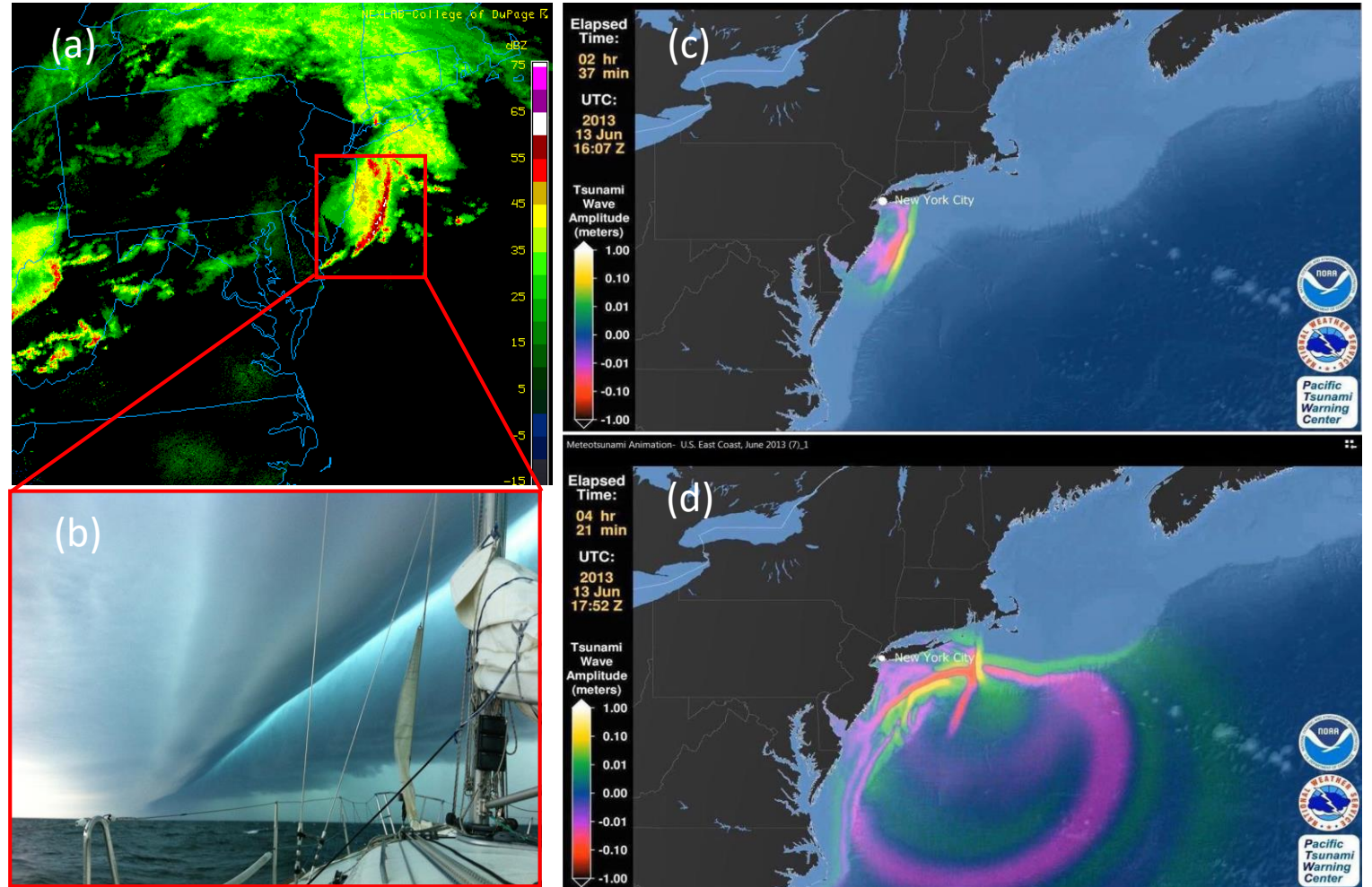


Meteorological Tsunamis: Risks Along the New Jersey Coast

Advisor: Dr. Cheng Zhang

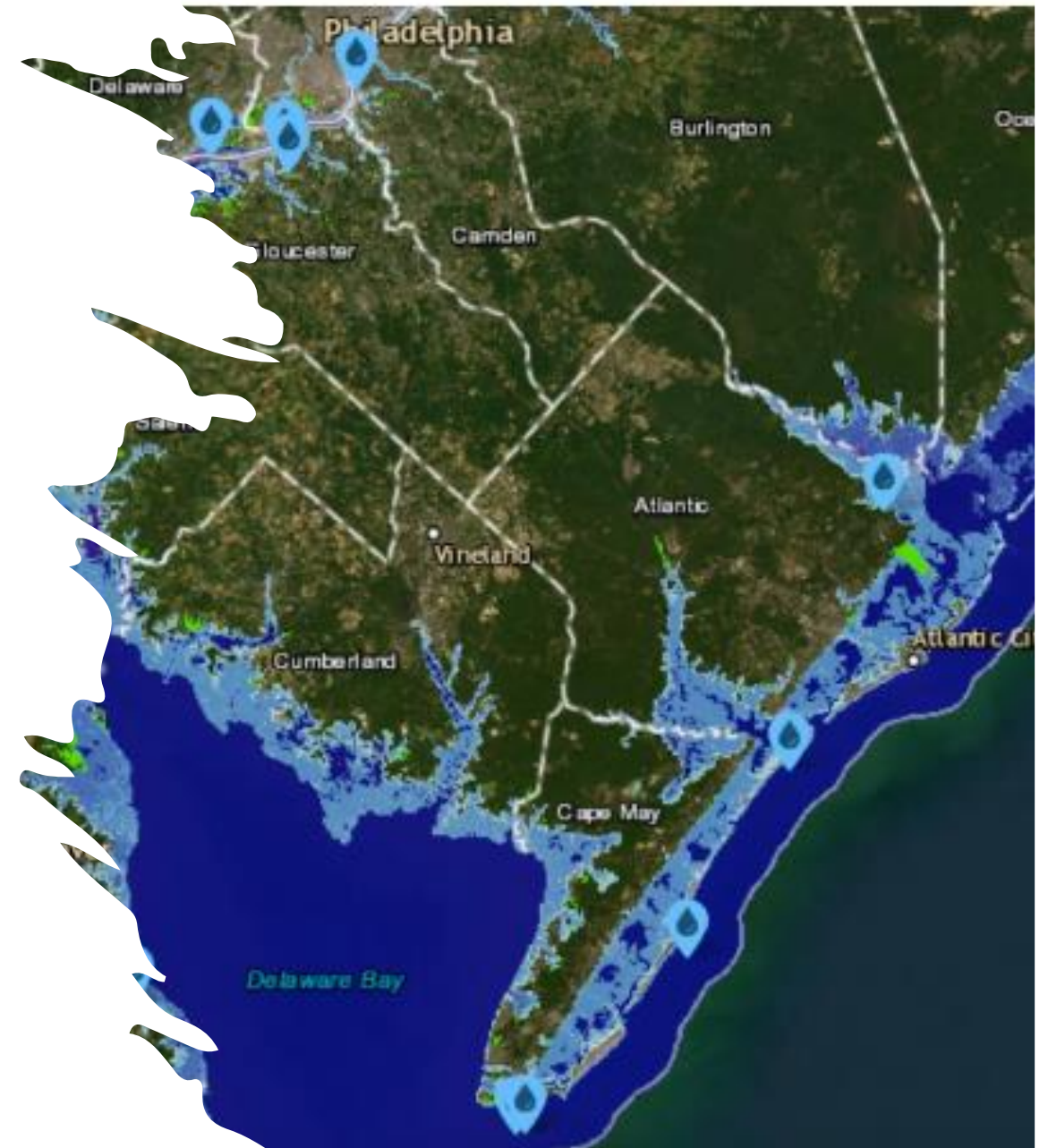
- Sudden changes in atmospheric pressure (Figures a & b), moving at high speeds, can generate significant tsunamis (Figures c & d).
- This clinic team will numerically reproduce the notable June 13, 2013, meteo-tsunami event on the US East Coast, which generated a six-foot wave at Barnegat Inlet, injuring three people.
- A probabilistic analysis will be conducted to assess the potential meteo-tsunami risk along the New Jersey Coast by running a large number of synthetic scenarios.



Evaluating the Vulnerability of Coastal Structures in New Jersey due to Climate Change

Dr. Kauser Jahan and Dr. Cheng Zhang

- Identify coastal structures such as water/wastewater treatment plants, landfills etc
- Utilize Google Earth Engine to access and analyze historical flood data near landfill locations.
- Simulate flood extents using a hydrodynamic model HEC-RAS to evaluate impacts on nearby landfills.
