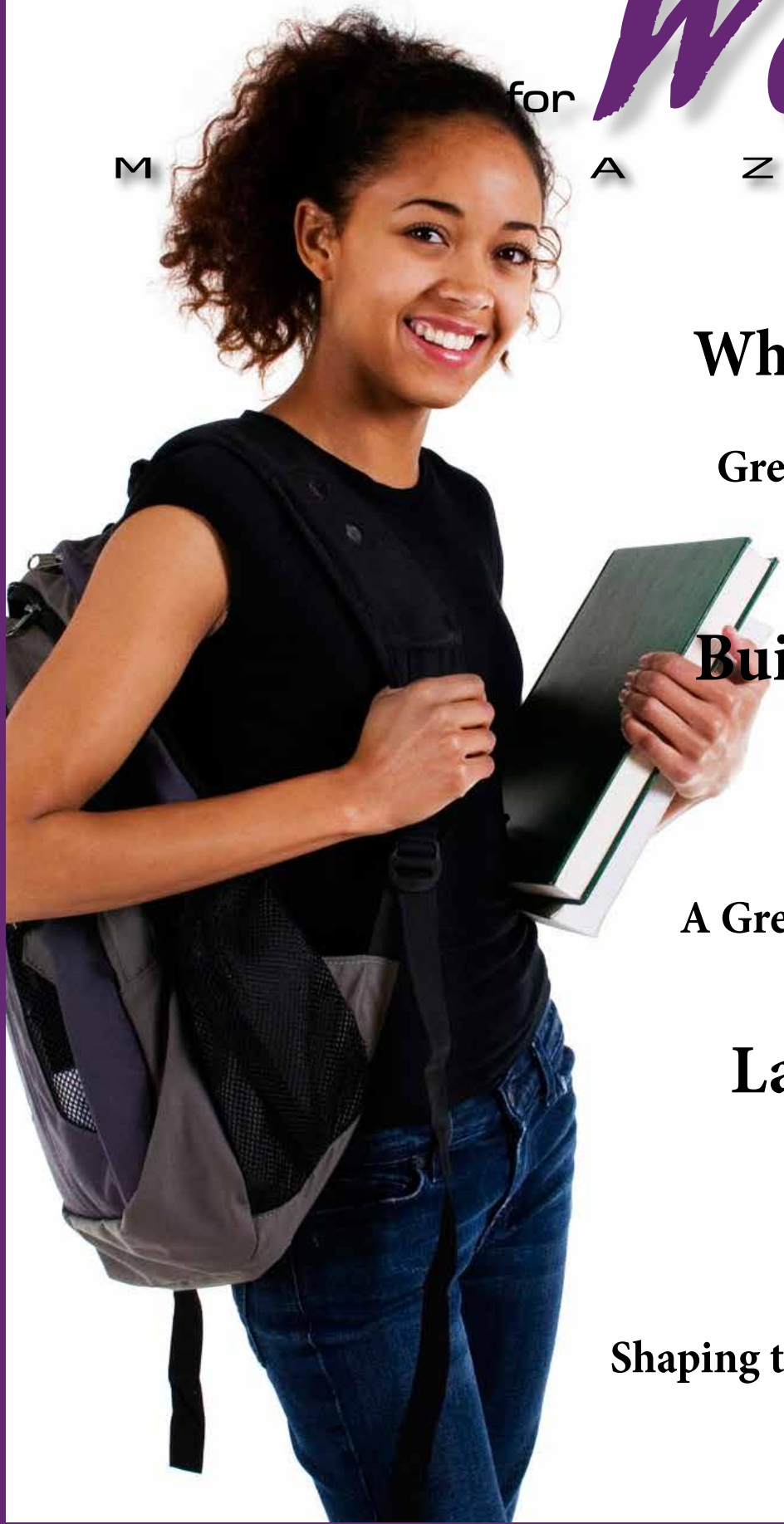
S.T.E.M for Women MAZINE



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By JoAnne Castagna, Ed.D.

"Do you like working at the Army Corps?" a seventh grade girl asked Ali Palen, a structural engineer with the U.S. Army Corps of Engineers, New York District.

Palen recently visited the West Point Middle School as part of the agency's STEM Program (Science , Technology, Engineering and Math) that aims to inspire young girls and boys to pursue careers in science, technology, engineering and mathematic.

Palen says that this girl's question is the purpose of these events and that the experience is positive not only for the students, but also for the presenters.

