



# WALKING THE ARE 50

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## Programming & Analysis (PA60) Practice Exam

40 Practice Questions + 2 10 Question Case Study

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# Walking the ARE 50 Practice Exam

*We crawl before we walk; we walk before run; licensure is hitting your stride.*

## **About the Exam**

A fitting play on words for the naming of this ARE 50 practice exam series. If you were like me when you were younger you had always dreamed of being able to call yourself an ‘architect.’ I knew the first day I stepped foot into my high school draft class that this was the career that I was going to build for myself.

This practice exam is just another step of many in your journey to completing the ARE Exams. The goal of this practice test was to provide testers with another outlet to test the knowledge they have acquired through the various NCARB resources, but doing it in such a way that it forces you to apply that information.

What sets this practice exam apart from the others currently available is that it gives a much larger variety of question types that you would find on the actual exam. Some do not provide those applied questions (drag and place, and hot spot marker) for this exam, when that is very much a reality when taking the test. Every question on every exam is important, carrying with it the same weight as every other. Learning how to answer the same type of question in a variety of different ways is invaluable to passing these exams.

The most efficient way to use this practice exam is to print out the answer sheets at the front of the PDF so that you can refer to them when the question applies. Some other tips when taking the exam, practice striking out and highlighting key information within questions as you read through them. This will serve as good practice for the actual exam. The last thing you should do when taking this practice exam is to time yourself. The exam duration for this 95-question exam is 3-hours, 15 minutes. Set a timer with that exam length, and pause it if you intend to take your 15-minute timed break as you would if you were sitting for the actual exam. Timing yourself is critical as this exam was written with the intent of creating some longer-worded scenarios that a tester could potentially run into on their actual exam that could push the time limit allotted. It is strongly advised that you utilize all of the time provided even if you should happen to make it through the exam with plenty of time to spare. Flag questions on your answer sheet as you take the test and if you complete the exam and all of your flagged questions, go through the entire exam for a second time only changing answers that you are positive need to be changed.

Finally, the other aspect of this exam that is drastically different than the others is the explanation of the answers. Some of the other practice material simply explains why the correct answer for the question is the correct answer and fails to explain why the other answers are incorrect. Failing to disclose that information is detrimental to your education. This practice exam attempts to change that by fully explaining each answer and also identifying how a potential answer could be correct if

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the question was worded a bit differently. Even on the questions that involve doing some calculation, it shows how to arrive at a potentially wrong answer in contrast with how to arrive at the correct answer. It might seem confusing at first, but sometimes the only way to fully understand the solution is to contrast it with a wrong answer.

### *About the Author*

Erik Walker is native of Minnesota and a graduate of North Dakota State University's architecture program as a part of the first year to receive their Masters of Architecture Degree in 2007. In addition to that, he also holds a Bachelor's Degree in Environmental Design and a Bachelor's Degree in History.

He completed his licensing exams in August of 2018 by passing all six divisions of the ARE 50 exams. In total it took eleven tries to pass those six exams over a 21-month period. The Practice Management exam was his biggest struggle, failing it twice on his way to completing the exam process along with failing the PA exam on the first try.

In addition to holding an NCARB Certificate, he has registrations in the states of North Dakota, Minnesota, and Wisconsin, and has completed work in Iowa, Oklahoma, Texas, South Dakota, Nebraska, Kansas, and Missouri while working for other design firms.

### *Exam Feedback*

If you would like to provide feedback or voice comments or concerns about this exam, you can reach Erik at the email address listed below by putting 'WTARE50-PA Feedback' in the subject line.

[3rik.walker@gmail.com](mailto:3rik.walker@gmail.com)

This process is not for the faint of heart and this exam in my opinion is absolutely brutal. It will do more than test your knowledge, it will test your resilience. Will you bounce back from that failed exam or will you rise to the challenge? Just remind yourself that this is a process and failing is not all bad, it is just learning what not to do on your next exam.

**YOU CAN DO THIS!**

Good luck on your ARE 50 exam journey.

