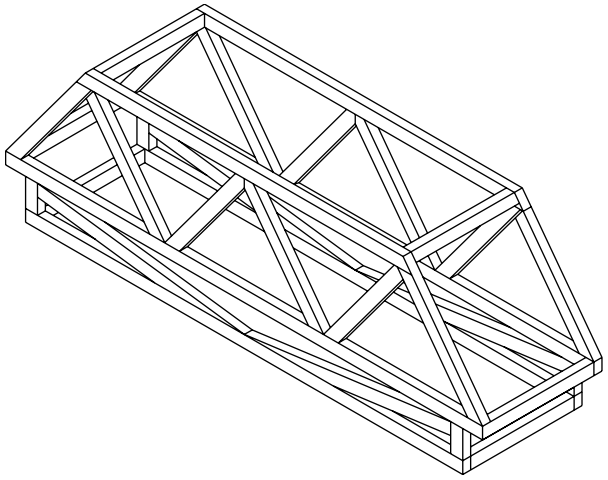
Chapter 25

BRIDGE

A. OPEN B FILE.

Step 1. When you start a new drawing away start with the B file. If you started this drawing as the B file go directly to Steps B. If your did not start as the B file complete these Steps: Click **Open** from the File Menu. Click **F1 No** to save current part. Key in **a:b** for the filename and press ENTER.



B. TURN OFF GRID AND SNAP.

Step 1. Turn off the Grid and Snap. Use **CTRL-G**. Hold down CTRL and press G.

Step 2. Click **Off** in Grid Properties Display.

Step 3. Click to **uncheck Active** in Snap Properties.

Step 4. Click OK.

D. CHANGE TO SIDE VIEW.

Step 1. Change to the Side View. Use **ALT-V 2**. Hold down ALT and press V. Key in 2 and press ENTER.

E. CREATE A RECTANGLE.

Step 1. ESC to the Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE.

Step 4. F7 RECTANGLE.

Step 5. F2 WIDTH/HEIGHT.

Step 6. Key in **12** for width.

Step 7. Key in **4** for height.

Step 8. F9 KEY IN.

Step 9. Key in:
Zero (0) for coordinate X and press ENTER.
0 for Y and press ENTER.
0 for Z and press ENTER.

Step 10. Use **ALT-A** to center the drawing on the screen. Hold down ALT and press A.

F. DRAW PARALLEL LINES INSIDE THE RECTANGLE.

Step 1. ESC to Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE.

Step 4. F3 PARALLEL.

Step 5. F2 AT A DISTANCE.

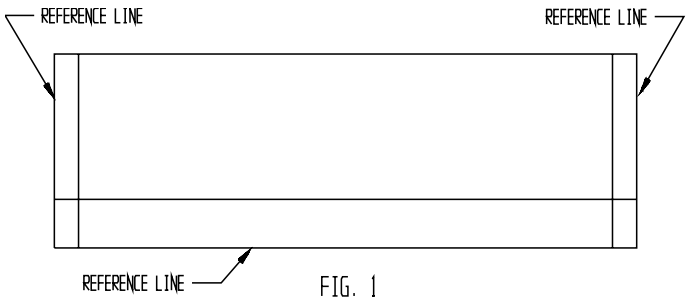


FIG. 1

Step 6. Key in **1** for distance and press ENTER.

Step 7. The bottom line of the rectangle will be the reference, **Fig. 1**. Select it with a click. Move the cursor slightly inside the rectangle and click.

Step 8. F10 BACKUP to key in new distance.

Step 9. Key in **.5** for distance and press ENTER.

Step 10. Click the left side of the rectangle, **Fig. 1**, as the reference line and click slightly inside the rectangle. Repeat at right side of the rectangle.

Step 11. At this time it is a good idea to save the drawing. Click **Save As** from the File Menu. Key **a:bridge2d** filename and press ENTER. Press ESC for Part Description.

G. EDIT USING TRIM FIRST.

Step 1. ESC to Main Menu.

Step 2. F2 EDIT.

