AARON J. RUBIN, P.E.

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BIOGRAPHY:

I am professionally licensed geotechnical engineer with over 15 years of civil engineering experience. I currently work as a lecturer in the Smith College Picker Engineering Program. I am a strong proponent of interdisciplinary teaching and research because working with other disciplines broadens my perspectives and provides me with new ideas for research and teaching. During my PhD in the Civil and Environmental Engineering Department at the University of Massachusetts Amherst I collaborated with the Electrical Engineering, Geoscience, and Classics departments. My research interests are primarily in energy (geothermal HVAC and offshore wind), railroad geotechnics, and novel GPR applications. I have specific research experience in the estimating and modeling of the thermal conduction of soils, electromagnetic wave propagation and quantitative GPR data collection, in situ railroad testing, and dam safety. I try to conceptualize classes such that students learn more than just the technical material – drawing on my professional experience to teach skills that were useful to me in practice. I have six years of consulting experience primarily in geotechnical site evaluations, foundation and earthworks design, dam safety inspections and remediation design, HVAC geothermal applications, preparation of geotechnical contract documents, and construction observation. I enjoy traveling internationally both for professional conferences and personal exploration. My international experiences have given me new perspectives on what is possible. My life experiences, teaching, research, consulting experience all inform and ground each other, augmenting the perspectives I've gained to improve my future work.

EDUCATION:

University of Massachusetts, Amherst, MA
Ph.D. Civil Engineering (Geotechnical Engineering)
Dissertation Topic "Application of Ground Penetrating Radar for use in Thermal Conductivity Site Investigations"
-Defended September 14, 2018
Degree Awarded: February 2019

University of Massachusetts, Amherst, MA
M.S., Civil Engineering (Geotechnical Engineering), May 2007
Master's Thesis: "Tensile Strength of Fine Grained Soils"

Tufts University, Medford, MA
B.S., Mechanical Engineering, May 2005

RESEARCH EXPERIENCE:

NSF Grant – Award Number 2301588 *Sept. 2023 – Present*
ERI: Dielectric Mixing Models for Coarse Aggregate

The proposed research seeks to advance our fundamental understanding of how the gradation of coarse aggregates mixed with varying amounts of finer aggregate relates to observed physical properties such as maximum density, porosity, water content and how those in turn relate to the electromagnetic property relative permittivity (dielectric constant) of the overall mixes. The practical implication of the work is the development of a more effective dielectric mixing model that uses the material properties of the air, water, and solid particles to estimate the relative permittivity of the bulk mix. This will allow GPR to more effectively estimate aggregate properties and object/target depth. In order for GPR to be a trusted

tool for geotechnical engineers, dielectric mixing models that are reliable for the full range of fine and coarse aggregates must be developed. The proposed research has the following specific objectives:

- Objective 1: Establish the repeatability of common practices for specimen preparation and methods that produce the highest quality specimens when testing large particle aggregates.
- Objective 2: Create a data set of relative permittivity values covering a wide range of aggregate gradations, density, and water content.
- Objective 3: Create a dielectric mixing model that may be appropriately used on coarse large particle aggregates.

To date, this research has provided research opportunities for 11 undergraduate women, 9 of whom were able to have research experiences for the first time in their academic career. The second way this funding is broadening participation of women in STEM is that the some of the Smith College research students are working with a local Girls Inc Eureaka! program chapter headquartered in Holyoake, MA (approximately 20-minute drive from campus). The Girls Inc Eureka! program is national program run by local chapters which provides girls a 5-year experience preparing them to participate and excel in cutting-edge, dynamic STEM careers. The development of this connection has the synergistic benefit of putting female Smith College students in a mentoring role to middle school and high school girls in engineering and STEM. Simultaneously, it is anticipated that the Eureaka! program girls will be inspired by the college aged women in engineering.

It has produced a conference paper in its first year and will fund travel for undergraduates to an academic conference. It is anticipated to result in journal publications during the 2024-25 academic year.

Smith College Picker Engineering Program, Northampton, MA *May. 2019 – Present*

Collaborative Research

Historic Northampton *Sept. 2024 – Present*

A collaboration with UMass Amherst Geoscience, Smith College, and Historic Northampton. Historic Northampton is one of the oldest homesteads in Northampton, MA with occupation dating back to the 1600s and the oldest structures dating to the 1700s. The team worked to collect ground penetrating radar data to locate the lost location of historic structures on the property. Undergraduate students were able to help with the collection of real-world data. Final results are currently pending.