## Walking the ARE 50 PA60 Practice Exam Answer Sheet

### Questions

- 1.) A B C D E F  
2.) \_\_\_\_\_  
3.) A B C D E F  
4.) A B C D  
5.) A B C D  
6.) A B C D E F  
7.) Use Supplement #7  
8.) Use Supplement #8  
9.) A B C D E F  
10.) \_\_\_\_\_  
11.) A B C D  
12.) A B C D  
13.) \_\_\_\_\_  
14.) Use Supplement #14  
15.) Use Supplement #15  
16.) A B C D E F  
17.) A B C D E F  
18.) Use Supplement #18  
19.) Use Supplement #19  
20.) A B C D E F  
21.) Use Supplement #21  
22.) A B C D E F  
23.) A B C D  
24.) A B C D  
25.) Use Supplement #25  
26.) Use Supplement #26  
27.) A B C D E F  
28.) A B C D  
29.) \_\_\_\_\_  
30.) Use Supplement #30  
31.) A B C D  
32.) A B C D E F

### Questions

- 33.) A B C D E F  
34.) Use Supplement #34  
35.) \_\_\_\_\_  
36.) A B C D E F  
37.) A B C D  
38.) A B C D  
39.) Use Supplement #39  
40.) Use Supplement #40  
41.) A B C D E F  
42.) A B C D E F  
43.) A B C D E F  
44.) A B C D E F  
45.) A B C D E F  
46.) A B C D E F  
47.) A B C D E F  
48.) A B C D E F  
49.) A B C D E F  
50.) A B C D E F  
51.) A B C D E F  
52.) A B C D E F  
53.) A B C D E F  
54.) A B C D E F  
55.) A B C D E F  
56.) A B C D E F  
57.) A B C D E F  
58.) A B C D E F  
59.) A B C D E F  
60.) A B C D E F  
61.) A B C D E F  
62.) A B C D E F  
63.) A B C D E F  
64.) A B C D E F

### Questions

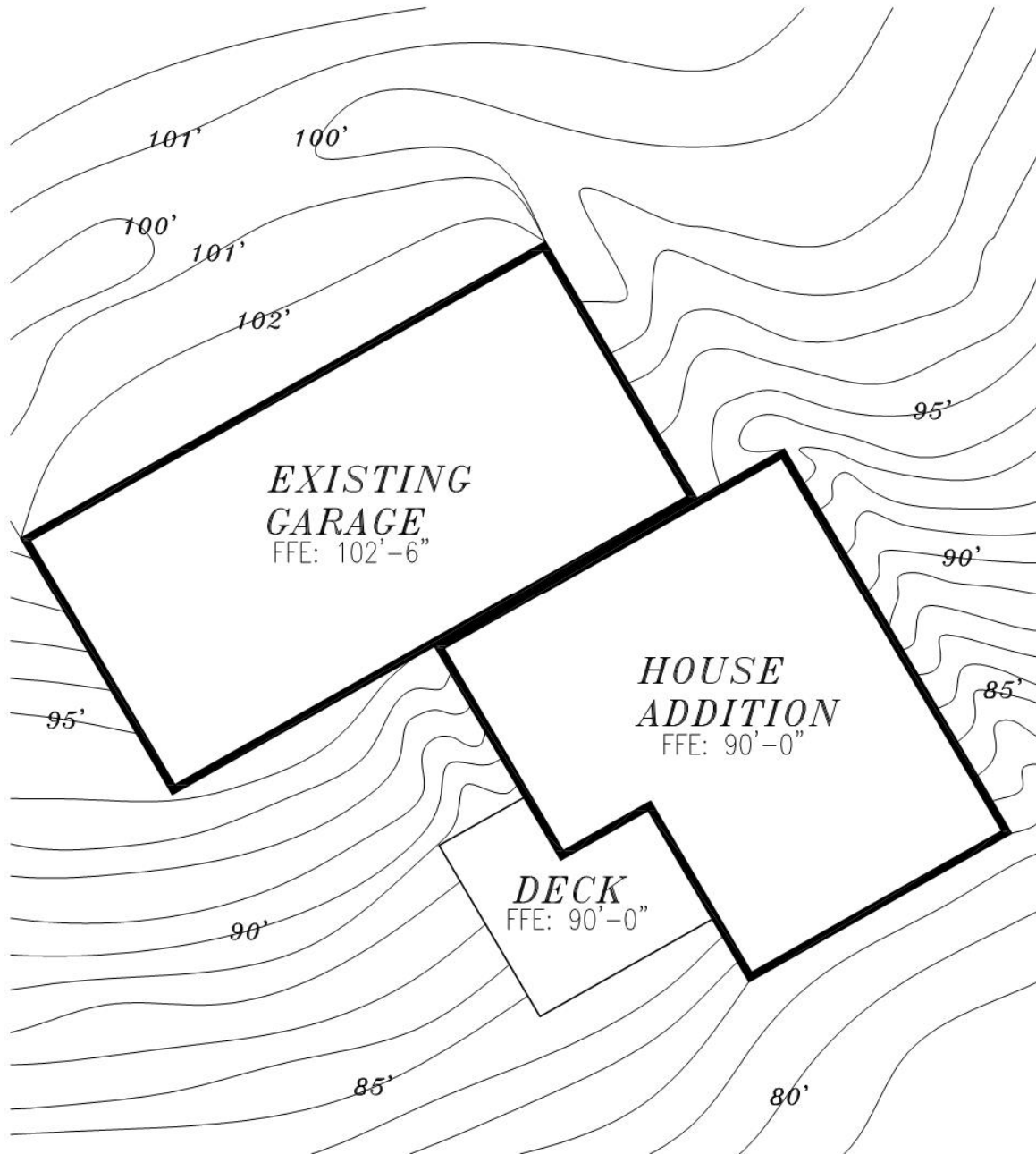
- 65.) A B C D E F  
66.) A B C D E F  
67.) A B C D E F  
68.) A B C D E F  
69.) A B C D E F  
70.) A B C D E F  
71.) A B C D E F  
72.) A B C D E F  
73.) A B C D E F  
74.) A B C D E F  
75.) A B C D E F