Step 3. F1 TRIM/EXTEND.

Step 4. F1 FIRST.

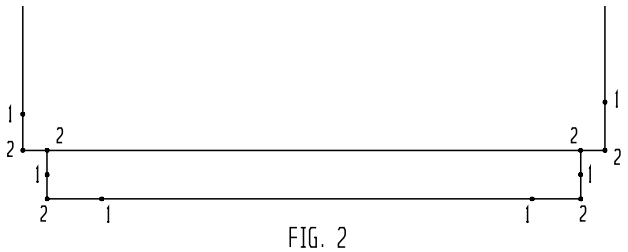


FIG. 2

Step 5. To trim part of a line, click the line you are to keep, Line 1, **Fig. 2**. Move cursor close to the intersection with Line 2 and click. Repeat at all 1, 2 Lines.

H. DRAW PARALLEL LINES.

Step 1. ESC to Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE.

Step 4. F3 PARALLEL.

Step 5. F2 AT A DISTANCE.

Step 6. Key in **.3** for distance and press ENTER.

Step 7. The top line of the rectangle will be the reference, Line 1, **Fig. 3**. Select it with a click. Click slightly inside. Click the middle line, Line 2 as the reference line. Click slightly above. Click the bottom line as the reference line, Line 3. Click slightly above. Click Line 4, as the reference line. Click slightly inside the rectangle. Repeat, for the second Line 4.

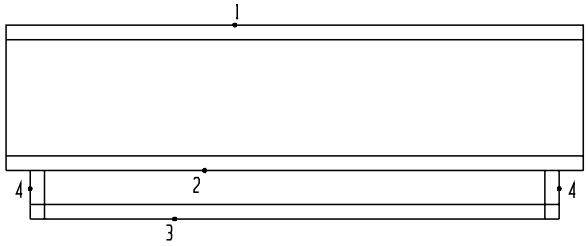


FIG. 3

Step 8. Use **CTRL-R** to clear highlighted entities. Hold down CTRL and press R.

I. DRAW DIAGONAL USING ALONG LINE AND ENDENT.

Step 1. ESC to Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE.

Step 4. F1 ENDPOINTS.

Step 5. F6 ALONG LINE.

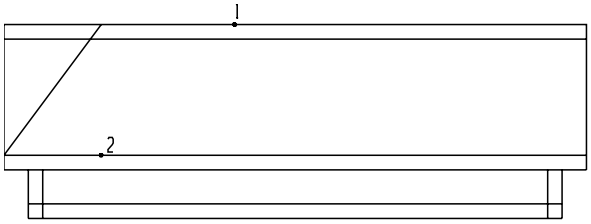


FIG. 4

Step 6. To indicate Start Point move cursor to the top chord of bridge, Line 1, **Fig. 4** and click.

Step 7. Key in **2** for distance and press ENTER.

Step 8. F3 ENDENT.

Step 9. To indicate End Point click the left end of Line 2, **Fig. 4**.

J. SECOND DIAGONAL.

Step 1. F3 ENDENT.

Step 2. To indicate Start Point, click top end of Line 3, **Fig. 5.**

Step 3. F6 ALONG LINE.

Step 4. To indicate End Point, click left end of Line 2, **Fig. 5**.

Step 5. Key in **4** for distance and press ENTER.

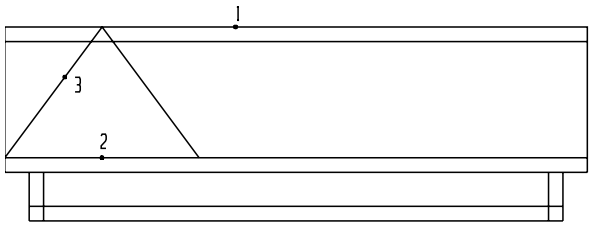


FIG. 5

K. THIRD DIAGONAL.

Step 1. F4 CENTER.

Step 2. To indicate Start Point, click top chord, Line 1, **Fig. 6**.

Step 3. F3 ENDENT.

