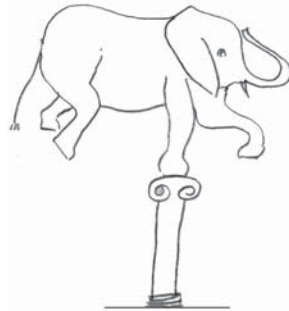


THE TWO MAJOR FORCES

► COMPRESSION AND TENSION

Some Basic Terms. To talk about architecture and engineering we should use some basic terms correctly. Architects talk about two basic types of forces in structures.

Compression is a squeezing or pushing force.



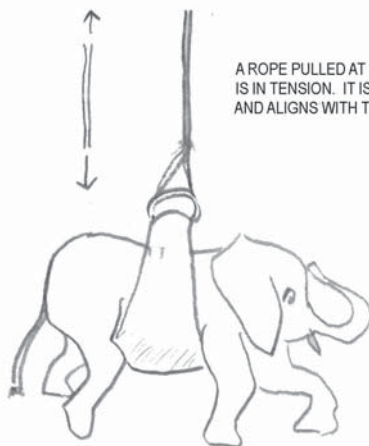
A COLUMN IN COMPRESSION



REACTION = LOAD



THE COMPRESSION IS THE SAME THROUGHOUT THE COLUMN



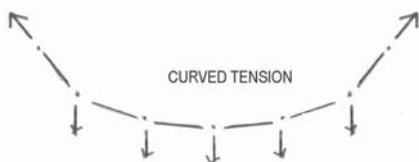
THE ROPE HOLDING THE ELEPHANT IS IN TENSION

A ROPE PULLED AT BOTH ENDS IS IN TENSION. IT IS STRAIGHT AND ALIGNS WITH THE FORCES



STRAIGHT TENSION

A LOAD IN THE MIDDLE CAUSES THE ROPE TO BEND



CURVED TENSION

MANY LOADS CAUSE IT TO CURVE LIKE A SUSPENSION BRIDGE

Tension is a stretching force. A thin, straight rope supporting a heavy load is in tension. A rope supported at two ends curves to carry many loads, but it is also in tension.

A rope or wire in tension breaks by the fibers pulling apart.

A column in compression can fail in either of two ways. A short, stubby column will fail when the material, such as stone, crushes. This is called compression failure.

A long, slender column fails in buckling. This happens when the column bows, as if it is trying to get out of the way of the load.

Real world fact:

Grocery store produce scales measure weight (load) by using a spring which stretches under tension.

Experiment:

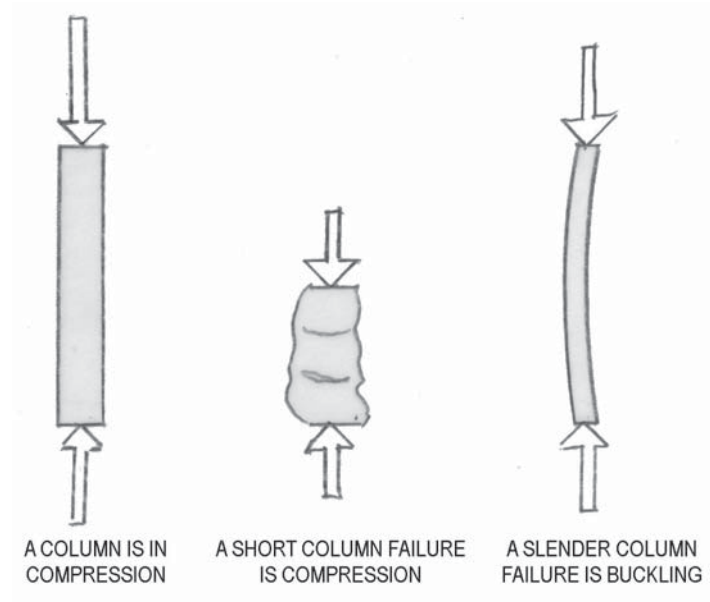
Stand with your hands on your head. Push down. Your neck feels compression. Push harder and see if your knees try to buckle, to get out of the way of the load.

THE TWO MAJOR FORCES

► COMPRESSION AND TENSION

If you can visualize a curved cable carrying tension along its whole length, can you also visualize a curved column in compression. This would be an arch. If properly shaped, an arch can carry a heavy load while only experiencing compression forces.

An arch is like a column.....



think: cheese puff under a dictionary

think: a single piece of spaghetti holding up an orange

Review:

Draw a picture showing compression:

Draw a picture showing tension:

