

I took the General Structures Exam yesterday and here are some comments:

There were 28 calculation problems, some of those didn't actually require math if you were familiar with the question type. There were no bolt, concrete, or joist girder type questions. Most of the questions were reaction and maximum FB type questions. There were a few  $F=P/A$  questions and those were very straight forward. There were 2 vector force problems but on one, you just had to determine the direction of the forces, not actually calculate the loads. There were 2 foundation questions, determine the load on the footing and how big does the footing need to be. There was a question about how much hydrostatic pressure would be required to lift a 6" slab.

I don't recall any history questions or any specifically having to do with the typical span for different size structural systems. There were a lot of questions asking you to choose the best system for the project type (dorm, office, library, etc.) They were fairly straight forward, and didn't seem like they were trying to trick you into a wrong answer (unless they actually tricked me and I missed them).

On the reference material, they provided quite a bit of information that you don't need, and not nearly enough of what you do. There was something like 20 formulas for beams with different types uniformly distributed loads. It is actually easier just to do it long hand than to try and introduce yourself to a new formula. They don't provide you with area calculations for various shapes other than square or rectangular (really - who would need those?) I actually could have used the formula to the area of a circle (I should have known it but I forgot it during the test). I didn't refer to the section properties of steel sections once. Hopefully it's because I didn't need to.

On GS, I used every second. I answered all the non math questions first and finished with those in about 1 hour and 30 minutes. I reviewed all the math problems, answered the ones I knew and tried to figure out about 6. With 1 minute to go, I just chose answers on 2 questions.

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There were 3 or 4 questions. To be honest, I didn't even try to learn truss problems. I was struggling to understand them completely and felt that I would sacrifice the questions I got on trusses and would spend my remaining available study time on other subjects.

I would seriously recommend that you skip all the calculation problems - don't even read them until you have gone through and answered every one of the other questions. That way, you don't add to your apprehension or start thinking that you don't really know what you are doing (when in fact you probably could eventually figure it out). I answered around 100 non math questions in about 1 hour 45 min and spent every minute that I had remaining on the math problems (leaving the truss problems for the very end). As it turns out, I finally got to the truss questions with about 5 minutes remaining so I simply guessed the answers. If I had tried to do those ones first, I would have spent too much time on questions that I had a low chance of getting correct and I would have run out of time and not answered questions that I probably got correct.

This is a pretty no nonsense way to approach this test but I have taken all nine tests, passed the first 8 and I am awaiting the results of number 9. I have always been a very poor test taker and more times than not, create most of my own problems - mostly because I stress out. Study diligently, every day and use your common sense. Many of the example test problems you get in the guide books are much more difficult and take far to much time - you would never get questions like that on the test. Occasionally you will get a ridiculously difficult question - its better to guess and move on than to spend precious time on them.

Remember, history and definitions count as much as the math questions and there are a lot more of them.

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For moving loads reference AISC Steel Construction Manual Beam Tables. Look at diagrams 40,41 & 42 in the green covered ASD ninth edition on page 2-310.

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General Structures:

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Later you will be amazed how some direct answers are just in front of you. (I.e.: How much is the code's minimum uniform load required for an office space?)

A bunch of formulas and diagrams will be also in the screen ready for use: Bending moment, shear, deflection, etc.

Warning: no direct reference to specific wood or reinforced concrete formulas / coefficients, so try to memorize those in the convenience of your home.

Others questions are just answered ½ hour later in the body of a future question (because the options given, you will see).

My exam:

22 questions involving formulas.

10 questions regarding interpretations of diagrams.

Ridiculous questions about nail calculations: 5 (that is curious, only 3 involving bolts).

Trusses: 5 questions.

History: 2 questions.

Interpretation of pictures: 5 questions.

All other questions were just common sense guessing about different situations in the amazing world of the structures.

Exam time: I noticed that the time was quite exiguous for me, especially because the calculations. (Be quick, if you spend more than 2 minutes, go ahead, mark the question, and review it/those in the last ½ hour).

So, guys... be safe... be careful with the axial loads.

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Just got back from the GS exam and I thought I'd post because it was fairly tough and frustrating. I'm blurry eyed, but here goes.

Before the exam, during the 20 min. tutorial, you can review all the reference pages. Mine had many of the beam diagrams and formulas right out of the steel manual, a list of not-so helpful formulas, 2 bolt charts (shear & bearing), many W shapes property charts. No wood charts, load reductions, steel joist charts or concrete/reinforcement. Steel info.

Almost all of the questions I got were related to picking structural systems based on situation, cost or loads. The questions are phrased impossibly so I spent time trying to figure out WHAT they were looking for. For example: "With respect to fire resistance, which of the following is NOT a requisite factor in a structural system during design?" The answer choices were A. structural failure, B. occupancy, C. load, D. member span.

They would often ask a question and then give complicated answers which you have to interpret. For example: when asked, "Why choose a truss over a steel beam in this situation?" the answer was "a lower capacity crane can be used" instead of just saying "it's lighter." (and, that's a more obvious one...)