### Case Studies

- 76.) A B C D  
77.) \_\_\_\_\_  
78.) Use Supplement #78  
79.) A B C D  
80.) A B C D E F  
81.) A B C D  
82.) Use Supplement #82  
83.) \_\_\_\_\_  
84.) A B C D E F  
85.) \_\_\_\_\_  
86.) A B C D E F  
87.) A B C D  
88.) Use Supplement #88  
89.) Use Supplement #89  
90.) A B C D  
91.) \_\_\_\_\_  
92.) A B C D  
93.) A B C D  
94.) A B C D E F  
95.) Use Supplement #95



- 8.) Use the hot spot marker to identify the area of the drawing that should be cause for concern with the design of this new addition.

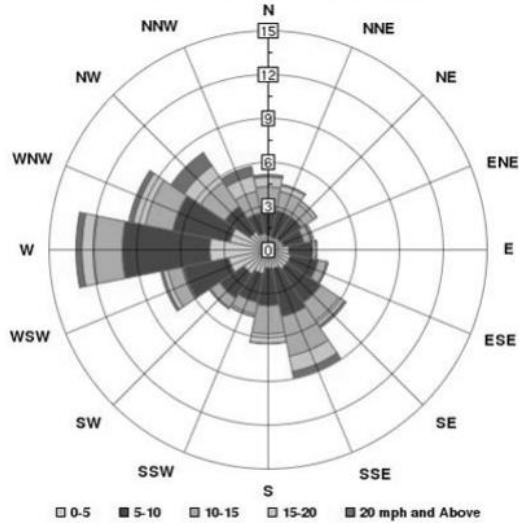


**SITE PLAN**  
SCALE: NTS



## Walking the ARE 50 Practice Exam (PA60)

1. An architect is designing a house for a client in a cold climate. Using the annual wind rose below, which sides of his house should have minimal windows to prevent air intrusion of cold winter winds? (Pick three)



- a. North  
b. South  
c. East  
d. West  
e. Southeast  
f. Northwest
2. A topographic map of a building site has been lost forcing the architect to calculate the drop of the drain pipe running from his hilly rural site to the center of the street. The plumbing consultant has requested 7.5% slope on the 315' long pipe running 8'-0" below grade to ensure that the water in the line doesn't freeze. What is the total drop of the pipe? (Fill in the blank, round to the nearest tenth)

3. A restaurant owner has approached an architect about helping her select a new site for her business. She likes this area because it is a good mix of buildings and believes that she can get a good amount of foot-traffic through her door. Using the image below, and with the listed criteria, which building number would be best suited to house her restaurant?