- Predict return period floods using Gumbel distribution for risk assessment.



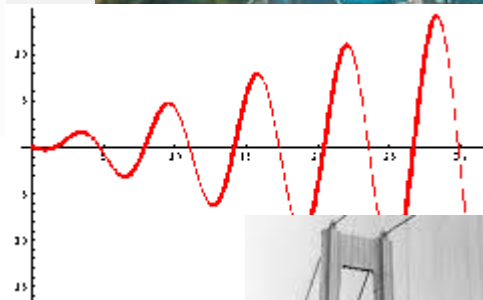
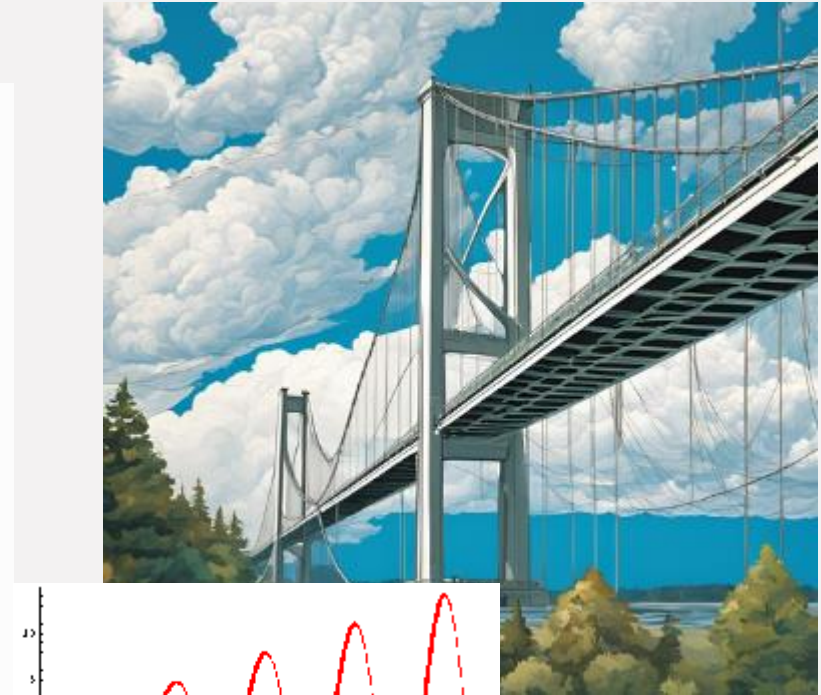
The Scholar Bridge: Bridge Dynamics

Advisor: Dr. Adriana Trias; trias@rowan.edu; Rowan Hall 233

Graduate Student: John Vrabel

Students will use accelerometers and LiDAR sensors to capture the vibrations of a bridge model. This project is part of the NJDOT Bridge Resource Program.

- Literature review of basic structural vibration and mode shape concepts, non-destructive evaluation methods, and state-of-the-art technologies.
- Hands-on data collection and data processing.



Intensely Cold Exposure of Young Concrete – Lomboy, Riddell, Fajardo



Concrete can deteriorate due to freezing

- a) Determine the effect of the **timing** of short temperature incursions ...
- b) Determine the effect of the **duration** of temperature incursions ...

during curing on the strength development of concrete with additive-based frost protection.

