FOR ARCHITECTS
HYPERFINE
No. 846 Brand
BY ARCHITECTS

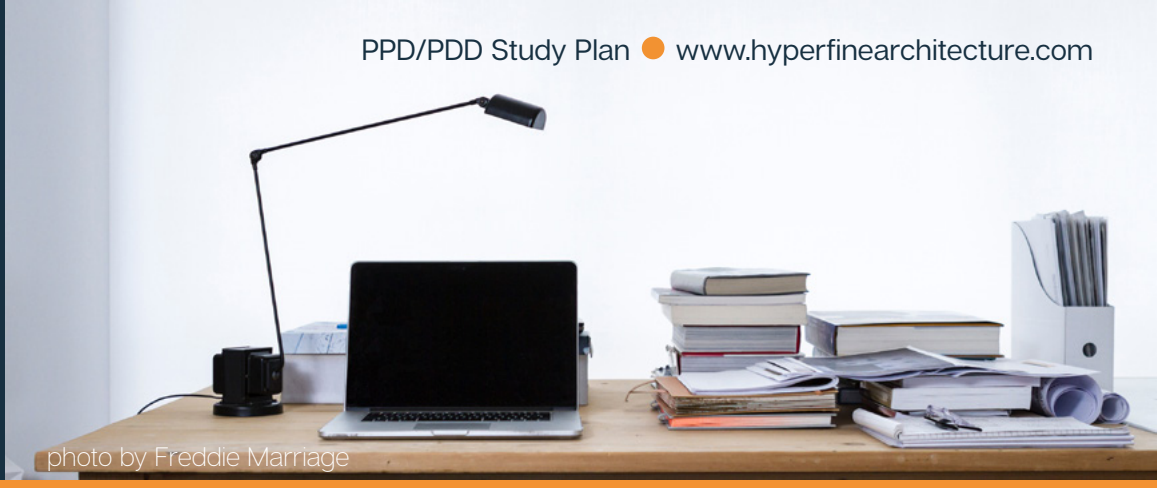


photo by Freddie Marriage

My final two ARE exams were PDD and PPD, in that order. I took them 10 days apart, so I was studying for both at the same time. This page shows my 8-week study plan, which ends with the PDD exam. This was a pretty enthusiastic plan and I did not follow it 100% because life. It did work for me though, so I wanted to share the exact resources I used to pass these exams.

PDD/PPD
8-WEEK STUDY PLAN

LEGEND

K = Kaplan PDD Study Guide • BS = Black Spectacles Videos • B = Ballast 4.0 Study Guide • HCL = Heating, Cooling, Lighting (Lechner) • PEA = Plumbing, Electricity, Acoustics (Lechner) • AGS = Architectural Graphic Standards • AHPP = Architect's Handbook of Professional Practice • BC = Building Construction Illustrated (Ching) • BCo = Building Codes Illustrated 2012 Version (Ching) • ASC = Architect's Studio Companion (Allen) • Q = Quiz • IBC = 2012 International Building Code • ADA = 2010 ADA Standards for Accessible Design

KEY

K2 = READ Kaplan Chapter 2
BS45 = WATCH 45 minutes of Black Spectacles (Pro Tip: Watch on 1.5X speed)
Q20 = STUDY 20 questions from any online or book quizzes to which you have access

WEEK 1
MECHANICAL SYSTEMS

MONDAY	K2 • BS45 • Q20
TUESDAY	B27 • B28 • BS45 • Q20
WEDNESDAY	HCL15 • BS45 • Q20
THURSDAY	HCL16 • BS45 • Q20
FRIDAY	HCL16 • BS45 • Q20
SATURDAY	HCL16 • BS45 • Q20
SUNDAY	REVIEW • Q25

WEEK 2
ELECTRICAL SYSTEMS

MONDAY	K3 • BS30 • Q20
TUESDAY	B18 • BS20 • Q20
WEDNESDAY	B32 • BS20 • Q20
THURSDAY	HCL12 • Q25
FRIDAY	HCL14 • Q25
SATURDAY	PEA2 • Q20
SUNDAY	REVIEW • Q50