- Must be a stand-alone building
- Must have a view of some green space
- Must have access to adequate parking
- Must have adequate roof area for her new HVAC equipment



- a. Building 1  
b. Building 2  
c. Building 3  
d. Building 4  
e. Building 5  
f. Building 6
4. A potential client has approached an architect for a project. They are looking to build a research laboratory with a couple of small lecture halls that make up less than ten-percent of the total square-footage of the building to allow for the local college to use as over flow space. What is the occupancy of going to be classified as?
- a. A – Assembly  
b. B – Business & A – Assembly  
c. B – Business  
d. E – Educational

5. An architect has been trying to work out the net floor area for an office complex with his client. The building houses eleven water closets scattered throughout the 75,680 gross-square-foot, single-story building. What is the net square footage of the building if the water closets are 50 S.F. each?
- 68,319 S.F.
  - 68,869 S.F.
  - 68,916 S.F.
  - 69,630 S.F.
6. A new-build senior living recreational center is in the early planning stages and the architect is working with his structural engineer to determine which structural system would be best suited to span the 40-foot open space in this Type IIB building? (Pick three)
- Wood Joists
  - Laminated Beams
  - Shallow open-web joists
  - One-way reinforced concrete slab
  - Precast concrete plank
  - Concrete waffle slab
7. A small local retailer is looking to vacate their current space to build a new location. They are currently working with the architect to organize some of the critical spatial relationships that they are going to need in their new building. Using the criteria below on supplement #7, drag and place the correct symbol into the adjacency matrix. Some will be used more than once and some may not be used at all. (Drag and place)
- The Retail Floor should be next to the R&D Office and restrooms
  - The President has been complaining of noise coming from the current facility's break room
  - The Receptionist needs to be next to the retail floor and near the conference rooms to coordinate meetings
  - The R&D Office works closely with the President for new product development
8. An architect has been working on designing a house to a farmer's existing garage on a hilly site. The farmer was hoping to capture the views of the valley with this new addition. The architect has contracted with a civil engineer to help with the site grading due to the steepness of the site. The initial drawing that the architect received from the engineer can be seen in supplement #8. Using the hot spot marker, click on the area of the drawing that should be cause for concern with the design of this new addition. (Use supplement #8, hot spot marker)
9. A Neonatal Intensive Care Unit is planning a new addition in Phoenix, AZ in a location that is known for dust storms. If the building footprint is planned to be 88,150 S.F., and we assume that vertical dust space is 3-4 S.F. per 1,000 S.F., what is the most ideal building efficiency and resulting net square footage? (Pick two)
- 75%
  - 65%
  - 55%
  - 48,130 S.F.
  - 48,483 S.F.
  - 57,298 S.F.
10. A new retail center is in the works on a 100' x 75' site with a 15-foot setback on each side. The site according to the local zoning code has a FAR of 3.0. The owner of the retail center has asked that the building has an estimated building efficiency of 75%. What is the largest net floor area that the developer could build on this site? (Fill in the blank, round to the nearest foot)



