ARCH 314
STRUCTURE I

RECITATION SESSION 6
FACULTY: Prof. Peter Von Buelow
GSI: Faezeh Choobkar
FALL 2025

Welcome to recitation session

Introduction:

Faezeh Choobkar (PhD student)
Contact: faezehch@umich.edu
Office hours: by appointment

Outline:

Quick Recap
Provide the solution for the assignment
Answering student's questions
Recitation lab

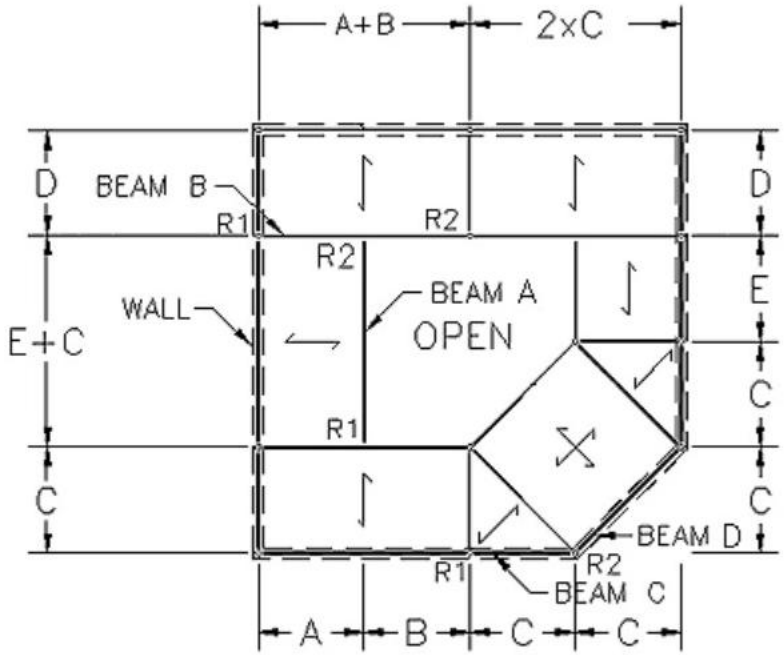
Problem Set

9. Floor Systems

For each beam, A through G, determine the loading from the floor, the wall and from other beam reactions. Then, calculate the end reactions for each beam.

DATASET: 1 -2- -3-

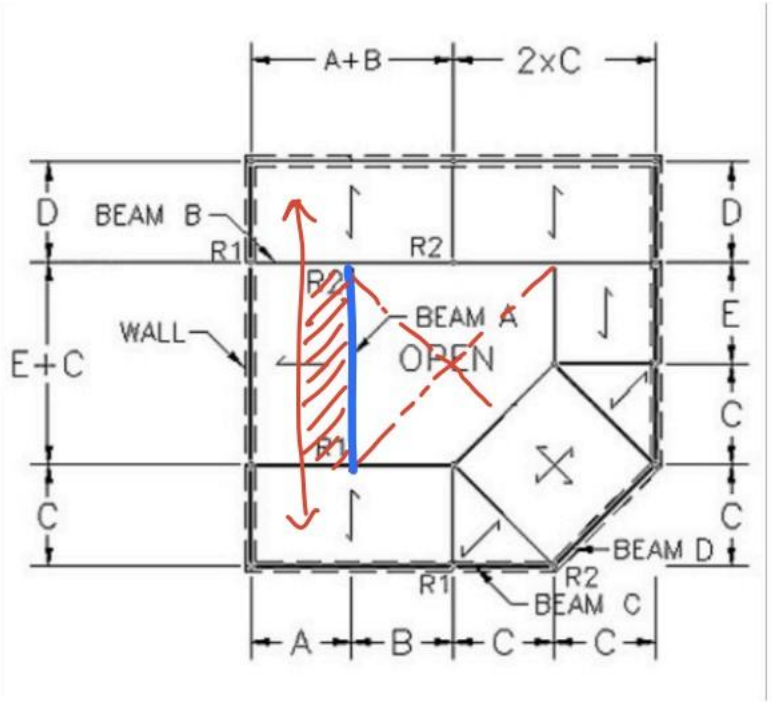
Span A	12 FT
Span B	14 FT
Span C	9 FT
Span D	12 FT
Span E	18 FT
Dead load of wall	580 PLF
Dead load of floor	49 PSF
Live load on floor	27 PSF



