# 5 *Sizer: Concept Mode* Tutorial 5 – Two Story House (US)

## 5.1 Software Version and Standard

This tutorial was completed using WoodWorks® US 2019, and NDS 2018.

## 5.2 Introduction

This tutorial goes through the creation and design of a commercial two-story wood-frame structure with a pitched roof.

Click here to download a copy of the Sizer file (.wwa) created from going through this tutorial.

## 5.3 Settings

1. Click on the ***New Concept Mode File*** button on the toolbar.
2. Click on the ***Settings*** tab located in the menu bar.
3. Click on the ***Company Information*** tab in the ***Settings*** window.

Note: Navigate through the ***Company Information Tab*** and enter relevant company information.

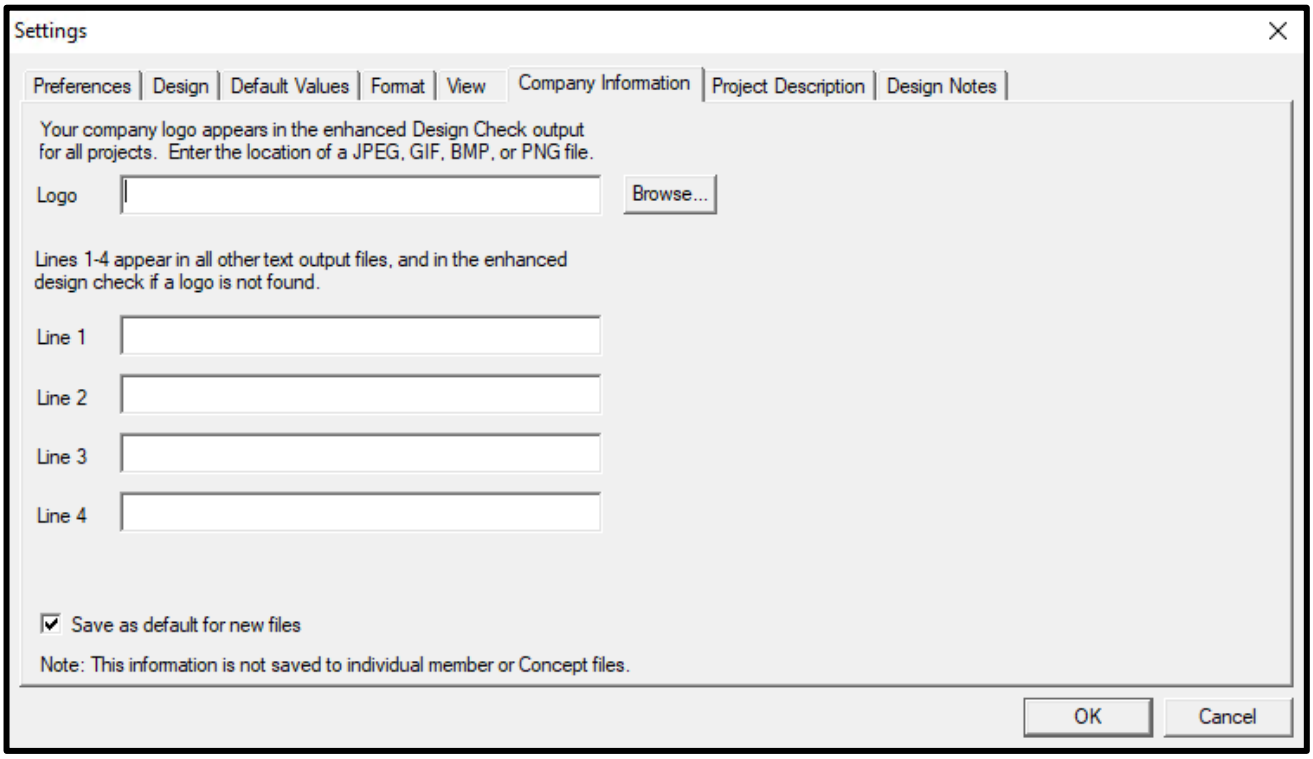



Figure 1: *Sizer: Concept Mode – Tutorial 5 – Company Information*

4. Click on the ***Project Description*** tab in the ***Settings*** window.

<u>Note:</u> Navigate through the ***Project Description Tab*** and enter relevant project information.

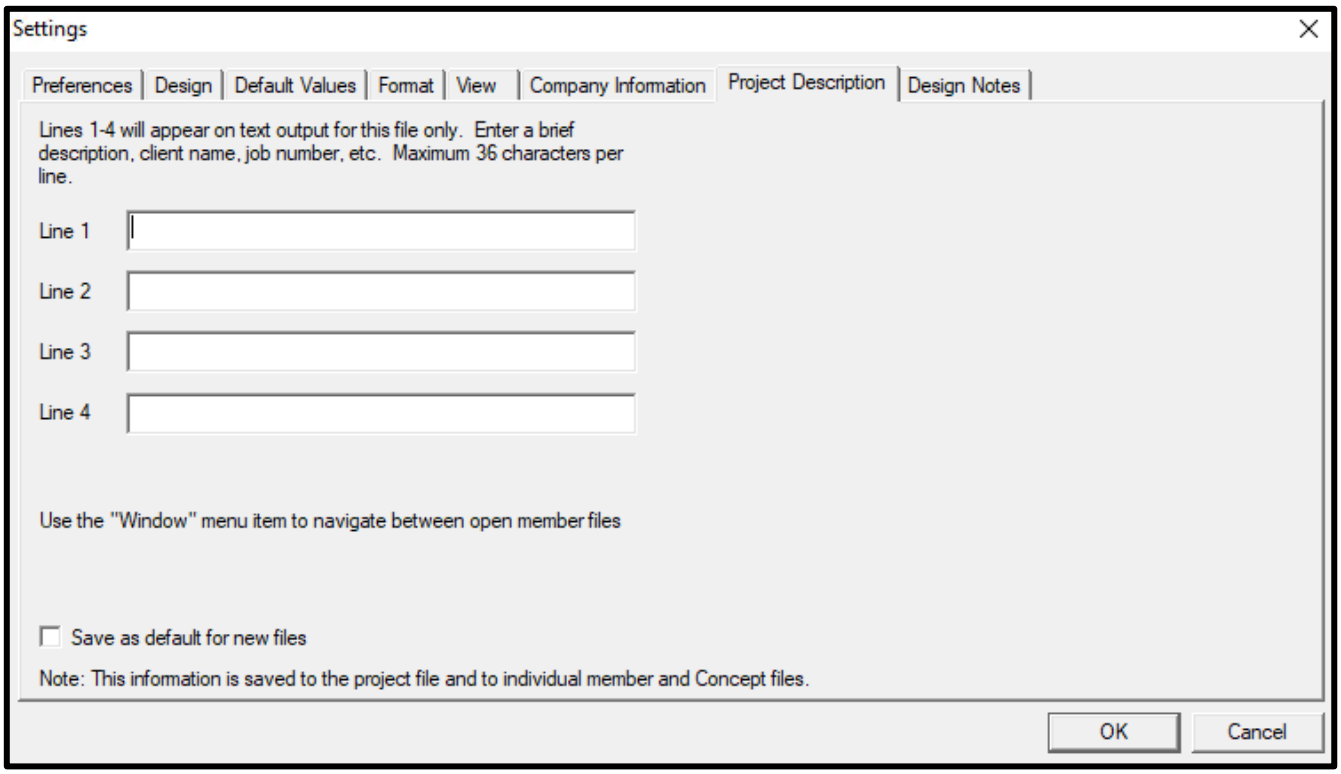



Figure 2: *Sizer: Concept Mode – Tutorial 5 – Project Description*

5. Click on the ***View*** tab in the ***Settings*** window.
6. Under the ***Viewing area*** section, specify ***75 (ft)*** as ***North-South***.
7. Under the ***Viewing area*** section, specify ***100 (ft)*** as ***East-West***.
8. Under the ***Snap increment*** section, specify ***180 (in)*** as ***North-South***.
9. Under the ***Snap increment*** section, specify ***180 (in)*** as ***East-West***.
10. Select the ***Group name*** check box.
11. Click ***OK***.

Note: To save these settings as default settings, select the ***Save as default for new files*** check box before clicking ***OK***.

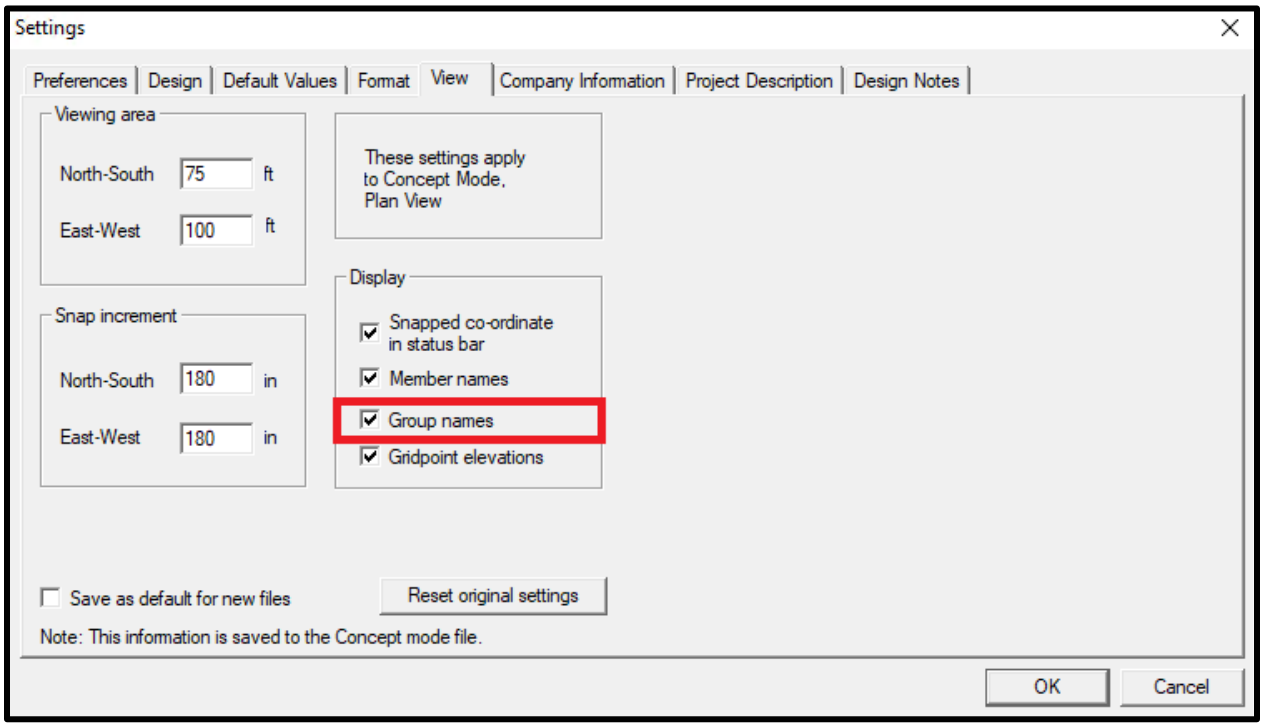



Figure 3: *Sizer: Concept Mode – Tutorial 5 – View Settings*

## 5.4 Roof and Floor Levels

1. Click on the ***Levels*** button on the toolbar.
2. Enter a ***Roof*** elevation of ***20 (ft)***.
3. Click ***Modify***.
4. Enter a ***Floor 1*** elevation of ***10 (ft)***.
5. Click ***Add***.
6. Click ***OK***.

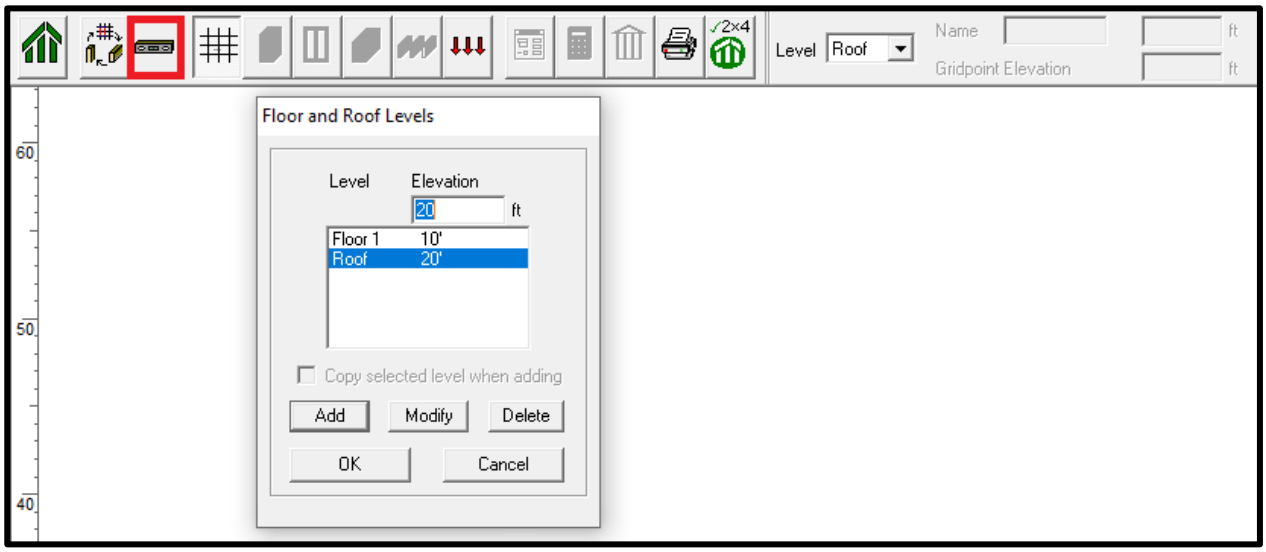



Figure 4: *Sizer: Concept Mode – Tutorial 5 – Floor and Roof Levels*

## 5.5 Generate Gridlines

1. Click on the ***Edit*** tab located in the menu bar.
2. Click on ***Generate Grid***.

Figure 5: *Sizer: Concept Mode – Tutorial 5 – Generate Gridlines*

## 5.6 Floor Level

### 5.6.1 Columns

1. Click on the ***Column View*** button on the toolbar.
2. Click on the ***Material Design Groups*** button on the toolbar.
3. Enter ***Centre*** in the ***Name*** field.
4. Click ***Add***.
5. Click ***Yes*** in the warning window.
6. Click ***OK***.

Figure 6: *Sizer: Concept Mode – Tutorial 5 – Material Design Groups (Columns)*

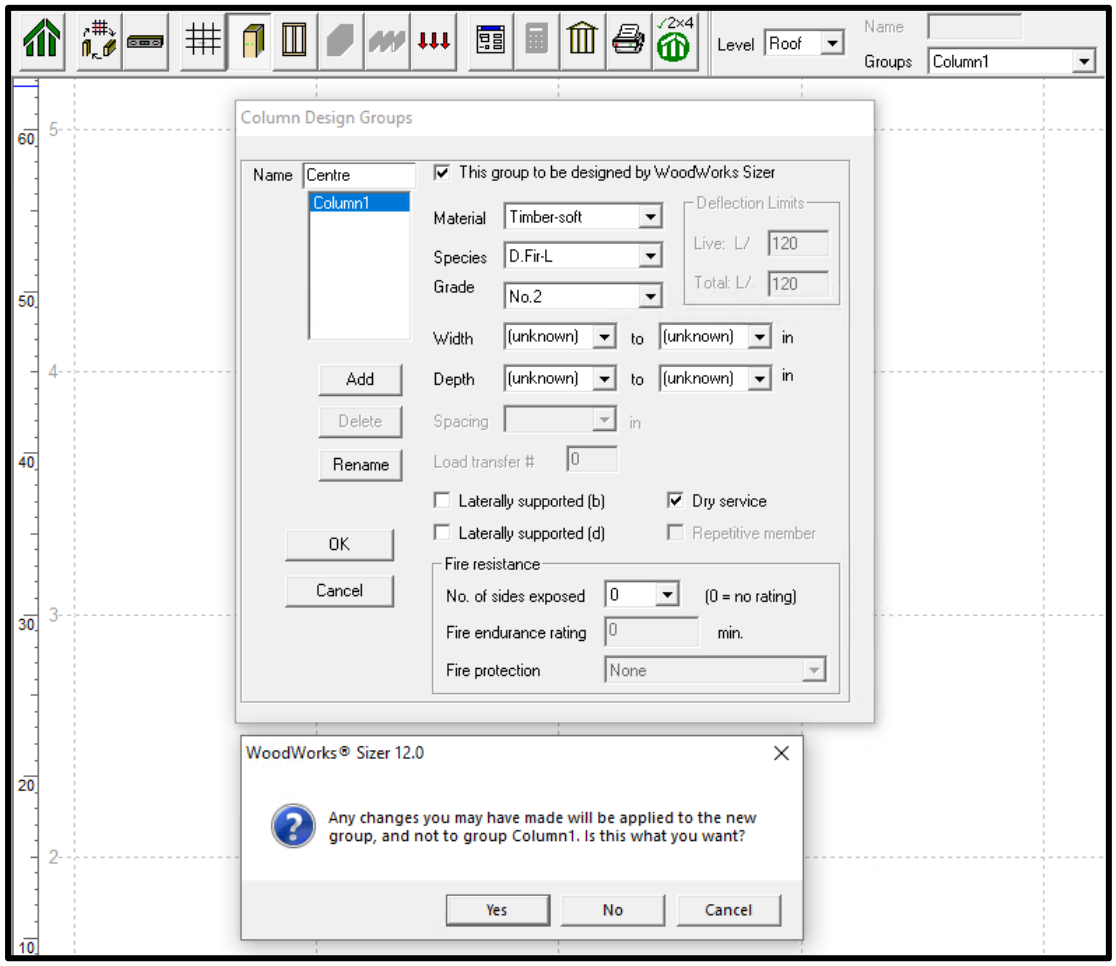



Figure 7: *Sizer: Concept Mode – Tutorial 5 – Column Design Groups*

7. Select ***Floor 1*** from the ***Level*** drop-down list located on the toolbar.
8. Select ***Centre*** from the ***Groups*** drop-down list located on the toolbar.
9. Add columns at the following locations: ***A-3***, ***B-3***, ***C-3***, ***D-3***, ***E-3***, and ***F-3***.
10. Select ***Column1*** from the ***Groups*** drop-down list located on the toolbar.
11. Repeat step 9 for the following locations: ***A-1***, ***B-1***, ***C-1***, ***D-1***, ***E-1***, ***F-1***, ***A-2***, ***B-2***, ***C-2***, ***D-2***, ***E-2***, ***F-2***, ***A-4***, ***B-4***, ***C-4***, ***D-4***, ***E-4***, ***F-4***, ***A-5***, ***B-5***, ***C-5***, ***D-5***, ***E-5***, and ***F-5.***

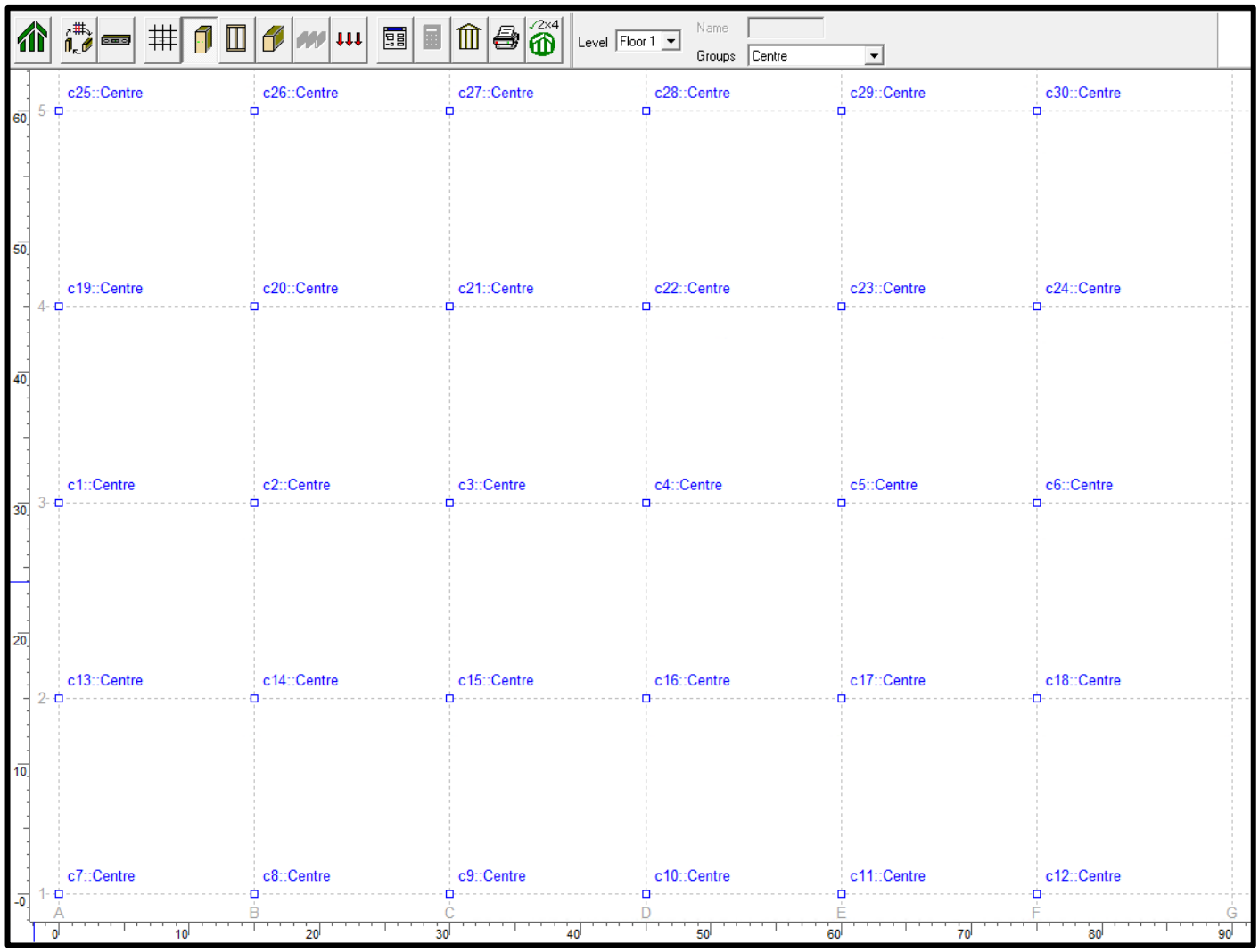



Figure 8: *Sizer: Concept Mode – Tutorial 5 – Column Locations (Floor 1)*

### 5.6.2 Walls

1. Click on the ***Wall View*** button on the toolbar.
2. Click on the ***Material Design Groups*** button on the toolbar.
3. Enter ***Wall2*** in the ***Name*** field.
4. Click ***Add***.
5. Click ***Yes*** in the warning window.
6. Click ***OK***.

Figure 9: *Sizer: Concept Mode – Tutorial 5 – Material Design Groups (Walls)*

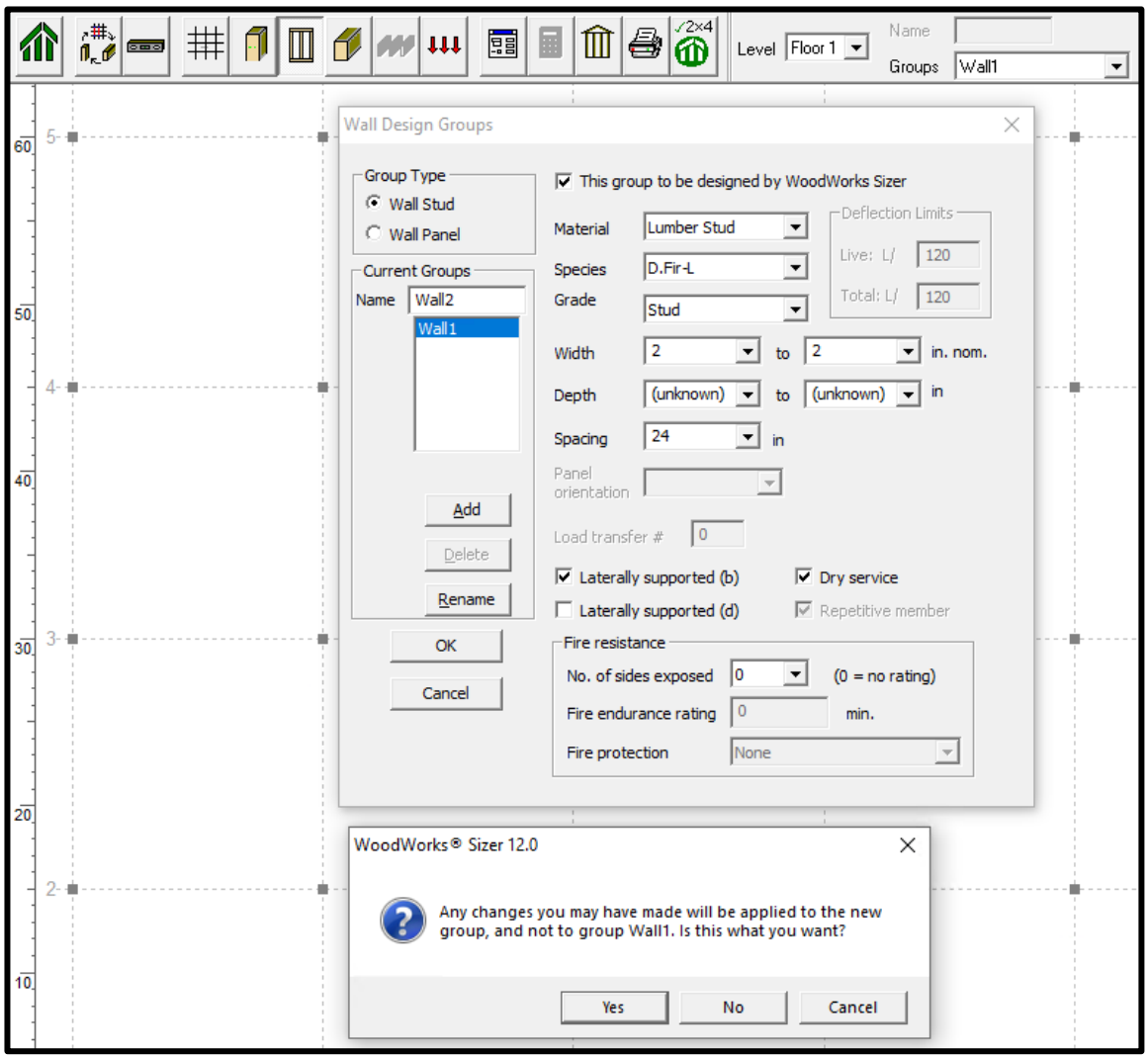



Figure 10: *Sizer: Concept Mode – Tutorial 5 – Wall Design Groups*

7. Select ***Floor 1*** from the ***Level*** drop-down list located on the toolbar.
8. Select ***Wall1*** from the ***Groups*** drop-down list located on the toolbar.
9. Click on ***F-1*** and drag the wall to ***F-3***.
10. Select ***Wall2*** from the ***Groups*** drop-down list located on the toolbar.
11. Click on ***F-3*** and drag the wall to ***F-5***.