- 1.) **Answer A, D, F.** For this question you need to be able to understand how to read a wind rose chart, and design principles utilized for different climates, specifically in this scenario, a cold climate. If we look at the wind rose given in the question, we will see that throughout the year the most frequent winds (not the strongest) come from the west and the south-southeast. The highest frequency of strong winds (over 20 mph) come from the northwest. Fundamentally, designing in a cold climate an architect should have the majority of the glazing facing south for solar gains. Optimal orientation of a structure is five-to-twenty-five degrees east of south. With that said, the sides of a house in a cold climate, using the wind rose provided should be blocked from the north, west, and northwest sides from cold winter winds. The reason Answer B is incorrect is because predominantly south winds tend to be and feel warmer than wind blowing from a westerly direction, when the question asked specifically which walls to protect against 'cold winter winds.' (Refer to Sun, Wind, and Light p.13-14) The correct answer is A, D, F.
- 2.) **Answer 23.63.** This is an example of how potentially this exam is designed to trip up a tester in that this long-worded question does not give a lot of information. The question is asking to find the total drop (or rise) of the drain pipe, and gives us the slope of the pipe (7.5%) and the total run of the pipe (315'). It also gives us an 8'-0" dimension, which in this case, is irrelevant in the outcome of the answer. The base of this question is to use the slope equation to solve for the rise of the pipe. Here is that equation:

$$\frac{\text{Rise}}{\text{Run}} = \text{Slope}$$

The first thing we have to do is convert the slope from a percentage to a decimal, and to do that we divide by 100.

$$\frac{7.5\%}{100} = 0.075$$

From there let's plug it back into the original equation:

$$\frac{\text{Rise}}{315'} = 0.075$$

Next, do some algebra to calculate for the rise:

$$\begin{aligned} \text{Rise} &= (0.075) \times (315') \\ \text{Rise} &= 23.625 \text{ rounded to } 23.63 \end{aligned}$$

The correct answer is 23.63.

- 3.) **Answer B.** In this scenario, we have a restaurant owner looking for a building to put her restaurant into, with 'restaurant' being the only key piece of information in the body of the question. With that in mind, this question comes down to process of elimination based on her criteria. The first thing she requested was a stand-alone building which would eliminate Answer C (Building #3). The next criteria she is requesting is access to green space. Of the remaining buildings possible, Answer D (Building #4) does not have any green space in the immediate vicinity, just a couple of small parking lot trees. The next thing she requested is

access to adequate parking. Of the remaining buildings on the list Answer A (Building #1) does not appear to have much more than the few street parking spots in front of the building so we can eliminate that one. Building #2 has those streets spots as well, but it is also close enough to the parking lot across the street for customers. That leaves us with buildings #2, #5, and #6 for the last requirement, which is for the building to have enough roof area for the new HVAC and kitchen equipment. With that said, the building that has the most unobstructed roof area to accomplish this is building #2. Answer E (Building #5) is smaller than the others making it incorrect, and Answer F (Building #6) is incorrect even though the apparent roof areas between buildings #2 and #6 are roughly the same. Building #6 has more equipment usage on the roof currently thus reducing the amount of total square footage she would have to mount her equipment. The correct answer is B.

- 4.) **Answer C.** For this question, the key pieces of information given in the question are ‘research laboratory,’ ‘lecture halls,’ and ‘ten-percent of the square footage.’ Armed with that information, in Section 509 of the IBC it states that incidental uses shall not be individually classified or occupy more than ten-percent of the total square footage of the story in which they are located. Therefore, Answer B is incorrect as we do not need to individually classify the lecture halls, which is classified as an assembly space. Since the primary function of the building is the research labs Answer A is incorrect, and even though in the question it stated that it was going to allow the local college to use the space as overflow, that does not then classify the space as an E – Occupancy. If you look at Chapter 3 of the IBC, it clearly lists research and testing laboratories under Group B. The correct answer is C.
- 5.) **Answer A.** This question is asking you to calculate the total net square footage of a 75,680 S.F. office building. In the question it gave you the number of water closets in the facility, which was eleven. We need to make two calculations in order to get to our answer. First, we have to multiply the 75,680 S.F. by 9-percent which is the typical gross building area required for mechanical spaces (Refer to ARE 5 Review Manual, p10-15 Table 10.3, ‘Space Requirements for Estimating Non-assignable Areas’). Here is the math for that:

$$75,680 \text{ S.F.} \times 0.09 = 6,811.2 \text{ or } 6,811 \text{ S.F.}$$

The next thing we have to calculate is the square footage of the eleven water closets which is typically 50 S.F. per water closet. Here is the math for that:

$$50 \text{ S.F.} \times 11 \text{ Water Closets} = 550 \text{ S.F.}$$

From there, we take those two numbers and add them together then subtract it from the gross building square footage to find our answer. Here is the math for that:

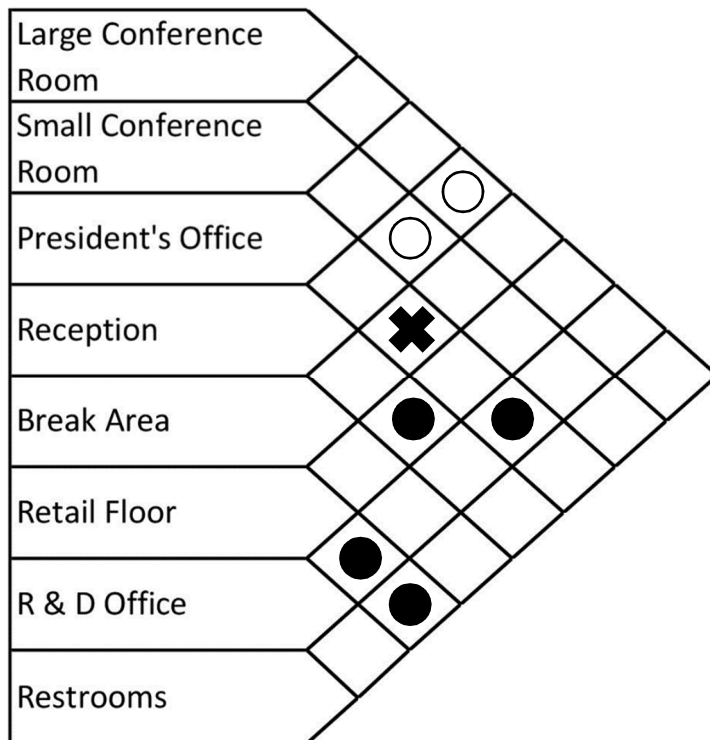
$$550 \text{ S.F.} + 6,811 \text{ S.F.} = 7,361 \text{ S.F.}$$

$$75,680 \text{ Gross S.F.} - 7,361 \text{ S.F.} = 68,319 \text{ S.F.}$$

If we look at the possible answers, the correct answer is A.