Intensely Cold Exposure of Young Concrete – Lomboy, Riddell, Fajardo

Research demonstrated that concrete with additive based frost protection (ABFP) can be mixed, cast, and cured at $-5\text{ }^{\circ}\text{C}$ while still developing strength comparable to control mixed cast and cured at $+20\text{ }^{\circ}\text{C}$. A significant benefit of ABFP concrete is to eliminate the need for cold weather protections such as active heating during curing, thus saving construction costs. These investigations will simulate a situation where concrete with ABFP is cast at $-5\text{ }^{\circ}\text{C}$, but an unexpected deep freeze (-10 to $-20\text{ }^{\circ}\text{C}$) occurs shortly thereafter. If you have questions about the topic, please contact Dr. Lomboy.
lomboy@rowan.edu

WHAT YOU WILL BE DOING –

Activities

- Review literature on the effect of the timing of short temperature incursions during curing on the strength development
- Mix concrete to make concrete specimens
- Quantify the damage of low temperatures on young concrete
- Make sure work areas are clean and orderly

Reports and Presentations

- Write a final report or paper and present at the end of the semester

Concrete Beam Testing – Lomboy, Moraña

Concrete beams will be designed with different geometries and concrete materials. Beams will be either plain, reinforced with rebars, or fiber reinforced. Tests will be conducted on concrete for their compressive strength. Beams will be tested for their fracture strength. The goal are to (1) achieve beams with high fracture strengths; (2) lean load and displacement controlled testing of beams; (3) learn to calculate the fracture properties of beams.

If you have questions about the topic, please contact Dr. Lomboy. lomboy@rowan.edu

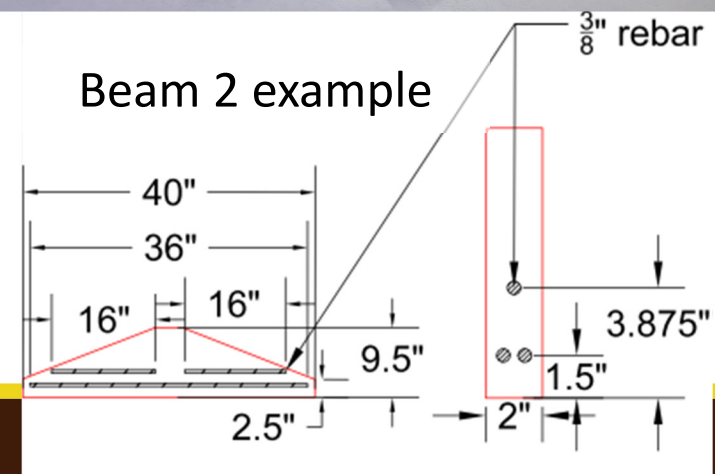
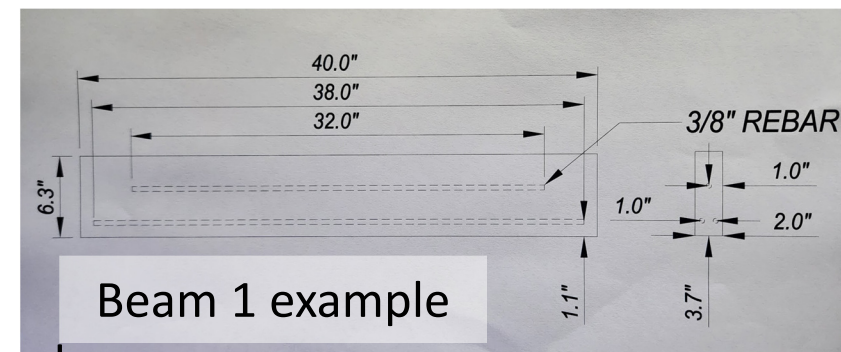
WHAT YOU WILL BE DOING –

Activities

- Prepare materials for testing
- Mix concrete and cast beams
- Measure the mechanical properties of concrete and beams
- Make sure work areas are clean and orderly

Reports and Presentations

- Write a final report or paper and present at the end of the semester



Permeability and Porosity of Concrete – Lomboy, Looc

Water penetration



Concrete



**AASHTO T358
Surface
Resistivity Test**



**German's
permeability
test**



**ASTM D4404
Pore size
analyzer**

**Measure concrete permeability and
pore size distribution**

Permeability and Porosity of Concrete – Lomboy, Looc

High permeability combined with the concrete's exposure to the unfavorable environment will adversely affect the durability of concrete through physical effects that include surface wear, cracking, and exposure to extreme temperatures, as well as through chemical effects involving leaching of cement paste, sulfate attack, alkali-aggregate reaction, and corrosion of embedded steel. This study will measure the permeability and pore volume distribution of different types of concrete mixtures and relate these properties to electrical resistivity and durability.

WHAT YOU WILL BE DOING –

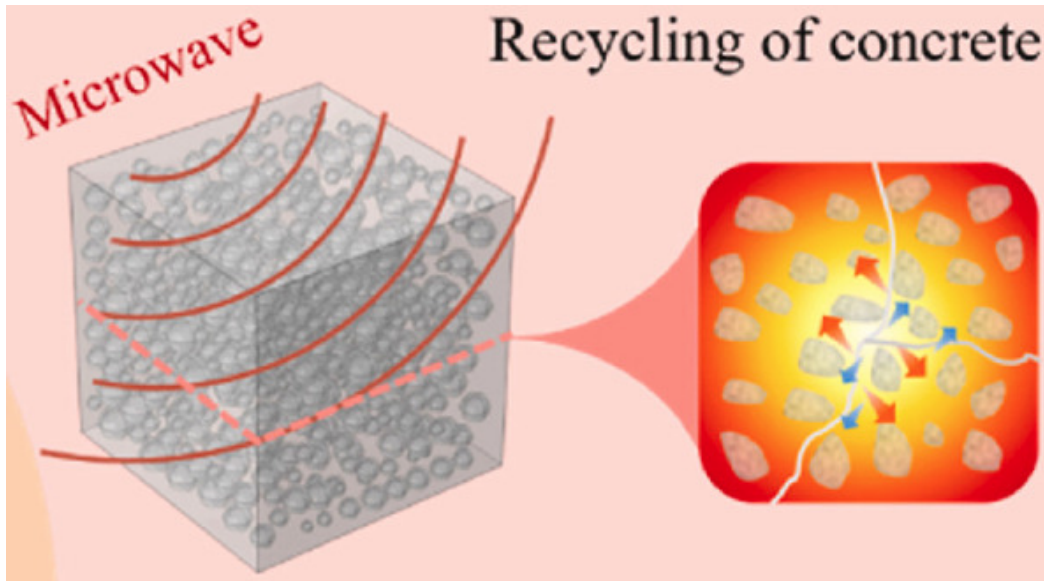
Laboratory Activities

- Mix concrete
- Test permeability properties of concrete using different methods
- Prepare materials for testing
- Make sure work areas are clean and orderly

