



On this date in 1782, Martin Van Buren was born in New York. He would grow up to be the eighth U.S. president and the first one born in the United States.

KidsPost

SURVEY SAYS

Last week's survey asked: **Have you ever missed school for a vacation?** More than 500 readers responded:



Problem-Solving

A Structural Engineer Bears a Weighty Burden

There is a building under construction next door to KidsPost, and we've been watching it get built from our windows. It made us wonder how a building is put together.

A structural engineer is the person who figures out how to turn an architect's design into a real building. How thick should the floors be? How many columns does each floor need for support?



Matthew Herringa makes the architects' designs hold up.

Matthew Herringa is the engineer for the 12-story office building, Columbia Center on 15th Street NW, and he does complex math and physics all day long. "It's everything from algebra to calculus and some differential equations," he said, referring to advanced types of math.

To figure out how much weight a column in a building must support, Herringa first adds up the weight of all the concrete, steel and other building materials above the column, then adds in the weight of the furniture and the people who will be in the offices. Then he figures out how many columns there are and how much weight each one has to support.

It's not always simple. You might have seen a building being built in which some columns look like they're leaning. That's because buildings have complicated interiors, and columns can't always go straight up and down. One fifth-floor column in Herringa's building, for example, is slanted because "if we had gone straight down with that column, it would've ended up in the electrical room," he said. He had to calculate how to angle the column so it missed the electrical room below. It still had to be structurally sound — that is, hold up the building's weight.

Things can get especially difficult when architects ask for something unusual. The architects on this project wanted the floors to have a lot of open space, and that meant fewer columns — and more calculations for Herringa. "The more you spread the columns out, you need bigger columns because each

one supports more weight," he explained.

Architects Atsushi Ishizaki and Chuong Cao also wanted a four-story corner lobby with glass walls and no concrete columns. It took a while for Herringa to come up with a way to make that happen: two thin, slanted steel columns that hold up the corner of the building.

The relationship between architect and engineer is a little like a kid and parent — a role Herringa knows as the father of 3- and 6-year-old girls. Architects are always coming up with different things they want to do, Herringa said. It's the engineer who has to say: No, you can't do that, but you could do this instead.

— Margaret Webb Pressler

Making It Work

A professional engineer uses science and math to turn ideas into something useful. Engineers played a role in just about every important achievement of recent civilization, including electricity, indoor plumbing, television, the Internet, health care, automobiles, highways and space flight.

There are more than 2 million engineers in the United States, working in 19 main fields of engineering. Some examples:

Chemical engineers figure out how to turn raw materials into valuable products, including plastics, medicines and man-made fabrics.

Industrial engineers use knowledge of science, design, mechanics and human behavior to make complicated systems work more efficiently. This could include the flow of people through an amusement park, patients through a hospital or toys from where they're made to the store shelf.

Mechanical engineers help with the building, design, production and maintenance of mechanical systems, including machines in factories or engines on planes.

Traffic engineers use research and technology to make roads, bridges, signs and traffic lights more efficient so traffic can move smoothly and safely.



Go online to see photos of the building's progress.
www.washingtonpost.com/kidspost



BUILDING ILLUSTRATION COURTESY MONUMENT REALTY

When it's finished, this 12-story office building will have an open, four-story entrance, as shown in the drawing above.

If You Build It . . .

Here are some of Columbia Center's design challenges and Matthew Herringa's engineering solutions:



CHALLENGE: Build large areas, for offices, that don't have columns (above).
SOLUTION: Use fewer columns, but make each thicker to support more weight.



CHALLENGE: Electrical room gets in the way of a support column.
SOLUTION: Build the column at an angle around the electrical room while still supporting the weight of the floors above.



CHALLENGE: Upper floors extend from the side of the building but with no support underneath (left).
SOLUTION: Thick concrete slabs sit on top of outside columns (shown below), helping support the floor that extends out.

