

PROJECT SUMMARIES (As provided by ERDC)
2009 SUMMER RESEARCH INTERNSHIP

Job. Num	Discipline	Level	Supervisor/Laboratory	Description
1	Civil Engineering/ Oceanography	MS or BS (Upper-level undergraduate)	Stan Boc Costal & Hydraulic Laboratory Vicksburg, Mississippi	The Coastal Engineering Branch is an organization that evaluates the performance of coastal engineering structures and assesses impacts to coastal areas from storm processes to improve shore protection and navigation project design. CHL is seeking a student to become involved with hand-on activities in the office and field that support research and development in coastal structures condition assessment and field instrumentation and data collection.
2	Civil Engineering (Costal and Hydraulic)	MS or BS (Upper-level undergraduate)	Jeffrey A. Melby Costal & Hydraulic Laboratory Navigation Division, Harbors, Entrances and Structures Branch Vicksburg, Mississippi	Student will populate Enterprise Coastal Inventory Database with coastal data. The data will include general project overview, maps, aerial photos, waves and water level measurements, and topographic and bathymetric data. The duties could include rudimentary data processing, database modification, Google Earth interface construction, or building GIS maps from topographic and bathymetric data and translating these products to Google Earth presentations, depending on the aptitudes and expertise of the student.
3, 4	Remote Sensing/ Environmental	MS or BS (Upper-level undergraduate) (Two Students)	Jennifer Wozencraft Costal & Hydraulic Laboratory Navigation, Costal Engineering Vicksburg, Mississippi	Looking for a student to expand its basic land cover classification, which currently identifies vegetation as short or tall, and brown or green into more specific categories, like vegetation species. The work would entail a literature review of lidar and hyperspectral processing techniques for vegetation identification, and development of a process to apply these techniques to Joint Airborne Lidar Bathymetry Technical Center of Expertise lidar and hyperspectral imagery using ENVI software. A basic knowledge of hyperspectral image processing, lidar technology, and ENVI software would be helpful.
5	Civil/Hydraulic Engineering	MS or BS (Upper-level undergraduate)	Dennis Webb Costal & Hydraulic Laboratory Navigation Division, Navigation Branch Vicksburg, Mississippi	The student will be involved with research in the area of design of navigation channels and/or structures. The emphasis will be focused on assisting with reimbursable navigation projects on the ERDC Ship/Tow Simulator and/or physical navigation models. The student will assist with all aspects of the research to include model setup, conducting tests, and data processing. At times, the student will be expected to perform independent, after given general guidance, of direct supervision from the engineer.

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6	Geographical Information Systems, Costal Geology, Coastal Engineering	MS or BS (Upper-level undergraduate)	Donald Stauble & Ray Ratcliff Costal & Hydraulic Laboratory Navigation, Costal Engineering Vicksburg, Mississippi	Looking for a student to expand its analysis of coastal change detection using remote sensing (aerial photography, Lidar and hyperspectral scanners) in a GIS from pre- and post-storm data sets. The work would involve a literature review of Lidar and hyperspectral processing techniques for shoreline change detection, dune and beach erosion quantification and geomorphic change detection. These techniques will be applied to aerial photography, lidar bathymetry and topographic surveys and hyperspectral scanner data sets using ArcGIS and other GIS software. A basic knowledge of GIS, image processing, lidar technology and ArcGIS would be helpful.
7	Civil/Coastal/Ocean Engineering	MS or BS (Upper-level undergraduate)	Ty Wamsley Costal & Hydraulic Laboratory Flood, Storm Protection Division Vicksburg, Mississippi	The student will be involved with research in the area of storm surge, waves, and coastal erosion. The emphasis will be focused on the numerical modeling of these coastal processes. The student will assist with all aspects of the research to include data analyses, model setup, simulation, and calibration/validation. At times, the student will be expected to perform independent, after given general guidance, of direct supervision from the engineer. A basic knowledge of coastal processes and experience with MATLAB would be helpful.
8	Architectural/Mechanical/ Electrical Engineering	MS or BS (Upper-level undergraduate)	Larry Danyluk Cold Regions Research & Engineering Laboratory (CRREL) Hannover, New Hampshire	<p>The student will primarily be responsible for producing “as built” electronic drawings of the existing facilities at CRREL. The duties will include retrieving archival information, modifying existing files and/or creating new drawings, and field verification of the new drawings. Desirable qualifications are listed below. Individual is needed to produce electronic floor plans of CRREL buildings. Reuirements:</p> <ul style="list-style-type: none"> • Computer skills: AutoCAD, 2D efficiency essential, general Word, Excel and Office program experience. • Technical Profficiency: ledge of terminology and comprehension of drawing symbols and layouts, ability to independently verify drawing information to assure electronic drawings contain the latest layouts and updates, ability to convert into AutoCAD precise scaled full-size electronic drawings from existing hard copy building plans, knowledge in converting AutoCAD drawings files into other electronic formats, such as pdf files.