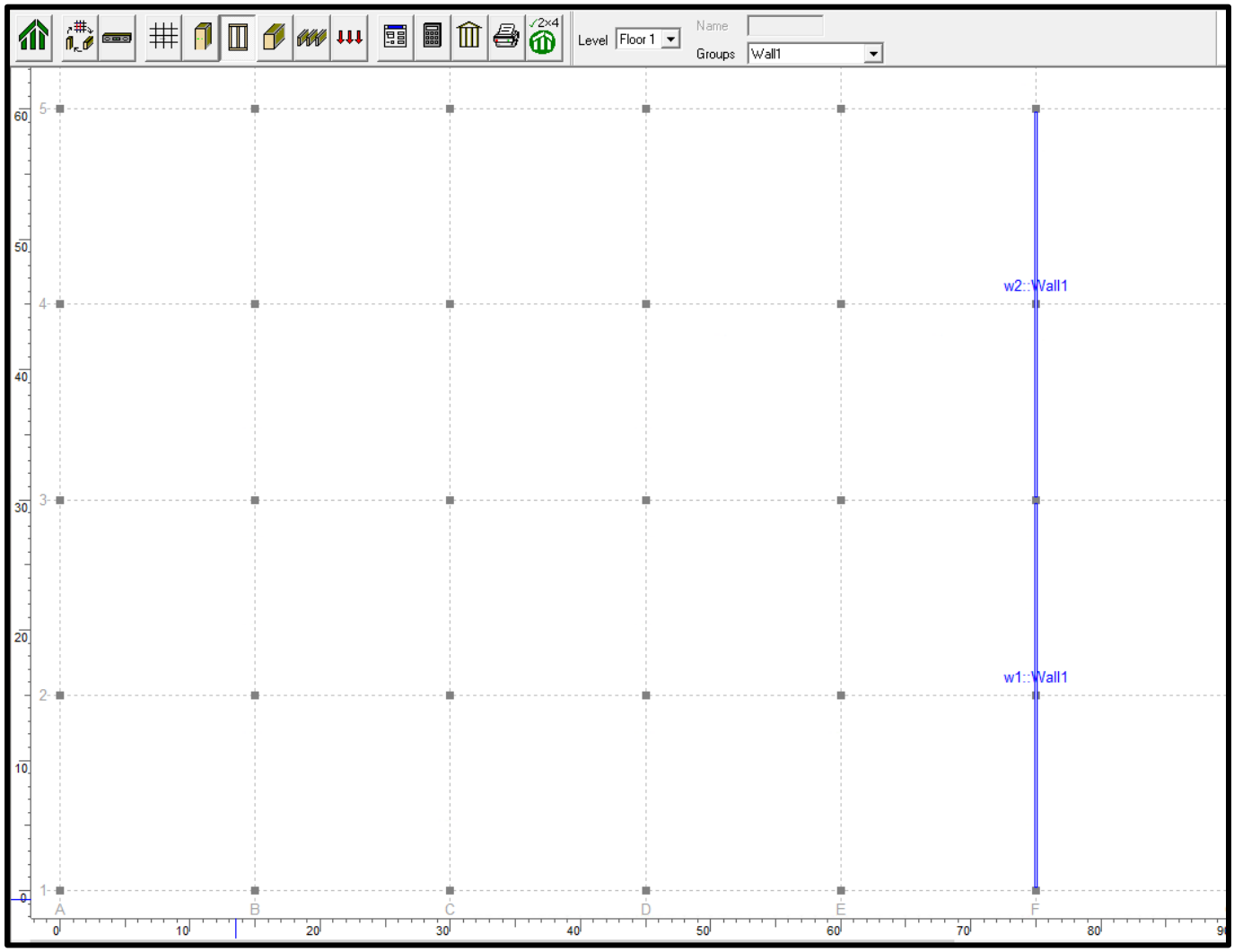



Figure 11: *Sizer: Concept Mode – Tutorial 5 – Wall Locations (Floor 1)*

### 5.6.3 Beams

1. Click on the ***Beam View*** button on the toolbar.
2. Click on the ***Material Design Groups*** button on the toolbar.
3. Specify ***Glulam-Balanced*** from the ***Material*** drop-down list.
4. Enter ***Purlin*** in the ***Name*** field.
5. Specify ***Load transfer #*** as ***1***.
6. Click ***Add***.
7. Click ***Yes*** in the warning window.
8. Click ***OK***.

Figure 12: *Sizer: Concept Mode – Tutorial 5 – Material Design Groups (Beams)*

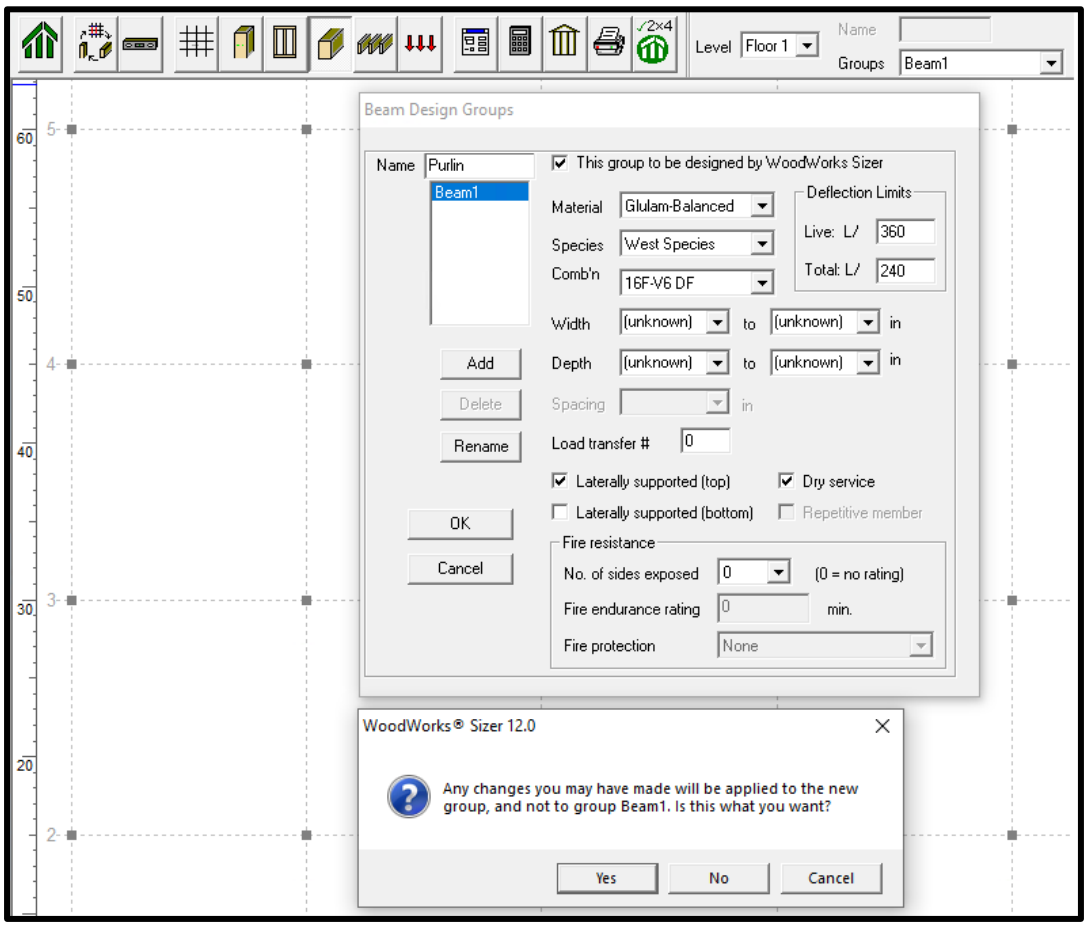



Figure 13: *Sizer: Concept Mode – Tutorial 5 – Beam Design Groups*

9. Select ***Floor 1*** from the ***Level*** drop-down list located on the toolbar.
10. Select ***Beam1*** from the ***Groups*** drop-down list located on the toolbar.
11. Click on ***A-1*** and drag the wall to ***A-3***.
12. Click on ***A-3*** and drag the wall to ***A-5***.
13. Repeat steps 11 and 12 for gridlines ***B, C, D, E,*** and ***F***.

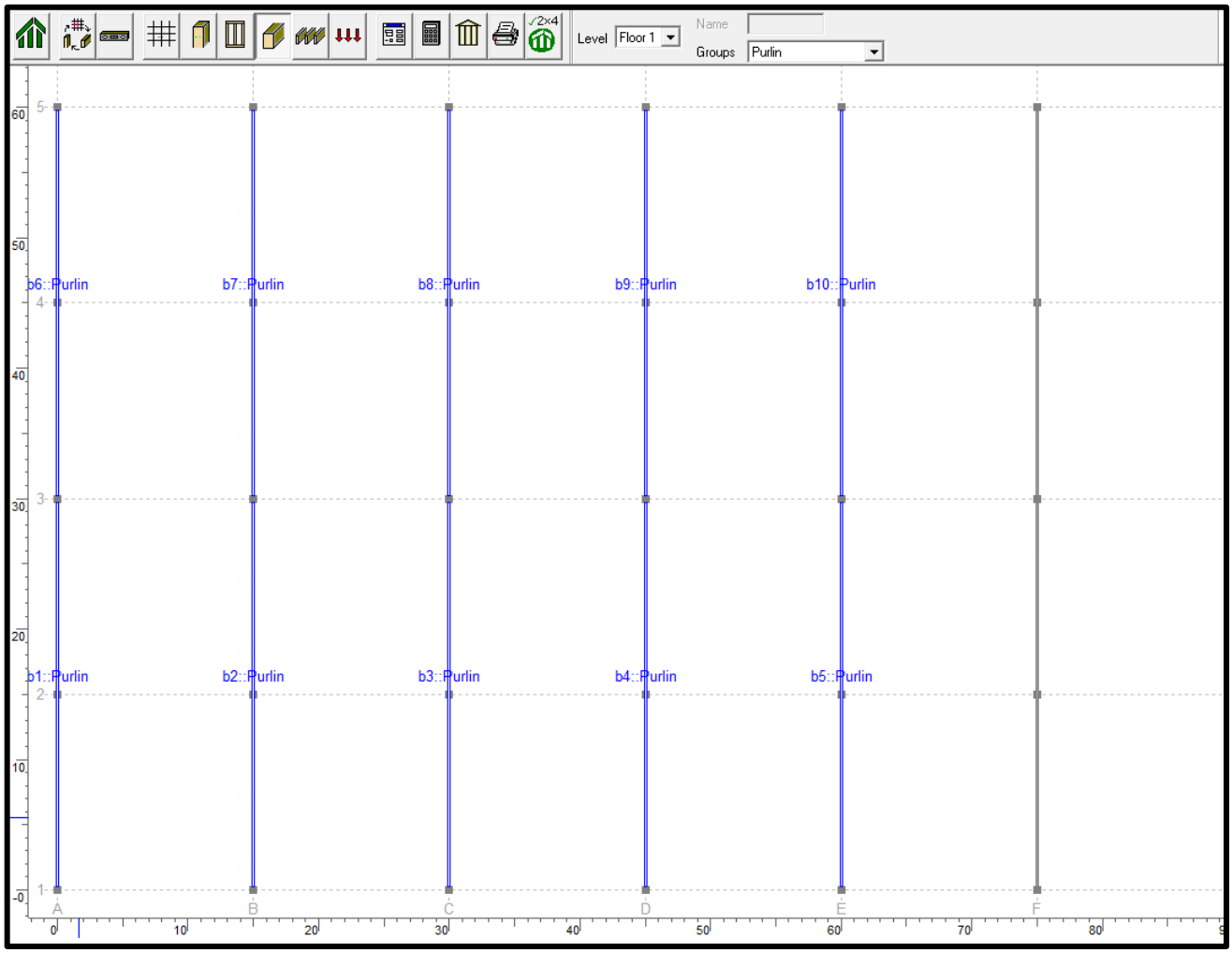



Figure 14: *Sizer: Concept Mode – Tutorial 5 – Beam1 Locations (Floor 1)*

14. Select ***Purlin*** from the ***Groups*** drop-down list located on the toolbar.
15. Click on ***A-1*** and drag the beam to ***B-1***.
16. Click on ***B-1*** and drag the beam to ***C-1***.
17. Click on ***C-1*** and drag the beam to ***D-1***.
18. Click on ***D-1*** and drag the beam to ***E-1***.
19. Click on ***E-1*** and drag the beam to ***F-1***.
20. Repeat steps 15-19 for gridline ***5***.
21. Click on ***A-3*** and drag the beam to ***B-3***.
22. Click on ***B-3*** and drag the beam to ***C-3***.
23. Click on ***C-3*** and drag the beam to ***D-3***.
24. Click on ***D-3*** and drag the beam to ***E-3***.
25. Repeat steps 21-24 for gridline ***4***.

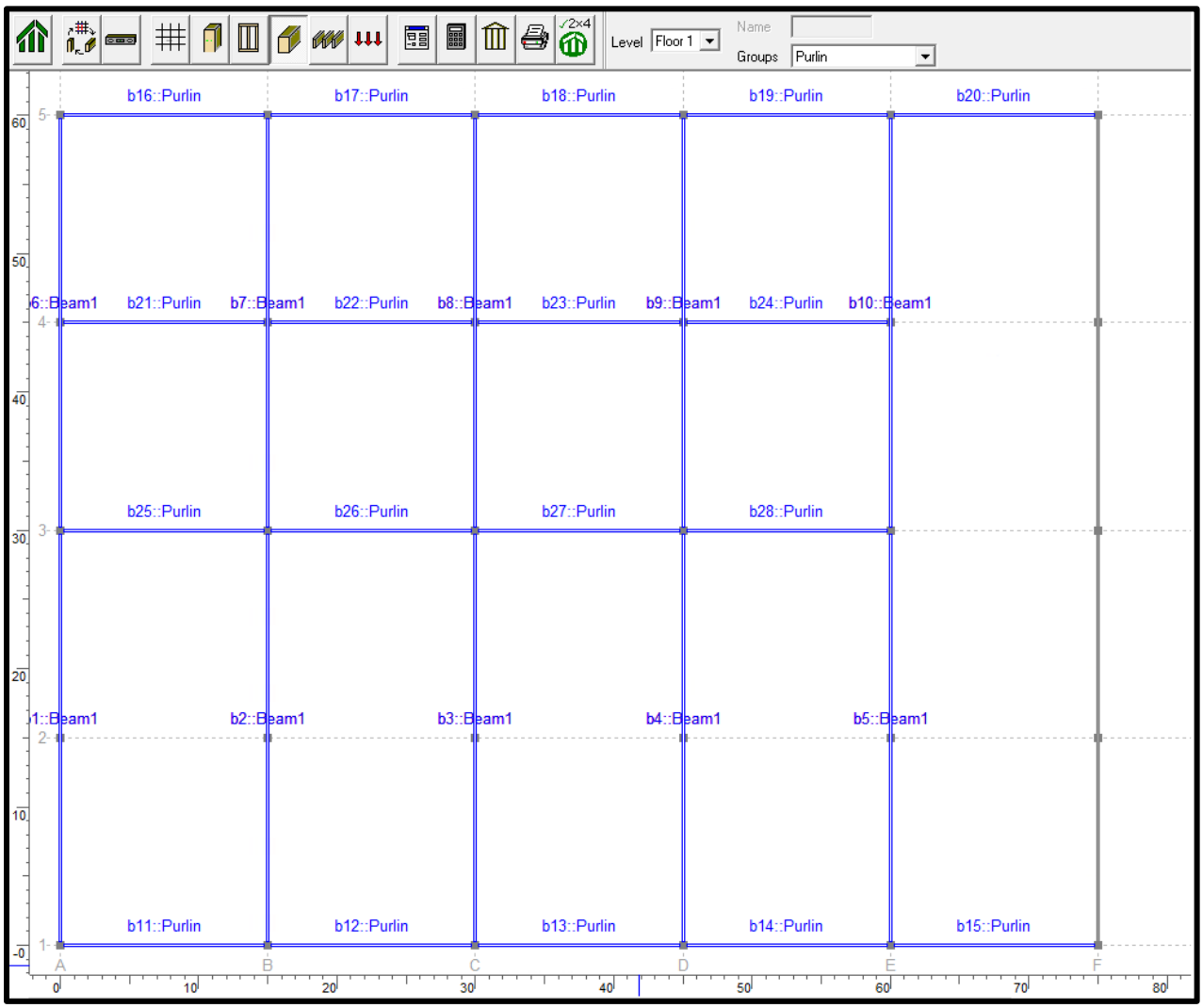



Figure 15: *Sizer: Concept Mode – Tutorial 5 – Purlin Locations (Floor 1)*

### 5.6.4 Joists

1. Click on the ***Joist View*** button on the toolbar.
2. Create a joist area by clicking on gridpoints ***A-1***, ***B-1***, ***B-3,*** and ***A-3***.
3. Create a joist area by clicking on gridpoints ***B-1***, ***C-1***, ***C-3***, and ***B-3***.
4. Create a joist area by clicking on gridpoints ***C-1***, ***D-1***, ***D-3***, and ***C-3***.
5. Create a joist area by clicking on gridpoints ***D-1***, ***E-1***, ***E-3***, and ***D-3***.
6. Create a joist area by clicking on gridpoints ***E-1***, ***F-1***, ***F-3***, and ***E-3***.
7. Create a joist area by clicking on gridpoints ***E-3***, ***F-3***, ***F-5***, and ***E-5***.

