

Problem B

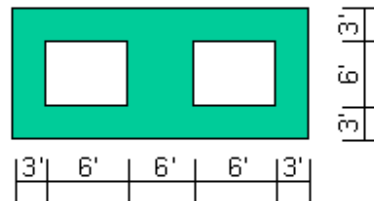
Concrete Wall

Concrete

$E = 3600$ ksi, Poissons Ratio = 0.2

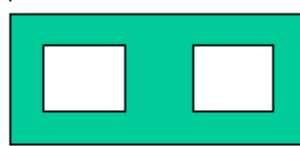
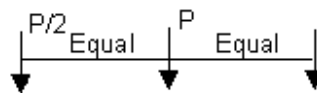
To Do

Model wall using shell elements. Determine shear axial force and moment in Pier A, and determine total shear, moment and axial force at the sixth level for all piers combined.

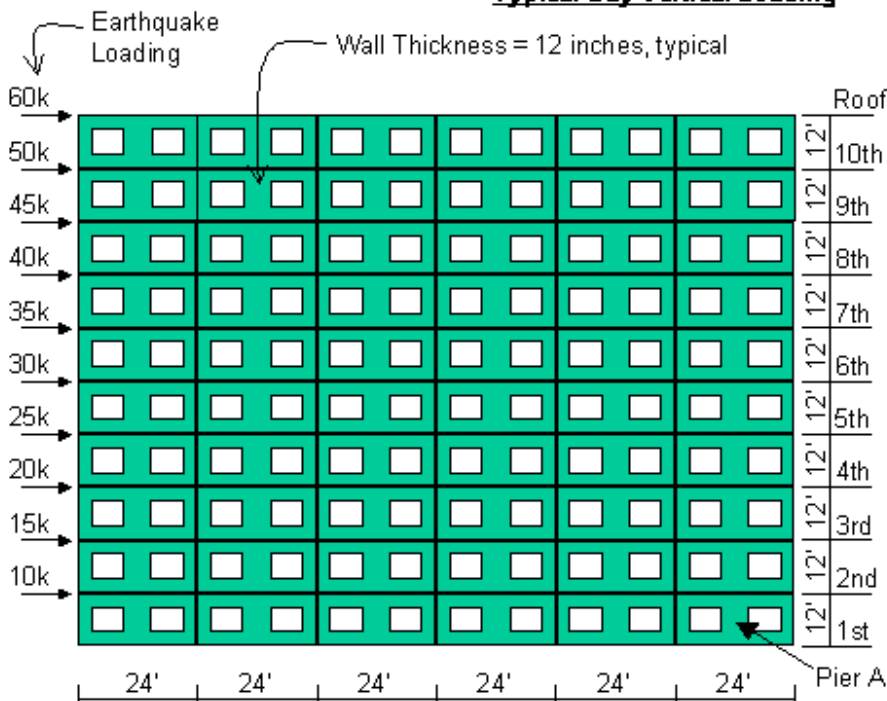


Typical Bay Dimensions

P (DL) = 21.6 k, P (LL) = 7.2 k



Typical Bay Vertical Loading

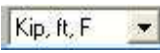


CSI Solution Demonstrates Use of These Features

- Groups
- Section Cuts
- Load Combinations
- Linear Replication

Problem B Solution

1. Click the **File menu > New Model** command to display the **New Model** form.


2. Click the drop-down box to set the units to 



3. Click the **Wall** button to display the **Shear Wall** form. In that form:

- Type **8** in the *Number of Divisions, X* edit box.
- Type **4** in the *Number of Divisions, Z* edit box.
- Type **3** in the *Division Width, X* edit box.
- Type **3** in the *Division Width, Z* edit box.
- Click the **OK** button.

4. Click the “X” in the top right-hand corner of the 3-D View window to close it.

5. Click the **Set Display Options** button  (or click the **View menu > Set Display Options** command) to display the **Display Options for Active Window** form. In that form:

- Check the *Labels* box in the *Joints* area.
- Check the *Labels* box in the *Areas* area.
- Click the **OK** button.

6. Select area objects 6, 7, 10, 11, 22, 23, 26 and 27 by clicking on them.

7. Press the Delete key on the keyboard to delete those objects.

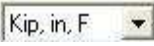
8. Click the **Refresh Window** button  to refresh the drawing.

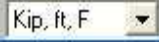






9. Click the **Define menu > Load Cases** command to display the **Define Loads** form. In that form:

- Type **LIVE** in the *Load Name* edit box.
- Select *Live* from the *Type* drop-down box.
- Type **0** in the *Self Weight Multiplier* edit box.
- Click the **Add New Load** button.
- Type **QUAKE** in the *Load Name* edit box.
- Select *Quake* from the *Type* drop-down box.
- Type **0** in the *Self Weight Multiplier* edit box.
- Select *None* from the *Auto Load* drop-down box.
- Click the **Add New Load** button.
- Click the **OK** button.