READ my detailed review of each of the resources listed here

FOR ARCHITECTS
HYPERFINE
No. 846
Brand
BY ARCHITECTS

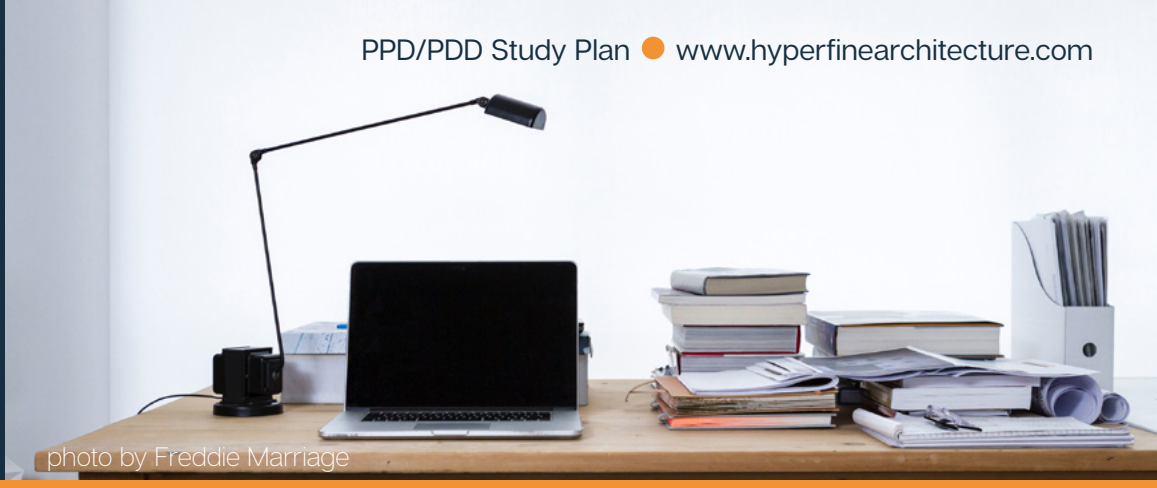


photo by Freddie Marriage

A note on quizzes: I find it helpful to practice answering questions and thinking about the answers. The ARE tests you as much on your test-taking ability as it does on your knowledge of these topics. So don't forget to practice taking tests. I also used quizzes as open-book research items. It's more important to know the answer than getting a high score on a practice quiz. Looking up the answer to a difficult question is a great way to retain information. AGS is great for this research.

WEEK 3
PLUMBING

MONDAY	K4 • BS40 • Q25
TUESDAY	B31 • BS40 • Q25
WEDNESDAY	Q25
THURSDAY	Q25
FRIDAY	PEA3 • Q25
SATURDAY	PEA4 • Q25
SUNDAY	PEA6 • Q50

NOTES: This is also included sprinklers and fire protection. I also stopped scheduling watching the Black Spectacles videos at this point. I thought they were very good for general HVAC stuff but the structural chapters and professional drawings standards stuff wasn't as helpful.

WEEK 4
STATICS / BEAMS / COLUMNS

MONDAY	REVIEW • Q30
TUESDAY	K5 • B12 • BC1 • Q30
WEDNESDAY	K5 • B12 • BC2 • Q30
THURSDAY	BCI
FRIDAY	K6 • B13 • BC2 • Q30
SATURDAY	K15 • B14 • BC • Q30
SUNDAY	K12 • B15 • BC • Q50

NOTES: This is when I first started looking at structures, a topic I felt generally familiar with. I did not spend any time memorizing formulas with cosines, vectors, or how to solve trusses, etc. I did make sure to understand basics like deflection, bending moments, slenderness ratio and tributary areas.

WEEK 5
WOOD + LATERAL LOADS

MONDAY	K7 • B18 • Q40
TUESDAY	AGS8 • Q30
WEDNESDAY	AGS8 • BCI4 • Q30
THURSDAY	BC • Q30
FRIDAY	K16 • B23 • BC5 • Q30
SATURDAY	K17 • B22 • BC6 • Q30
SUNDAY	REVIEW • Q75

NOTES: I do mostly residential architecture, so I was most familiar with wood as a structural system. Though it's not listed here, I spent a lot of time reading FEMA 454: Designing for Earthquakes to learn about lateral loading.

WEEK 6
STEEL + CONCRETE

MONDAY	K9 • AGS5 • Q30
TUESDAY	B20 • BC7 • Q30
WEDNESDAY	K8 • BC8 • Q30
THURSDAY	AGS • Q30
FRIDAY	B19 • BC9 • Q30
SATURDAY	K11 • B16 • Q30
SUNDAY	AGS • Q75

NOTES: I spent more time reading FEMA this week as well. Focus on Chapter 5. There were questions on PDD and PPD that I answered correctly specifically because I read that chapter.