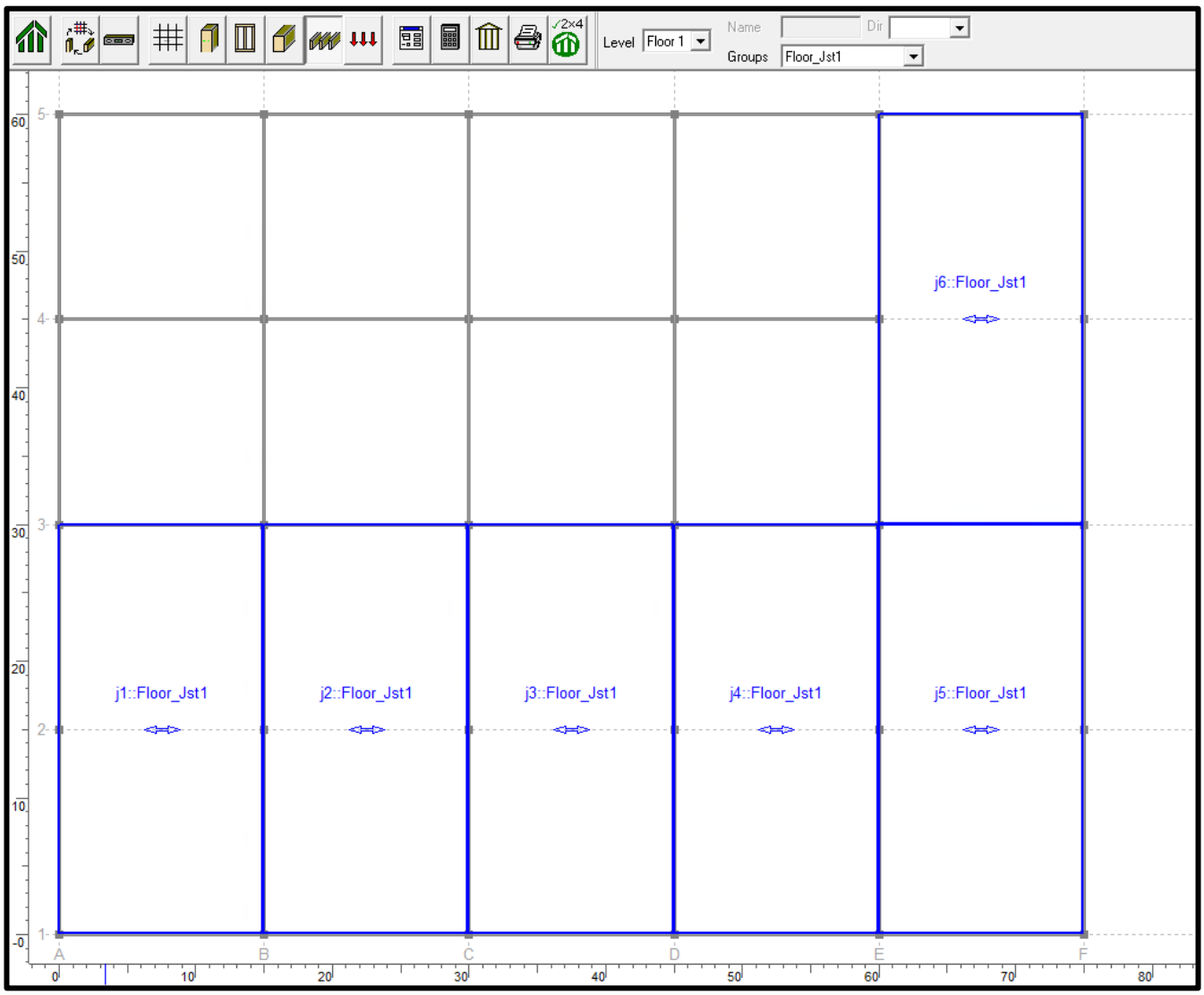



Figure 16: *Sizer: Concept Mode – Tutorial 5 – Joist Locations (East-West Direction)*

8. Create a joist area by clicking on gridpoints ***A-3***, ***B-3***, ***B-5,*** and ***A-5***.
9. Create a joist area by clicking on gridpoints ***B-3***, ***C-3***, ***C-5***, and ***B-5***.
10. Create a joist area by clicking on gridpoints ***C-3***, ***D-3***, ***D-5***, and ***C-5***.
11. Create a joist area by clicking on gridpoints ***D-3***, ***E-3***, ***E-5***, and ***D-5***.
12. Change the direction of the joist areas created in steps 8-11 to the ***North-South*** direction.

Note: The joists can span in the North-South or East-West direction. Change the direction by highlighting the joist area and changing the direction indicated in the ***Direction field*** of the data bar.

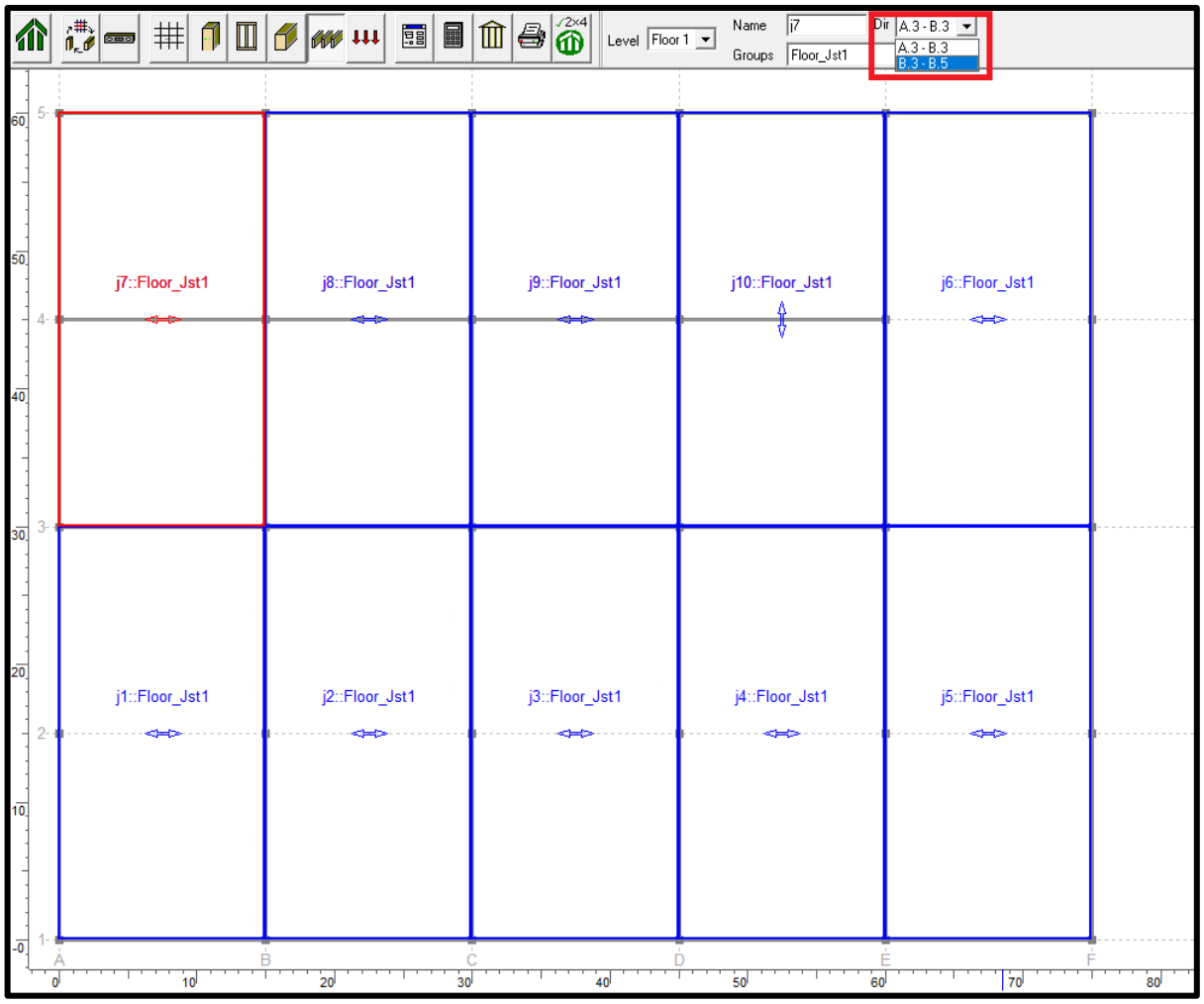



Figure 17: *Sizer: Concept Mode – Tutorial 5 – Joist Locations (North-South Direction)*

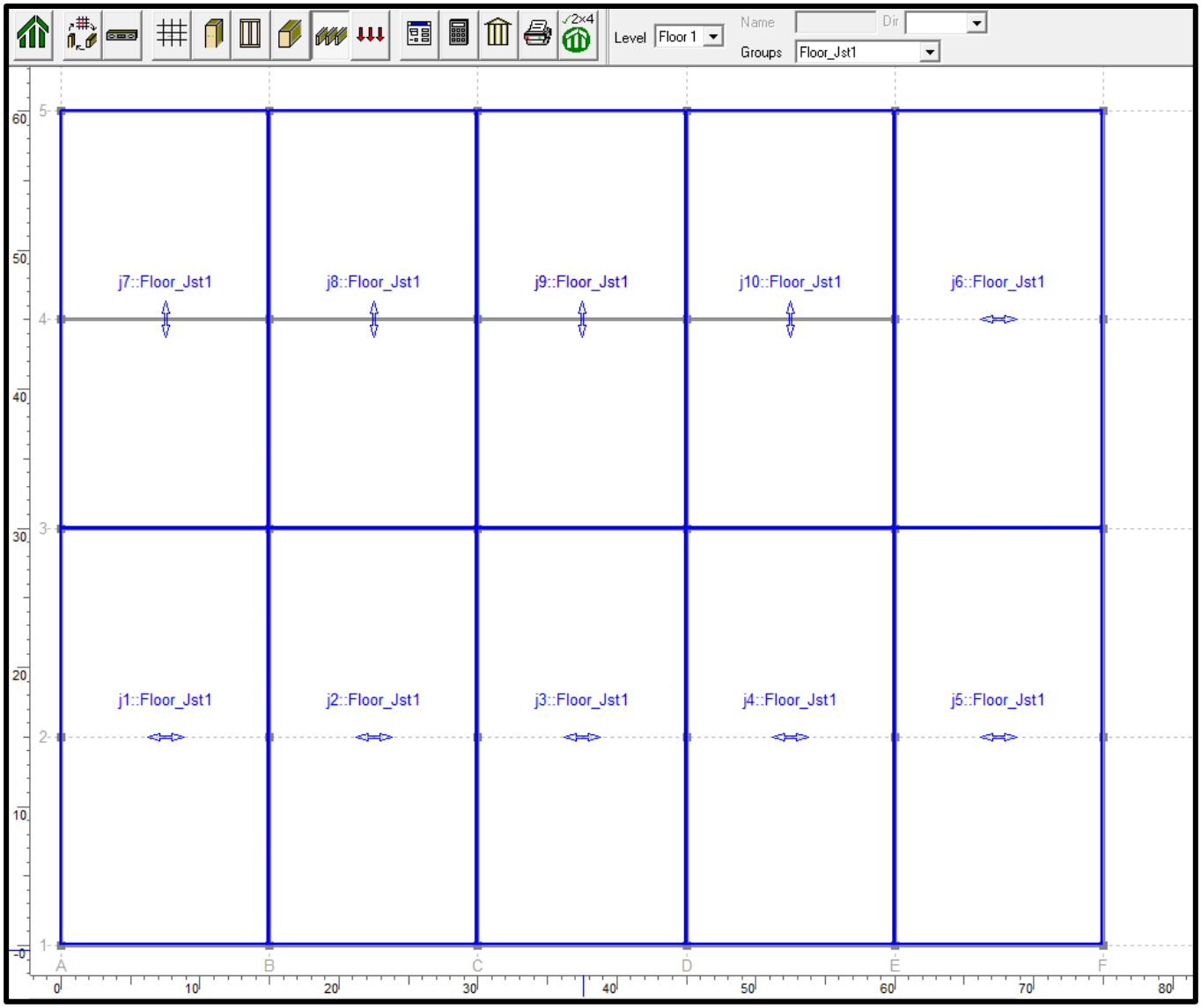



Figure 18: *Sizer: Concept Mode – Tutorial 5 – Joist Locations (Floor 1)*

### 5.6.5 Loads

1. Click on the ***Loads View*** button on the toolbar.
2. Select ***Dead*** from the ***Type*** drop-down list located on the toolbar.
3. Specify ***Area*** from the ***Distribution*** drop-down list located on the toolbar.
4. In the ***Magnitude*** field enter a value of ***20 (psf)***.
5. Create a load area by clicking on the following grid points: ***A-1***, ***F-1***, ***F-5***, and ***A-5***.