I had probably 20 variations of beam diagrams (solving for reactions, loads, shear, moments), 4 history questions, 1 truss question which only asked about tension or compression in members - no numerical forces, 6 retaining wall/pool wall/pile questions, 5 soil questions (test types, classifications), 1 question about bolt capacity, 10 or so questions about interpreting pictures (metal hangers, space frames, force resultants, foundation types, weld diagrams). I had a few questions involving thermal stress and deformation. Lots of questions about properties of arches and rigid frames. Some involving loads and tributary area. Even a few questions that were straight out of Mat & Methods.

There were probably about 25 questions involving formulas. Most of them were asking for a ratio, not actually asking you to solve them. For example: they would ask what the difference is between an equally loaded glu-lam beam and steel beam, giving you all the stats (A, S, E, I, etc.) on both. The answers were always like "2 times more" or "1/3 more" or "25% less." Or, for example, they would ask which property ISN'T a factor in determining column bending. The answer is based on the formula components.

Often, they would ask you to solve a problem by an obvious formula, in a not-so obvious way. They would give you load, moment, sect. mod and area of a beam and ask you to give the max span. Or using the info they give, solve one formula in order to solve another for what they are asking for. It is really helpful to know your algebra...

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Having just taken this test... You do not need to memorize the formulas, they are provided in a worded format (i.e.  $watts = volts \times amps$ ). However, in my test, there was a few questions that had no tables associated with them and required a table to do a 'simple computation' - I would never have thought to memorize the \$/unit measurement of a

combustible (hopefully it was one of the 'test' questions)! I can only suggest that you study in order to be able to draw conclusions from the material you covered.

My materials of study were ALS (too focused on calcs that were not necessary), Ballast (a great deal of erroneous information) and the arch exam prep guide (basically useless). I had the recommended 'M&E Equipment for Buildings' book but thought the others would surely be good enough. Having gotten back home and looked in this book and found some of the answers, I was wrong, I would highly recommend those books on the recommended reading list from NCARB. These study guides, while good in general information, were not enough of a basis for the conclusions the exam required. I am hoping that my extensive experience in architectural surveying was enough - we shall see.

It is important to understand, and something I am having a difficult time with, that these exams are not testing us about what you, and I, think an Architect should know; like fire hose cabinets should be no more than 130' from all points it serves, but it is testing on a majority of things that are not something an Architect would generally be required to know in professional practice, like the maximum number of disconnect means in a service entrance. This is the reason that all Architects, if you ask them, would say they don't think they could pass the test if they had to take it again today. Having several professional Engineers as friends, they find it humorous that I am being tested on things that I can legally not do (can you say Lateral Forces?). I plan and would encourage all candidates to try to affect change in the Licensing process by channeling the exam to be more appropriate to the practice of architecture in the 21st century verses that of the renaissance.

[I've taken Material/Methods and passed and Contract Documents/Services which I feel very confident I passed].

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Interesting comments. When I first began taking the exams, I had similar thoughts and still do.

A few of these exams are like this but Pre Design and Mechanical / Electrical / Plumbing exams are terrible exams. I did pass them, but feel the exams are very poorly put together. (Pre Design and MEP)

As far as the Lateral forces exam is concerned, this exam is a legitimate architectural exam. It is not geared toward being an engineer, and the engineer's exam is quite a bit different than the ARE. To practice architecture, you must be educated on a building's structural capabilities / limitations. The reason (one anyway) is that you are often to provide an owner with the structural schematics way before you ever hire an engineer. So you have to pick a system, and get it past the schematic design phase, to establish a budget, etc.. If you let an owner think that they could build a certain type of building, but pick the wrong system you might have just created a tough project.

You get the idea, but structural is very important, and the ARE doesn't expect you to be an engineer, but you need to be able to talk sense with one. If you had to hire a structural engineer in the preliminary design phases, then your fees would be too high to compete with an architect who knows structure. Keep in mind that early design phases are often done without fees for the architect in hopes of getting the job (competition with other firms), and if you had to always hire an engineer for 'free' work, then you will not be driving that nice car/truck/boat that successful architects have (ha).

But anyway, I agree, some of the exams are not written very well, and certainly need some revamping.

We all have different backgrounds, and different future plans for using our licenses. So different exams might not seem right to some people. You, for example, don't plan to use the structural knowledge in the future, where I see it as very important. Others plan to do renovation work, and see a need for the History exam to be reintroduced, I don't like the history part, and get along fine without it.

Well, good luck with the rest of your exams!!!

My guess is that you will see why some of these exams were required some time down the road, even if they were written poorly.

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My suggestion is that you should take GS and LF "back to back", because it is a lot of overlapping info and the little extra effort is worthy. Believe me.

This is my experience in both exams:

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Lateral Forces:

I studied with the ALS book, mock exam and ALS flashcard program (that's very good). Also I used the book Design for Earthquakes, author: Ambrose and Vergun, editor: Willey & Sons.

I begun with the ALS study guide as a starting point and then used the other book as a back up. I found the reading of the book very helpful because most of the questions were related to real situations at the work. Also I recommend to have read (and photocopy) the complete Chapter 16 of the UBC.

I got almost no calculations and either none truss calculations, but yes a lot questions regarding conceptual considerations and interpretation of pictures and sketches. I agree that the exam is not that easy, and a little tricky, but if your first performed GS (there is a lot of overlapping info) and some little common sense, you will be OK.