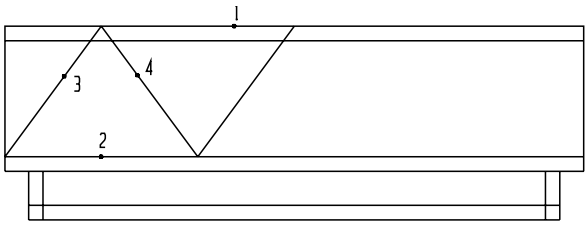


FIG. 6

Step 4. To indicate End Point, click Line 4 toward the bottom, **Fig. 6**.

Step 5. Save the drawing. Use **CTRL-S**.

L. DRAW PARALLEL LINES.

Step 1. ESC to Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE.

Step 4. F3 PARALLEL.

Step 5. F2 AT A DISTANCE.

Step 6. Key in **.3** for distance and press ENTER.

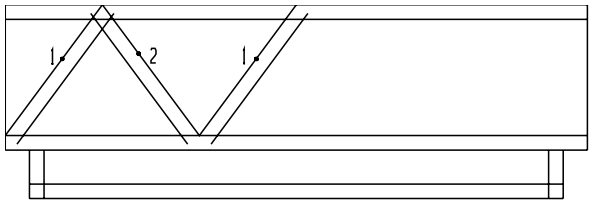


FIG. 7

Step 7. Click Line 1, **Fig. 7** as reference line. Click slightly to the right. Repeat at second Line 1.

Step 8. Click Line 2, **Fig. 7** as the reference line. Click slightly to the left.

M. EDIT DIAGONALS USING TRIM FIRST.

Step 1. ESC to Main Menu.

Step 2. F2 EDIT.

Step 3. F1 TRIM/EXTEND.

Step 4. F1 FIRST.

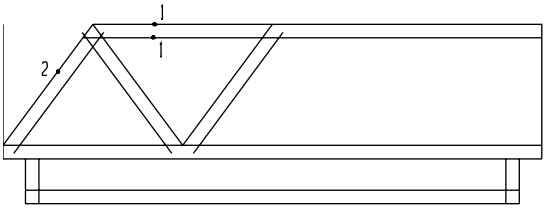


FIG. 8

Step 5. To trim part of a line, click the line you are to trim, Line 1, **Fig. 8**. Move cursor close to the intersection with Line 2 and click. Repeat at the other 1,2 Line.

Step 6. Trim Line 3 at Line 4, **Fig. 9**.

Step 7. Trim Line 5 at Line 1, **Fig. 9**.

Step 8. Trim Line 4 at Line 1, **Fig. 9**.

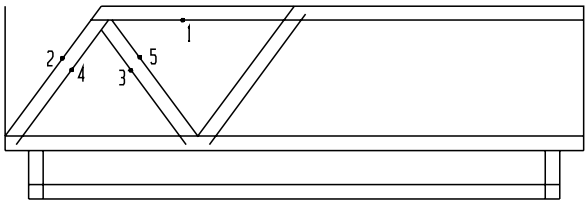


FIG. 9

Step 9. Trim all Line 1's at Line 2's, **Fig. 10**.

Step 10. Use CTRL-R to clear temporary markers. Hold down CTRL and press R.

Step 11. Save the drawing. Use **CTRL-S**.

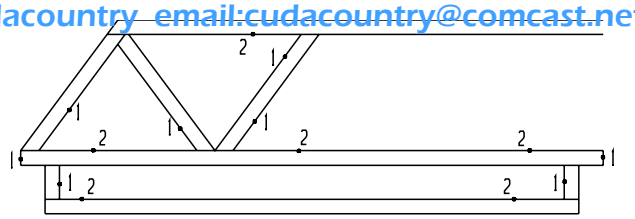


FIG. 10

N. DRAW ONE VERTICAL LINE DOWN CENTER.

Step 1. ESC to Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE.

Step 4. F5 HORIZONTAL/VERTICAL.

Step 5. F2 VERTICAL.

Step 6. F4 CENTER.