Dassault Foundation *Summer 2020*

A collaboration Smith College and Tufts University engineering faculty, to study what elements and ordering of CAD and simulation instruction facilitate deep learning of statics concepts and help students approach and solve complex problems. At Smith, we prepared a 1-cr elective course, to run concurrently with Engineering Mechanics, which provides formal instruction on Solidworks and Simulia through several assignments and a final project. The course was then piloted in the Fall of 2020. In the future, we will compare the outcomes of students who take both courses to students who take Engineering Mechanics only.

Student Research Advisor

Special Studies Advisor *Sept. 2024 – present*

This special study involves scale model calculations and design for the novel East Coast Ladder, aiding and improving fish passage on the Atlantic Coast. This project will include data collection and design implementation at the USGS S.O. Conte Anadromous Fish Research Center in Turners Falls, MA

Special Studies Co-Advisor *Sept. 2020 – May 2021*

This special study was a two-semester effort that involved researching modeling, simulation, and the quantification of uncertainty as presented in undergraduate engineering curriculum. The work culminated with the student presenting a paper at the American Society of Engineering Educators Conference during the spring semester.

Summer Research Advisor: *May. 2019 – Aug 2020*

I oversaw the research of two undergraduate Smith students (funded research through the Smith summer SURF program). The main focus of the SURF research was railroad related and was a collaborative effort with the University of Massachusetts Amherst Civil and Environmental Engineering department and the private company HyGround Engineering (a LORAM subsidiary). We tested novel approaches to measuring in situ characteristics of railroad ballast using non-destructive techniques (lightweight defelectometer also referred to as LWD and ground penetrating radar).

The research included the following:

- Developing a test box (approximately 2 ft x 3ft x 2ft) for measuring GPR and LWD ballast response.
- Conducting data on approximately 25 box tests at minimum or maximum density and various saturation levels.
- Conducted 125 minimum density and 50 maximum density tests on ballast/fouling mixtures.
- Characterized the repeatability of minimum and maximum density tests on ballast and the repeatability of LWD tests on prepared cylindrical ballast specimens.

To date, both SURF students were able to prepare and submit conference papers to 4th International Conference on Transportation Geotechnics.

This research continued into the Summer of 2020 and is anticipated to continue in the future. Additional research included additional tests on fouling material and preparation of journal articles.

Undergraduate Thesis Advisor: Sept. *2019 – May 2020*

I acted as the primary thesis advisor for a Smith undergraduate student with the thesis topic "Characterizations of Connecticut Granite Ballast materials and implications to USA High Speed Rail Networks." This research was a continuation of the SURF summer research. This research involves preparing numerical models to estimate the mechanical properties and relative permittivity of railroad ballast. The objective is to predict mechanical properties based on GPR measurements.

University of Massachusetts Civil and Environmental Engineering Department, Amherst, MA

Dissertation Research: Advisor: Dr. Carlton Ho *Sept. 2013 – Aug. 2018*

The application of GPR for thermal conductivity in situ site investigation was investigated using analytical modeling validated with experimental data. The research addressed the analytical modeling of thermal conductivity and electrical relative permittivity based on mineralogy, void ratio, and saturation. The separate models were then unified such that the thermal conductivity of sands could be estimated from relative permittivity measurements made by commercial GPR systems.

The research included the following:

- Conceptualization and execution of a research program from the ground up.
- Made interdisciplinary connections on campus (electrical engineering and geoscience departments) to acquire the required testing equipment.
- Conducted over 150 thermal conductivity and relative permittivity measurements on 6-inch diameter specimens prepared to a wide range of void ratio and saturation conditions.
- Developed novel analytical models for the thermal conductivity and relative permittivity of sands based on soil structure geometry.
- Unified the developed analytical models such that thermal conductivity could be calculated from relative permittivity measurements.

- Scaled up relative permittivity measurements using a commercial GPR system in a 6-ft x 6-ft sandbox to validate the unified model.

This research is expected to result in 3 journal publications and 5 conference publications.

University of Massachusetts Civil and Environmental Engineering Department, Amherst, MA
Research Assistant: Advisor: Dr. Carlton Ho *Feb. 2017 – Aug. 2018*
This project is a joint Federal Railroad Administration cooperative project conducted by Earth Science Systems, LLC (ESS) of Wheat Ridge, CO, Burlington Northern Santa Fe Railroad (BNSF), and the University of Massachusetts Amherst. A railroad test track was built at a BNSF Railroad facility in Topeka, KS for the purpose of evaluating the material properties of ballast under a variety of fouling and moisture conditions. A novel GPR device was tested in conjunction with lightweight deflectometer (LWD) and dynamic cone penetrometer (DCP) tests at the test track with a specific focus on estimates of elastic modulus.

