4-29-2015

ODU Students Work on Nation's First Climate Change Adapted Neighborhood

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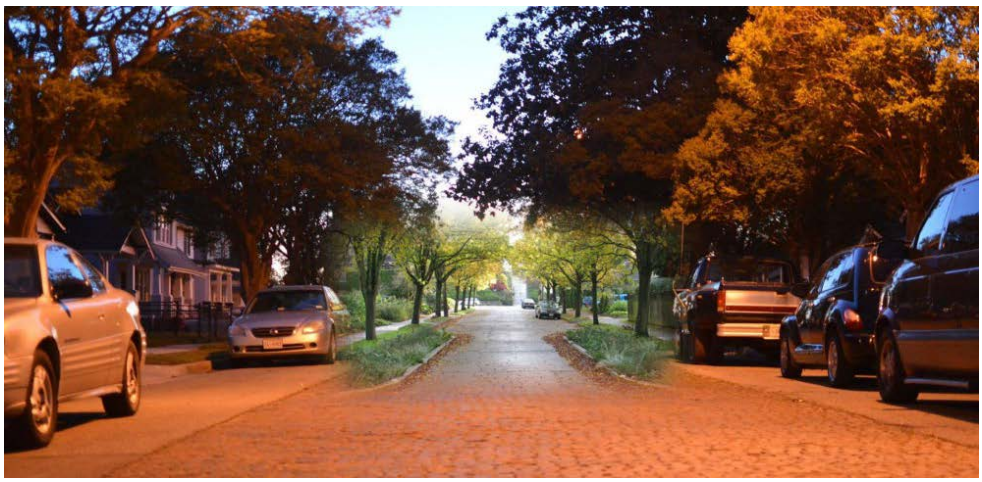
on April 29, 2015



Credit: Jason Kazi

By Jugal Patel | Digital Editor

When Skip Stiles set out to prepare a 175-home, near-century-old Norfolk neighborhood for climate change and sea level rise, he didn't want to reinvent the wheel. After searching for ideas, however, Stiles came back empty-handed.

"This is the first street level adaptation project happening before a storm hits in the United States," he said.

An aerial view of Chesterfield Heights– a historic neighborhood in Norfolk that lies along the gradually encroaching Elizabeth River. Credit | Source: Google Earth™ mapping service

Stiles is the Executive Director of Wetlands Watch, a statewide nonprofit environmental group based in Norfolk, VA. After securing funding from the Virginia Sea Grant, Wetlands Watch gathered interest from the Hampton University Architecture department and the Old Dominion University Civil and Environmental Engineering department, to have students design the neighborhood's adaptation.

According to Stiles, the only similar adaptation work has been done in St. Augustine, Florida—though the work was much less comprehensive in comparison to Chesterfield Heights' parcel by

parcel adaptation. While the work in St. Augustine was oriented towards preserving various structures in the historic city, the Chesterfield Heights project involves a whole suite of issues.

To design the adaptations, the group had to address the neighborhood's coastline, streets, storm water drainage system, codes and regulations, utilities– even the individual homes.

"We quickly discovered that there is nothing 'off the shelf' that works—first, no one had done this kind of work before… anywhere," Stiles said.

The neighborhood chosen was Chesterfield Heights—which sits along the slowly expanding, regularly encroaching Elizabeth River.

The historic status of Chesterfield Heights was one reason for it being chosen as the site for climate change adaption work. Created in the early 20th century, most of the neighborhood's development occurred between the 1920s and the 1950s. In 2003, Chesterfield Heights was added to the national historic register.

Much of the neighborhood's infrastructure has aged with passing years, and is already impacted by rising water. The nearest tide gauge at Sewell's Point has measured 14-inch sea level rise since the 1930s. Although the neighborhood experiences problems now, future projections provide more reason for concern. In the next 30 to 50 years, sea levels are expected to rise by about 1.5 feet.

Storm water outfalls that should drain water out of the neighborhood during flood events are already submerged—even at low tide. Drainage pipes installed in the 1920s and 1930s are also undersized and in poor condition to handle large amounts of water

that arrive through high tides, rainfall events, and storm surges.

