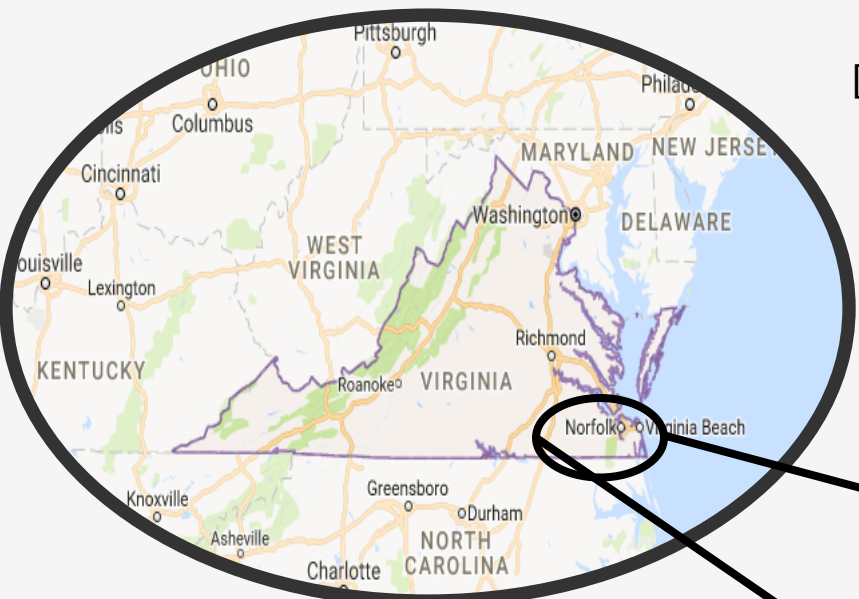


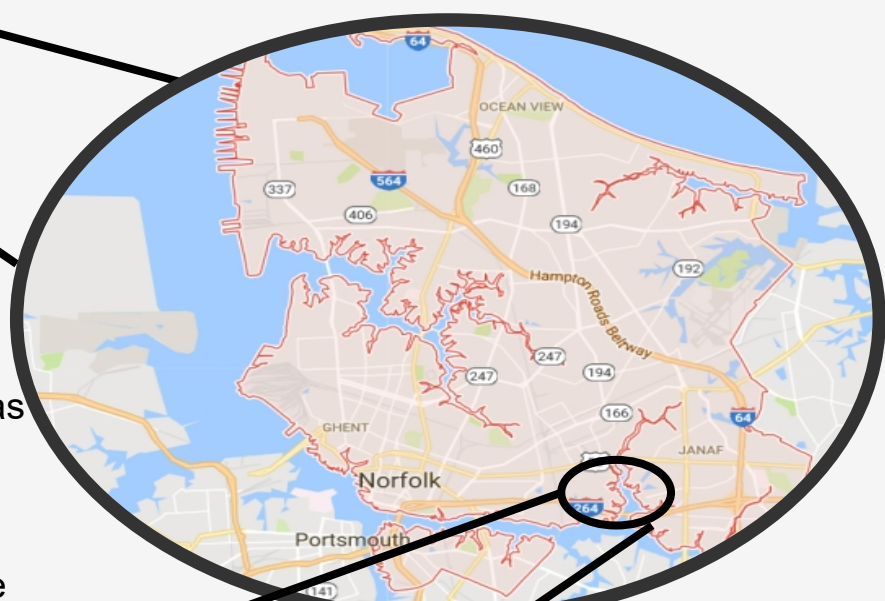
Engaging in the Resiliency of the Chesterfield Heights Community

This project focuses on providing an early warning system to the residents of a high risk community that suffer from flooding events on a regular basis.