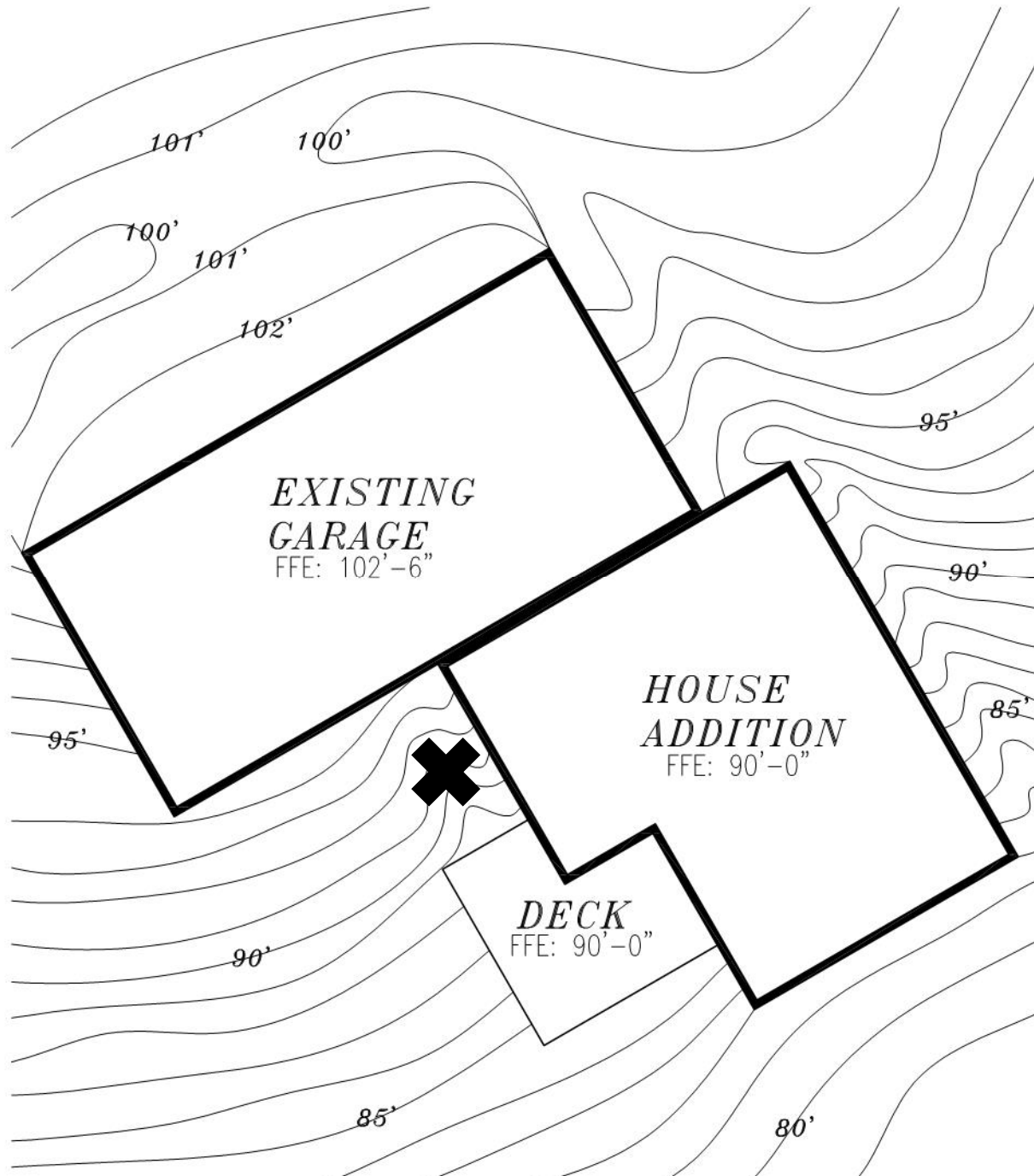
6.) **Answer C, E, F.** The essence of this question is to be able to select a possible structural system for this senior living recreational center that has to meet only two criteria, that it can span 40-feet, and that the system meet the requirements for a Type IIA building. For that reason, Answers A & B are incorrect as both are made of wood and would not satisfy the Type IIB requirement as both are made of combustible material. Answer B is the curve ball in this set of answers- as it can span upwards of 80-feet. This span requirement is the reason why Answer D is correct as well as a one-way reinforced concrete slab can span only up to about 15-feet. With that said, shallow open-web steel joists can easily make the 40-foot span and are non-combustible, precast concrete plank is also non-combustible and can make the necessary 40-foot span, and the concrete waffle slab also non-combustible able to span upwards of 55-feet. The correct answer is C, E, F. (Review the Architect's Studio Companion Ch. 1, 2, and 3 for structural system selection)

7.) Here is the correct answer:



If we break down each of the criteria listed, this is what we end up with. The retail floor needs to be next to the R & D Office and the restrooms hence the two black dots at the bottom of the table. The second piece of information given doesn't give us an adjacency but it suggests one. The President is complaining of noise coming from the break area therefore the two spaces should have no adjacency to satisfy the requirement. The third criteria also tries to throw us off by saying conference room(s) – plural – meaning that we will end up with two white dots as shown on the plan along with a black dot where the reception and retail floor come together. The final criteria for this question states that the R & D Office works closely with the President suggesting that their spaces should be adjacent to each other, which gives us the black dot the farthest to the right in the table where the two spaces intersect on the chart.

8.) Here is the correct answer:



On this diagram there are a few areas that could be cause for concern, above the garage, and east of the house and garage, and above the deck. The correct answer is the swale above the deck because that would deteriorate the deck and foundation over time if water was allowed to continuously run over and under it. The goal of site grading is to get water to drain away from buildings. The contours on the north and east sides are not ideal, but do indicate positive drainage away from the building. The correct answer is shown with the 'X'.