"STEM events foster an environment of exploration and questioning for children. Exposure is the most important objective. Why wouldn't I jump at the chance to help expose children to the thing that I love to do? Participation in STEM events is a no-brainer for me and it's fun!" says Palen.

Palen visited several seventh grade classes at the school that is located at the West Point Military Academy in West Point, New York. The school serves the children of service members at the academy.

This isn't the first time the agency has visited the school. Palen was preceded by other speakers including most recently - Col. Paul E. Owen, New York District Commander, U.S. Army Corps of Engineers and Raymond Schembri, Hydraulic Engineer, New York District, U.S. Army Corps of Engineers.

Owen discussed Super-storm Sandy with the students and its impact on the New York region and the agency and Schembri talked about flood reduction methods the Army

Exploration & *Questioning*

Students watch a Flood Wall Demonstration. (Photo by JoAnne Castagna, Ed.D, Public Affairs Specialist, U.S. Army Corps of Engineers)

Corps constructs to help control flooding during storm events.

One of the ways that Sandy personally impacted the District was its destroying of its Caven Point Marine Terminal. Palen is one of the structural designers that designed a new, more flood resistant terminal that is being constructed right now.

Palen talked with the students about her role on this project. In addition she explained what structural engineers do, basic building components and how tension, compression and loads are important information for structural engineers.

She explained that in order for structural engineers to know what types of building components and materials are needed and where to position them, they need to know about tension, compression and loads. It's important because different

materials are good for tension and compression. For example, steel takes tension well and concrete takes compression well.

To demonstrate, Palen gave the students two marshmallows and two index cards. With the marshmallows she taught the basics of tension and compression loading

Students learn what tension and compression is and why it is important to know w with the use of objects including index cards and marshmallows. (Photo by JoAnne Specialist, U.S. Army Corps of Engineers)

by having the students stretch and squeeze the marshmallows with their fingers. Palen then taught the basics of beam bending with the index cards. She had the students bend the index card and discuss whether the top and bottom of the "beam" would be in tension or compression.

vhen designing a building. They learned
e Castagna, Ed.D, Public Affairs

Structural engineers also need to be aware of applied loads which are pressure and weight in a particular direction. Palen described the different type of loads to the students, including lateral loads and gravity loads.

The class then explored flood loading and discussed whether it would be a gravity or lateral load on a building. The students agreed that it would be a lateral load. Palen went on to explain how she had to take this in consideration when she was designing the Caven Point Marine Terminal that was destroyed by Sandy.

The terminal is located right on the Hudson River in New York City. It's where the district keeps its boats and where its hydraulic team works.

"Waves crashed into the terminal. The walls were ripped off and the

structure ended up completely under water," said Palen.

Palen asked the students how they would protect a building from flooding. The students mentioned waterproofing and raising the building. Palen said that these methods are good and many of these were applied when designing the new terminal.

She designed a new facility that will withstand the water and wave loading from flood waves. In addition, parts of the building were raised and flood proofing and flood walls were included.

She then had the students gather around a table to show them a Flood Wall Demonstration. On the table she had an aluminum tray, which contained a small scale As she poured water on one side of the wall and the students anxiously watched to see if the wall would hold up under the water pressure and Palen had the students discuss where they thought the wall would fail. After a minute or so, the bottom of the wall made of Play-Doh flood wall spanning the width. The wall was made with aluminum foil and was secured to the sides of the box with Play-Doh.

gave out, letting the water stream into the other side of the tray.

Palen said that this demonstration shows how water pressure increases with depth and how connections are very important in design. The bottom of the "wall" experienced the greatest water pressure and it was this bottom connection that failed first.

With this new structural engineering knowledge in mind, the class then went to work on a class assignment they've been working on named "Beat the Flood."
The classes are suppose to take the knowledge that they receive from

the Army Corps engineers and apply it to this class project. The project requires the students to construct a home that can survive a flood. They have to decide on what building materials to use and how to construct the home.

Palen assisted the teacher is explaining the project to the students and guided them on their decision making. Palen enthusiastically yelled out to the students - "You are the Engineer! Think about what you have to do to design your home."

"The biggest challenge of a STEM event is relating to the children and teaching the material in a way that they will understand. This is also the largest benefit. Aristotle once said, ***'The one exclusive sign of thorough knowledge is the power of teaching.'*** Sometimes you need to re-teach yourself the basics so that you are better equipped to explain it to the children.

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