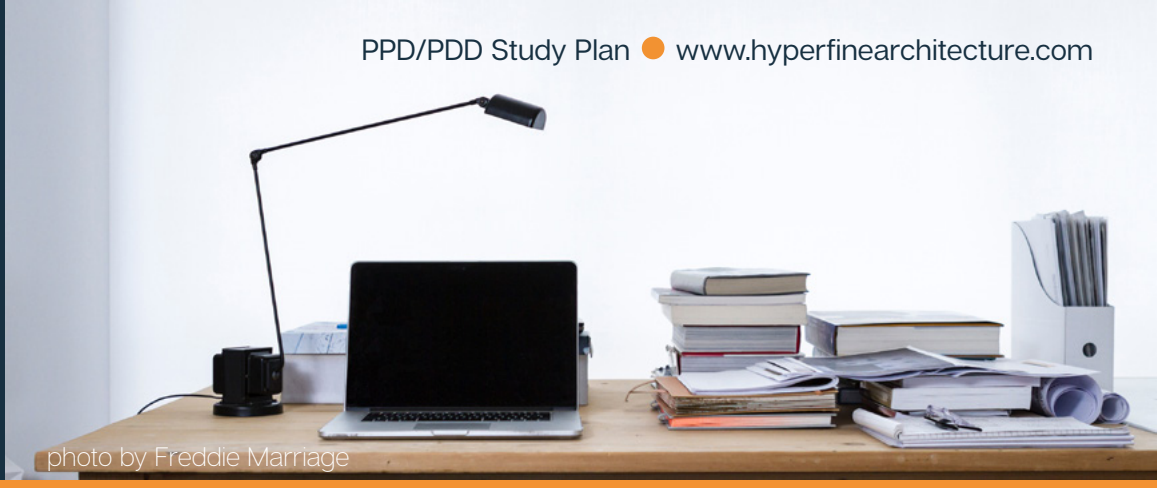


photo by Freddie Marriage

Again, I did not follow this guide 100%, but this was always my reference to what I should have been doing. On nights when I just couldn't study I would at least lay on the couch and watch relevant YouTube videos. You'll also see starting Week 3 I didn't do much on Thursday nights...I was teaching a Revit/Construction Documents class so I didn't plan a lot of study time that I knew I wouldn't end up doing. That class is now a premium online course, you can read about it HERE.

WEEK 7

ASSEMBLIES + METALS + VERTICAL TRANSPORT + ACOUSTICS

MONDAY	PEA5 • AGS13 • Q40
TUESDAY	PEA7 • Q40
WEDNESDAY	AGS7 • Q40
THURSDAY	Q40
FRIDAY	AGS11 (exterior vertical enclosures• Q40
SATURDAY	BC7 • BC8 • Q40
SUNDAY	REVIEW • Q100

NOTES: This was a catch-all week where I studied various random things that didn't explicitly fit any of the other categories. I looked at things like curtain wall details, galvanic action, elevator types and noise-reducing assemblies and materials.

WEEK 8

CODES + ADA

MONDAY	IBC3 • IBC4 • Q40
TUESDAY	IBC5 • Q40
WEDNESDAY	IBC6
THURSDAY	BC
FRIDAY	IBC7 • IBC10
SATURDAY	ADA 2 • ADA 3 • ADA 4
SUNDAY	REVIEW • Q75

NOTES: This week I focused on code and ADA stuff as well as generally reading through Ching Building Construction Illustrated

WEEK 9

TEST DAY + PPD FOCUS

MONDAY	PDD EXAM!
TUESDAY	PASS!
WEDNESDAY	-
THURSDAY	-
FRIDAY	ASC
SATURDAY	ASC
SUNDAY	ASC

NOTES: I didn't have a great plan for after PDD. I scheduled PPD 10 days later and in between I read the ASC and the IBC almost exclusively.

Free sample from the new 8-week guided study course.

Get 7 study assignments a week for 8 weeks. Started July 23rd.

Details and signup here.

PPD/PDD STUDY QUESTIONS

WEEK 1

Structures - Bending Moments

Code & Construction - Fire Separation

ADA - Door Clearances

Construction - Roof Flashing

Construction - U-Factors & R-Values

Mechanical - Refrigeration Cycle

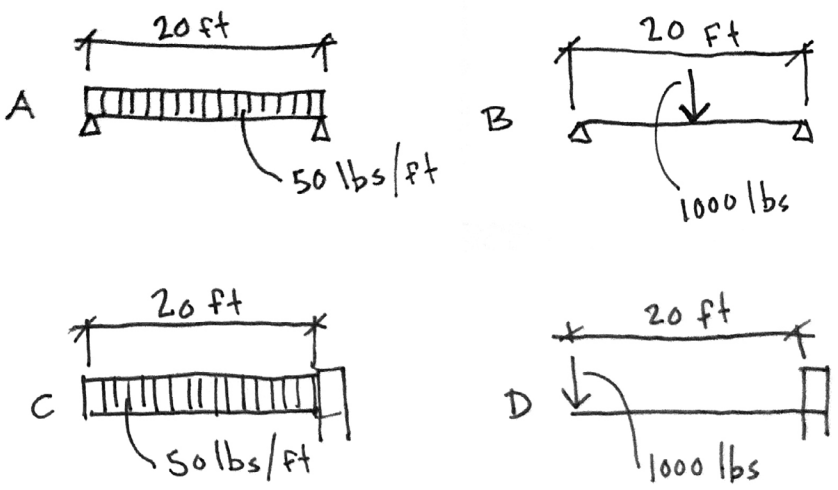
Sustainability - Double Skin Facades

STRUCTURES
ASSIGNMENT 1

Each of these beams is a W12x30. Consider the bending force acting on each beam:

- Which one is subjected to the most?
- Which one is subjected to the least?
- What structural property/formula should you reference?
- How much does each beam weigh?
- Does the size of the beam matter when considering bending moments?

Before you answer, which beam do you think you'd feel the most safe standing on?



A - Uniformly distributed load supported on both ends
B - Point load at center supported on both ends
C - Uniformly distributed load on a cantilever
D - Point load at end of cantilever

REFERENCES

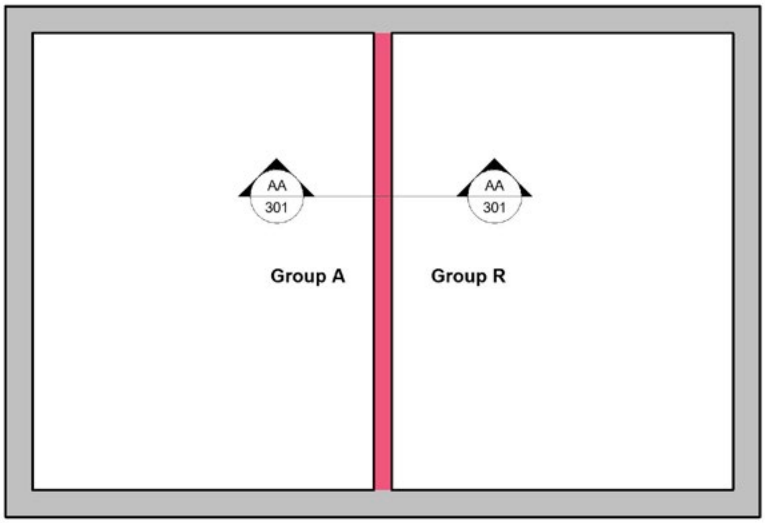
W-Flange Sizes
Structural Formulas - Architectural Graphic Standards pg 1026 - or - Structural Formulas Link
YouTube: Civil Engineering Academy - Finding the Max Bending Moment in Beams
YouTube: Dartmouth X - Types of Beams - Cantilever and Simply Supported
YouTube: Dartmouth X - What is a Beam?

YOUR NOTES

CODE & CONSTRUCTION
ASSIGNMENT 2

- What is the required separation (hours) between Group A and Group R occupancies? Assume the building is equipped with sprinklers.
- Sketch a wall section of a metal stud wall with the required rating.
- Repeat this for Groups I-3 and M with no sprinklers and a minimum STC of 50.

Don't worry about the top and bottom connections of the wall, just think about the layers of material you need.



not my best floor plan ever

REFERENCES

2012 IBC - Chapter 5 - Section 508
UL Wall Selector
Architectural Graphic Standards pg 529

508.4 Separated occupancies.
Buildings or portions of buildings that comply with the provisions of this section shall be considered as separated occupancies.

TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)

OCCUPANCY	A, E		I-1[a], I-3, I-4		I-2		R[a]		F-2, S-2[b], U		B, F-1, M, S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1[a], I-3, I-4	—	—	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	—	—	—	—	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R[a]	—	—	—	—	—	—	N	N	1[c]	2[c]	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2[b], U	—	—	—	—	—	—	—	—	N	N	1	2	NP	NP	3	4	2	3	2	NP
B, F-1, M, S-1	—	—	—	—	—	—	—	—	—	—	N	N	NP	NP	2	3	1	2	1	NP
H-1	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	NP	NP	NP	NP	NP	NP

YOUR NOTES

MECHANICAL
ASSIGNMENT 13

The diagram on the right is a Centralized Variable Air Volume system.

Before looking up the components:

» Is B producing heat or coolth?

» Why do you think that?