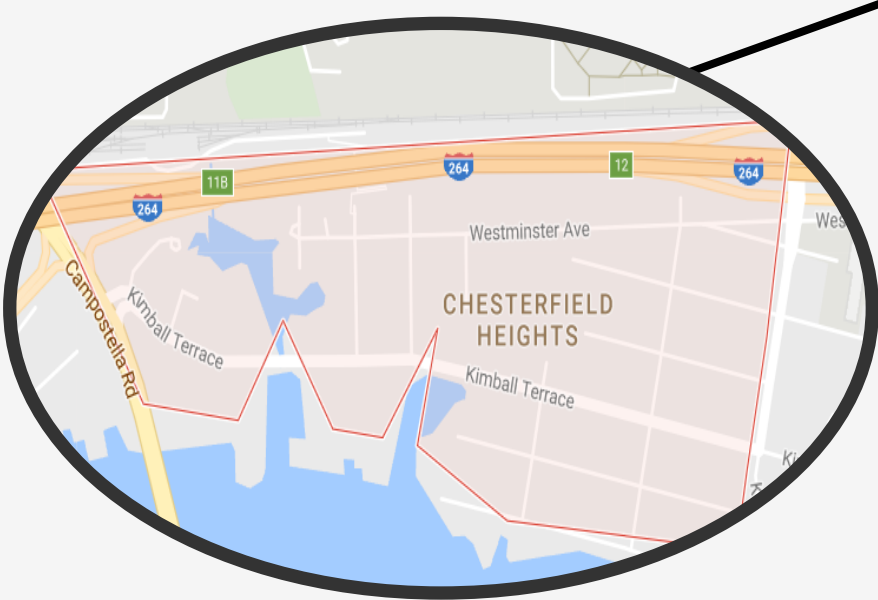
The Location: Chesterfield Heights



[1] Virginia is a coastal Commonwealth of the United States situated on the Atlantic seaboard. Virginia, like other coastal states and commonwealths is prone to flooding due to its proximity to the ocean. To combat the increased risk of flooding, Virginia is attempting to implement strategies to protect its most at risk areas.



One of the most at risk areas for Virginia and the country as a whole is the Hampton Roads area of Virginia. Located in the southeastern portion of the commonwealth, Hampton Roads is the second most at risk area for flooding in the United States, only surpassed by New Orleans. One of the most affected communities within Hampton Roads is Norfolk, Virginia, pictured on the right.




Pictured to the left is the Chesterfield Heights area. It is located in Southeastern Norfolk along the eastern branch of the Elizabeth River.

Who lives in Chesterfield Heights?

Chesterfield Heights


by the Numbers

Size




0.235 sq mi (150 acres)

3 Members Per Household on Average




Population




787 Residents

Median Income




\$34,800

Poverty Rate




Residents Below Poverty Level (30.37%)
Residents Above Poverty Level (69.63%)

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Rainfall Flooding: A Community Concern

Because Chesterfield Heights is in such a vulnerable area, the city of Norfolk is developing plans to address storm surge and water storage related flooding by 2022. However, our team recognizes the need for early action during rainfall events, as these occur most often and threaten community operations on a regular basis.


[2]




Residents speak to project engineers and architects about city plans for improvement.





Team members at a Chesterfield Heights town hall meeting.



