



Task Sheet

REU 2007



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Major: Civil Engineering

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Mentor: Dr. Julie Young

Project Title: Physical modeling of Tsunami Induced Sediment transport and Scour

Complete the following in consultation with your mentor. Use additional sheets as needed.

- A. Describe your mentor's overall project in one or two paragraphs. Use terms that can be understood by the average person, and avoid technical jargon.
- B. Describe your specific role in the project in two or three paragraphs.
- C. List your specific project tasks that you will complete by the end of the 9-week program.

Task sheet is due by 1 pm Tuesday June 5th. Submit one copy to the Dan Cox, one copy to your mentor, and retain one copy for your records.

Part A: Overall Project Summary

The experimental project will attempt to look at the effect of tsunami which causes high intensity wave runup and drawdown that can mobilize substantial amount of sediments deposits. Consequently this results in erosion and scour damage which can undermine building foundations and other infrastructures along the coast line. The project will help to improve the understanding of the effect of tsunamis on sediments deposits and its effects on structures. The ultimate goal of this project is to develop performance based tsunami engineering design methodology for coastal infrastructures.

The proposed project will help to improve our understanding of high intensity wave runup and drawdown over a movable bed, and associated scour. It is very important to distinguish between the effects of high intensity wave runup and drawdown, and one of the questions to be answered will be whether majority of the erosion happens during the runup or during the drawdown. Until now, there has not been much systematic study on the high intensity, transient wave drawdown effects. Physical simulations of solitary wave and cnoidal wave over a movable sand bed with an initial constant slope of 1:10 and 1:15 with and without reef will be conducted. The results obtained will be used to analyze tsunami-induced erosion and deposition. For the 1:10 slope case with the reef, a 45 cm diameter cylinder will be embedded in the sand to investigate tsunami-induced scour.

Part B: Specific role in the project

My roles will be to review literatures relating to tsunami induced sediment transport and scour, assists in the setup of the experiments which include calibration and installation of various sensors to be used for obtaining data. I will also be involved in conducting experiments to measure the wave profile, flow speed, fluid pressure gradient, sediment flux rates, bottom morphology, and pore pressure gradients. The assurance of quality control of the data will also be my responsibility.

Part C: Tasks to be completed

- Review literatures relating to tsunami induced sediment transport and scour as well as wave-induced soil failure.
- Conduct experiments to measure the wave profile, flow speed, fluid pressure gradient, sediment flux rates, bottom morphology, and pore pressure gradients.
- Analyze results to determine the effects of high intensity wave runup and drawdown, and associated erosion and deposition patterns.
- Investigate soil remediation strategies to reduce the risk of large scale erosion or soil failure due to high intensity wave loads.
- Summarize and present research findings in a write-up and poster.