Step 7. Click Line 1, **Fig. 11**.

Step 8. Save the drawing. Use **CTRL-S**.

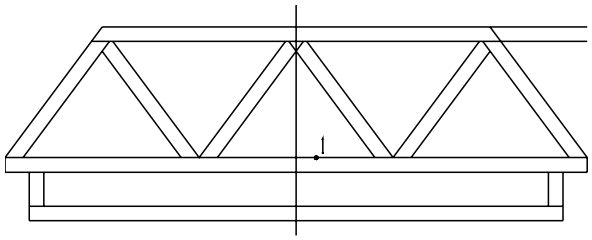


FIG. 11

O. MIRROR DIAGONALS.

Step 1. ESC to Main Menu.

Step 2. F4 X-FORM.

Step 3. F5 MIRROR.

Step 4. F2 COPY.

Step 5. F1 SINGLE.

Step 6. Select the diagonals, Lines 3 thru 8, **Fig. 12**, with a click and press ENTER.

Step 7. F3 2 POINTS.

Step 8. F4 CENTER.

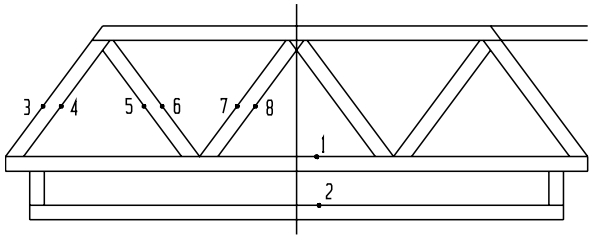


FIG. 12

Step 9. To indicate 1st position on plane, click Line 1, **Fig. 12**.

Step 10. To indicate 2nd position on plane, click Line 2.

P. EDIT DIAGONALS USING FIRST AND DOUBLE.

Step 1. ESC to Main Menu.

Step 2. F2 EDIT.

Step 3. F1 TRIM/EXTEND.

Step 4. F1 FIRST.

Step 5. Trim Line 1's at Line 2, **Fig. 13**.

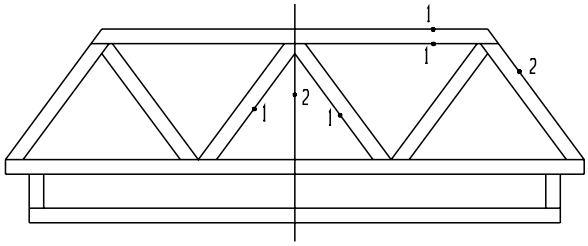


FIG. 13

Step 6. F10 BACKUP to select a different method.

Step 7. F3 DOUBLE.

Step 8. Click Line 2, **Fig 14** as entity to trim and click Lines 1 and 3 and trimming entities.

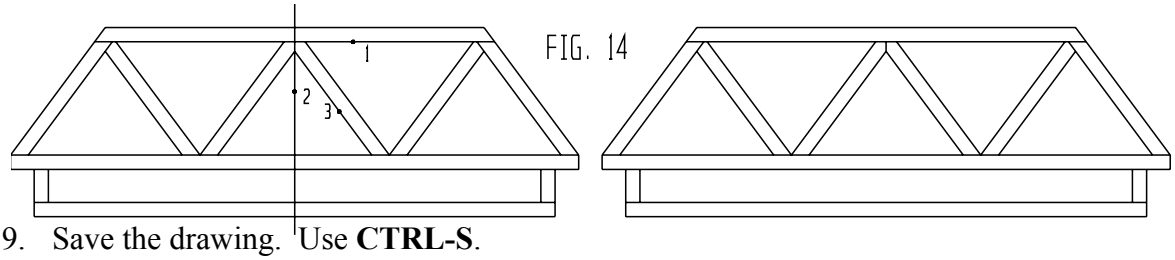


FIG. 14

Step 9. Save the drawing. Use **CTRL-S**.

Q. SUBSTRUCTURE.

Step 1. ESC to Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE

Step 4. F1 ENDPOINTS.

Step 5. F3 ENDENT.