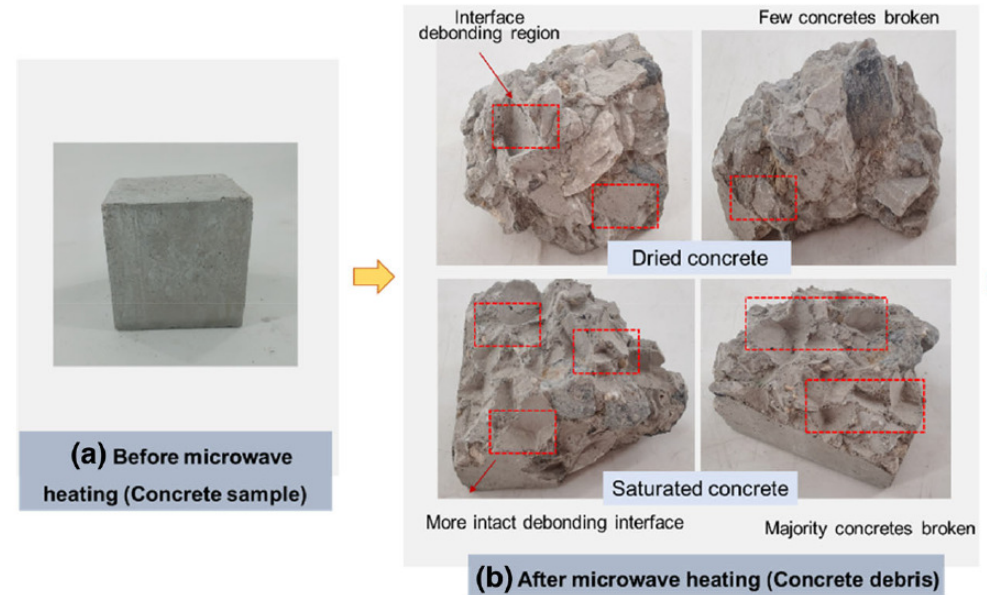
Reports and Presentations

- Write a final report or paper and present at the end of the semester

Microwave Effects in Concrete – Lomboy, Abubakri, Roshanbin



Xiao & Xue, 2024, Renewable and Sustainable Energy Reviews, 199:114498



Wei, et al. 2021, Matls and Struc, 54:142

- **Derive relationships between microwave and concrete parameters**
- **Determine penetration of microwave energy for concrete**
- **Loss of compressive strength of hardened concrete under microwave heating**
- **Effect of microwave heating on microstructure and porosity of concrete**

Microwave Effects in Concrete – Lomboy, Abubakri, Roshanbin

This project is a novel rapid microwave thermal process to accelerate the demolition, recycling, and repair of concrete structures. The success of the project would revolutionize the repair and maintenance of the pavements and highways by introducing new technology with higher efficiency (time and cost) compared to the conventional methods and assisting highway agencies to repair and reopen roads much sooner than current methods. The project aims to apply microwave energy to rapidly increase the internal temperature of concrete and, subsequently, damage the local concrete matrix, leading to accelerating the demolition process. If you have questions about these requirements please contact Dr. Lomboy. lomboy@rowan.edu

WHAT YOU WILL BE DOING –

Laboratory Activities

- Mix concrete
- Measure the properties of concrete under varying microwave power
- Make sure work areas are clean and orderly

Reports and Presentations

- Write a final report or paper and present at the end of the semester



Bioremediation for Cold Regions

Project Managers – Dr. Jagadish Torlapati, Dr. Kiriti Yenkie & Dr. Yusuf Mehta

- ▶ Develop experiments for bioremediation of in cold regions
- ▶ Investigate ways to optimize the bioremediation process
- ▶ Collect literature data for model validation
- ▶ Project funded by Department of Defense
- ▶ **Requesting: 3 CEE students**



CENTER FOR RESEARCH & EDUCATION IN
ADVANCED TRANSPORTATION ENGINEERING SYSTEMS



Engineers Without Borders



Project Managers –Dr. Yusuf Mehta, & Dr. Jagadish Torlapati

- ▶ Prepare for implementation trip to Ecuador
- ▶ Complete the design of water tank to increase the water quantity
- ▶ Develop a filtration system to improve the drinking water quality
- ▶ Complete trip planning requirements
- ▶ **Requesting: 4 Students from any engineering discipline**



Enhancing Heavy Vehicle Safety: Integrating Advanced Technologies, Human Factors, and Policy Interventions

Advisor: Dr. Mohammad Jalayer

In this engineering clinic, students will explore key aspects like technology, driver behavior, and regulatory measures on heavy vehicle safety.

Potential publication opportunity



Identifying Travel Needs for South Jersey and Shore Customers

Advisor: Dr. Mohammad Jalayer

In this engineering clinic, students will help to better understand South Jersey and Jersey Shore weekday and weekend travel both in the summer and off-season to identify transit gaps and opportunities for bus customers and help grow ridership.