10. Click the **Define menu > Combinations** command to display the **Define Response Combinations** form. In that form:



- Click the **Add New Combo** button to display the **Response Combination Data** form. In that form:
 - Type **ALL** in the *Response Combination Name* edit box.

- Select *Linear Add* from the *Combination Type* drop-down box if it is not already selected.
 - Select *DEAD* in the *Case Name* drop-down box (if it is not already selected) and type **1** in the *Scale Factor* edit box (if it is not already there).
 - Click the **Add** button.
 - Select *LIVE* in the *Case Name* drop-down box.
 - Click the **Add** button.
 - Select *QUAKE* in the *Case Name* drop-down box.
 - Click the **Add** button.
 - Click the **OK** buttons on the **Response Combination Data** and **Define Response Combinations** forms.
11. Select joints 10, 25 and 45.
 12. Click the **Assign menu > Joint Loads > Forces** command to display the **Joint Forces** form. In that form:
 - Select *DEAD* from the *Load Case Name* drop-down box.
 - Type **-10.8** in the *Force Global Z* edit box in the *Loads* area.
 - Click the **OK** button.
 13. Select joint 25.
 14. Click the **Assign menu > Joint Loads > Forces** command to display the **Joint Forces** form. In that form:
 - In the Options area, select *Add to Existing Loads*.
 - Click the **OK** button.
 15. Select joints 10, 25 and 45.
 16. Click the **Assign menu > Joint Loads > Forces** command display the **Joint Forces** form. In that form:
 - Select *LIVE* from the *Load Case Name* drop-down box.
 - Type **-3.6** in the *Force Global Z* edit box in the *Loads* area.
 - Click the **OK** button.
 17. Select joint 25.
 18. Click the **Assign menu > Joint Loads > Forces** command to display the **Joint Forces** form. In that form:
 - In the Options area, select *Add to Existing Loads*.
 - Click the **OK** button.
 19. Click the drop-down box in the status bar to change the units to .
 20. Click the **Define menu > Materials** command to display the **Define Materials** form. Highlight the CONC material and click the **Modify/Show Material** button to display the **Material Property Data** form. In that form:


- Verify that the modulus of elasticity is 3600 and Poisson's ratio is 0.2.
 - Click the **OK** buttons on the **Material Property Data** and **Define Materials** forms to exit the forms.
21. Click the drop-down box in the status bar to change the units to .
22. Click the **Define menu > Area Sections** command to display the **Area Sections** form. Click the **Modify/Show Section** button to display the **Area Section Data** form. In that form:
- Accept all of the default values.
 - Click the **OK** buttons on the **Area Section Data** and **Area Section** forms to exit the forms.
23. Click the **Select All** button .
24. Click the **Edit menu > Replicate** command to display the **Replicate** form. In that form:
- Click the Linear Tab if it is not already selected.
 - In the *Increments* area type **24** in the *dx* edit box.
 - Type **5** in the *Number* edit box.
 - Click the **OK** button
25. Click the **Restore Full View** button .
26. Click the **Set Display Options** button  (or the **View menu > Set Display Options** command) to display the **Display Options for Active Window** form. In that form:
- Check the *Not in View* box in the *Joints* area.
 - Uncheck the *Labels* box in the *Areas* area.
 - Click the **OK** button.
27. Click the **Select All** button .
28. Click the **Edit menu > Replicate** command to display the **Replicate** form. In that form:
- Click the Linear Tab if it is not already selected.
 - In the *Increments* area type **0** in the *dx* edit box.
 - Type **12** in the *dz* edit box.
 - Type **9** in the *Number* edit box.
 - Click the **OK** button.
29. Click the **Restore Full View** button .
30. Click the **Set Display Options** button  (or the **View menu > Set Display Options** command) to display the **Display Options for Active Window** form. In that form:
- Uncheck the *Not in View* box in the *Joints* area.
 - Check the *Labels* box in the *Joints* area.