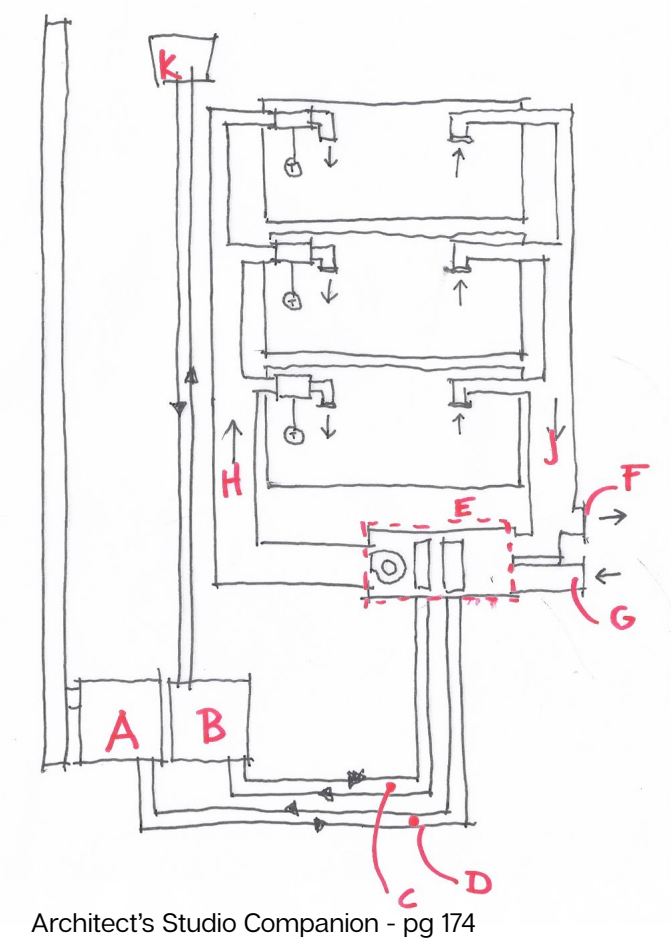
» Based on that answer, what do you think is in line C?

Ok, now you can look at some references

» Label all the lettered components

» Name some common project types that would use this system

» What are three advantages of this system?



Architect's Studio Companion - pg 174

REFERENCES:

Architect's Studio Companion (166, 168, 174)
Ching Building Construction Illustrated (11.17)
YouTube: The Engineering Mindset
Dept. of Energy Sustainability Guide Ch 5 PDF

YOUR NOTES

ELECTRICAL
ASSIGNMENT 14

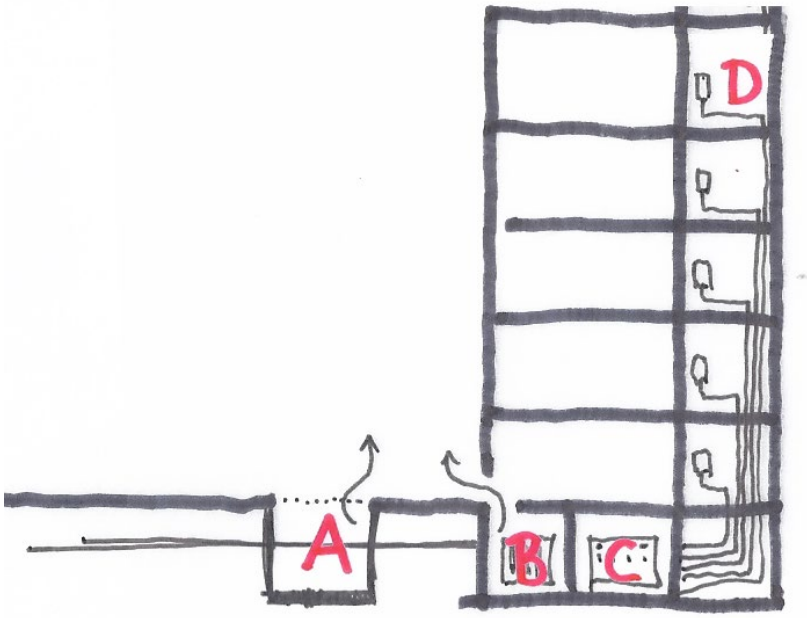
» What is a transformer?

Watts (W) = Volts (V) * Amps (I)

» Are watts higher or lower after the electrical supply goes through a transformer?

» What about volts?

» In the diagram on the right, which two letters are likely spots for a transformer?



