Design Proposal Template:

School: Pasco High School **State:** Florida **Division:** Middle School or High School

Team Members' Names: Lauryn James, Alexis DeBona, Dylan Matthews, and Angeline Garcia

Project Title: Readers should have a general sense for what the project is about and want to read more. (20 word maximum)

HydroAware Alert System (HAAS)
Because Every Second Counts: Smart Flood Alerts for Safer Roads and Smarter Choices.

Inequity Being Addressed: Describe the inequity that you will attempt to address with your proposed solution, and why you chose this inequity. Students are able to consider a global perspective related to their inequity. (75 word maximum)

Hurricanes hit Florida and other coastal regions, causing problems like flooding for homes, vehicles and communities. In Dade City, we encountered people who cannot afford to repair or replace what's lost, especially when it comes to essential items like cars. This creates an inequity where transportation is vital for accessing work, school, healthcare, and basic needs. When people can't afford to replace a damaged vehicle, their ability to recover and maintain their livelihood is disrupted.

Community Research and User Identification: Explain the process used to identify the inequity and select your user. Include any research done to identify issues in your community and understand which groups face challenges because of these issues. (150 word maximum)

After the widely broadcasted Hurricane Helene and Milton, our communities had little time to recover. Together, they claimed over 460 lives, damaged 120,000 cars, and caused more than $100 billion in damage across the Southeast (Healthtrustjobs.com). We couldn't go to school and it took months to get rid of the flooding. This devastating impact inspired us to develop a project aimed at saving lives and easing the burden on families affected by flooding. Living in Florida is already expensive—costing between $46,645 and $112,401 annually—and an estimated $3 to 5 billion in vehicle damage cost. With this in mind, we designed our project to help reduce flood-related damages and cost, especially for families who are financially vulnerable. We interviewed two teachers, and a CNA named Sam, about how hurricanes affected their jobs and communities. We focused on Sam, after realizing how healthcare is a critical and heavily impacted sector during disasters.

User Profile: Provide a detailed description of your selected user. Include information about challenges they face, how those challenges impact their lives, and specific project needs based on user feedback. (150 word maximum)

Sam, a Certified Nursing Assistant at Dade City Hospital, gave us a firsthand look at the challenges essential workers face during natural disasters. Her job is "no work, no pay," so when Hurricane Milton hit and flooded most of the roads, it made them impassable. She couldn't get to work—and couldn't get paid—putting her family in a tough financial spot. With Sam stuck at home, she talked about how patient care suffered: treatments were delayed, shifts were understaffed, and stress ran high for those working. Some patients didn't receive the care they needed, putting lives at risk. Sam's experience and concerns shows that flooded roads aren't just an inconvenience—they threaten both livelihoods and lives. Her story highlights the urgent need for safer and reliable alert systems through or around flooded roads during disasters.