Potential publication opportunity

Objective: Assessment of Aging Characteristics of Highly Elastic Asphalt Binders

AND Evaluating the Use of Control Joints for Controlling Repeated Transverse Thermal Cracking

Production of HEB's



Sensor Installation

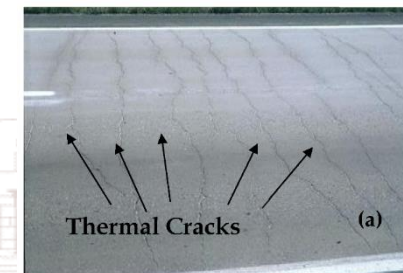


Impact of research work to DoD/Industry

- Develop more sustainable asphalt materials that have a lower environmental impact
- Longer service life of asphalt pavements by delaying low-temperature cracking and freezing temperatures – economical benefits
- Improve the resistance of flexible pavements to thermal cracking in cold regions using control joints.

Specific Tasks

- Produce HEB's in the laboratory
- Perform short-term and long-term aging of HEBs
- Characterize the aging effect on HEBs through chemical and physiochemical parameters
- Analyze test data, determine and compare the aging indices
- Identify, select, and procure material and equipment,
- Evaluate the performance of asphalt mixtures at various types of joint types (partial- vs. full-depth) and joint sealers.





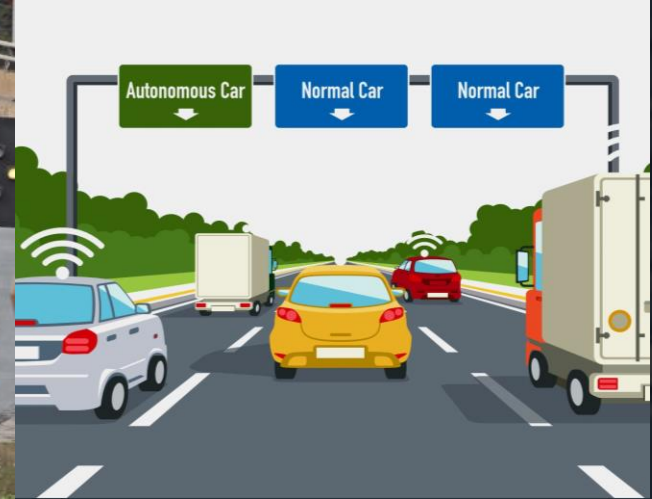
Commercial Motor Vehicle Crashes in New Jersey

Dr. Fahmida Rahman

- Conduct a review of the literature available for commercial motor vehicle (CMV) crashes. It will focus on:
 - ❖ CMV data
 - ❖ Causes of CMV crashes
 - ❖ Methods used by DOTs, Local Agencies, and Researchers to analyze CMV crashes
 - ❖ Identify countermeasures adopted to reduce CMV-related crashes
- Identify main causes of CMV crashes using the Federal Motor Carrier Safety Administration (FMCSA) data and develop a crash prediction tool for NJ.

Self Driving Cars in Work Zones

Dr. Fahmida Rahman



- Test the self driving cars in different types of lane closures using Simulation Software.
- For each lane closure case, compare roadway capacity with varying Self Driving Cars/Connected and Autonomous Vehicle (CAV) penetration rates
- Develop capacity adjustment factors for individual cases

CEE LIVING LABS

Dr. Fahmida Rahman and Dr. Kauser Jahan



Help the Civil & Environmental Engineering Department Labs come alive with REAL-TIME DATA!

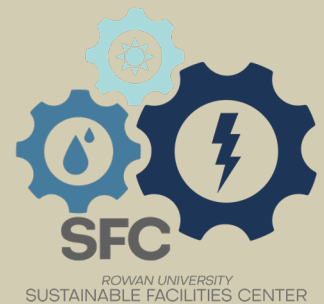
We would like to integrate state of the art sensors that will provide real time data enveloping all core areas of civil engineering-structural, environmental (energy use, water and air quality) and much more. Living labs are interactive and will provide a dynamic environment for teaching and research.



Sponsor: Friends of CEE and CEE Alumni



Sustainable Facilities Center Engineering Clinic Projects



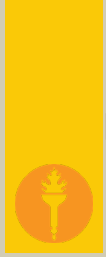


Sustainable Facilities Center (SFC)



- Since 2018, the SFC engages in contract work for the New Jersey Department of Military and Veterans Affairs (**NJDMAVA**) and New Jersey American Water.
- Provides funding for **graduate student positions**.
- Provides opportunities for **summer internships!**
- Gain access to SFC space (Rowan Hall Room 222) for studying.
- Check out our website [here!](#)

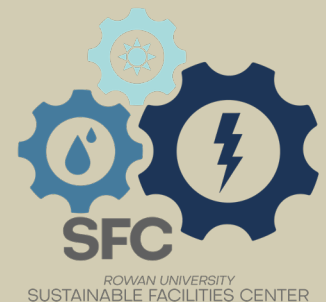




SFC Engineering Clinic Projects



- Building Energy and Water Audits (**NJDMAVA**)
- Building Information Modeling (**NJDMAVA**)
- Sustainable Facilities Management (**NJDMAVA**)
- Sustainable Drinking Water (**New Jersey American Water**)





Building Energy and Water Audits



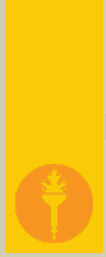
Clinic Advisors: Dr. Riddell, Dr. Trias, Dr. Haas, and Dr. Li

Clinic Description: This project aims to assess a building's energy and water consumption to identify inefficiencies, evaluate performance, and recommend cost-effective measures to improve sustainability, reduce energy usage, and lower operating costs for NJDMAVA.

Clinic Requirements:

- Seeking ME, CEE, and ECE majors (separate projects for each major)
- Attend off-campus visits to NJDMAVA sites.
- Use field equipment (thermal cameras, flow bags, etc.) to collect building data.