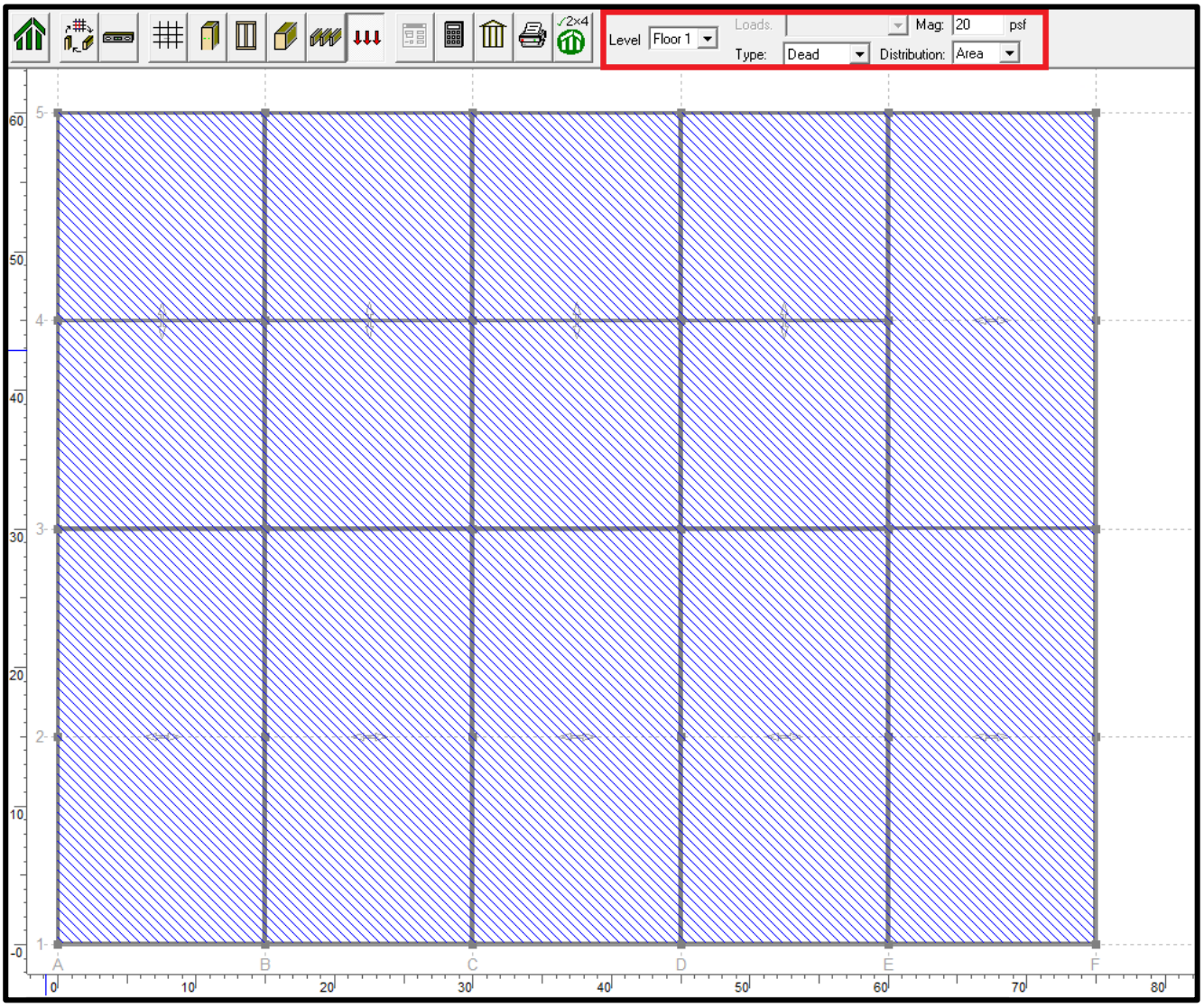



Figure 19: *Sizer: Concept Mode – Tutorial 5 – Dead Load (Floor 1)*

6. Select ***Live*** from the ***Type*** drop-down list located on the toolbar.
7. Specify ***Area*** from the ***Distribution*** drop-down list located on the toolbar.
8. In the ***Magnitude*** field enter a value of ***50 (psf)***.
9. Create a load area by clicking on the following grid points: ***A-1***, ***F-1***, ***F-5***, and ***A-5***.

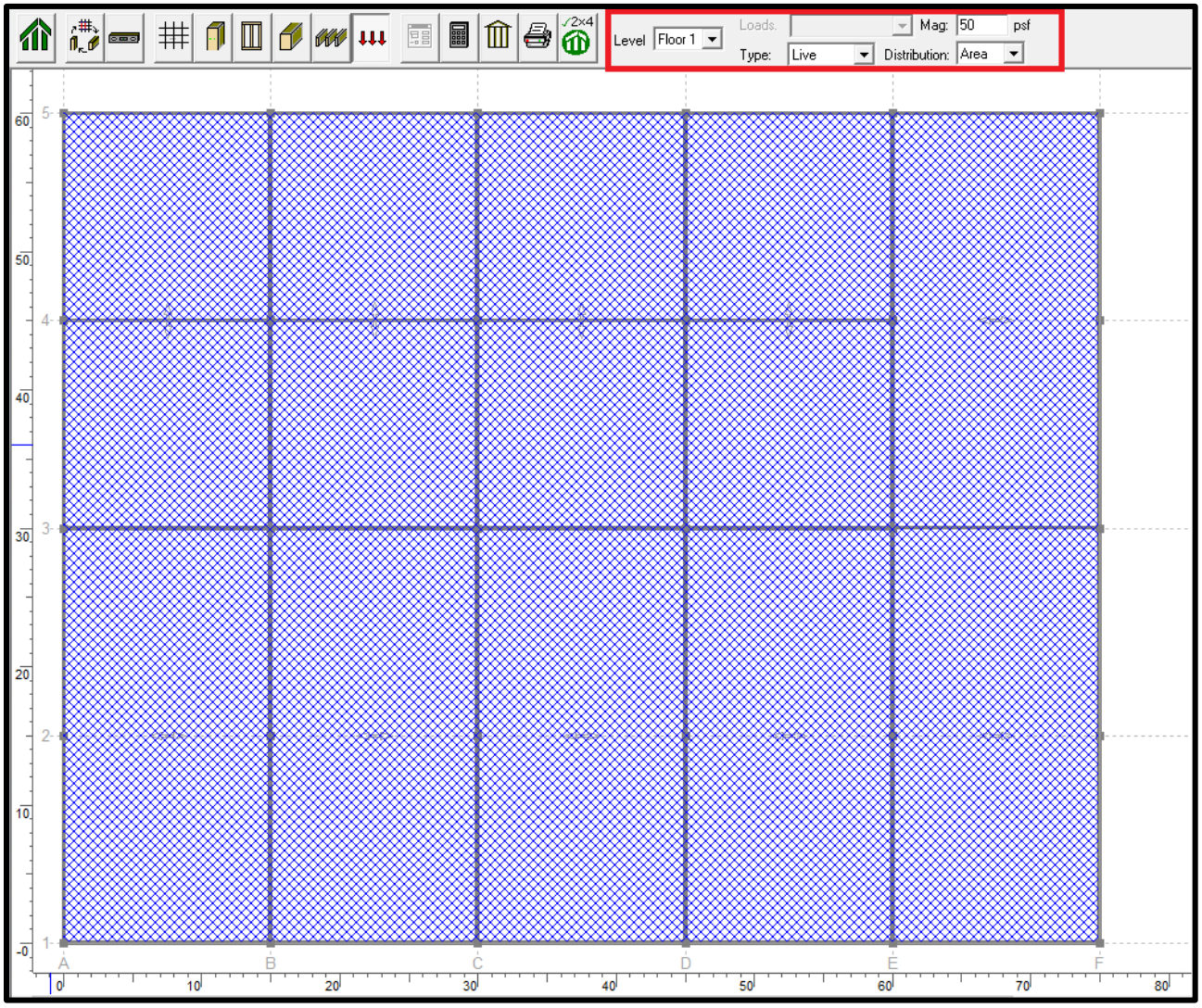



Figure 20: *Sizer: Concept Mode – Tutorial 5 – Live Load (Floor 1)*

## 5.7 Roof Level

### 5.7.1 Gridlines

1. Click on the ***Grid View*** button on the toolbar.
2. Select ***Roof*** from the ***Level*** drop-down list located on the toolbar.
3. Select grid point ***A-3*** (gridlines ***A*** and ***3*** should change to red).
4. In the ***Gridpoint Elevation*** field enter a value of ***7 (m)***.
5. Press the ***Enter*** key on the keyboard.
6. Click ***Yes*** in the warning window.
7. Repeat steps 4-6 for gridpoints ***B-3***, ***C-3***, ***D-3***, ***E-3***, and ***F-3***.

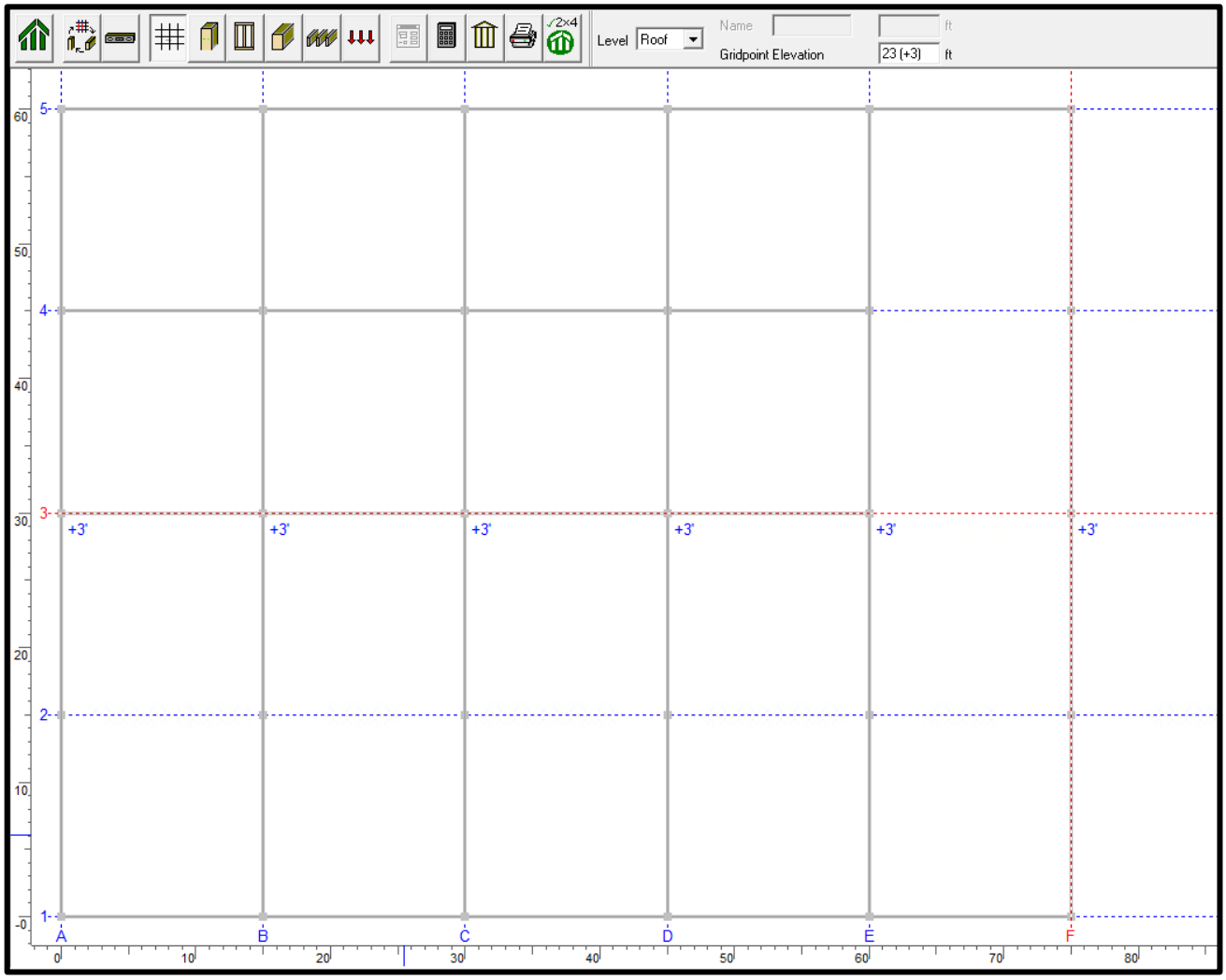



Figure 21: *Sizer: Concept Mode – Tutorial 5 – Adjusting Roof Elevation*

### 5.7.2 Columns

1. Click on the ***Column View*** button on the toolbar.
2. Select ***Centre*** from the ***Groups*** drop-down list located on the toolbar.
3. Add columns at the following locations: ***A-3***, ***B-3***, ***C-3***, ***D-3***, ***E-3***, and ***F-3***.