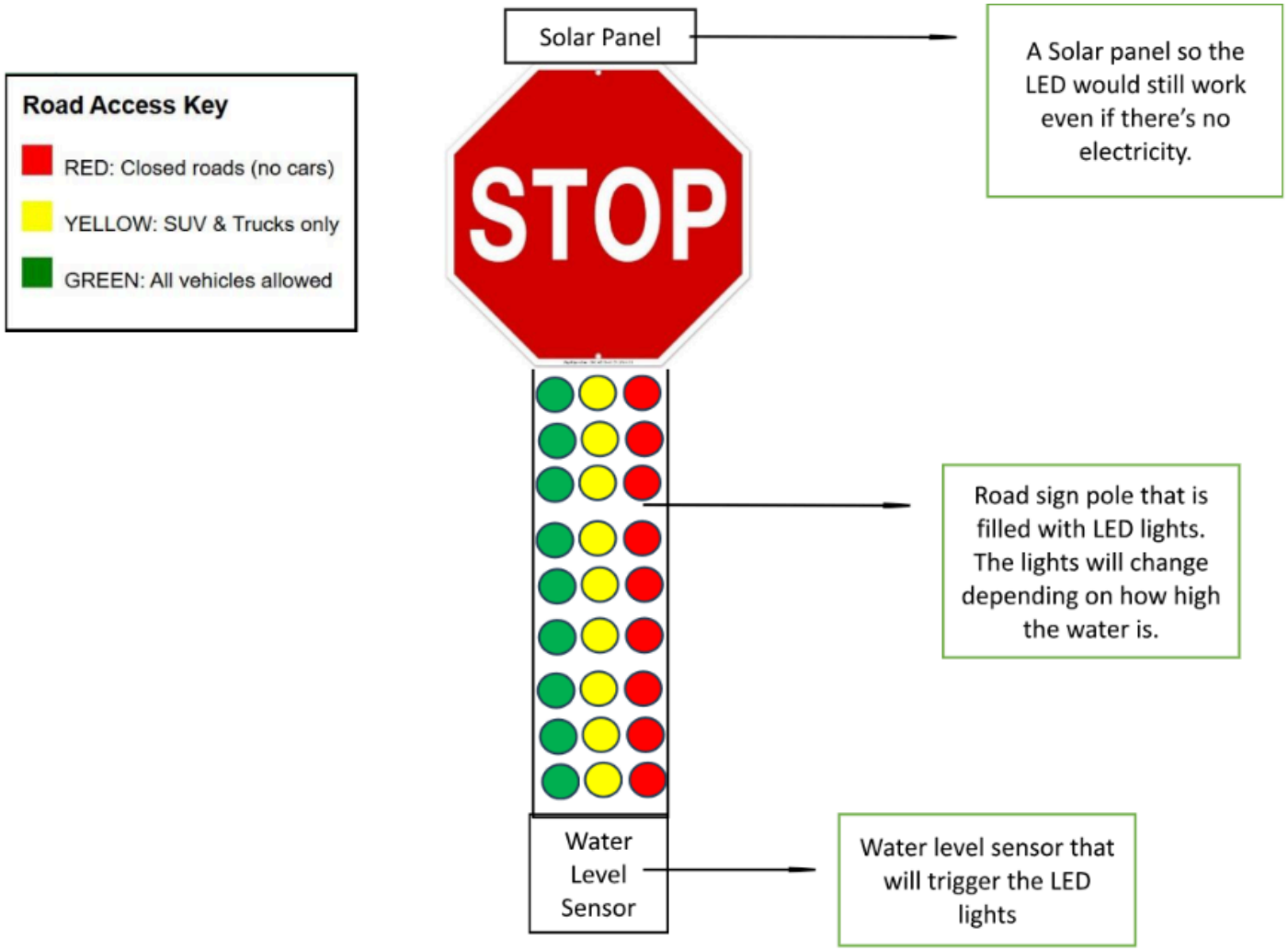
Project Goals: List your project goals and explain how these goals will address the inequity. Project goals should define the desired outcomes, not specific features of the proposed solution. (150 word maximum)

Our project aims to reduce the risks and burdens caused by flooding, especially for essential workers like Sam, a CNA who relies on safe and reliable transportation to care for others. The goal is to protect public safety by providing real-time, easy-to-understand alerts and speed guidance to prevent accidents like hydroplaning or engine damage. We also aim to address transportation inequity by supporting people in flood-prone, underserved areas who often can't afford to lose a car or miss work due to dangerous road conditions. By helping families like Sam's avoid flood-related car damage and travel disruptions, we hope to lessen both the financial and emotional stress that extreme weather brings. Finally, by expanding access to critical flood information through our alert system and live map, we strive to serve more communities beyond Dade City and ensure that vulnerable individuals are better prepared and protected during floods.

Proposed Solution: Describe your proposed solution, including any innovative and unique features, and explain how this solution will address your users' needs and the inequity they face. (150 word maximum)

Our solution is a smart, tech-powered upgrade to traditional speed limit signs built, to alert drivers during floods. Using an Arduino Uno and a water-level sensor, our system measures flood depth in real time and responds with color-coded LED signals: green for safety, yellow for caution, and red for danger. It also updates the speed limit to reduce the risk of hydroplaning or engine damage. A solar panel keeps running even during power outages. Beyond the sign, we created a website and text alert system to notify residents of flooded roads nearby, helping people like Sam, an essential worker, plan safe routes and avoid costly delays. Hurricane flooding causes serious harm, injuries, power outages, and financial strain, but our solution protects lives, reduces car damage costs, and helps prevent environmental pollution from flooded vehicles.

Initial Design: A single graphic of your first design idea with key features adequately labeled. It should be easy to understand and the reader should have a general understanding of how the prototype functions by looking at the graphic. Max size 8.5" x 11"



This was our simple initial design. For our updated design, we've changed the individual LED lights to an LED strip. Instead of a stop light we also opted for a speed limit road sign to attach a digit segment display which can change the values of the speed limit depending on how high the water level is and also included a SimModule for the text alert feature.