Step 6. To indicate Start Point click Line 1 toward the top, **Fig. 15.**

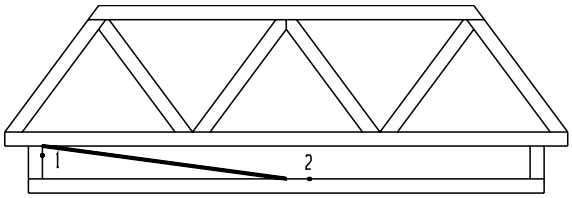


FIG. 15

Step 7. F4 CENTER.

Step 8. To indicate End Point click Line 2, **Fig. 15**.

R. DRAW PARALLEL LINE.

Step 1. ESC to Main Menu.

Step 2. F1 CREATE.

Step 3. F1 LINE.

Step 4. F3 PARALLEL.

Step 5. F2 AT A DISTANCE.

Step 6. Key in **.3** for distance and press ENTER.

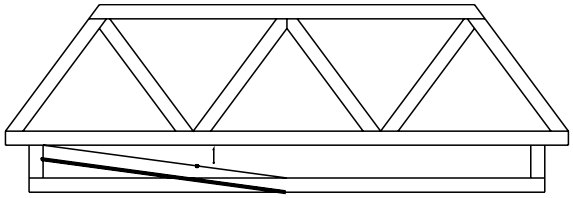


FIG. 16

Step 7. Click Line 1, **Fig. 16**. Move the cursor slightly below the line and click.

S. EDIT USING TRIM FIRST.

Step 1. ESC to Main Menu.

Step 2. F2 EDIT.

Step 3. F1 TRIM/EXTEND.

Step 4. F1 FIRST.

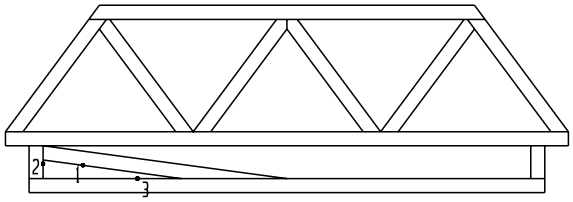


FIG. 17

Step 5. To trim part of a line, click the line you are to keep, Line 1, **Fig. 17**. Move cursor close to the intersection with Line 2 and click. Repeat at the Line 3. That is, click the line you are to keep, Line 1. Move cursor close to the intersection with Line 2 and click.

T. MIRROR SUBSTRUCTURE.

Step 1. ESC to Main Menu.

Step 2. F4 X-FORM.

Step 3. F5 MIRROR.

Step 4. F2 COPY.

Step 5. F1 SINGLE.

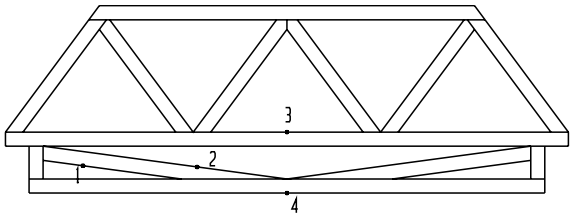


FIG. 18

Step 6. Select Lines 1 and 2, **Fig. 18**, with a click and press ENTER.

Step 7. F3 2 POINTS.

Step 8. F4 CENTER.

Step 9. To indicate 1st position on plane, click Line 3, **Fig. 18**.

Step 10. To indicate 2nd position on plane, click Line 4.

Step 11. Use CTRL-R to clear temporary markers. Hold down CTRL and press R.

Step 12. Save the drawing. Use **CTRL-S**.

J. ADD 3rd DIMENSION TO BRIDGE.

Step 1. ESC to Main Menu.

Step 2. Change to the Isometric View. Use **ALT-V 7**. Hold ALT and press V. Key in 7 and press ENTER.

Step 3. Use **ALT-A** to center the drawing on the screen. Hold down ALT and press A.

Step 4. Draw the extruded lines in a different color. Change the color to **purple**. Click the color swatch in the side Tool Bar. Click the purple, number 6.