The research included the following:

- Site observation of the construction of a full-scale test track at a commercial rail yard in Topeka, KS
- Collected data using Ground Penetrating Radar, Lightweight Deflectometer (LWD), mini-Dynamic Cone Penetration, in-situ ballast density, and in-situ ballast water content based on ASTM procedures.
- Collection of field test data at active railways in Topeka, KS, Phoenix, AZ, and Kansas City, MO.
- 3D COMSOL multiphysics and GeoTrack modeling of railroad conditions.
- Related LWD measurements to ballast fouling index.

This research resulted in 2 conference publications.

University of Massachusetts Geosciences Department, Amherst, MA
Independent Study: Advisor: Dr. William P. Clement *June 2014 – Dec 2014*
The objective of this work was to learn the principals and practice of ground penetrating radar (GPR) used as a site investigation tool. The data was collected at three test sites was processed to prepare a site characterization. Sites were selected to focus on use of GPR for granular materials sites, fine grained materials sites, and utility/obstruction location.

University of Massachusetts Civil and Environmental Engineering Department, Amherst, MA
Independent Study: Advisor: Dr. Alan J. Lutenegger *Jan 2014 – Sept 2014*
The objective of this work was to measure the thermal conductivity of bentonite based grouts used for geothermal heat source applications and to determine if the thermal properties can be enhanced by the addition of small amounts of Type-F Flyash. These measured values will serve as reference or baseline values for comparison with values of thermal conductivity reported by manufacturers of thermal grouts. The results of this study were not suitable for publication, but could be incorporated into a proposal for future research funding.

Poggio Civitate Field School, Vescovado di Mulro, Italy
The Poggio Civitate Archaeological Field School is among the oldest and most well respected archaeological training programs in the world. Their program provides students and archaeology enthusiasts the opportunity to excavate at the site under the direction of a staff of professional archaeologists, conservators, illustrators, and photographers.

June 2013 – Aug 2013
During the 2013 field season I was present for the full 6 weeks. I was involved in all aspects of fieldwork, including excavation and data collection, archaeological survey and drawing, objects conservation, illustration, photography, and cataloging. In addition, I preformed an evaluation on the potential timber sizing and geometry of Etruscan structures. I also contributed to artist renditions of Etruscan structures based on calculations made.

July 2015

During the 2015 field season I conducted a weeklong GPR survey of four locations to aide in the detection of ancient structures. An anomaly was detected in an area previously unexcavated and led to excavation during the 2016 field season. The results of the 2016 excavations was published *Etruscan Studies: Journal of the Etruscan Foundation* in the end of season field report.

University of Massachusetts Civil and Environmental Engineering Department, Amherst, MA
Masters Thesis and Research Assistant: Advisor: Dr. Alan J. Lutenegger *June 2005 – May 2007*
Research was conducted with Dr. Lutenegger for two years as part of the Masters Thesis "Tensile Strength of Fine Grained Soils" and various other projects.

Research activities included:

- Conducted full-scale helical pile load tests.
- Performed dozens of index tests including hydrometers, Atterburg limits, proctor compactions, swelling, linear shrinkage, collapse and incremental load oedometers.
- Preformed tensile strength tests (double punch tests) on compacted soils at varying energy compaction efforts and water contents.
- Conducted field work utilizing inclinometer and pressure transducer instillation for the Vermont Agency of Transportation
- Analyzed, complied and reported data and results

This research contributed to 3 conference publications presented by Dr. Lutenegger between 2007 and 2009.

TEACHING EXPERIENCE:

Smith College Picker Engineering Program, Northampton, MA
Lecturer *Fall 2018 – Present*
Strength of Materials (Fall 2018/19, Spring 2021, Fall 2021) – Course designed for Junior and Senior level students. The course builds on the principles of Static Mechanics and introduces students to internal stress state and static failure analysis. As part of the course, students complete a final project in which they are tasked to provide a theoretical analysis of an object under loading and compare it to actual strain-gage measurements taken in a laboratory setting. The final project allows for students to make connections between the theoretical and experimental behavior of materials. Class size is typically 25-30 students.

"I super appreciate your kindness when helping me understand new concepts."