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9	Civil Engineering	MS or BS (Upper-level undergraduate)	Nicholas Boone Geotechnical & Structures Laboratory Geoscience & Structures Division Vicksburg, Mississippi	The student will be involved with research in the areas of structural dynamics as it relates to protective structures. The emphasis will be on blast and ballistic performance evaluated through laboratory and field experiments. The student will assist with all aspects of the research to include the setup and execution of the experiments, data reduction, analyses and reporting. The student will periodically work in a field environment that will require travel and handling materials with weights of up to 50 pounds. Numerical and analytical exercises may also be conducted to evaluate material performance in support of this project. A basic knowledge of structural engineering with any coursework on structural dynamics would be particularly helpful. An interest in ballistics and penetration would be useful also.
10	Geology or Geological Engineering	Graduate Student	Danny Harrelson Geotechnical & Structures Laboratory Vicksburg, Mississippi	The student will work as part of a team to assist with a current effort in measuring the weathering phenomena of large stones used for shoreline and wave projection in the great lakes region of the United States. The student will be involved in field observations of stone weathering, possible quarry investigation and monitoring trips to various field sites to assess weathering potentials and rock mass loss. The student will also be involved in analysis of the data, and in documenting the results for potential publications.
11	Civil/Geotechnical Engineering	Upper-level undergraduate	Tina Holmes Geotechnical & Structures Laboratory Geoscience & Structures Division Vicksburg, Mississippi	The student will be involved with the inspection of dams located on Army installations. The emphasis will be focused on the inspecting and reporting of data collected during the observation of dams. The student will assist with all aspects of the project to include documenting problems associated with dams and dam failure, analysis of the data collected, and documenting of results in databases and potential publications. The student will work with installation personnel and with other Corps of Engineer Districts. At times, the student will be expected to perform independent, after given general guidance, of direct supervision from the engineer. The student's work environment will be both indoor and outdoor.