Step 5. F4 X-FORM.

Step 6. F1 DELTA.

Step 7. F3 JOIN.

Step 8. F7 ALL DISPLAYED.

Step 9. F1 ALL.

Step 10. Press ENTER for the Number of Copies.

Step 11. Key in:
0 for dX and press ENTER
.2 for dY and press ENTER
0 for dZ and press ENTER.

Step 12. F10 BACKUP **three** times.

Step 13. F2 COPY.

Step 14. F7 ALL DISPLAYED.

Step 15. F1 ALL.

Step 16. Press ENTER for the Number of Copies.

Step 17. Key in:
0 for dX and press ENTER
2.8 for dY and press ENTER
0 for dZ and press ENTER.

Step 18. Use **ALT-A** to center the drawing on the screen. Hold down ALT and press A.

Step 19. Save this 3D drawing as **bridge3d**. Click **Save As** from the File Menu. Key in **a:bridge3d** for the filename and press ENTER. Press ESC for Part Description.

K. DRAW LATERAL STRUTS USING LINE ENDENT.

Step 1. Draw the lateral struts in a different color. Change the color to **green**. Click the color swatch in the side Tool Bar. Click the green, number 1.

Step 2. ESC to Main Menu.

Step 3. F1 CREATE.

Step 4. F1 LINE

Step 5. F1 ENDPOINTS.

Step 6. F3 ENDENT.

Step 7. Draw **Lines 1 thru 3** across trusses for the lateral struts in **green** color, **Fig.19**. Use ALT-W to zoom in.

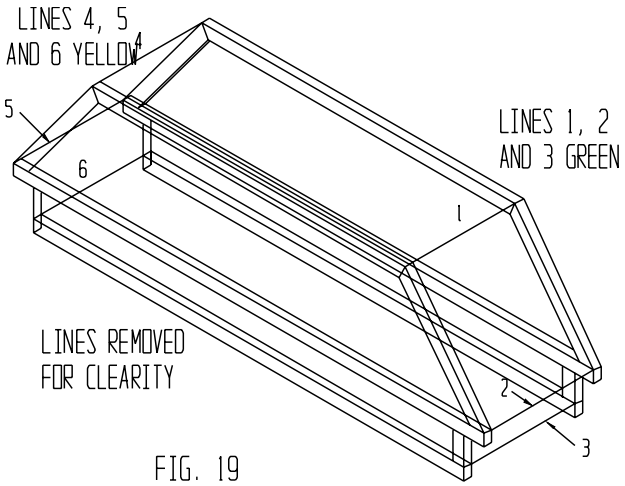


FIG. 19

Step 8. Use **ALT-A** to center the drawing on the screen. Hold down ALT and press A.

Step 9. Draw the lateral struts, Lines 4 thru 6 in yellow color. Change the color to **yellow**. Click the color swatch in the side Tool Bar. Click the yellow, number 4.

Step 10. Draw **Lines 4 thru 6** across trusses for the lateral struts in **yellow** color, **Fig. 19**. Use ALT-W to zoom in.

Step 11. Save the drawing. Use **CTRL-S**.

L. ADD 3rd DIMENSION TO LATERAL STRUTS.

Step 1. ESC to Main Menu.

Step 2. Use **ALT-A** to center the drawing on the screen. Hold down ALT and press A.

Step 3. F4 X-FORM.

Step 4. F1 DELTA.

Step 5. F2 COPY.

Step 6. F7 ALL DISPLAY.

Step 7. F2 BY TYPE.

Step 8. Click the **green** and click OK.

Step 9. Press ENTER for the Number of Copies.

Step 10. Key in: **RIGHT END**
-.2 for dX and press ENTER.
0 for dY and press ENTER.
0 for dZ and press ENTER.

Step 12. F10 BACKUP **two** times.

Step 13. F7 ALL DISPLAY.

Step 14. F2 BY TYPE.

Step 15. Click the **yellow** and click OK.

Step 16. Press ENTER for the Number of Copies.