"Professor Rubin has had incredible lectures that I found helpful for homework sets and exams. He was able to clearly explain and answer questions in class."

"Dr. Rubin had great office hours availability. Individual meetings often proved to help my understanding of a topic more than two weeks of classes alone."

"While this class was difficult and a lot of work, overall I really enjoyed taking it. I thought that the final project was especially fun."

"I would like to again thank professor Rubin for the time and energy he put into EGR 375 and also into teaching us that we are already engineers (with the acknowledgement that we need a little more schoolwork to make it official). As someone who dreaded taking this class, and at one point promised myself I never would, I can officially say I loved being in class, I loved this project, and I even, somehow, ended up loving mechanics."

Finite Element Modeling (Spring 2019/2020, Fall 2020/2021/2022/2023/2024) – This course is an elective offering to juniors and seniors in the Picker Engineering Program developed from the ground up by Aaron. This course is an introduction to finite element methods for the analysis of solids, fluids, and heat transfer. Topics covered include the creation of 1D, 2D, and 3D models of engineering problems in COMSOL Multiphysics (a commercial engineering program), comparison of modeled results to laboratory measurements, and the evaluation of modeled results. An emphasis is placed not only on the creation of computer models, but also on how to validate those models with real world data. Class size is typically around 15 students.

What students said about the course:
"This course is unlike any Engineering elective I had taken at Smith College. It requires you to utilize all the material you learned from the core engineering courses and apply it to a theoretical computer model. I absolutely loved the structure and topics I learned in this course and would recommend this class to other students."

"Prof. Rubin is an awesome teacher! If you take this course or any other course with him, definitely go visit him in office hours or send an email if you have any questions or concerns. He is great in terms of working with students individually and he is great support. He is super nice also, very easy to talk to, so don't hesitate to reach out to him if you need anything. Definitely one of the best teachers I had here at Smith!"

"Writing memos is a very effective way to process and synthesize information. I feel as though I learned a great deal from having the assignments be in momo–format. Your plethora of office hours was much appreciated and valued!"

"This was an awesome class, really fun and you learn a lot!"

Geothermal Systems (Spring 2019/2020/2022/2023, Winter 2021, Fall 2023/2024) – This course is an elective offering to juniors and seniors in the Picker Engineering Program developed from the ground up by Aaron. Topics to be covered include the different types of geothermal systems used for heating and cooling, calculating heat exchange, evaluation of site geothermal potential, design of geothermal systems, as well as construction techniques and considerations. Course activities will include discussions, design projects, and field trips to ongoing geothermal construction sites (when possible). Class size is typically 10-15 students.

What students said about the course:
"I really enjoyed this class and even if this may not be your topic of interest, you really leave with a lot of new knowledge and a little bit of experience working on a real world problem."

"This is the class to take if you really want to get some experience doing real design work. It can take a lot of time and effort, but the learning experience is so incredibly worth it. I would absolutely take another course with Prof. Rubin again."

"This felt like a pocket of engineering not typically explored by Smithies. I had a great time understanding the real–world applications and experiencing them first hand!"

"I loved this class and I think that I learned a lot. Professor Rubin was very helpful in answering questions and making sure we understood what we were learning."

"I loved this class. I thought all the readings and assignments were really important and helpful, so I was never just wasting my time. The sequencing made sense and I thought we got feedback so quickly which was very helpful."

Design Clinic (Academic Year 2020-21, 2021-22, 2022-23, 2023-24, 2024-25) – This is a two-semester senior level course that focuses on collaborative design. Students work in 3-4 person teams on projects sponsored by industry firms or government agencies. In this co-taught class instructors act as "coaches" for the student teams with weekly meeting to help facilitate student-driven work. While working on real-world project, students engage in problem framing, design,

professional communication, teamwork, experimentation, and life-long learning. Class size is typically 30-35 broken up into teams.

What students said about the course:
"I have gained a lot of skills and perspective about the professional life through his constant feedback and help."

"Your availability outside of class was SO impressive and SO helpful! Thank you!"

