Student Checklist (1A)

This form is required for ALL projects.

1. a. Student/Team Leader: Jacob Karavias Grade: 11

   Email: jzk32203@gmail.com Phone: (631) 525-2515

   b. Team Member: _____ c. Team Member: _____

2. Title of Project:

   The Effect of Geometric Shapes on Reducing Beach Erosion

3. School: Sachem North High School School Phone: (631) 471- 1400

   School Address: 212 Smith Road
   Lake Ronkonkoma, NY 11779

4. Adult Sponsor: Gregg McGrath Phone/Email: gmcgrath@sachem.edu

5. Does this project need SRC/IRB/IACUC or other pre-approval? ☐ Yes ☒ No Tentative start date: 9/23/19

6. Is this a continuation/progression from a previous year? ☐ Yes ☒ No
   If Yes:
   a. Attach the previous year's ☐ Abstract **and** ☐ Research Plan/Project Summary
   b. Explain how this project is new and different from previous years on
   ☐☐ Continuation/Research Progression Form (7)

7. This year's laboratory experiment/data collection:

   9/23/19 (Actual Start Date: (mm/dd/yy)) 1/16/20 (End Date: (mm/dd/yy))

8. Where will you conduct your experimentation? (check all that apply)
   ☐ Research Institution ☒ School ☐ Field ☐ Home ☐ Other: _____

9. List name and address of all non-home and non-school work site(s):

   Name: _____ _____

   Address: _____ _____

   _____ _____

   Phone/ email _____ _____

10. **Complete a Research Plan/Project Summary following the Research Plan/Project Summary instructions and attach to this form.**

11. **An abstract is required for all projects after experimentation.**

Research Plan

Erosion is a natural phenomenon that occurs when moving water displaces sediment. This is most noticeable in coastal environments. Long Island is famous for its beaches from Jones Beach to the Hamptons. Today, there is much less beach than decades ago and the local beaches will continue to shrink as sea level continues to rise. During the hurricane season and through the winter, strong storms with heavy surf have displaced large areas of local beaches. Many of these beaches are public beaches that require rebuilding, at a cost to the taxpayers. Often large areas of the beach are closed or inaccessible for long periods of time, preventing people from enjoying them. Around the world, countries have used tetrapods to prevent coastal erosion and to create jettys. The use of tetrapods started in the 1950's and continues today. However burying them underneath the beach to reduce sand loss has not been considered.

By the end of the project a simulated beach with no net movement of sediments will hopefully be achieved. A prediction is that the beach with the tetrahedral objects will have the least net movement of sediments.

A 3'x 4'x 6" hydroponic tray will be set up with three and a half, five gallon buckets of sand from Robert Moses Field two beach. The tray will be filled to emulate a beach environment where there is a simulated supratidal zone, with a natural slope below the water line with about 4" of water covering the emulated intertidal zone. A gyre will be placed on the opposing wall of the beach to simulate wave actions. Control trials will be conducted without any structures where displaced sand will be measured by using a 3D scanner. Control simulations will include a natural tide with no storm action as well as a simulated storm. The experimental trials will consist of placing the tetrapods below the sand and then covering the tetrapods with sand. The gyre will be then set to simulate normal wave action and then simulated a storm surge. The displaced sand will then be scanned and measured by the 3D scanner. The amount of sand displacement in the experimental trials will be compared against the control.

The project does not pose any risk or danger to humans or any organisms because no harmful agents are being used.

Data will be obtained by using a 3D scanner. The 3D scanner will create a model of the simulated beach before and after the experiment occurs. Comparing the difference of sediment can be found by finding the percent change from the original beach.