- Check the *Restraints* box in the *Joints* area.
 - Check the *Fill Objects* box in the *General* area.
 - Click the **OK** button.
31. Select joint 10. You may need to zoom in to distinguish it.
32. Click the **Assign menu > Joint Loads > Forces** command to display the **Joint Forces** form. In that form:
- Select *QUAKE* from the *Load Case Name* drop-down box.
 - Type **10** in the *Force Global X* edit box in the *Loads* area.
 - Type **0** in the *Force Global Z* edit box in the *Loads* area.
 - Click the **OK** button.
33. Select joint 243.
34. Click the **Assign menu > Joint Loads > Forces** command to display the **Joint Forces** form. In that form:
- Type **15** in the *Force Global X* edit box in the *Loads* area.
 - Click the **OK** button.
35. Repeat Steps 33 and 34, except select the joint and type the values shown in the following table in the Force Global X edit box:

Select This Joint	Click this command to Display the <i>Joint Forces</i> form	Type this in the Force Global X edit box
427	Assign menu > Joint Loads > Forces	Type 20 , click OK
611	Assign menu > Joint Loads > Forces	Type 25 , click OK
795	Assign menu > Joint Loads > Forces	Type 30 , click OK
979	Assign menu > Joint Loads > Forces	Type 35 , click OK
1163	Assign menu > Joint Loads > Forces	Type 40 , click OK
1347	Assign menu > Joint Loads > Forces	Type 45 , click OK
1531	Assign menu > Joint Loads > Forces	Type 50 , click OK
1715	Assign menu > Joint Loads > Forces	Type 60 , click OK



36. Click the **Show Undeformed Shape** button  to remove the displayed joint force assignments.
37. Click the **Set Display Options** button  (or the **View menu > Set Display Options** command) to display the **Display Options for Active Window** form. In that form:
- Check the *Labels* box in the *Areas* area.
 - Click the **OK** button.
38. Zoom in on the pier labeled Pier A in the problem statement.
39. Select joints 208, 213 and 218.

40. Select area objects 138 and 142.
41. Click the **Assign menu > Assign to Group** command to display the **Assign/Define Group Names** form. In that form:
 - Click the **Add New Group** button to display the **Group Definition** form. In that form:
 - Type **PIERA** in the *Group Name* edit box.
 - Accept all of the other default selections.
 - Click the **OK** buttons on the **Group Definition** and **Assign/Define Group Names** forms to exit the forms.
42. Click the **View menu > Restore Full View** command.
43. Select all points level with the bottom of the sixth floor windows by “windowing” (points 972, 973, 980, and so forth; “49 points” should display on the status bar in the lower left-hand corner of the screen).
44. Select all area objects level with the bottom half of the sixth floor windows by using the [intersecting line selection method](#) (area objects 730, 738, 742, and so forth; “24 area objects” should display on the status bar in the lower left-hand corner of the screen).
45. Click the **Assign menu > Assign to Group** command to display the **Assign/Define Group Names** form. In that form:
 - Click the **Add New Group** button to display the **Group Definition** form. In that form:
 - Type **6TH** in the *Group Name* edit box.
 - Accept all of the other default selections.
 - Click the **OK** buttons on the **Group Definition** and **Assign/Define Group Names** forms to exit the forms.
46. Click the **Define menu > Section Cuts** command to display the **Section Cuts** form. In that form:
 - Click the **Add Section Cut** button to display the **Section Cut Data** form. In that form:
 - Type **PIERA** in the *Section Cut Name* edit box.
 - Select *PIERA* from the *Group* drop-down box.
 - Accept all of the other default selections.
 - Click the **OK** button.
 - Click the **Add Section Cut** button to display the **Section Cut Data** form. In that form:
 - Type **6TH** in the *Section Cut Name* edit box.
 - Select *6TH* from the *Group* drop-down box.
 - Accept all of the other default selections.
 - Click the **OK** buttons on the **Section Cut Data** and **Section Cuts** forms to exit the forms.

47. Click the **Set Display Options** button  (or the **View menu > Set Display Options** command) to display the **Display Options for Active Window** form. In that form:
- Uncheck the *Labels* box in the *Joints* area.
 - Uncheck the *Labels* box in the *Areas* area.
 - Click the **OK** button.

48. Click the **Analyze menu > Set Analysis Options** command to display the **Analysis Options** form. In that form:



- Click the **Plane Frame XZ Plane** button  to set the available degrees of freedom.
 - Click the **OK** button.
49. Click the **Run Analysis** button  to display the **Set Analysis Cases to Run** form. In that form:
- Click on *Modal* in the *Case Name* list to highlight it.
 - Click the **Run/Do Not Run Case** button.
 - Click the **Run Now** button.

50. When the analysis is complete, check the messages in the **Analysis** window (there should be no warnings or errors) and then click the **OK** button to close the **Analysis** window.

51. Click the **Display menu > Show Tables** command to display the **Choose Tables for Display** form. In that form:
- Click on the *Structure Output* item in the *Analysis Results* area in the display area of the form.
 - Click the **OK** button to display tabular results.
 - Select *Section Cut Forces* from the drop-down list to display the forces at the defined section cuts.

52. When finished viewing the section cut forces, click on the **Done** button to close the form.