Building Information Modeling

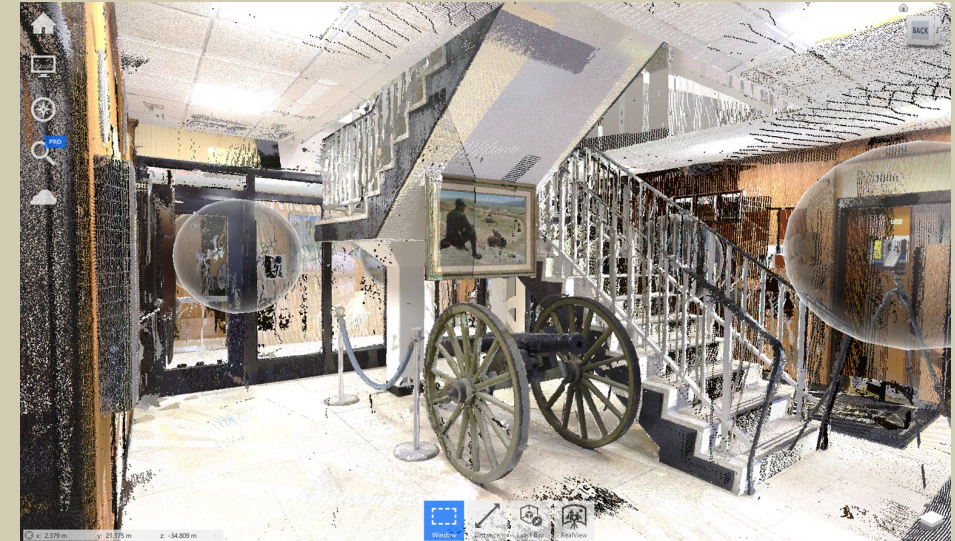


Clinic Advisors: Dr. Trias and Dr. Riddell

Clinic Description: This project is a collaborative process of collecting and organizing detailed building data to create a 3D digital model that integrates design, construction, and operational information for improved decision-making and project management for NJDMAVA.

Clinic Requirements:

- Seeking ME, CEE, and ECE majors!
- Two-semester commitment.
- Learn Autodesk ReCap, Revit, AutoCAD, and Insight.





Sustainable Facilities Management



Clinic Advisors: Dr. Trias and Dr. Riddell

Clinic Description: This project aims to document building systems (HVAC, plumbing, and/or electrical), use advanced facility management software (BUILDER SMS and FacilityDude), to develop solutions for unique challenges at NJDMAVA facilities and create detailed preventative maintenance plans aimed to increase system lifetime for NJDMAVA.



Clinic Requirements:

- Seeking ME, CEE, and ECE majors!
- Attend off-campus visits to NJDMAVA sites.





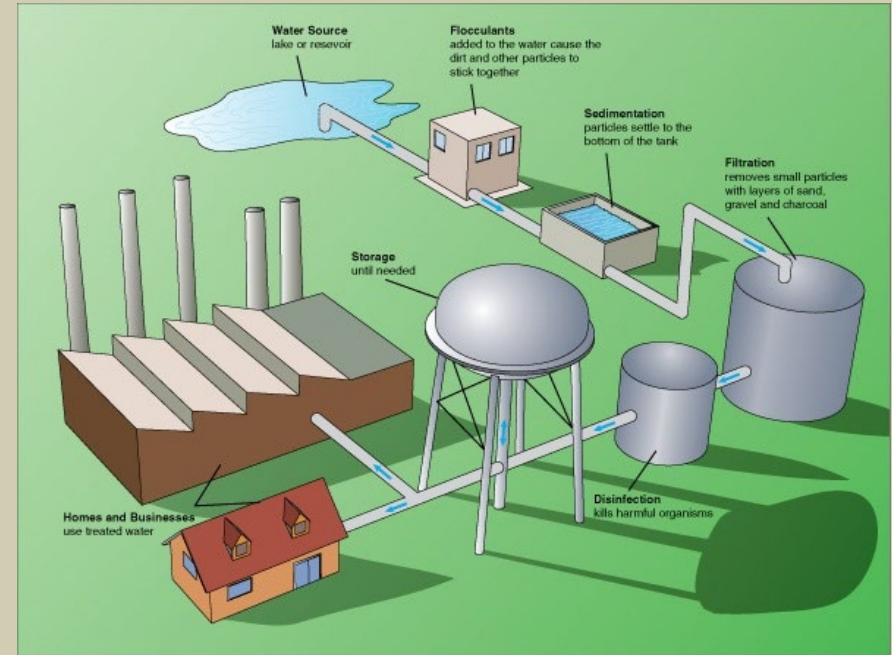
Sustainable Drinking Water

Clinic Advisors: Dr. Riddell, Dr. Torlapati, Dr. Yenkie

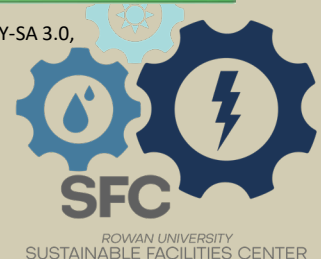
Clinic Description: This project uses energy benchmarking to prioritize facilities for future energy and water audits, aligning with New Jersey Board of Public Utilities requirements, by quantifying energy use, identifying high-priority sites, recommending cost-effective measures, and supporting grant applications for New Jersey American Water.

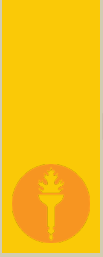
Clinic Requirements:

- Seeking CEE and ChE majors!
- Attend off-campus visits to New Jersey American Water sites.



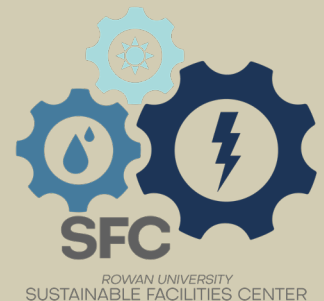
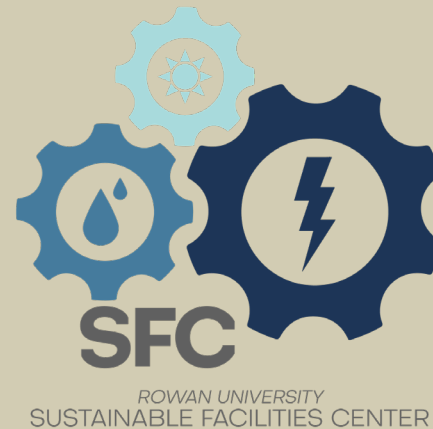
By CK-12 Foundation - File:High_School_Engineering.pdf, page 73, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=16024233>





We are excited to have you if interested!