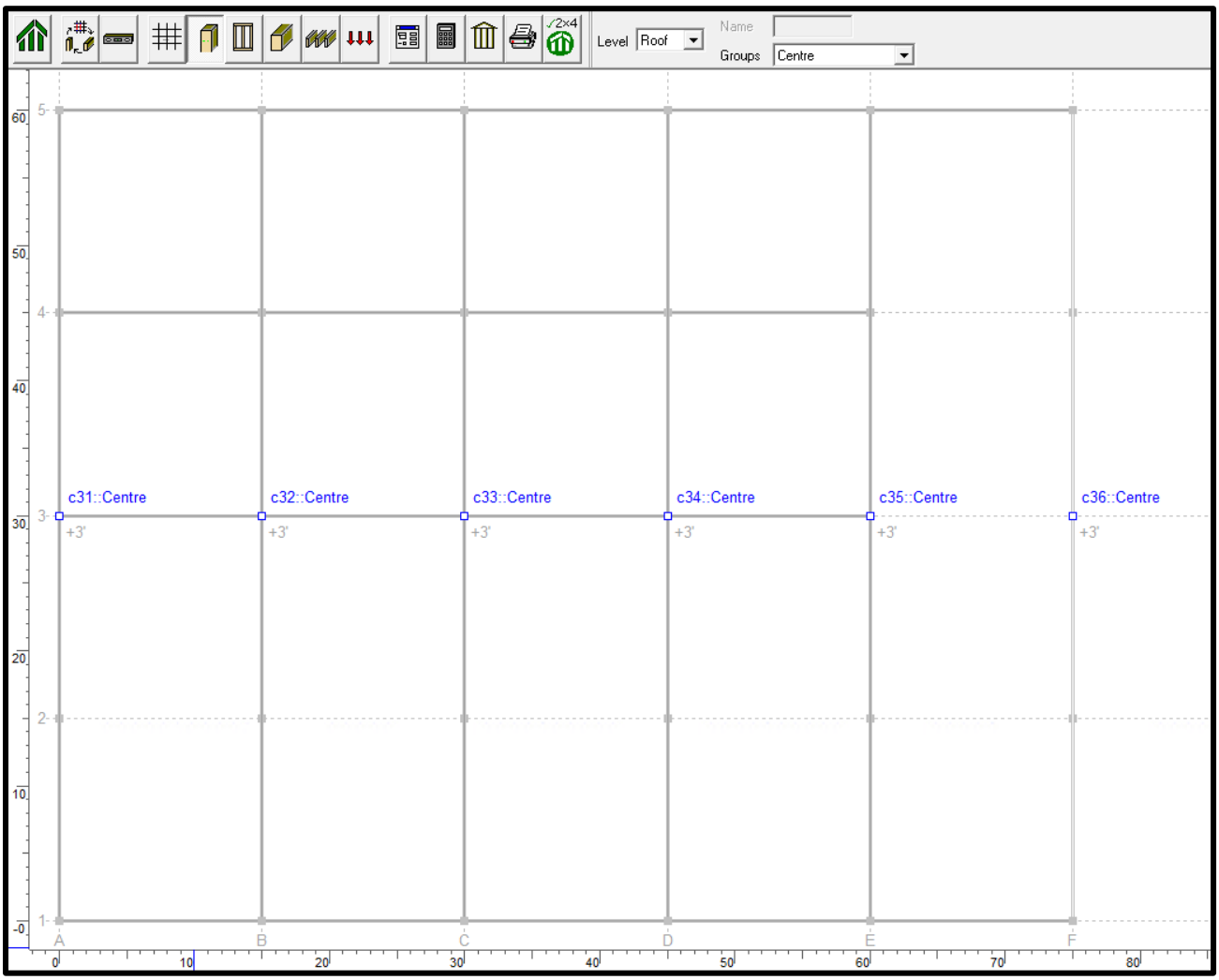



Figure 22: *Sizer: Concept Mode – Tutorial 5 – Column Locations (Roof)*

### 5.7.3 Walls

1. Click on the ***Wall View*** button on the toolbar.
2. Select ***Wall1*** from the ***Groups*** drop-down list located on the toolbar.
3. Click on ***F-1*** and drag the wall to ***F-3***.
4. Click on ***F-3*** and drag the wall to ***F-5***.
5. Repeat steps 3 and 4 for gridline ***5***.
6. Click on ***A-1*** and drag the wall to ***B-1***.
7. Click on ***B-1*** and drag the wall to ***C-1***.
8. Click on ***C-1*** and drag the wall to ***D-1***.
9. Click on ***D-1*** and drag the wall to ***E-1***.
10. Click on ***E-1*** and drag the wall to ***F-1***.
11. Repeat steps 6-10 for gridline ***5***.

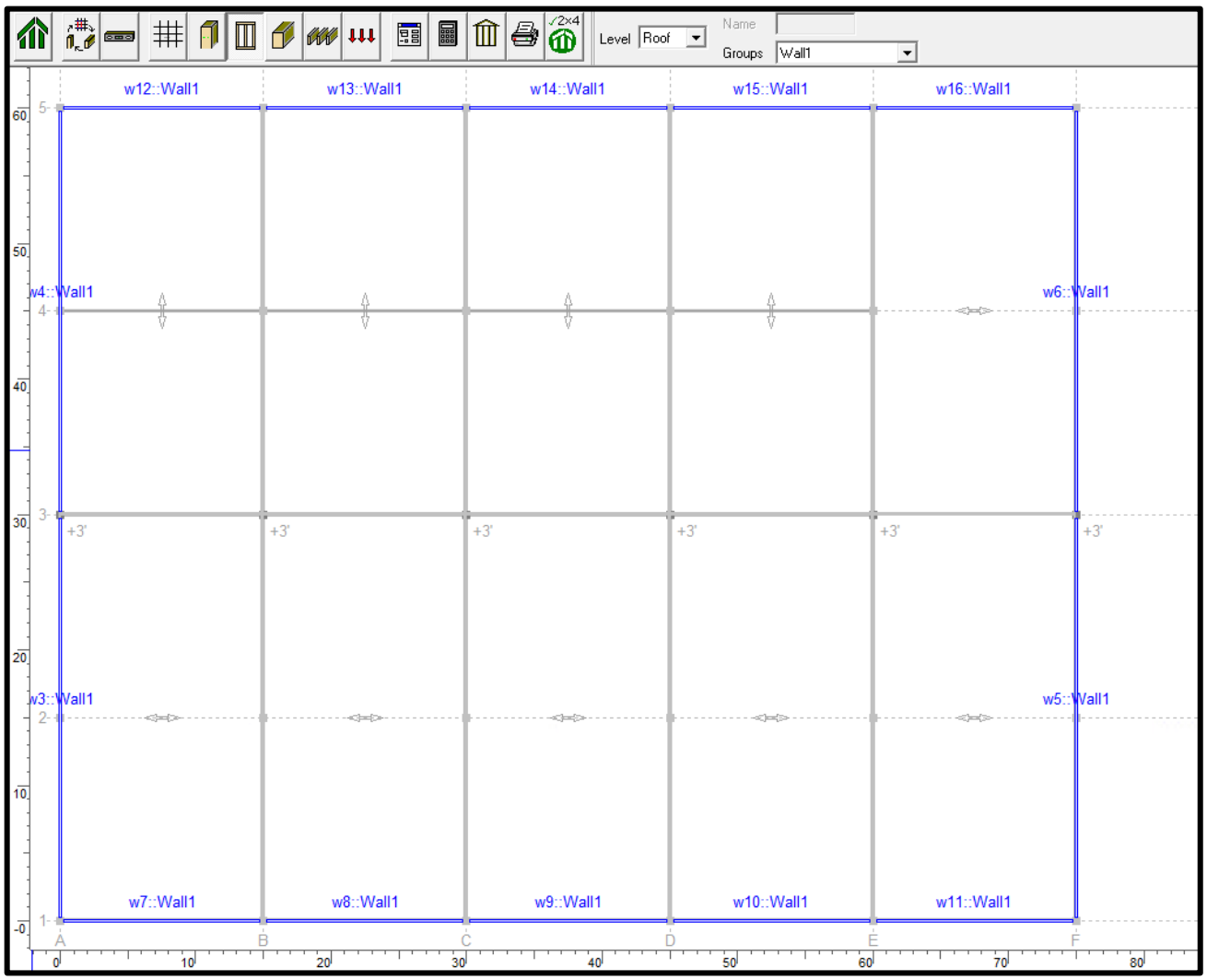



Figure 23: *Sizer: Concept Mode – Tutorial 5 – Wall Locations (Roof)*

### 5.7.4 Beams

1. Click on the ***Beam View*** button on the toolbar.
2. Click on the ***Material Design Groups*** button on the toolbar.
3. Specify ***Glulam-Balanced*** from the ***Material*** drop-down list.
4. Enter ***Ridge*** in the ***Name*** field.
5. Click ***Add***.
6. Click ***Yes*** in the warning screen.
7. Click ***OK***.
8. Choose ***Ridge*** from the ***Group*** drop-down list on the data bar.

Figure 24: *Sizer: Concept Mode – Tutorial 5 – Material Design Groups (Beams)*

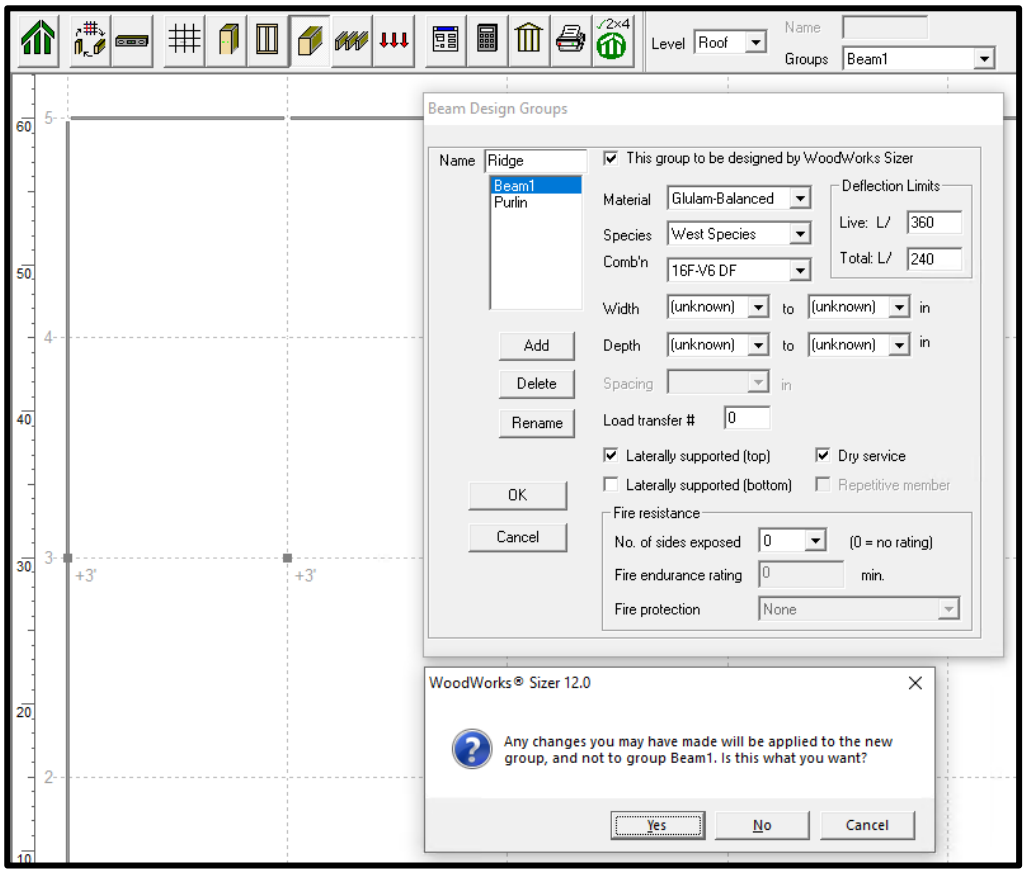



Figure 25: *Sizer: Concept Mode – Tutorial 5 - Adding Ridge Beam to Beam Design Group*

8. Select ***Ridge*** from the ***Groups*** drop-down list located on the toolbar.
9. Click on ***A-3*** and drag the beam to ***B-3***.
10. Click on ***B-3*** and drag the beam to ***C-3***.
11. Click on ***C-3*** and drag the beam to ***D-3***.
12. Click on ***D-3*** and drag the beam to ***E-3***.

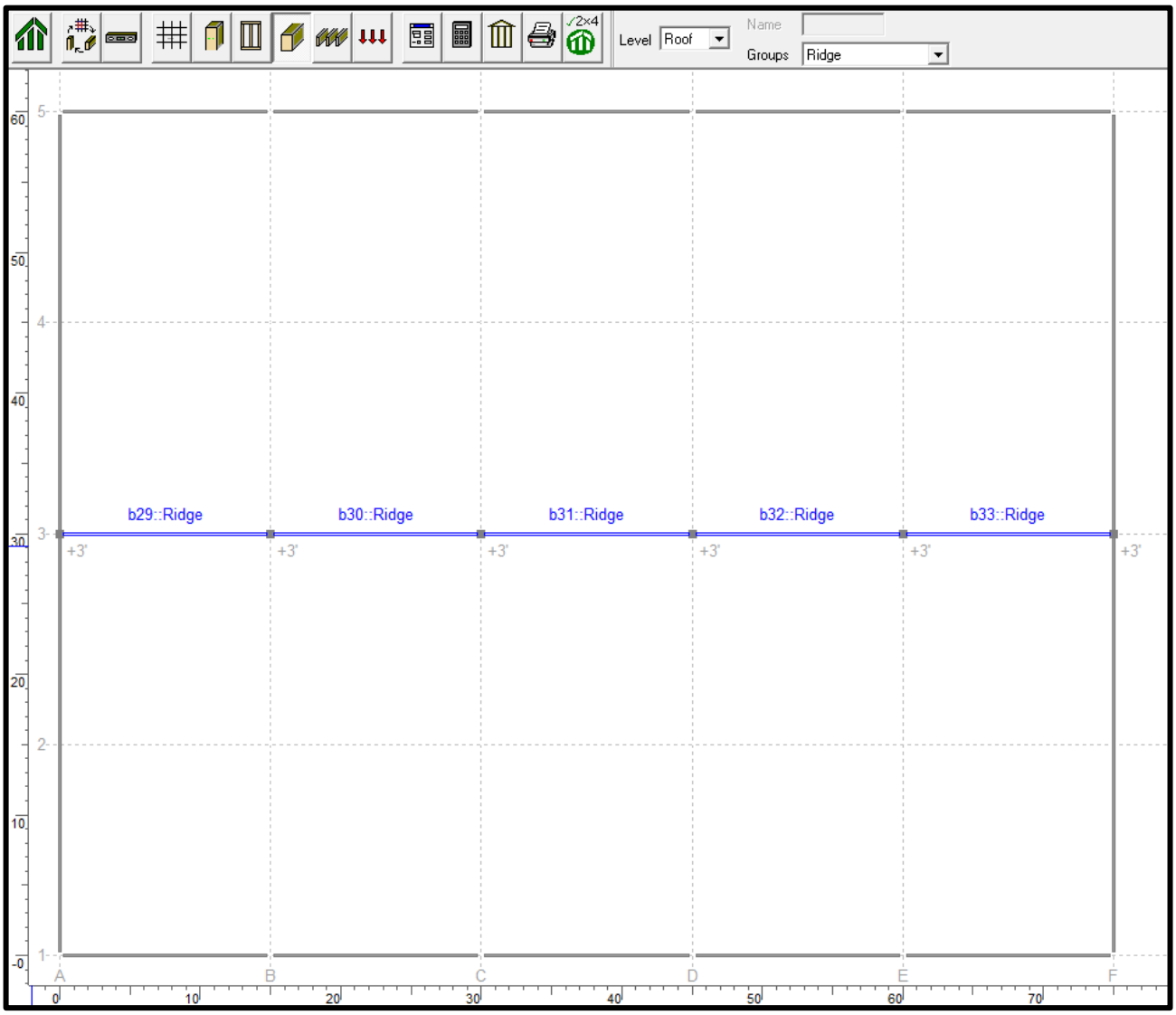



Figure 26: *Sizer: Concept Mode – Tutorial 5 – Ridge Locations (Roof)*

### 5.7.5 Joists

1. Click on the ***Joist View*** button on the toolbar.
2. Click on the ***Material Design Groups*** button on the toolbar.
3. Select ***Roof*** and ***Joists*** under the ***Group Type*** section.
4. Enter ***Parall_truss*** in the ***Name*** field.
5. Click ***Add***.
6. Click ***Yes*** in the warning window.
7. Click ***OK***.