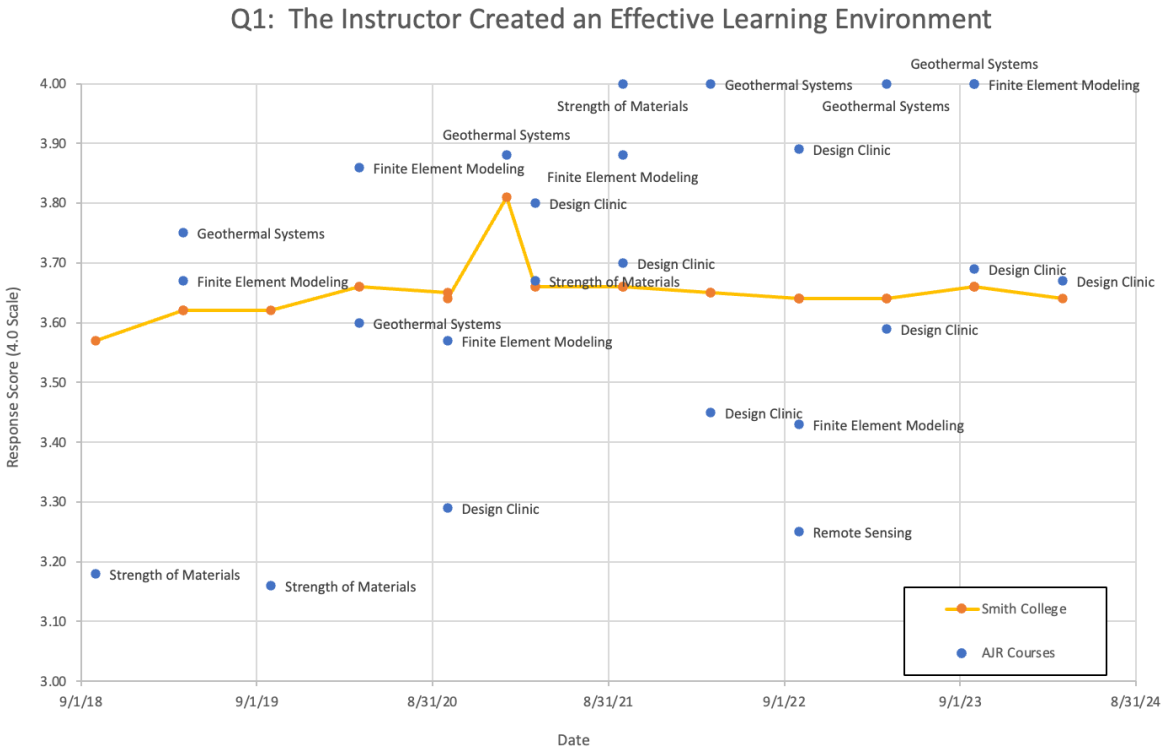
"The feedback we received at sprint meetings was really helpful to our project and gave us a lot to think about that we hadn't before. It helped keep us on track too, as we didn't always keep timing in mind and focused more on just completing the project which helped a lot."

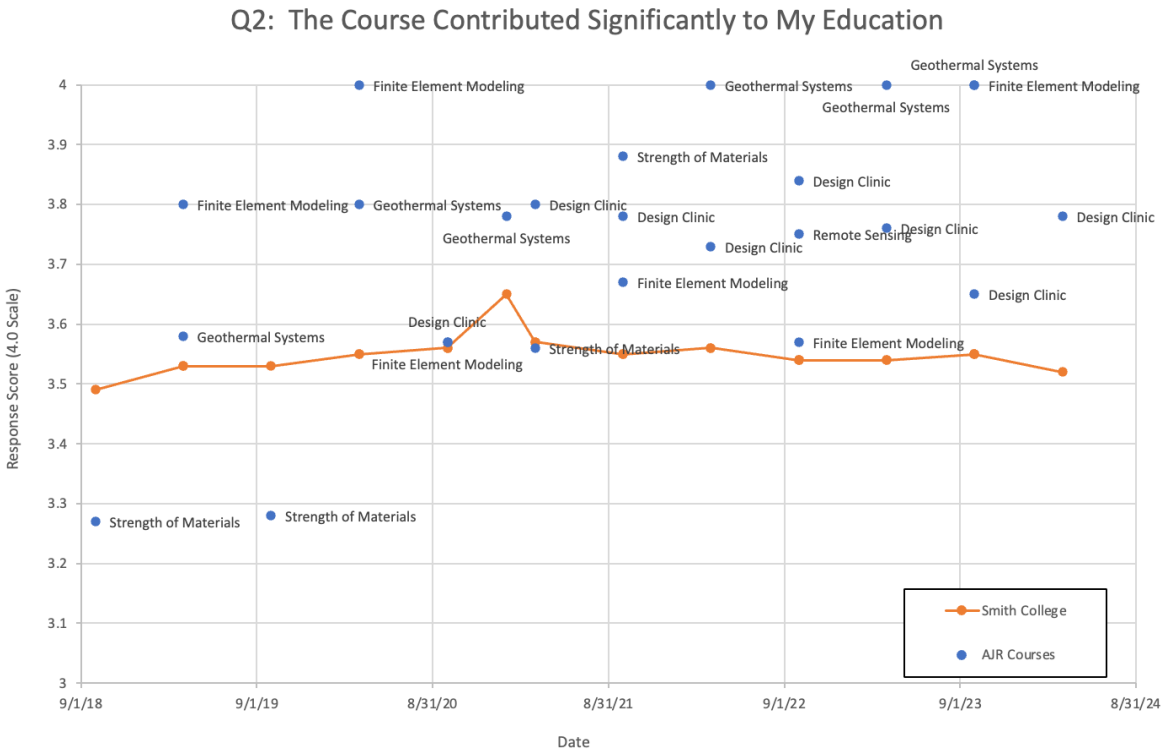
"Design Clinic is a lot of work but is such a cool experience and you learn so much professionally and there is so much room to learn the technical aspects that you are interested in."

Remote Sensing (Fall 2022) – This course is a new elective offering to juniors and seniors in the Picker Engineering Program developed from the ground up by Aaron. Remote Sensing explores technology such as radar, sonar, LiDAR, resistivity, and other techniques used to collect data when engineers have to be "hands off." An emphasis is on both research of cutting-edge techniques and practical application of field work and data collection. Course activities include discussions, research projects, and field work using ground penetrating radar and other systems. Class size is typically 12-14 students.

Complete Teaching Record:
Q1: The Instructor created an effective learning environment
Q2: The course contributed significantly to my education

4 = Strongly Agree, 3 = Agree, 2 = Disagree, 1 = Strongly Disagree





University of Massachusetts College of Engineering, Amherst, MA

Teaching Associate for Freshman Seminar *Fall 2015 & Fall 2016*

This course was designed to be an introduction to engineering for first-year first semester students with a focus on both technical (an engineering project) and non-technical (advising geared towards student success). I was responsible for developing a syllabus to cover both aspects of the course with the following learning outcomes:

- Express their own motivation for studying engineering.
- Develop a concrete plan for being a successful student.
- Express the role of engineering in society and identify common applications of engineering in the workplace.
- Plan, conduct, and execute an engineering evaluation.
- Recognize ethical behavior in engineering.

As the instructor of record for the 19 students in this class, I had the following responsibilities:

- Developed a syllabus for the 1-credit Freshman Seminar Course
- Conducted weekly lectures
- Develop weekly homework assignments
- Develop a team based final project to be completed during the final 6 weeks of the semester
- Held weekly office hours
- Grade course work and assign final grades

The final project was a large portion of the technical work of the class. In the Fall 2015 semester I developed a design-based project focused on geothermal energy. In the Fall 2016 semester I developed a project focused on building Lego bridges that could most efficiently hold a specified weight. Lego pieces were given fictitious cost amounts (larger pieces "cost" more than smaller pieces) such that the students had to consider cost ramifications in their designs. In the Fall 2016 semester my students nominated me for a Distinguished Teaching Award.

University of Massachusetts Commonwealth Honors College, Amherst, MA
Graduate Advising Assistant *Sep 2013 – May 2018*

My primary source of assistantship during my PhD program was as an advisor at the Commonwealth Honors College. The Commonwealth Honors College (CHC) at UMass provides small honors classes that foster intellectual exchange in close interaction with faculty offering the advantages of a small college alongside the resources of a nationally recognized research university. The Commonwealth Honors College was formed in 1999 and currently includes approximately 3,700 students (about 16% of the total UMass undergraduate population). These students were typically in the top 5-10% of their high school graduating class.

Advising sessions were conducted in group meetings, drop-in hours, or half-hour pre-scheduled appointments. As an advisor, I typically advised over 200 students (of all majors and colleges) per semester on wide range of subjects including:

- Course selection (of both honors and major requirements)
- Helping students select a major
- Helping students conceptualize an honors thesis or project
- Helping students find undergraduate research opportunities and labs
- GPA concerns and academic struggles
- College transition issues or other personal distress topics
- Career planning

I took particular joy in advising honors engineering students. I would often discuss how honors thesis or projects or undergraduate research could be used to further augment their resumes and career plans. I would use my experiences in both academia and the private sector to provide a context when answering their questions.