Plumbing, Electricity and Acoustics pg 36

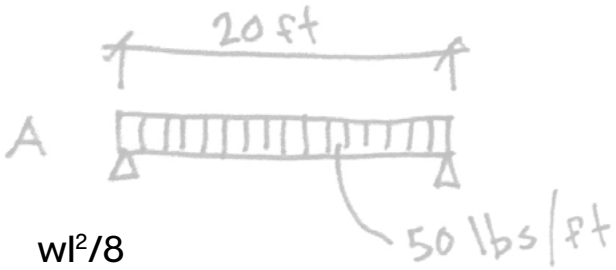
REFERENCES:

YouTube: Techquickie (watch at least the part starting at 2:45 about waterguns)
Plumbing, Electricity and Acoustics pg 38
Architect Studio Companion pg 188
https://www.explainthatstuff.com/transformers.html

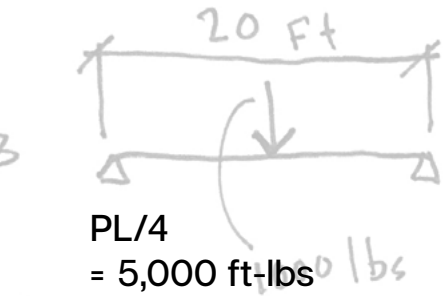
YOUR NOTES

ANSWERS

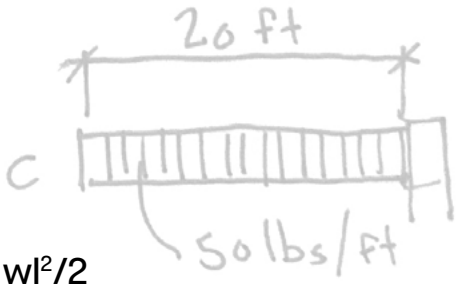
ASSIGNMENT 1



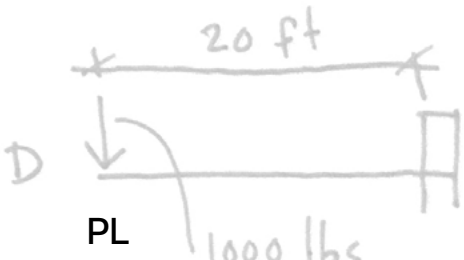
$wl^2/8$
= 2,500 ft-lbs



PL/4
= 5,000 ft-lbs



$wl^2/2$
= 10,000 ft-lbs



PL
= 20,000 ft-lbs

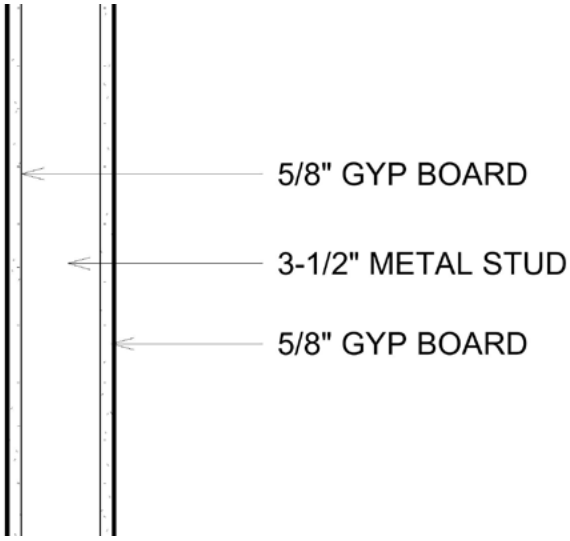
MAX MOMENT FORMULAS

D bends the most, A bends the least. This is a question about bending MOMENTS. You can find these formulas in Architectural Graphic Standards or at the link above, or by googling.

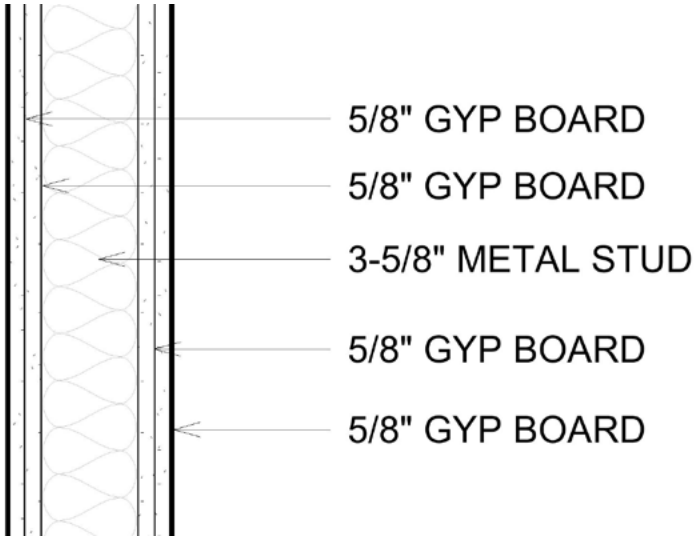
The beam itself weighs 600lbs. A W12x30 is 12 inches tall and weighs 30 lbs per linear foot. (20ft x 30lbs/ft = 600lbs) I didn't size this beam, so I don't know if it could actually support any of these loads. In this question the size of the beam does NOT matter. You can see from the formulas that the bending moment doesn't acount for any physical properties of the beam. It is only concerned with how much weight there is, what the span is and how much support there is. Watch the 2nd video link above for a good description of this stuff.

