

#08 Multi-Story Diaphragm Construction

Lateral systems for taller structures

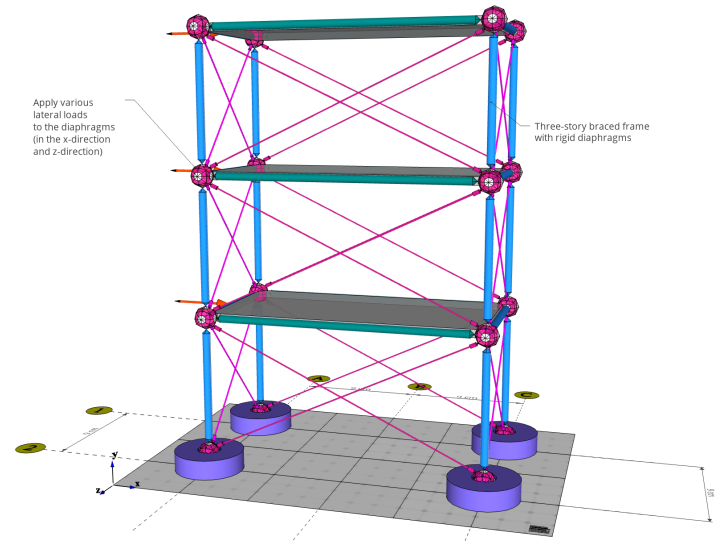
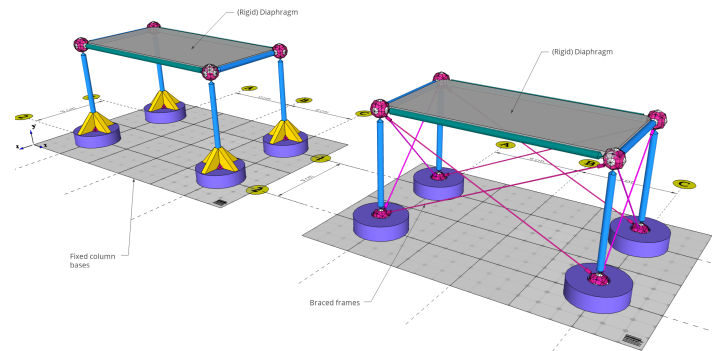
Part I. Building the model

Recall your work in [Build + Connect - 07 - The Single-Story Diaphragm](#). You built two single-story structures: one with braced frames and one with moment connections. In each model, the roof plane served as a structural diaphragm.

In this activity, you'll need to build our biggest structure yet: a three-story building with three diaphragms for the floors and roof.

Follow the instructions in [Build + Connect 08 - Multi-Story Diaphragm Construction](#).

Note: the type of lateral system you build is not critical to the learning objectives of this exercise. So if you don't have enough braces to build this structure, and want to use moment connections instead, that is fine.



Part II. Apply loads

Apply lateral loads to each diaphragm as shown, individually, and then in different combinations.

Focus on concentric loads (loads that align with the center of gravity of the diaphragm), but feel free to experiment with eccentric loads as well.

If you'd like to simulate seismic events by translating or rotating the base plate, that is OK too.

Part III. Reflect

Reflect on what you have learned from this activity, considering the following prompts.

Make a 2D sketch of the deformed shape of the structure under lateral loading. What types of reactions result from this type of loading at the column bases?

As I developed this model, it reminded me of one of my grad school professors, [German Gurfinkel](#). In my wood design and analysis course, he had this running joke based on Shakespeare's "*to be or not to be*" speech in Hamlet. He would say: "to brace, or not to brace ... that is the question ... (long pause, and then dramatically he'd say) ... TO BRACE!" Why do you think this Build + Connect exercise reminded me of this experience from my grad school days? Why do you think Professor Gurfinkel made this joke so often in his teaching?

This build also reminded me of a professional experience I had when I was a young intern, fresh out of college. At night on April 17th, 2001, I was sleeping in the Renaissance Hotel at Mount Vernon Square in Washington DC. I had been commuting from my home in Chicago to Washington, DC in order to work at the site office for the 2.3 million square foot (in other words, HUGE) Washington Convention Center. I woke up the next morning, turned on the news on the TV, to see [the media reporting on my job site](#). That was an exciting and memorable morning at work! How do you think we maintain stability of a structure during the construction process? Do you know how it is codified or governed? What loads are considered? And in a collapse like this, whose fault do you think it is?

Did you learn anything else unexpected or interesting through this activity? Were you reminded of any concepts or calculations from other classes you have taken?