In addition to advising, I also provided other services to the Commonwealth Honors college including:

- Provided first drafts of policy initiatives for the director of advising (at CHC)
- Provided a first review of applications to the Commonwealth Honors College for internal admissions including a review of GPA, courses taken, and submitted essays. These reviews were to ensure that applicants met the minimal standards of CHC before further consideration.
- Reviewed student honors thesis proposals and independent study proposals to ensure that the documents met the minimum standards before additional reviews.
- Led New Student Orientation general sessions for CHC students and discipline specific sessions for Engineering CHC students. These sessions included an introduction to the CHC expectations and CHC curriculum as well as course selection for the fall semester.

Civil and Environmental Engineering Department, Amherst, MA
Teaching Assistant: Soil Mechanics (CE-ENGIN 320) *Feb 2006 – Dec 2006*

I worked with Professor Alan J. Lutenegger (primary course instructor for Soil Mechanics) as the sole TA for the laboratory sections. This required junior level course typically has 30-40 students per semester broken up in two 2-3 lab sections. Weekly responsibilities included:

- Conducted lectures during the beginning of the lab section to introduce core principles and test procedure.
- Set up laboratory demonstrations and aided students conducting laboratory data collection.
- Graded lab reports
- Held office hours for questions on course material both related to the laboratory and lecture topics.

At the end of the semester I prepared semester grades and provided feedback to the course instructor.

CONSULTING EXPERIENCE:

CDM Smith, Cambridge, MA

Geotechnical Engineer *2007 – 2013*

After graduating with my Master of Science in Civil Engineering I worked at CDM Smith for 6 years. During this time I advanced from a junior engineer engaged primarily in fieldwork to a fully licensed engineer primarily engaged in project management. These experiences enhance my academic perspective by providing a context of practical applications both viewed from the field as a junior engineer and considering scope and budget implications as a project manager.

A selection of my typical project management experience includes:

- Primary Contact for New York City Department of Design and Construction (NYCDDC)
  - Actively managed up to 15 projects simultaneously
  - Managed up to 10 staff simultaneously to execute field work (primarily site investigations) and project deliverables (engineering recommendation reports, as-built drawings, and test boring logs)
  - Worked in close communication with NYCDDC project managers as the primary CDM Smith contact
  - Provided weekly summaries to NYCDDC and CDM Smith personnel
  - Prepared and tracked project budgets
  - Prepared project schedules and staffing plans
  - Reviewed project reports and construction drawings prepared by Jr. staff
- Metropolitan District Commission, Hartford CT
  - Actively managed up to 4 construction projects simultaneously
  - Reviewed engineering recommendation reports, construction specifications, and contract drawings prepared by Jr. staff members
  - Worked with Jr. staff members to review construction submittals (temporary excavation support, earthwork, dewatering, site monitoring and other construction documents)
  - Prepared and tracked project scope and budgets
- CDM Smith Geotechnical Lab Manager
  - Actively managed up to 3 laboratory technicians.
  - Worked with clients to optimize testing programs based on the anticipated construction conditions.
  - Reviewed laboratory test reports for accuracy and consistency prior to final submission.
  - Prepared operating budgets for the CDM Smith Geotechnical Lab.
  - Reviewed invoices, revenue and operating costs.

While working at CDM Smith I was fortunate to be involved in a wide variety of projects. CDM Smith is a full-service design and construction firm, which allowed me to participate in all phases of the project life cycle from conceptual evaluation through final construction. A selection of some of the types of projects I worked on are as follows:

- Facilities and Pipelines – Typically wastewater treatment plants, pump stations, large diameter sewers:
  - Countless geotechnical subsurface investigation programs (both as field observer and supervisor) including SPTs, test pits, Shelby tube sampling, field vanes, monitoring well installation, and construction observation.
  - Foundation Design – Shallow and deep foundation design for challenging site conditions including soft clays, organic deposits, urban fills and high water tables.
  - Preparation of contract documents including drawing plans and site details as well as writing specifications for earthwork, temporary excavation support, dewatering, fill materials, and other construction considerations.
- Construction Services
  - Temporary excavation support system design including sizing and layout of members and evaluation of submittals and shop drawings.
  - Dewatering evaluations for estimated quantities of pumping and feasibility of proposed systems.
  - Review of miscellaneous shop drawings and submittals for temporary construction conditions.
  - Site visits and construction observation including documentation and communication.
- Dam, Levees, and Earthen Embankments

- Completed over 50 Phase I Dam Inspection/Evaluation Reports for dams in Massachusetts including documenting the existing conditions, reporting findings, and providing a P.E. stamp to final drafts.
- Contributed to 4 Phase II Inspection/Investigation reports for dams in Massachusetts including calculations and construction plans to rehabilitate the dams.
- Evaluated 4 levee systems for compliance to USACE guidelines including calculation of probability of failure based on flood stage.