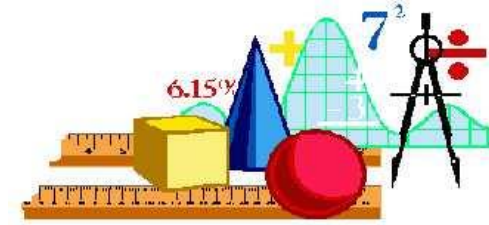
For any questions, please reach out to the project's advisor.



ENGINEERS ON WHEELS

Dr. Kauser Jahan, PE

Professor and Head of Civil and Environmental Engineering



Sponsor: CATALENT



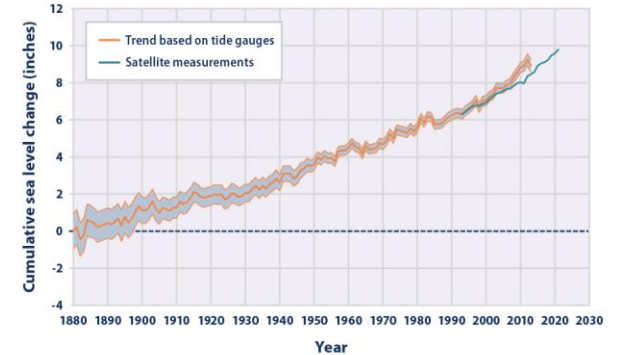
- Develop fun exciting hands on activities for K-12 students and teachers
- Virtual/physical visits to area schools during clinic period to expose engineering careers
- Prepare publications for conferences

Project E³: Energy, Environment and Education

Dr. Zhiming Zhang and Dr. Kauser Jahan



- Climate change has been accelerated due to greenhouse gas emissions, which results in increasing extreme weather events and sea-level rise. The U.S. is heavily investing in alternate clean energy and lowering of the carbon footprint. New Jersey is at the forefront of using renewable clean energy and has recently invested in two more new wind farms in the Atlantic Ocean.
- This project focuses on the education of future generations about their environment: specifically renewable energy and climate change. Students will acquire knowledge regarding the causes and effects of climate change, such as impacts of climate change on South Jersey.
- The wind and tidal data collected from hands-on and outdoor activities will be used to predict the amount of power generated by nature and to estimate the reduction in greenhouse gas emissions. Decision-making process will be practiced for a low-carbon future.

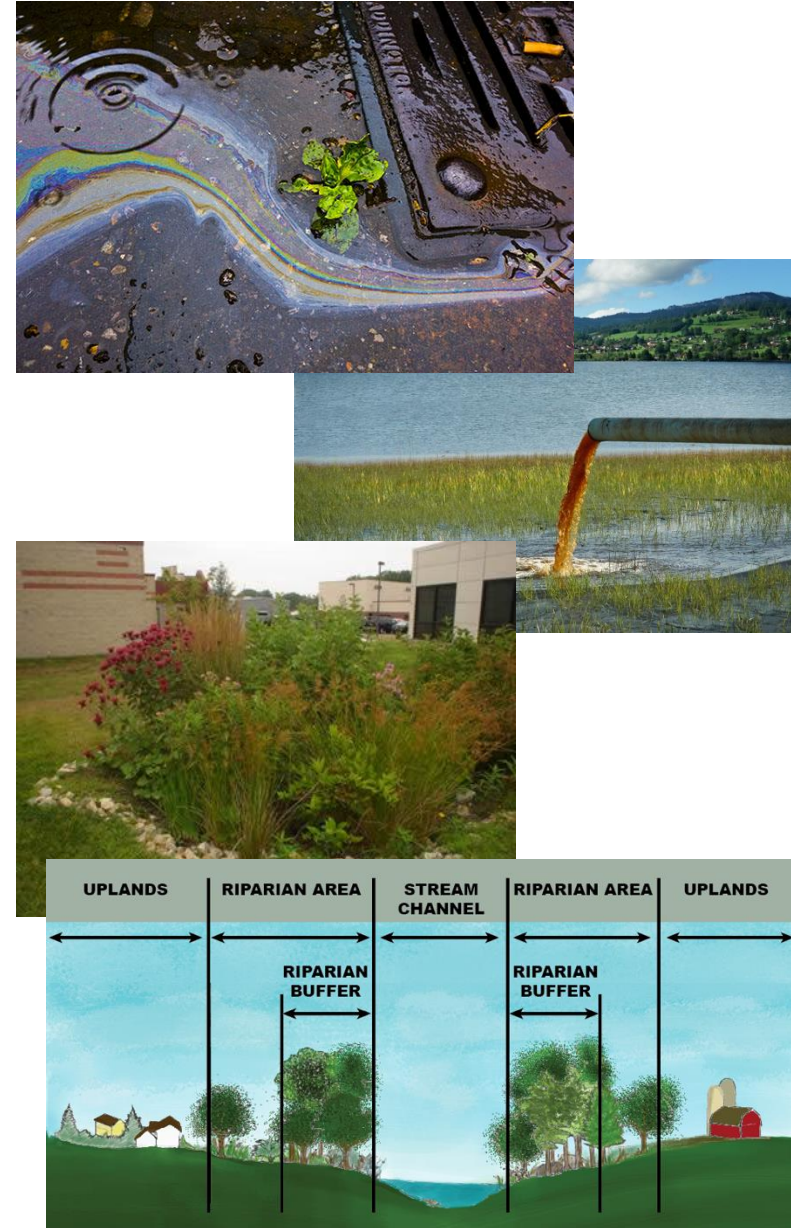


Green Infrastructure Optimization for Freshwater Protection

Dr. Zhiming Zhang and Dr. Kauser Jahan

Freshwater systems are of vital importance as they serve critical functions for the environment, ecosystem, and human development. Despite of their importance, more than half of the coastal rivers in the US has been moderately to severely polluted. Stormwater runoff is the most common way that nonpoint source pollution reaches freshwater systems.

