

Study Materials (listed in order of high use):

1. Ballast
2. **ALS (I found this to be the best as far as content – SURPRISE!!)**
3. Materials and Methods
4. International Building Code, UBC, BOCA code books
5. Ching Visual Dictionary
6. Flash Cards
7. Test bank from ALS
8. Architectural Graphic Standards
9. FEMA books (listed in other posts)

Exam notes to study:

- I reviewed GS notes - primarily bending moment diagrams.
- ALS covered the majority of the information on the exam, but was also heavy in math. Its good for training in concepts, but you won't use it much.
- Know the variables used in the equations – what they stand for and what units they are in.
- Retaining walls - I think there are lateral forces applied on these walls and this may show up again on LF (I didn't have any retaining wall questions on the GS).
- **Code references to wind and seismic forces – I glanced through them. UBC was referenced in most of the study materials, but we use the IBC and the terminology was different than UBC for similar variables.** The test did not use the UBC terminology.
- I also glanced through the BOCA code from 2000, and some of the FEMA books – primarily for information on retrofitting existing structures, visual identification of existing structures weaknesses, plan irregularities.
- **Wind velocity and speed (mph to psf - $P=0.00256V^2$) know how they relate; how do you get force given velocity.**
- **Drift – how it relates to wind forces and seismic, pounding, measurements for air speed and seismic activity,**
- **How to retrofit an existing structure for lateral forces – what would you do if it was a historical structure, a metal building, etc.. and what would you use – frames, moment resisting frames, braces, shear walls, buttresses; AGS gave some OK information, but the FEMA documents (not sure which one) gave**

more information.

- **irregularities in structures and how they respond to seismic activities, and wind forces. Again FEMA documents were helpful, Ching as well.**
- **heirarchy of building structural systems from most ductile to most stiff (moment frames - braced frames - shear walls) and which is "better" - ductile absorbs the energy better but will suffer interior system stresses (ceiling tiles and grids and lights fall all over the place). This is key. Ductile systems absorb the energy better and result in less seismic force because they tend to be lighter than rigid systems. Ductile systems on bedrock work better than on clay. Be able to understand how these relate back and forth – ductile versus rigid. Also, know some synonyms for ductility and rigidity as the terms on the exam will try to confuse you by using synonyms of these words.**
- shear walls are stiffer but heavier and the base shear force will be higher (generally – unless they are made of wood).
- **Not as much memorizing, but understand the different variables that go into base shear and how differences in soils, systems, irregularities, zones, etc... affect the structure. Know how these variables relate to different resistant systems**
- **Ground acceleration, resonance, periods of buildings versus soils, oscillation, how dampening devises affect resonance, what is a period, what affects a period – kind of like a sign wave or sound wave of how a building dances in reaction to a lateral force, how stiffness relates to resonance; soils in long periods and short periods, building characteristics of long and short period structures. Think of a smooth placid pond. No waves or wind so the surface is like glass. Now, throw a pebble into the pond and notice how the water reacts. The waves emanate from the pebble (epicenter), are largest closest to the epicenter, and dissipate out as they radiate away from the epicenter. Imagine this same idea on land and the ground acts the same as the water, except there are deposits of rock, clay, sand, muck in various locations which will magnify or dissipate the waves to varying degree. Know how ground conditions, stiffness, strength, rigidity, ductility will affect the waves. Google sound waves/sonar and understand how amplitude changes will affect the waves. Seismic is similar in these considerations.**
- **parapets and how they react to seismic forces, overturning moments, base shear at the bottom of the parapets where they connect to the roof, etc.**
- **diaphragms/shear walls and how they operate like a big wide flange beam on its side with the web being the diaphragm and the shear walls being the compression and tension flanges and how important the connections of the walls are to get the loads to the foundations.**
- **Recommended seismic design practices: symmetry in systems, keeping the**

resistant design elements as far from the center of gravity/rotation for the building as possible, continuity in the building, redundancy in the design, torsional problems. Goes back to system irregularities.

- **Remember that even a "perfect" building will experience torsion (called accidental torsion) due to someone moving a desk or file cabinet out of symmetry - simple stuff like that can affect torsion and the code wants it accounted for.**
- Maximum acceleration occurs when period of the building is 0.5 seconds - which will result in 2-3 times the ground acceleration being experienced by the building.
- **Use of wood diaphragms and their construction and connections.**
- Remember that the Gulf of Mexico is in seismic zone 0 (zero).
- only 90% of Dead load may be used to resist uplift.
- **Purpose of the code - save/protect lives, levels of allowable damage in relation to intensity of earthquake.**
- **Strut/drag strut and how they are utilized in buildings with plan irregularities.**
- Maximum chord forces, **P-Delta**, flexible diaphragms versus rigid diaphragms and how the loads are distributed through them.
- Importance factors and the buildings they are used for (utilities, hazardous storage, medical and emergency facilities $I=1.25$, all others 1.0 (except the wind one for 1.15).