
*                                                         *  
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