So do you actually have to memorize all the moment formulas? No, I don't think so. But you should be familiar enough with them to know that a beam with a point load will generally bend more than a beam with a uniform distributed load, and a cantilever will bend more than a beam supported on both ends. I would feel most safe standing on the beam supported at both ends, and that's the one that turns out to bend the least.

ASSIGNMENT 2



1 HR RATED WALL



2 HR RATED WALL

RATED WALL ASSEMBLIES

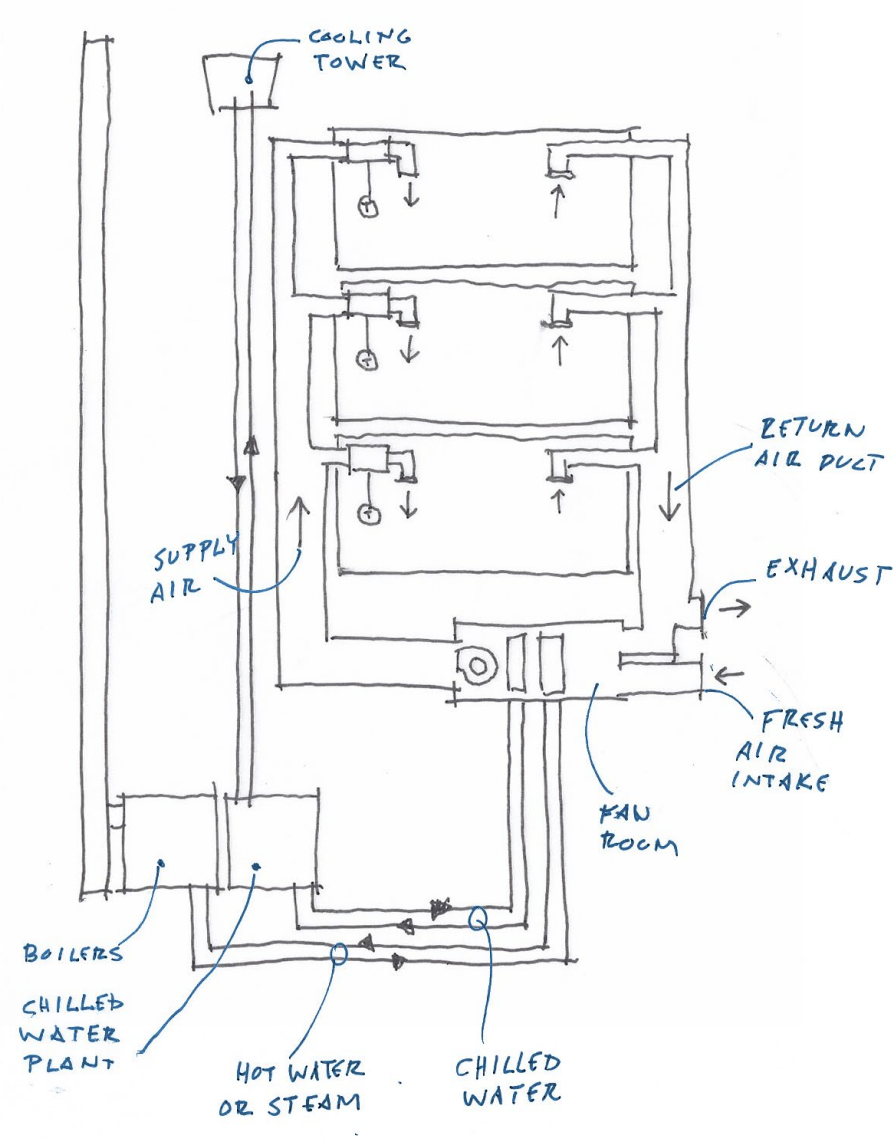
From Table 508.4, Group A and Group R require a 1-hr separation when the building is equipped with sprinklers. You can use a 3.5” steel stud with one layer of 5/8” gyp board on each side. Find this in the UL Wall Selector.

From Table 508.4 Group I-3 and Group M require a 2-hour separation when there are no sprinklers. You can get the 2hour rating by using a 3-5/8” stud and adding another layer of 5/8” gyp to each side. For the STC you can choose a variety of methods, including air gaps, resilient channels or insulation.

On the ARE you will probably be asked to find the thinnest, or the cheapest wall. Lots of ways to build these things, but adding layers of 5/8” gyp is typically the fastest way to get to your rating.