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12	Civil Engineering	MS or BS (Upper-level undergraduate)	Kent Newman Geotechnical & Structures Laboratory Airfields & Pavement Branch Vicksburg, Mississippi	The student will be involved in basic research investigating the use of bacteria to stabilize soils. Currently, we are investigating using bacteria to produce biopolymers that may be used to improve soil engineering properties for soil stabilization and dust control. Additional applications may involve treatment of range and fire control areas to prevent heavy metal leaching and migration into local runoff. The student will conduct soil strength testing and dust control tests. This will involve small, delicate sample (1" x 2" specimens) preparation for strength and/or larger samples for dust testing. The samples will be tested using unconfined compressive testing and/or dust control tests. All data analysis and interpretation will be performed by the student. The student will be expected to perform these studies independently (after being given training and guidance) which will demand significant responsibility. The student will be expected to collate the body of work into a concise report and discuss this work as a brief lecture/presentation at the end of the assignment. A basic knowledge of soils and unconfined compressive testing will be helpful. Prior experience with Instron software is helpful but not required. A working knowledge of Excel is also needed.
13, 14	Civil or Mechanical Engineer	Upper-level undergraduate (Two Students)	Henry McDevitt Geotechnical & Structures Laboratory Impact & Explosion Effects Branch Vicksburg, Mississippi	The student will assist senior engineers in conducting both Lab and Field experiments involving projectile penetration and blast effects on structures. The student will be expected to assist in the fabrication of test articles, data collection and data reduction. Student may be required to travel to Fort Polk, LA test site to participate in field experiments. Basic computer, lab and mathematics skills are required.
15	Civil Engineer	MS or BS (Upper-level undergraduate)	Timothy W. Rushing Geotechnical & Structures Laboratory Airfields & Pavement Branch Vicksburg, Mississippi	The student will be involved with research in the area of airfield pavements and airfield matting. The emphasis will be focused on the evaluation of prototype matting systems under full-scale simulated aircraft tests. The student will assist with test section construction, data collection, reduction, analysis, and reporting. . At times, the student will be expected to perform independent of direct supervision from the engineer, after general guidance. Some of the work will be performed outdoors. A basic knowledge of airfield pavements and proficiency in spreadsheet manipulation would be helpful.

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16	Computer Engineering	MS or BS (Upper-level undergraduate)	Doris Turnage Geotechnical & Structures Laboratory Mobility Systems Branch Vicksburg, Mississippi	Student will assist with or perform portions of laboratory and office research pertaining to the Battlespace Terrain Reasoning and Awareness (BTRA) - Battle Command (BC) research program. BTRA-BC is the next technological transformation required to realize the full potential of incorporating terrain and weather-based actionable intelligence into an integrated, net-centric battle command environment. The products and Tactical Decision Aids (TDAs) developed under this research are designed to accelerate the speed of decision and actions within Battle Command and improve the precision of analysis. The GSL is developing TDAs for tactical logistics and vehicle gap crossings. The student will work with the Principal Investigator (PI) to assist in the development of software products for Geospatial Information Systems (GIS) through the Commercial Joint Mapping Tool Kit (CJMTK) developed by Environmental Systems Research Institute (ESRI). Suggested Reading: Material on Geospatial Information Systems (GIS); Vehicle mobility; Environmental Systems Research Institute (ESRI).
17	Civil, Mechanical or Electrical Engineering	BS (Upper-level undergraduate)	Jody Priddy Geotechnical & Structures Laboratory Mobility Systems Branch Vicksburg, Mississippi	The student will provide technical support on projects involving performance testing of ground vehicles and/or aircraft in natural, off-road environments. The projects will include vehicle-level characterizations (e.g. weight, center of gravity), component-level characterizations (e.g., tire pressure, track width, contact area), and terrain characterizations (e.g., soil type, soil strength, moisture content). The projects will also involve the use of electronic sensors (e.g., load cells, potentiometers, accelerometers, inclinometers, strain gauges) and data acquisition systems. The student's specific tasks should involve: field, laboratory, office work settings, manual and/or digital data collection, data reduction using spreadsheets, and analysis tools using spreadsheets, MATLAB, etc.
18	Civil Engineering	Upper-level undergraduate	Stephen Robert Geotechnical & Structures Laboratory Structural Mechanics Branch Vicksburg, Mississippi	The student will be involved with research in the areas of progressive collapse and blast mitigation of reinforced concrete panels. The emphasis will be on the effectiveness of certain reinforced concrete slabs subjected to dynamic pressures and also to determine the rotational capacity and robustness of beam-column connections after the removal of its supporting column. The student will provide cost estimates for future experiments, collect and analyze test data, determine effectiveness of different material combinations in reinforced concrete slabs, assist in report writing and power point presentations, and assist with the ordering of materials and construction of full scale beam-column connection experiments.

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19	Civil Engineering	Upper-level undergraduate	Bradley Foust Geotechnical & Structures Laboratory Structural Mechanics Branch Vicksburg, Mississippi	<p>The Geotechnical and Structures Laboratory of the US Army Engineer Research and Development Center (ERDC) is engaged in ongoing research and development programs in the area of weapons effects and terrorist threat protection. These research programs involve design, testing, and analysis to investigate structures and structural components subjected to the severe dynamic-loading environments resulting from the detonation of explosives inside or external to the structures. The student is required to provide basic services in the areas of testing, evaluation and engineering support. The effort can generally be described by the following tasks:</p> <ol style="list-style-type: none"> 1) Assist project engineer with setting up the experiments. 2) Analyzing test data such as pressure time histories of the blast event. 4) Collaborate with research partners and potential vendors to determine appropriate innovative materials to test. 5) Analyze/plan material characterization of innovative materials 6) Recovering post-test data in the field that is critical to determining the effectiveness of the retrofit techniques. 7) Prepare reports and presentations of the results for ERDC review.
20	Civil Engineering/ Physicist/Geologist	MS or BS (Upper-level undergraduate)	Charles A. Weiss Geotechnical & Structures Laboratory Concrete & Materials Branch Vicksburg, Mississippi	The student will help with a current effort toward our investigation of the forensics of concrete including use of Non-Destructive testing in the analysis of cement-based building materials. Research may include use of optical microscopy, scanning electron microscopy, wavelength-dispersive X-ray chemical analysis, and X-ray diffraction analysis of materials.
21	Civil or Mechanical Engineering, Physicist, Geologist	MS or BS (Upper-level undergraduate)	Todd Rushing & Brian Green Geotechnical & Structures Laboratory Concrete & Materials Branch Vicksburg, Mississippi	The student will help with a current effort toward the development and forensic analysis of Ultra High Performance Concretes. This will include use both destructive and Non-Destructive laboratory test methods in the analysis of these materials. Since this research may include use of optical microscopy, scanning electron microscopy, wavelength-dispersive X-ray chemical analysis, and X-ray diffraction analysis of materials, good laboratory skills are recommended.

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22	Civil Engineering	Upper-level undergraduate	Evelyn Villanueva Geotechnical & Structures Laboratory Geoscience & Structures Division Vicksburg, Mississippi	The determination of breaching mechanisms for Corps embankment dams is an important consideration for engineering risk analyses. A common mode of failure for embankment dams and levees is flood overtopping. When population is at risk, accurate prediction of breach parameters is necessary to make reliable estimates. There are over 2 dozens of numerical and empirical models and none of them fully address the needs for all the cases. In this study we expect to evaluate overtopping software that has promise for Corps applications, assistance will be given in the development of procedures to evaluate and predict dam breach parameters from overtopping. The student will provide technical support by conducting a parametric analysis of three available models developed for dam breaching prediction. A parametric analysis will be conducted using the following computer programs: HR Breach (by HR Willingford, UK), Firebird (Ecole Poly Technique, Montreal, Canada) and SIMBA (Simplified Breaching Analysis by US Department of Agriculture). The expertise needed for this work will include the ability to input several key parameters including the embankment geometry, flood discharge, and material properties into the computer models, and to evaluate the outputs. It will be also helpful for the student to have knowledge in statistical analysis to facilitate the understanding of the performance of the models. If time allows, the student will be introduced to the laboratory tests to determine the coefficient of erosion.
23	General/Civil/Electrical/ Mechanical Engineering	MS or BS (Upper-level undergraduate)	Andrew R. McHugh Topographic Engineering Center Alexandria, Virginia	The student will be involved with advanced research and technology integration/prototyping for Army and other Department of Defense customers. Technologies include those associated with remote sensing, geospatial intelligence systems, command and control decision support systems, and human intelligence collection and management. The student will assist with all aspects of the research to include test setup, equipment setup and data analyses. At times, the student will be expected to perform independently, after receiving general guidance from senior engineers and scientists. <u>Suggested Reading</u> : Basic text books on: Remote Sensing of the Environment; Geographic Information Systems; Systems Engineering Process; and Mapping the Human Terrain.

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24	Computer Science or Software Engineering	MS or BS (Upper-level undergraduate)	Peter Seman Cold Regions Research & Engineering Laboratory (CRREL) Hannover, New Hampshire	The student will be working on our program on Synthetic Automotive Virtual Environments (SAVE). The student will be generating and modifying software to build training scenarios for a vehicle control trainer complete with motion platform and assist in programming algorithms to modify existing vehicle dynamics code to account for new variables (different types of driving surfaces, brake pedal or steering wheel force feedback, acoustic feedback, etc.). The student must be an upper-level undergrad or a graduate student with strong to exceptional programming skills. Automotive or mechanical interest a plus but not necessary. Desirable programming language skills include MATLAB, C, and Visual Basic. Excellent English language communication skills are also required. <u>Suggested Reading</u> : Technical papers from the project available on request.
25	Civil Engineering (Structures)	MS or BS (Upper-level undergraduate)	Henry Díaz & Edgardo Ruiz Structural Engineering Branch Geoscience & Structures Division Vicksburg, Mississippi	The student will be involved with research in the area of determining condition evaluation and safe load carrying capacity of bridges using non-destructive techniques. Non-destructive equipment to achieve these objectives includes ground penetrating radar (GPR) and strain transducers. The student will assist with all aspects of the research to include test setup, equipment setup and data analyses when required. At times, the student will be expected to perform independent, after given general guidance, of direct supervision from the engineer. A good portion of the work will be performed outdoor. A basic knowledge of AASHTO “Manual for Conditions and Evaluations of Highway Bridges” and “LRFR” codes is required. Also, the student should be familiarize with strain transducers and how they can be used on the field and having basic understanding ground penetrating radar would be helpful.

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26	Physicist or Chemical Engineering	MS or BS (Upper-level undergraduate)	Vincent Hock & Mark Ginsberg Construction Engineering Research Laboratory (CERL) Urbana Champaign, Illinois	Student will assist with or perform portions of field, laboratory, or office research pertaining to the military and civil works missions of the US Army Corps of Engineers. Topic area will be civil works and infrastructure, water security. <u>Suggested Reading</u> : Whatever standard text on Water Treatment used at your school's Civil Engineering Dept. Securing Our Water Supply: Protecting a Vulnerable Resource by Dan Kroll; PennWell Corp. (July 28, 2006); ISBN-10: 1593700695; ISBN-13: 978-1593700690
27	Biology, Ecology	MS or BS (Upper-level undergraduate)	Chris White, Adam Smith & Matt Hohmann, Ryan Busby Construction Engineering Research Laboratory (CERL) Urbana Champaign, Illinois	Student may assist with evaluation of DoD buildings and lands from an archaeology or historical perspective, literature reviews and development activities related to modeling invasive species distributions, occurrences, and population sampling, or laboratory analysis of soil, above ground plant biomass, and below ground root biomass samples to assess invasive species ecology and vulnerability to control strategies targeted at physiological and reproductive functions. <u>Suggested Reading</u> : National Register of Historic Buildings, basic plant ecology, biological systems modeling, and/or integrated pest management textbooks.
28	Biology, Ecology	MS or BS (Upper-level undergraduate)	Alan Anderson Construction Engineering Research Laboratory (CERL) Urbana Champaign, Illinois	The CNN branch of CERL performs a wide variety of applied and basic research tasks associated with sustainable use of Army training lands and force readiness. Broad topics including Threatened and Endangered Species (TES) viability, soil erosion control, vegetation management, and Acoustic/Noise impacts on natural, civilian and/or military environments. The student assigned to a CNN PI will assist with or perform portions of field, laboratory, or office research pertaining to these research efforts. Work will include data analysis, literature reviews and report generation.