The shoreline of Chesterfield Heights is heavily eroded allowing little room for water to advance until it meets the water front homes. Source: Google Earth™ mapping service

The coastline, once a beach for recreation, is heavily eroded with little room to accommodate residents. The coastal erosion has also been worsened by wakes created from shipping lanes existing just off of Chesterfield Heights' coast. The beach now lies close to the neighborhoods infrastructure, allowing scarce room for water to advance until it meets the waterfront homes.

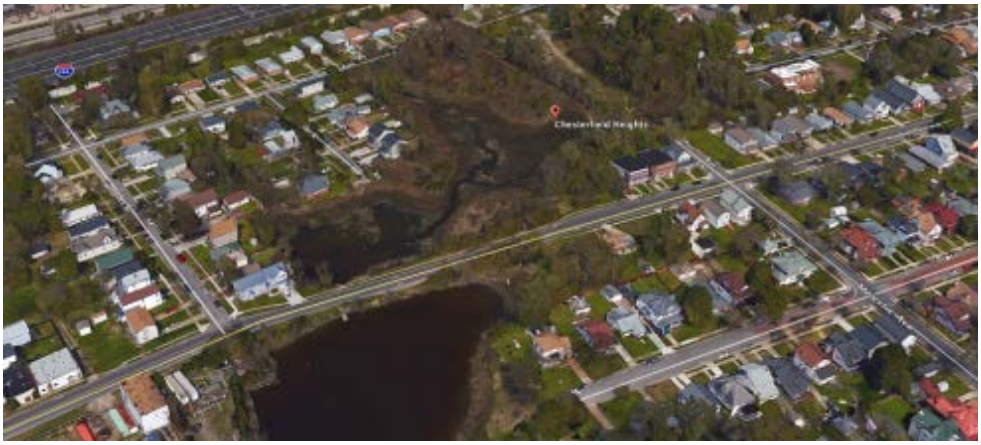
Getting in and out of the neighborhood is another issue. Only two roads lead into Chesterfield Heights—both of which regularly flood. The main road, Kimball Terrace, is wavy and frequently holds water within its troughs. During winter, that water turns into ice, causing dangerous driving conditions for residents of the neighborhood. Culverts near the road, which allow for water to drain beneath structures, are also eroded and backed up with sediment.

For students to conduct such novel adaptation design work, Wetlands Watch put together a team of professionals to provide support to the students throughout their design process. "Getting a team of mentors and advisers was a result of early work with the

Hampton Roads Green Building Council," Stiles says.

"We specifically recruited some talent we needed and people we knew we wanted—a commercial real estate developer, a historic property consultant, a really good local landscape architect, etc."

Since the project's conception, many others have expressed interest in getting involved as well. "As word got out about the project, others joined in asked to be part of the team," says Stiles. "People wanted to be a part of it because it is unique – no other project like it."



A low-lying, wavy, and deformed Kimball Terrace road is pictured above. Adaptation design options are either to build a bridge where the road is, or to raise the road itself. Source: Google Earth™ mapping service

ODU's involvement in the project comes through a senior engineering design course taught by Associate Professor of Civil and Environmental Engineering, Dr. Mujde Erten-Unal. Prior to the work done through the course, ODU's student chapter of the American Society of Civil Engineers was involved in the neighborhood adaptation project.

The students' initial involvement began with surveying residents of the community so that social dynamics could be central to the design. Students then had to collect data and conduct a water budget, in order to understand how much flooding comes through rainfall, tides, and storm surge.

Stiles also mentioned that the project would better integrate the neighborhood with the natural environment. Students were tasked with coming up with designs to make that work for both the residents, and for the ecosystem.

Students from an ODU senior Civil and Environmental Engineering Design course wait before giving a presentation on their designs at Norfolk's Slover Library. Credit: Alex Carlson

Apart from the assembling support from the Hampton Roads Green Building Council and about 35 professional environmental engineers and architects, the project has gathered involvement from the City of Norfolk, the Virginia Coastal Policy Clinic at William & Mary, the American Association of Architects, the Elizabeth River Project, and others.

On April 28th, students presented their designs for the capstone project at the Slover Library. They are also expected to give a presentation to the City of Norfolk's Watershed Task Force on May 6th. While the seniors are preparing to graduate and take their experience to the real world, the Chesterfield Heights project will continue as the designs are finalized and funding for implementation is sought after.

Jugal Patel is the Coastal Adaptation & Resilience Correspondent for the Virginia Sea Grant. This story is part of the ***Mace & Crown's Rising Seas, Sinking Cities initiative****.*