Figure 27: *Sizer: Concept Mode – Tutorial 5 – Truss Locations (Roof)*

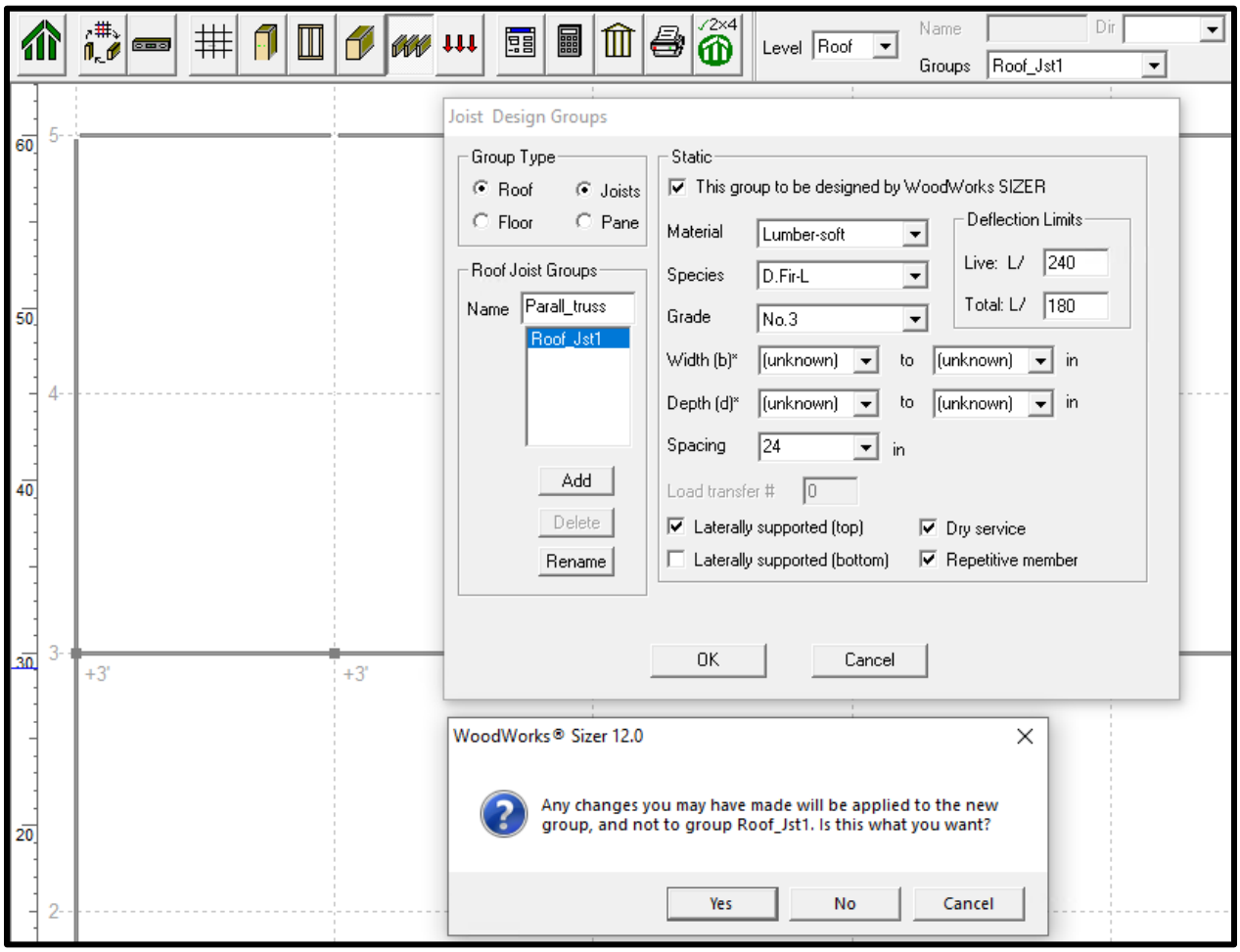



Figure 28: *Sizer: Concept Mode – Tutorial 5 – Adding Parallel Truss to Joist Design Groups*

8. Select ***Parall_truss*** from the ***Groups*** drop-down list located on the toolbar.
9. Create a joist area by clicking on gridpoints ***A-1***, ***B-1***, ***B-3***, and ***A-3***.
10. Create a joist area by clicking on gridpoints ***B-1***, ***C-1***, ***C-3***, and ***B-3***.
11. Create a joist area by clicking on gridpoints ***C-1***, ***D-1***, ***D-3***, and ***C-3***.
12. Create a joist area by clicking on gridpoints ***D-1***, ***E-1***, ***E-3***, and ***D-3***.
13. Create a joist area by clicking on gridpoints ***E-1***, ***F-1***, ***F-3***, and ***E-3***.
14. Create a joist area by clicking on gridpoints ***A-3***, ***B-3***, ***B-5***, and ***A-5***.
15. Create a joist area by clicking on gridpoints ***B-5***, ***C-5***, ***C-5***, and ***B-5***.
16. Create a joist area by clicking on gridpoints ***C-3***, ***D-3***, ***D-5***, and ***C-5***.
17. Create a joist area by clicking on gridpoints ***D-3***, ***E-3***, ***E-5***, and ***D-5***.
18. Create a joist area by clicking on gridpoints ***E-3***, ***F-3***, ***F-5***, and ***E-5***.

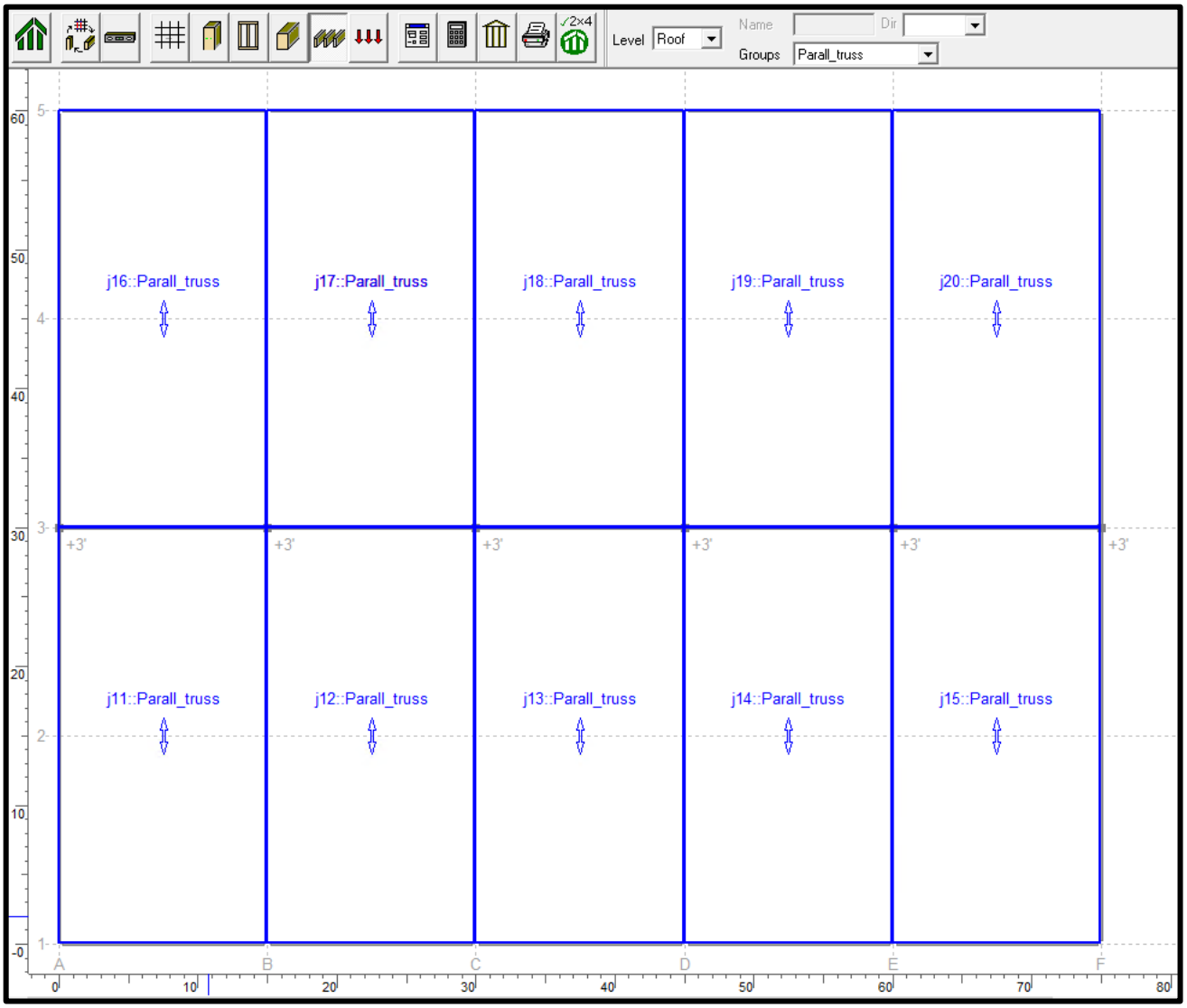



Figure 29: *Sizer: Concept Mode – Tutorial 5 – Parallel Truss Locations (Roof)*

### 5.7.6 Loads

1. Click on the ***Loads View*** button on the toolbar.
2. Select ***Dead*** from the ***Type*** drop-down list located on the toolbar.
3. Specify ***Area*** from the ***Distribution*** drop-down list located on the toolbar.
4. In the ***Magnitude*** field enter a value of ***20 (psf)***.
5. Choose ***Dead Area*** from the ***Type*** drop-down list on the data bar.
6. Create a load area by clicking on gridpoints ***A-1***, ***F-1***, ***F-5***, and ***A-5***.

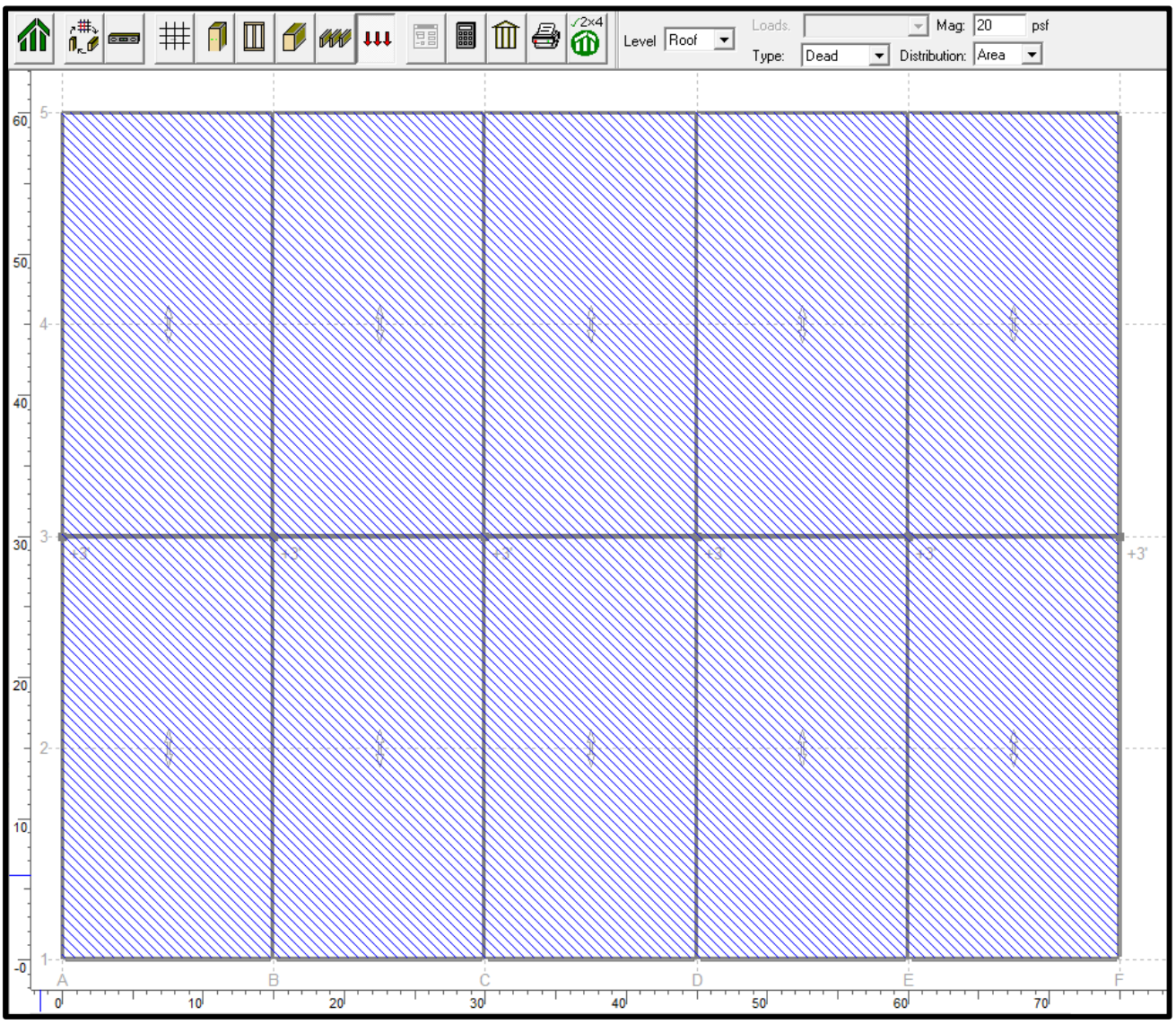



Figure 30: *Sizer: Concept Mode – Tutorial 5 – Dead Load (Roof)*

## 5.8 Elevation View

1. Click on the ***Grid View*** button on the toolbar.
2. Click on gridline ***A***.
3. Click on the ***Elevation View*** button on the toolbar.
4. Repeat steps 1 and 2 to see successive elevation views along gridlines ***B***, ***C***, and ***D***, etc.