Problem Set

#	Question	Your Response		Correct Answer	Score
1	Full uniform load on Beam A		PLF	SUBMIT	
2	End reaction R1 on Beam A		LBS	SUBMIT	
3	End reaction R2 on Beam A		LBS	SUBMIT	
4	Full uniform load on Beam B		PLF	SUBMIT	
5	Point load on Beam B		LBS	SUBMIT	
6	End reaction R1 on Beam B		LBS	SUBMIT	
7	End reaction R2 on Beam B		LBS	SUBMIT	
8	Full uniform load on Beam C		PLF	SUBMIT	
9	Peak value of triangular load on Beam C		PLF	SUBMIT	
10	End reaction R1 on Beam C		LBS	SUBMIT	
11	End reaction R2 on Beam C		LBS	SUBMIT	
12	Full uniform load on Beam D		PLF	SUBMIT	
13	Peak value of triangular load on Beam D		PLF	SUBMIT	
14	End reaction R1 on Beam D		LBS	SUBMIT	
15	End reaction R2 on Beam D		LBS	SUBMIT	

Problem Set



Floor dead load :

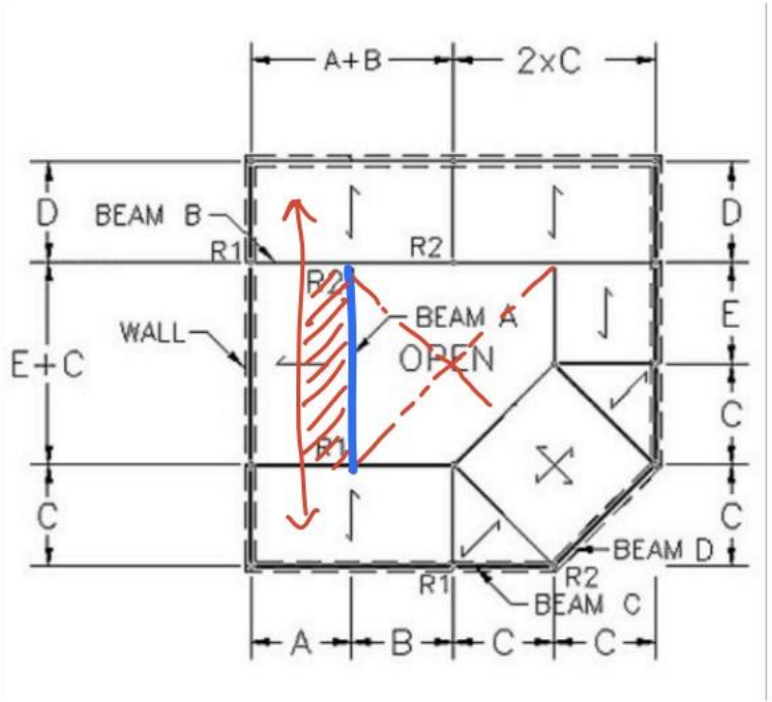
$49\ psf \times \frac{A}{2}\ ft = 294$

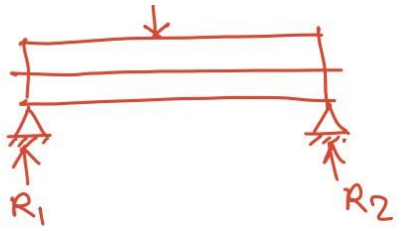
Floor live load :

$27\ psf \times \frac{A}{2}\ ft = 162$

$\rightarrow D_L + L_L = 456\ plf$

Problem Set



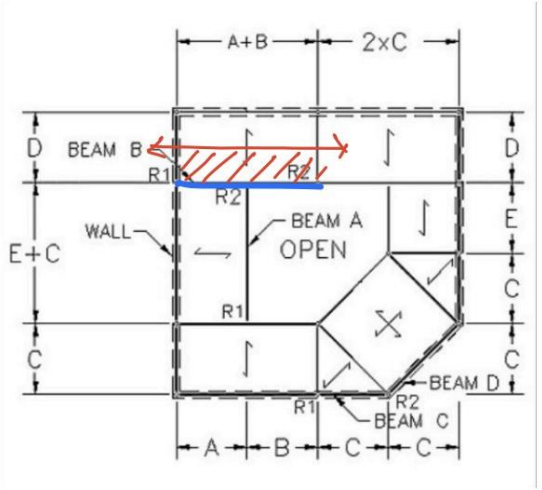


$L = E + C = 27\ ft$

$R_1 = R_2 = \frac{w\ell}{2} = \frac{456(27)}{2}$

$= 6156\ LBS$

Problem Set



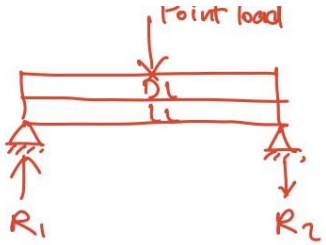
Floor Dead Load:

$49\ psf \times \frac{D}{2}\ ft = 294$

Floor live Load:

$27\ psf \times \frac{D}{2}\ ft = 162$

$D_L + L_L = 456\ plf$



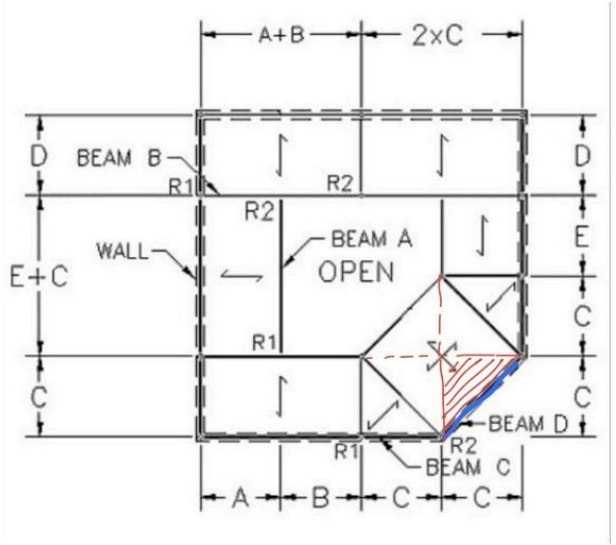
Point load = End reaction of Beam A = R_2 (Beam A)

= 6156 LBS

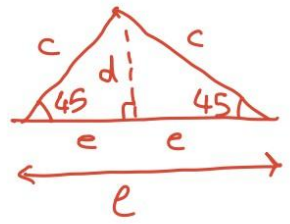
Total load on Beam B = $WL + R_{2(A)} = 456(26) + 6156 = 18012$ LBS

$R_1 = R_2 = \frac{W\ total}{2} = \frac{18012}{2} = 9006$ LBS

Problem Set



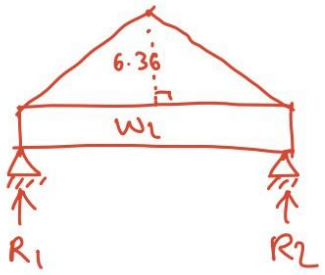
1. calculate the triangle Area.



$\sin 45 = \frac{\sqrt{2}}{2} = \frac{d}{9} \rightarrow d = 6.36$

$d = e = 6.36$

$\ell = e \times 2 = 12.72$

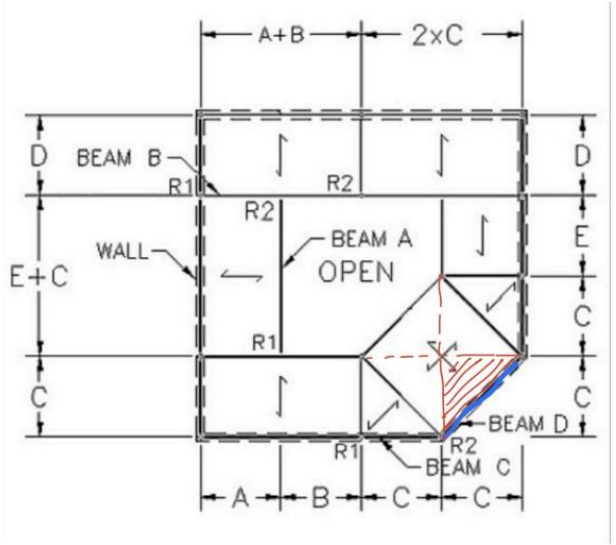


Peak of Triangle load:

$d \times (DL + LL) = 6.36\,(76) =$

483.36 PLF

Problem Set

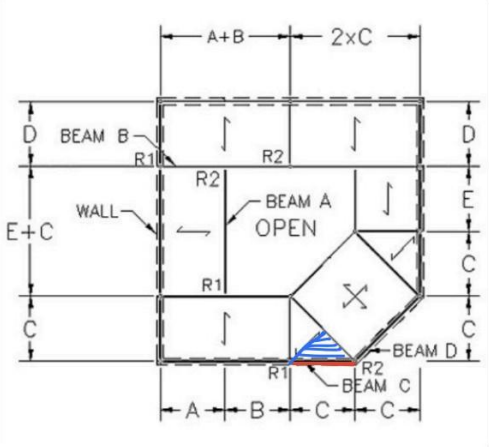


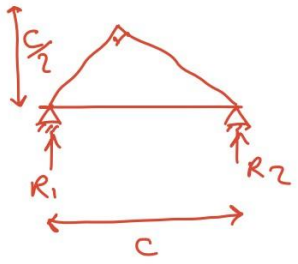
$$\begin{cases} w_{wall} = 580 \times 12.72 = 7377.6 \\ w_{floor} = \dfrac{we}{2} = \dfrac{483.36(12.72)}{2} = 3074.16 \end{cases}$$

$$w_{wall} + w_{floor} = 10451.76$$

$$R_1 = R_2 = \frac{10451.76}{2} = 5225.88 \text{ LBS}$$

Problem Set





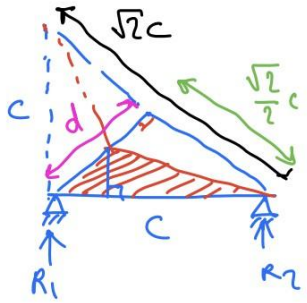
DL:

$49\ psf \times \frac{1}{2}\left(\frac{C}{2}\right)(C) = 992.25$

LL:

$27\ psf \times \frac{1}{2}\left(\frac{C}{2}\right)(C) = 546.75$

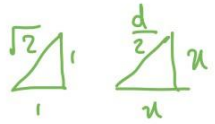
$D_L + L_L = 1539\ plf$



SPANC = 9ft

$c^2 = d^2 + \left(\frac{\sqrt{2}}{2}c\right)^2$

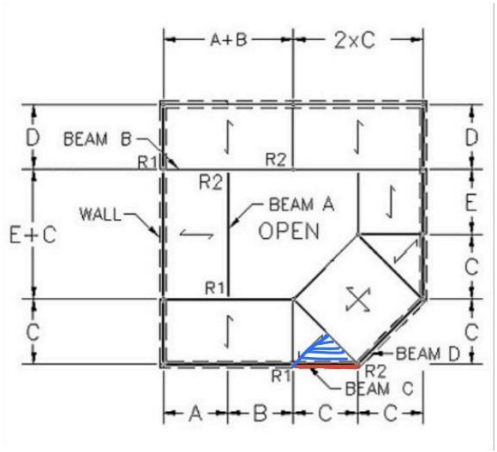
$\rightarrow d = \sqrt{c^2 - \left(\frac{\sqrt{2}}{2}c\right)^2} = 6.36$

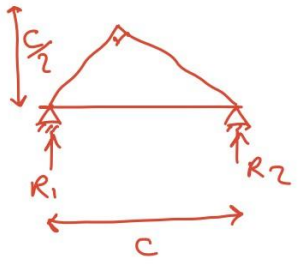


$\frac{1}{\sqrt{2}} = \frac{u}{3.18} \rightarrow u = 1.41$

Triangle Area: $\frac{1.41(9)}{2} = 6.345$

Problem Set





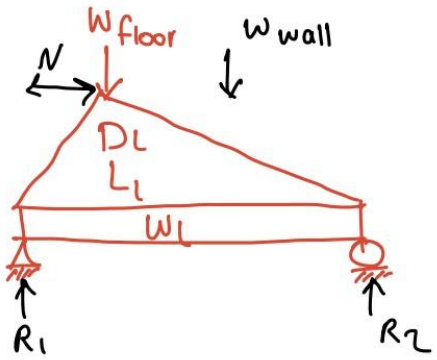
DL:

$49\ psf \times \frac{1}{2}\left(\frac{C}{2}\right)(C) = 992.25$

LL:

$27\ psf \times \frac{1}{2}\left(\frac{C}{2}\right)(C) = 546.75$

$D_L + L_L = 1539\ plf$



$w_{floor} = (49+27)(6.345)$

$= 482.22$

$w_{wall} = 580(9) = 5220$

$R_1 = \frac{5220}{2} + 482.22\left(\frac{2}{3}\right) = 2935.48$

$R_2 = \frac{5220}{2} + 482.22\left(\frac{1}{3}\right) =$

Structures II

Arch 324

Name 1 _____

Name 2 _____

Name 3 _____

Lateral Stability

Description

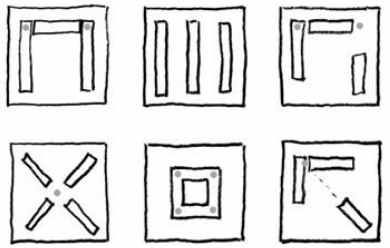
This project investigates stable arrangements of structural walls against lateral loading.

Goals

To observe the effects of lateral loading
To investigate the criteria of stable wall patters
To develop stable arrangements of shear walls based on the 2 point rule

Procedure

1. Arrange the small wood walls on the foam core base to support the MDF slab.
2. Make each of the six arrangements.
3. Apply lateral and torsional accelerations to the base and note the effects on the assembly. Mark on the diagrams below which fail and which remain stable.
4. Make your own stable and unstable arrangement.
5. Sketch the arrangements below and mark the intersection points.



Stable

Unstable

Due

During Recitation