Documenting city plans for 2022 Chesterfield Heights



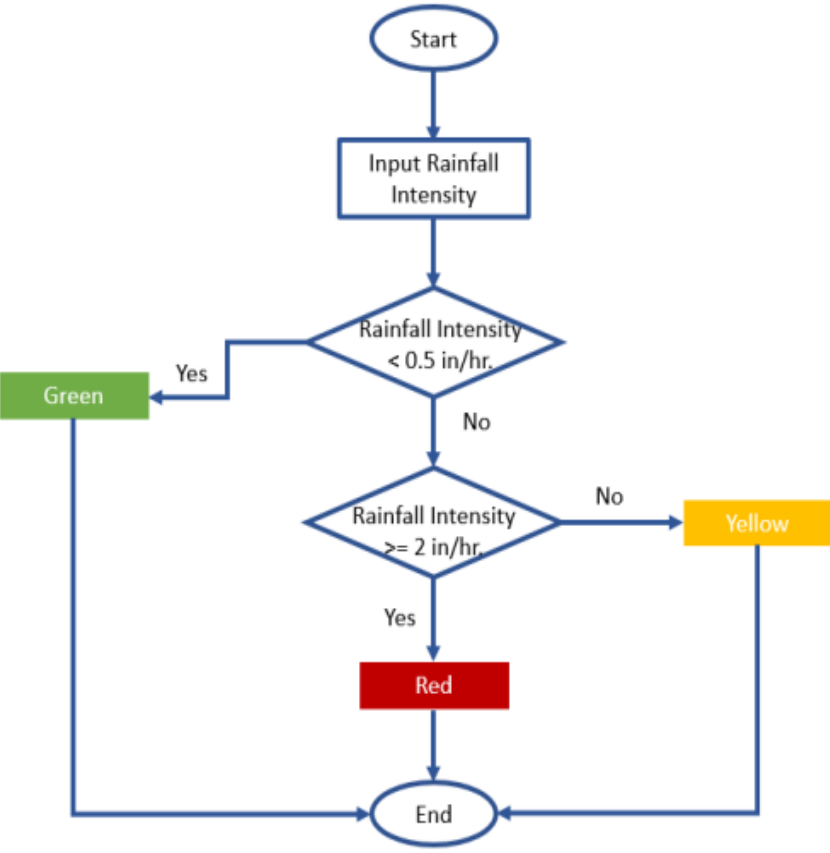
● Drainage Grates
● Drainage Outflows
→ Main Drainage Pipes



The picture above represents the current drainage map of chesterfield Heights as well as some of the detrimental conditions that the storm water management are in. The yellow image represents one of the corner grates. The red image represents on of the two outlets in the community.

Our Model

Our model is focused on capturing the worst-case scenario, in which water is entering the drainage system but there is no discernable outflow, among other assumptions. The model is based on the current capacity of the drainage pipes and defines flooding as the existence of standing water in areas where it does not exist on regular basis. Based on our research and consultations, the team has determined that the flooding threshold for our model is 2 inches of standing water over the drainage area. In order to convey this information in a more helpful way for the community, the team has decided to create a user interface that will be available to all residents of the community. The picture below represents a functional flow chart of the user interface and how the information is translated within the website.



Start
Input Rainfall Intensity
Rainfall Intensity < 0.5 in/hr? Yes → Green, No → Rainfall Intensity >= 2 in/hr? Yes → Red, No → Yellow
End

Within this model, the team has created a scale for the potential output of the model. These are recommendations based on research and experts advise:

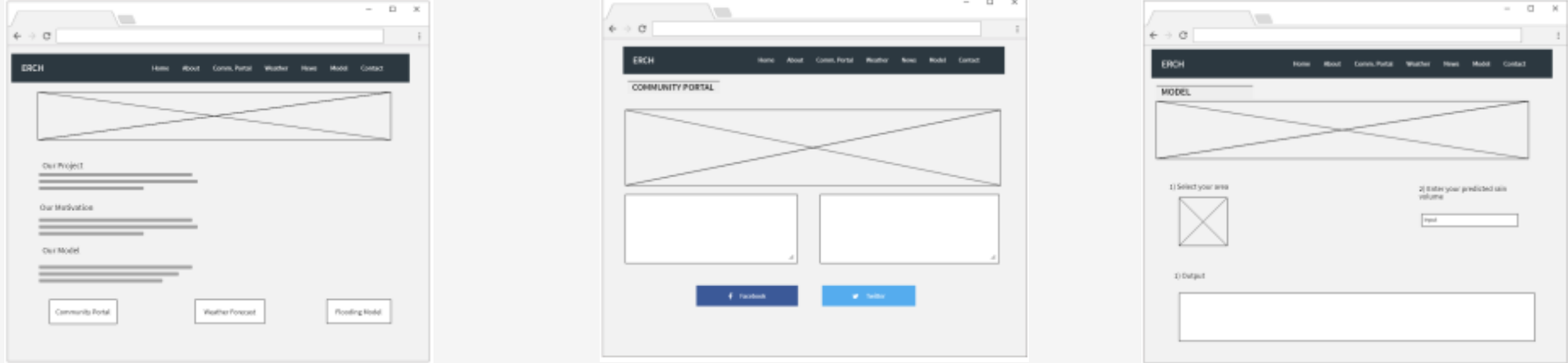
GREEN- Safe to stay home and safe to drive.