Don’t try to memorize the contents of Table 508.4, but do try to memorize that your required separations are on Table 508.4, so you can quickly find it in the provided resources if needed.

ASSIGNMENT 13

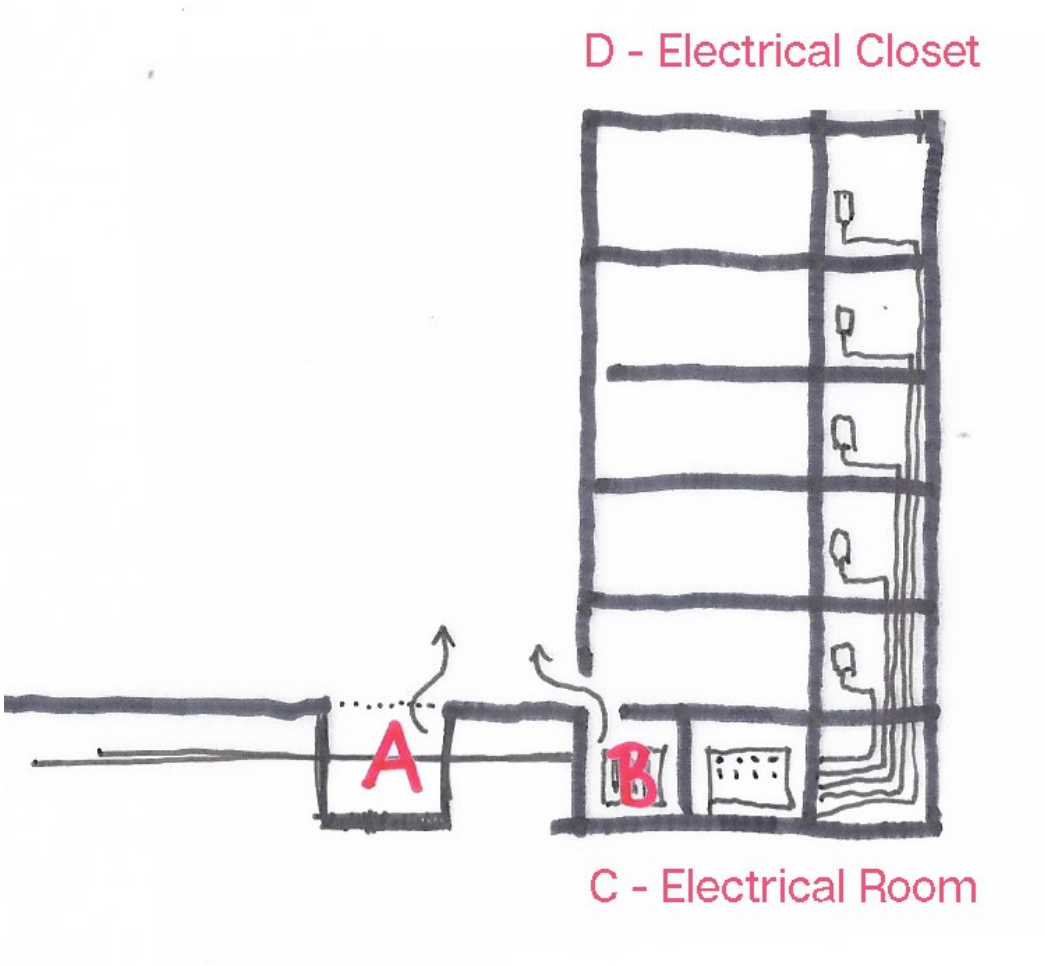


Component B is the chilled water plant, producing something cold. You can tell because it's connected via a supply and return to a cooling tower. Component A is the heating plant, it's only connected to an exhaust. If B is the chilled water plant, then the lines running into the building have chilled water.

According to Architect Studio Companion, Centralized All-Air Variable Air Volume Systems are used in all project types EXCEPT Apartments. This is probably because you can't simultaneously heat and cool different zones without some additional equipment.

Some advantages of VAV System (ASC pg 168):
Simple...low first cost
Maximum control of air quality and velocity
Can handle large changes in heating/cooling load
Minimal noise
Maximum flexibility for rental spaces over time

ASSIGNMENT 14



A transformer STEPS power, either up or down, so that it can be transported through power lines or used by buildings.

Trick question, Watts stay the same. As in the example sketch, the transformer will step down the voltage from the power lines to something more useable by the building components. But the Watts should stay the same, so only Volts and Amps are changed. If you watch the tech-quickie video at 2:45.

I think transformers are similar to going from the hose to the watergun.

This stepping down process produces a lot of heat, so the transformer will either be placed outside the building (A) or in the building on a space that has direct exterior access or venting (B)