<u>Note:</u> Click on any button on the toolbar to return to the main window.

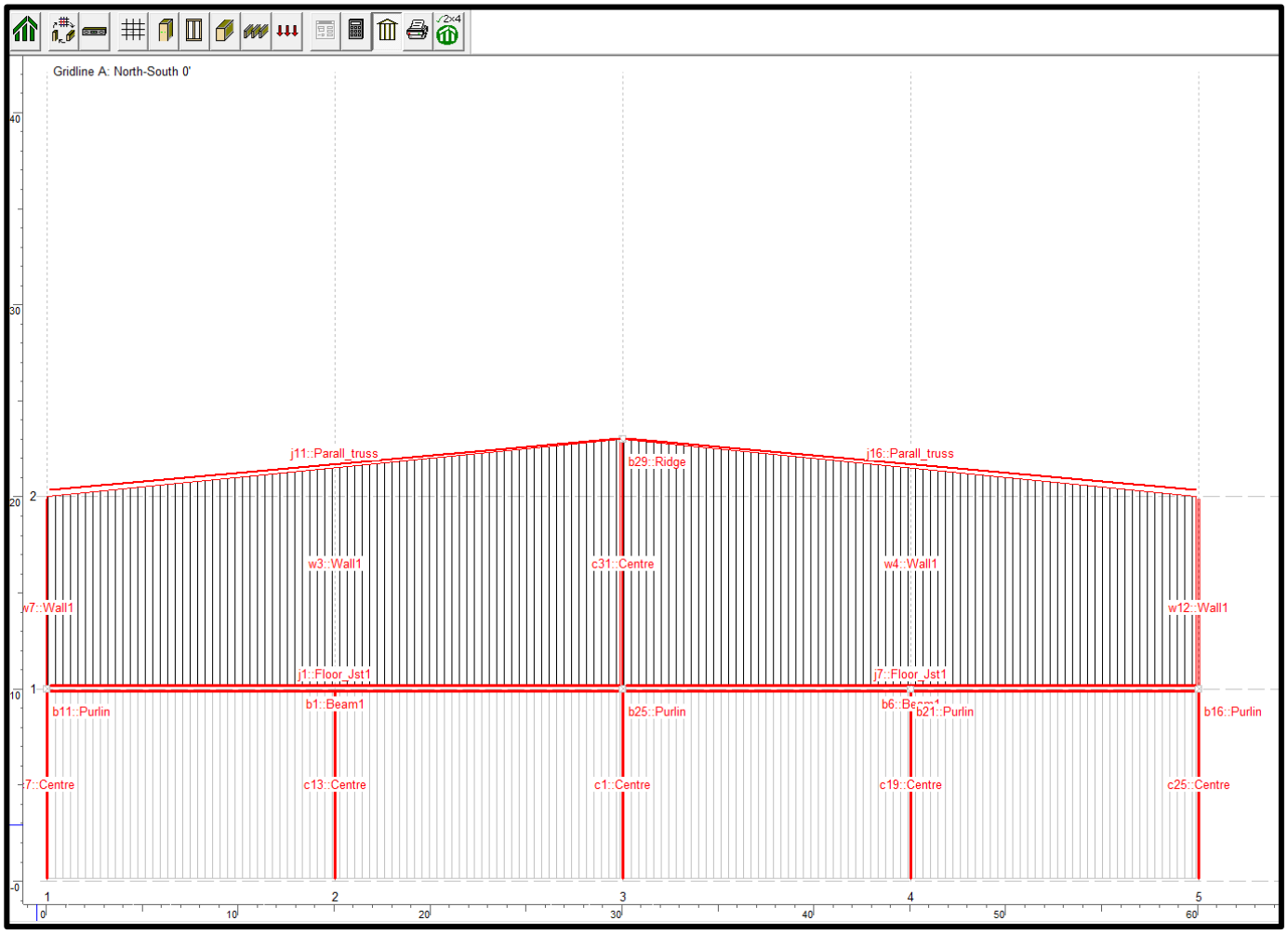



Figure 31: *Sizer: Concept Mode – Tutorial 5 – Elevation View (Gridline A)*

## 5.9 Designing the Structure

1. Click the ***Run*** button on the toolbar.

*Sizer* will complete the design, and will automatically generate the ***Results by Group***, ***Results by Member***, ***Material List***, and ***Reactions at Base***.

<u>Note:</u> To view the result pages, click on the ***View*** tab on the menu bar.

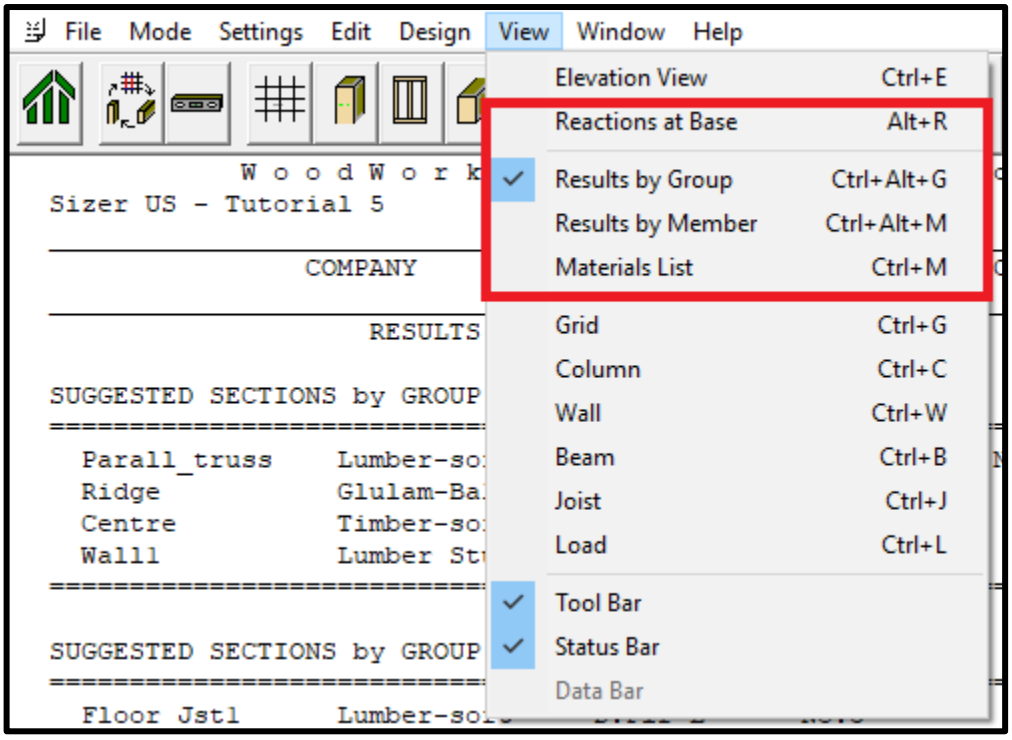



Figure 32: *Sizer: Concept Mode – Tutorial 5 – View Results*

## 5.10 View Results

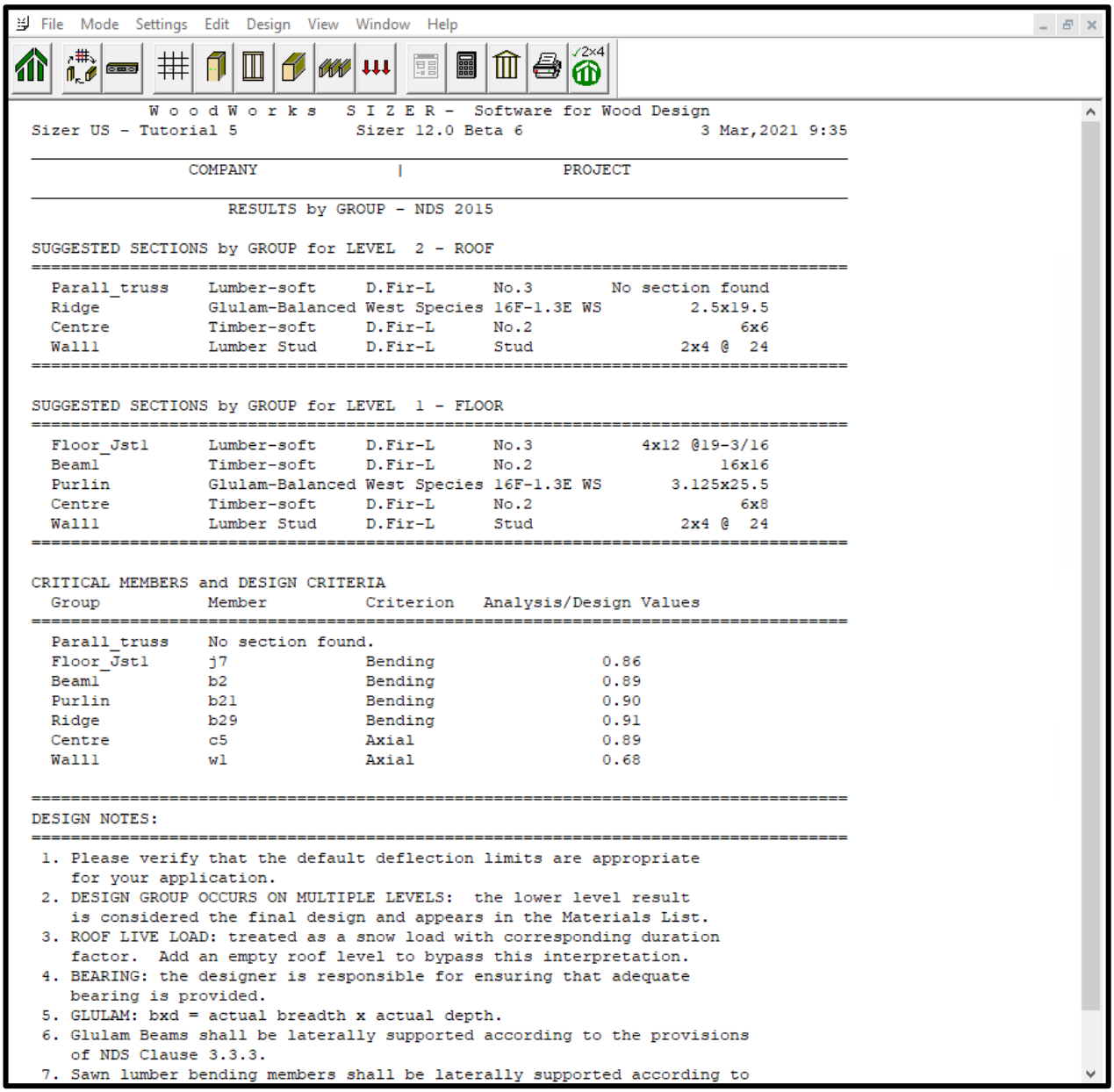
The ***Results by Group*** will appear and summarizes the suggested sections, for each floor, for each group specified in the project file (e.g., columns, walls, beams, and joists). Critical members and design criteria are also shown.

Click here to download a PDF of the results by group

Click here to download a PDF of the results by member.

Click here to download a PDF of the material list.

Click here to download a PDF of the reactions at base.



```
File  Mode  Settings  Edit  Design  View  Window  Help

            W o o d W o r k s   S I Z E R -  Software for Wood Design
Sizer US - Tutorial 5            Sizer 12.0 Beta 6                 3 Mar,2021 9:35
_________________________________________________________________________________
                COMPANY                |                PROJECT
_________________________________________________________________________________
                    RESULTS by GROUP - NDS 2015

SUGGESTED SECTIONS by GROUP for LEVEL  2 - ROOF
=================================================================================
  Parall_truss    Lumber-soft     D.Fir-L      No.3        No section found
  Ridge           Glulam-Balanced West Species 16F-1.3E WS         2.5x19.5
  Centre          Timber-soft     D.Fir-L      No.2                     6x6
  Wall1           Lumber Stud     D.Fir-L      Stud               2x4 @  24
=================================================================================

SUGGESTED SECTIONS by GROUP for LEVEL  1 - FLOOR
=================================================================================
  Floor_Jst1      Lumber-soft     D.Fir-L      No.3           4x12 @19-3/16
  Beam1           Timber-soft     D.Fir-L      No.2                   16x16
  Purlin          Glulam-Balanced West Species 16F-1.3E WS       3.125x25.5
  Centre          Timber-soft     D.Fir-L      No.2                     6x8
  Wall1           Lumber Stud     D.Fir-L      Stud               2x4 @  24
=================================================================================

CRITICAL MEMBERS and DESIGN CRITERIA
  Group           Member          Criterion   Analysis/Design Values
=================================================================================
  Parall_truss    No section found.
  Floor_Jst1      j7              Bending                 0.86
  Beam1           b2              Bending                 0.89
  Purlin          b21             Bending                 0.90
  Ridge           b29             Bending                 0.91
  Centre          c5              Axial                   0.89
  Wall1           w1              Axial                   0.68

=================================================================================
DESIGN NOTES:
=================================================================================
 1. Please verify that the default deflection limits are appropriate
    for your application.
 2. DESIGN GROUP OCCURS ON MULTIPLE LEVELS:  the lower level result
    is considered the final design and appears in the Materials List.
 3. ROOF LIVE LOAD: treated as a snow load with corresponding duration
    factor.  Add an empty roof level to bypass this interpretation.
 4. BEARING: the designer is responsible for ensuring that adequate
    bearing is provided.
 5. GLULAM: bxd = actual breadth x actual depth.
 6. Glulam Beams shall be laterally supported according to the provisions
    of NDS Clause 3.3.3.
 7. Sawn lumber bending members shall be laterally supported according to
```

Figure 33: *Sizer: Concept Mode – Tutorial 5 – Results by Group*