YELLOW- Safe to stay home. Drive with caution.

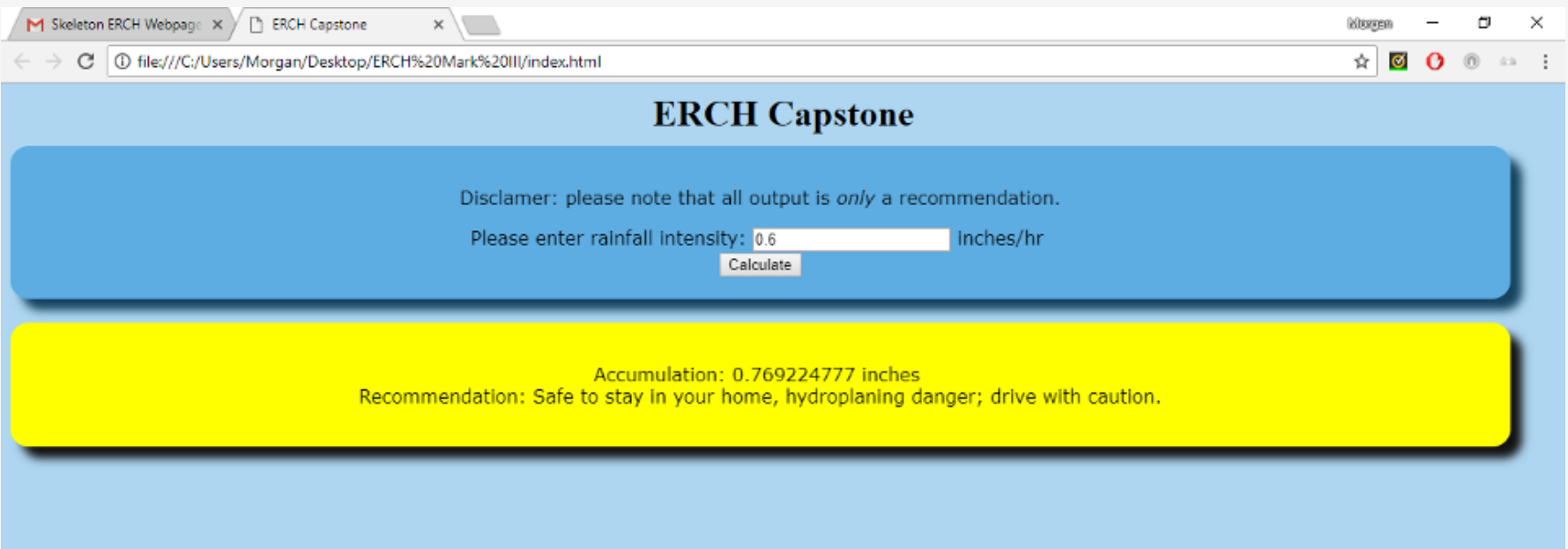
RED- Proceed with caution. Potential damage to home. Driving not advised.

Our Prototype

Our goal is to create an interactive website for residents to check the expected status of their neighborhood in the event of imminent rainfall. Below is the wireframe prototype for the website and user experience. From the wireframe, the team created a prototype website using the Weebly platform. The team collaborated with some Alumni and Computer Science undergraduates to manufacture a beta prototype of the website.



After going through the design face for the user interface the team obtained two prototypes with that se two different platforms in order to give shape to the website.



ERCH Capstone

Disclaimer: please note that all output is only a recommendation.

Please enter rainfall intensity: 0.5 inches/hr

Calculate

Accumulation: 0.769224777 inches
Recommendation: Safe to stay in your home, hydroplaning danger; drive with caution.

The picture above represents the Beta prototype that was created using Java as the platform as well as an example of the "YELLOW" output explained above.

Engaging in the Resilience of the Chesterfield Heights Community.

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Advisors: Dr. Kyle Gipson

Acknowledgments: Prof. Mason Andrews, Daniye Bartell

[1]: Google Maps
[2]: Site Visit