

Project Schedule

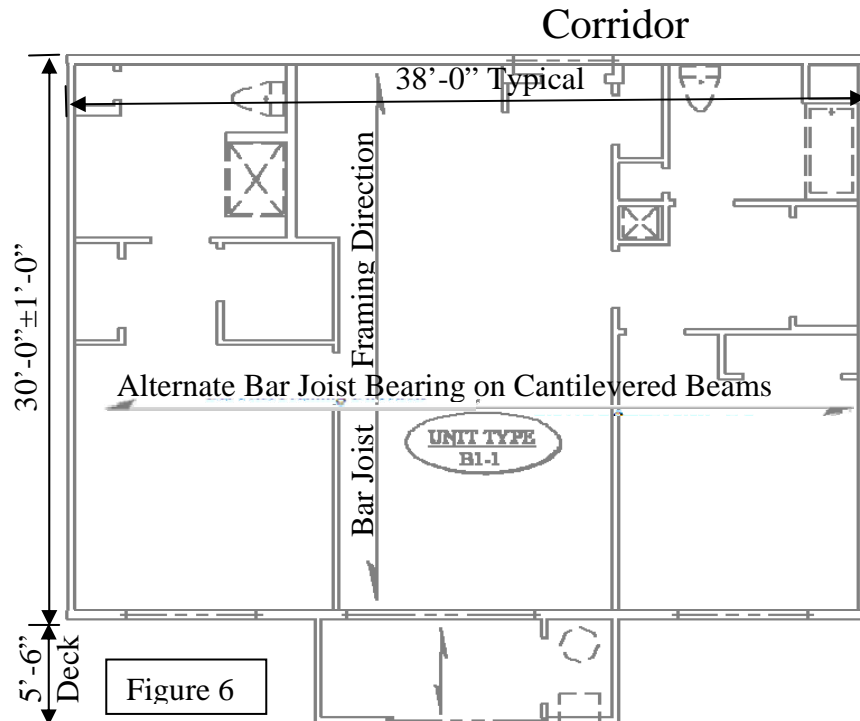
<u>Task</u>	<u>Weeks</u>	<u>Description</u>	<u>Exact Dates</u>
	Week of December 04, 2005	➤ Breadth topic research (EFIS)	•
	Week of December 11, 2005	➤ Finals week ➤ Review of steel and steel connections	• • Dec. 13-16
	Week of December 18, 2005	➤ Break	•
	Week of December 25, 2005	➤ Break	•
	Week of January 01, 2005	➤ Break	•
1	Week of January 08, 2005	➤ Classes begin ➤ Review of steel ➤ Determine best framing direction based on criteria from task 1 ➤ Calculate gravity loadings ➤ Determine preliminary member sizes	• Jan. 9 • Jan. 9-10 • Jan. 9-12 • Jan. 9-14 • Jan. 9-14
2	Week of January 15, 2005	➤ Adapt excel spreadsheet for braced frame lateral loads	• Jan. 16-21
3	Week of January 22, 2005	➤ Construct RAM model	• Jan. 23-28
	Week of January 29, 2005	➤ Complete RAM model	• Jan. 30- Feb 2
	Week of February 05, 2005	➤ Run computer analysis and process results	• Feb. 6-11
B	Week of February 12, 2005	➤ Update ram finite element building model using sizes established by calculations ➤ Construct system sequencing diagram for the braced frame system and compare with the light gage system	• Feb 13-17 • Feb 13-18
4	Week of February 19, 2005	➤ Spot check typical foundation sizes using Terzaaghi or Meyerhof bearing capacity method ➤ Conduct cladding analysis to create weather resistance for the EFIS system	• Feb. 20-22 • Feb. 22-25
B	Week of February 26, 2005	➤ Finish hand spot checks and finalize any unresolved issues	• Feb. 27-28
	Week of March 05, 2005	➤ Spring break	•
	Week of March 12, 2005	➤ Update building plans to reflect typical changes	• March 13-18
	Week of March 19, 2005	➤ Begin typing final report	• March 20-25
	Week of March 26, 2005	➤ Assemble and print reports	• March 27-31
	Week of April 02, 2005	➤ Final report due ➤ Prepare presentation	• April 5 • April 6-8
	Week of April 09, 2005	➤ First round of presentations	• April 10-12
	Week of April 16, 2005	➤ Correct and update presentation	• April 17-19
	Week of April 23, 2005	➤ Second round / jury presentations	• April 28