- Riparian buffer strips have been widely applied as an effective green infrastructure practice to protect rivers and streams. The optimization of riparian buffer strips will be investigated via addition of soil amendment.
- Rain gardens are cost-effective and aesthetically pleasing stormwater best management practices (BMPs), but nitrate cannot be effectively removed. Optimization of nitrate removal will be explored by enhancing microbial activities for denitrification.
- Bioswale retrofitting will also be investigated through soil amendment and engineered mulch chips.

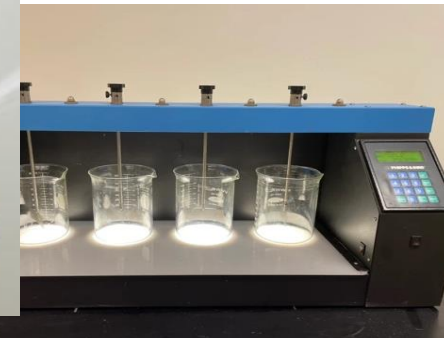
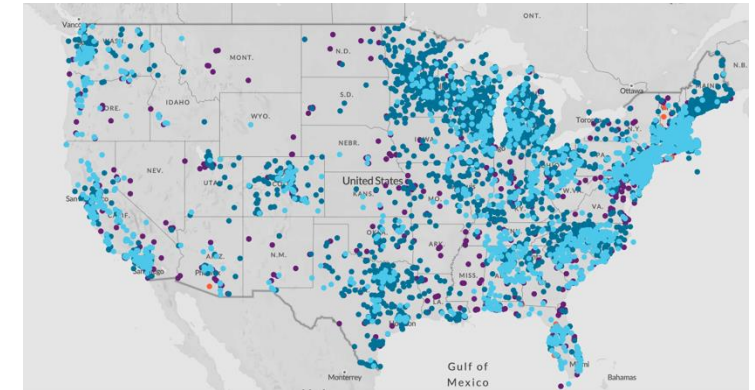


Identification and Sustainable Removal of PFAS

Dr. Zhiming Zhang and Dr. Kauser Jahan

Urban stormwater runoff is a major non-point pollution source that transports contaminants to receiving water bodies, particularly during the growth of urbanization and climate change. The contaminants in stormwater like per- and polyfluoroalkyl substances (PFAS) are prevalent and cancer-causing, posing threats to aquatic and human health.

- To learn PFAS migration towards freshwater systems, stormwater runoff samples from Trenton and Glassboro will be analyzed to identify PFAS.
- A solid waste, drinking water treatment residuals, will be repurposed to remove PFAS in the stormwater runoff.
- Different types of ion-exchange resins will be tested for the removal of PFAS compounds via batch sorption tests in the lab.



Electric Curing of Conductive Concrete

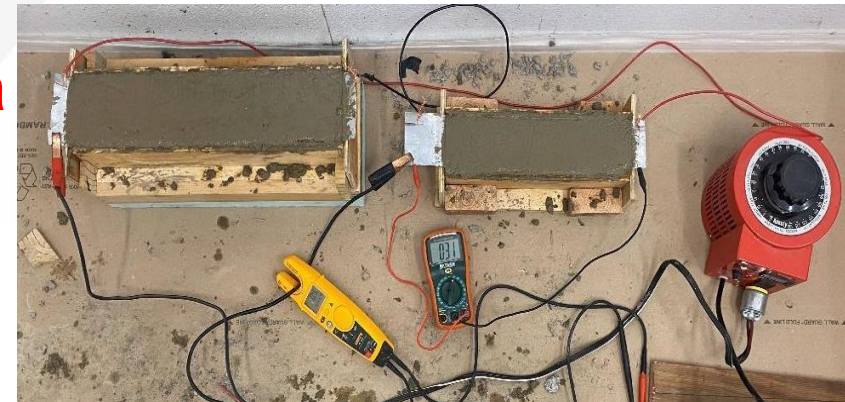
Students will work on federally funded project to develop electric curing regime for conductive concrete for construction in Arctic Regions. This project is funded by US DOD (**2 CEE, 2 ECE students**)

Advisor: Dr. Islam Mantawy and Dr. Shahriar Abubakri

Graduate Student: Alyssa Sunga and Mohamed Masbouba

Over the next semester, the students will:

- Student will work on development of different concrete mixes
- Students will work on setting up electric curing regimes
- Collect and analysis data



Hint: Work will be conducted in cold room at CREATES, please check if you have any health or feeling uncomfortable working in cold room



ASCE Concrete Canoe

This clinic is devoted for ASCE Concrete Canoe Competition for both Regional and Hopefully National Competition. For first time, Rowan will seek to 3D-print the whole canoe. This clinic will work closely with Additive Construction Canoe (5 CEE Students)

Advisor: Dr. Islam Mantawy

Graduate Students: Aly Ahmed

Over the next semester, the students will:

- Understanding the rules of 2024-2025 competition
- Getting concrete mixes for both casting and printing the Canoe
- Print small versions of the canoe for demonstration



The Scholar Bridge: Bridge Dynamics

Advisor: Dr. Adriana Trias; trias@rowan.edu;

Rowan Hall 233

Graduate Student: John Vrabel

This clinic project focuses on capturing and defining the vibrations of a 15-foot-long bridge with the objective of detecting damages at the support level.

Students will use accelerometers and a LiDAR scanner to capture the vibrations. This project is part of the NJDOT Bridge Resource Program.

- The team will go over a literature review of basic structural vibration and mode shape concepts, non-destructive evaluation methods, and state-of-the-art technologies.
- The team will participate in hands-on data collection and data processing.



Greening Camden

Project Managers – Dr. Jagadish Torlapati, & Dr. Mahbubur Meenar

- ▶ Identify locations to collect air quality samples in Camden, NJ
- ▶ Collect air quality samples at different location
- ▶ Complete data analysis for air quality measurements in Camden NJ
- ▶ Develop air quality training and education modules for Camden communities
- ▶ Project funded by EPA
- ▶ **Requesting: 4 CEE students**