Step 17. Key in: **LEFT END**
.2 for dX and press ENTER.
0 for dY and press ENTER.
0 for dZ and press ENTER.

Step 18. F10 BACKUP **two** times.

Step 19. F7 ALL DISPLAY.

Step 20. F2 BY TYPE.

Step 21. Click the **green** and **yellow** and click OK.

Step 22. Press ENTER for the Number of Copies.

Step 23. Key in: **ALL STRUTS**
0 for dX and press ENTER.
0 for dY and press ENTER.
-.3 for dZ and press ENTER.

Step 24. Save the drawing. Use **CTRL-S**.

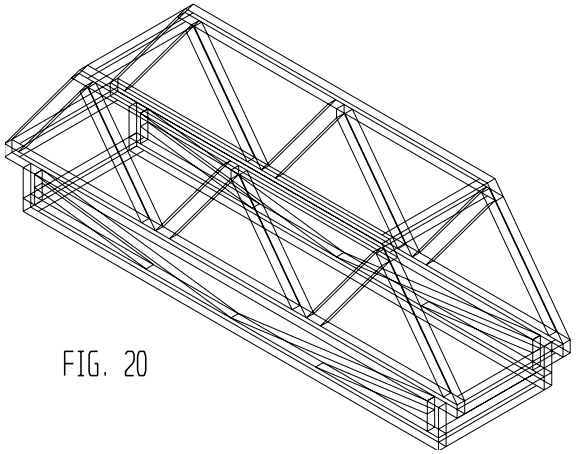


FIG. 20

M. CREATE LAYOUT VIEW.

Step 1. Bridge construction is now complete. The final step is to create a layout drawing of the Bridge in three different views, plus the Isometric View.

Step 2. ESC to Main Menu.

Step 3. Click the **down arrow** on the top Tool Bar until the **Layout Button** is displayed.

Step 4. Click the **Layout Button**.

Step 5. Key in: **bridge** for the Name.

Step 6. Set the **Paper Size** to **B**.

Step 7. Set the **Drawing Scale** to **KEY-IN** (Key-In is at bottom of list).

Step 8. Set **Actual Scale** to **.8**

Step 9. Click OK.

Step 10. F5 INSTANCE.

Step 11. F1 CREATE.

Step 12. Select **Top View** and click OK.

Step 13. Key in **0** for Rotation Angle and Press ENTER.

Step 14. F9 KEYIN.

Step 15. Key in: For **TOP VIEW**,
5.2 for X and press ENTER.
6.4 for Y and press ENTER.
0 for Z and press ENTER.

Step 16. F1 CREATE.

Step 17. Select **Front View** and click OK.

Step 18. Key in **0** for Rotation Angle and Press ENTER.

Step 19. F9 KEYIN.

Step 20. Key in: For **FRONT VIEW**,
5.2 for X and press ENTER.
3.2 for Y and press ENTER.
0 for Z and press ENTER.

Step 21. F1 CREATE.

Step 22. Select **Left View** and click OK.

Step 23. Key in **0** for Rotation Angle and Press ENTER.

Step 24. F9 KEYIN.

Step 25. Key in: For **LEFT VIEW**,
13.2 for X and press ENTER.
3.2 for Y and press ENTER.
0 for Z and press ENTER.

Step 26. F1 CREATE.

Step 27. Select **Isometric View** and click OK.

Step 28. Key in **0** for Rotation Angle and Press ENTER.

Step 29. F9 KEYIN.

Step 30. Key in: For **ISOMETRIC VIEW**,
12.4 for X and press ENTER.
8.4 for Y and press ENTER.
0 for Z and press ENTER.

Step 31. Save the drawing. Use **CTRL-S**.

N. REFINE THE VIEWS.

Step 1. Window, ALT-W in and delete the lines that can not be seen in the Isometric View. Use CTRL-Q to delete.

Use ALT-B to switch back to a previous view, instead of **ALT-A**.

Step 2. Trim lines, Use ESC, EDIT, TRIM and both First and Divide. Be careful!!