Tasks and tools to be used in each solution

Braced Frame Alternative

Task 1. Establish Trial Member Sizes

- Determine beam sizes based on a 38' max span and 21" ceiling height requirements. Determine if the use of shear studs as outlined in chapter 5 of the LRFD Manual are required for span and loading requirements.
- Establish if 5½" thickness of concrete and composite deck meets strength and vibration requirements based on manufacturer's data. Check for adequacy of three hour fire requirements based on Underwriter Laboratories (UL) testing.
- Determine the most economical floor framing direction. There are 2 options for framing directions: 31' in the North-South direction or 38' in the East-West direction bearing on steel beams that cantilever across the corridor, see figure 6 below. The systems will be compared by costs found in RS Means.
- Verify that the exterior corridor cantilever is adequate for loading.



Task 2. Determine Floor Loadings

- Find factored self weight based on member selections from Task 1.
- Establish superimposed dead loads based on building plans and use.
- Verify gravity loads established in Technical Report #2 with ASCE 7-98 chapters 3, 4, and 7.
- Verify lateral loads established in Technical Report #2 with ASCE 7-98 chapters 6 and 9.

Task 3. Complete Computer Analysis

- a. Input the steel braced frame members into a 3D RAM finite element analysis program.
- b. Assign lateral and gravity loading to the model based on the loads calculated in task 2. Set the computer analysis to analyze full and partial live load conditions to establish live load patterns on the structure.
- c. Verify adequacy of member sizes based on lateral loads occurring at cardinal directions and at 45 degree angles to the structure.
- d. Compare results for member sizes, loading on the footing, and story drift with the results of the hand calculations.

Task 4. Complete Hand Spot Checks

(To be used to verify specific members as needed)

- a. Using the Tributary Area Method for lateral loads, select the steel braced frame with the largest tributary area and calculate the seismic and wind story forces. Apply story forces to nodes and uniform gravity loads to horizontal beams.
- b. Adapting the Shear Wall Analysis excel spreadsheet created in Technical Report #3, calculate the axial and torsional loads on each braced frame in the system.
- c. Using the Truss Analysis, calculate axial and bending moments.
- d. Determine nodal loads using Portal Frame Analysis
- e. Select critical members within the truss and verify size using chapter 6 of the LRFD Manual based on interaction of the member's axial and bending loads.
- f. Determine story drift by the use of Virtual Work Method, as illustrated in the introduction to steel class at Penn State.
- g. Calculate new forces that are transferred to the foundation and size the foundation system based on the Terzaaghi or Meyerhof Bearing Capacity Methods.

Task 5. Final Analysis

- a. Design a cross brace-to-column connection capable of transferring the maximum calculated force. The connections chapter of the LRFD Manual and course notes from the Penn State master's connection course will be used to evaluate the connections. Calculate column to column splice connections for the frame in the same manner.
- b. Establish the final steel braced frame based on the RAM model.
- c. Verify that all calculated member and footing sizes in the final design of the structure correspond with the greatest loading of the structure.
- d. Prepare updated plans reflecting these changes to the structure.

Project Timeline

Week	Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Breadth Topic Research (EFIS)	█																				
2	Finals Week	█	█																			
3	Review of Steel and Steel Connections			█																		
4	Christmas Break			█	█																	
5	Break				█	█																
6	Classes Begin					█	█	█														
	Determine Best Framing Direction Based on Criteria from Task 1					█	█	█														
	Determine Preliminary member sizes					█	█	█														
	Calculate Gravity Loadings					█	█	█														
7	Adapt Excel Spreadsheet for Braced Frame Lateral Loads						█	█	█													
8	Construct RAM model						█	█	█													
9	Construct RAM model						█	█	█													
10	Run Computer Analysis and Process Results							█	█	█												
11	Establish Structural Steel Sequencing Diagram								█	█	█											
12	Spot Check Typical Foundation Sizes Using Terzaaghi or Meyerhof Bearing Capacity Methods									█	█	█										
	Conduct Cladding Analysis to Create Weather Resistance for the EFIS System										█	█	█									
13	Finish Hand Spot Checks and Finalize any Unresolved Issues											█	█	█								
14	Spring Break																					
15	Update Plans to Reflect Typical Changes																					
16	Begin Typing Final Report																					
17	Assemble and Print Reports																					
18	Final Report due																					
	Prepare Presentation																					
19	First Round of Presentations																					
20	Correct and Update Presentation																					
21	Second Round / Jury Presentations																					