- Geothermal
  - Completed over 10 geothermal evaluations including calculations for system sizing based on design heating and cooling loads.
  - Prepared construction drawings and specifications for 5 geothermal projects.
  - Performed construction monitoring for 2 geothermal construction projects.
  - One of Six members on a small working group to complete a geothermal manual for the company outlining technology, approach to design, and business opportunity

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PROFESSIONAL SOCIETY MEMBERSHIPS

American Societies of Civil Engineering (ASCE), member	*2007 – present*
Boston Society of Civil Engineers Section, member	*2007 – present*
Deep Foundations Institute	2020 – *present*
Etruscan Foundation, member	*2015 – 2020*
Geothermal Resource Council (GRC), member	2015 – *2017*
United States Society on Dams, member	*2010 – 2014*

PROFESSIONAL REGISTRATION/TRAINING

Professional Engineer (civil), Massachusetts, No. 49255
Professional Engineer (civil), New York, No. 091391
Center for the Integration of Research, Teaching, and Learning (CIRTL) Certified
OSHA 40-hour Hazardous Materials Safety Training 2007
OSHA 8-hour Supervisor Training 2009

PUBLICATIONS

Journal

Rubin, A,J., and Ho, C.L. *Soil Thermal Conductivity Estimated Using a Semi-Analytical Approach*. Geothermics, Vol 92, 2021. https://doi.org/10.1016/j.geothermics.2021.102051

Rubin, A.J. *Is Less More? A Review of Engineering Capstone Time Commitment and Grades*. International Journal of Engineering Education. 2024 Capstone Design Conference Special Issue. Accepted.

Rubin, A,J., and Ho, C.L. *Estimating the Thermal Conductivity from Relative Permittivity GPR Measurements*. Submitted.

Rubin, A.J. *Potential Challenges of Empirical Dielectric Mixing Models Applied to Coarse Aggregate*. Submitted.

In Progress:

Rubin, A,J., and Ho, C.L. *Estimating Relative Permittivity with a Geometric Semi-empirical Dielectric Model (GSDM)*. In Progress.

Peer Reviewed Conference Proceedings

Published in Proceedings (full text peer reviewed):

Rubin, A. J., Frantz, L., Gao, A., Silverman, G., Zhang, A., *Development of a Box for GPR Testing with Coarse Aggregates*. 2025 Annual Transportation Research Board (TRB), Washington, D.C. Accepted.

Rubin, A.J., Howe, S., and Kinsinger, M., *Implementing Individual Performance Reviews in an Engineering Capstone Design Course*, Capstone Design Conference, Dallas, USA, June, 2022

Yates, S., Conley, C., and Rubin, A.J., *Are You Sure About That? Introducing Uncertainty in Undergraduate Engineering Education*, 2021 ASEE Virtual Annual Conference Content Access, USA, July, 2021.

Akey, E.K., Jones, M.W., Ho, C.L., Rubin, A.J., *Measuring Railroad Ballast Modulus of Elasticity Using Light Weight Deflectormeter.* 4th International Conference on Transportation Geotechnics, Chicago, USA. May, 2021.

Jones, M.W., Akey, E.K., Ho, C.L., Rubin, A.J., *Repeatability of Minimum and Maximum Density Testing on Clean and Fouled Ballast*. 4th International Conference on Transportation Geotechnics, Chicago, USA. May, 2021.

Rubin, A,J., and Ho, C.L. (2018, June). *A Review of Methods to Estimate Soil Relative Permittivity*. 17th International Ground Penetrating Radar Conference 2018, Rapperswil, Switzerland.

Rubin, A,J., and Ho, C.L. (2018, May). *A Modified Method for Estimating the Thermal Conductivity of Sands*. GeoShanghai International Conference, Shanghai, China.

Rubin, A.J., Ho, C.L., and Oden C.P. (2018, January). *A Comparison of Railroad Ballast Elastic Modulus as Estimated from Lightweight Deflectometer (LWD) and Dynamic Cone Penetrometer*. 2018 Annual Transportation Research Board (TRB), Washington, D.C.

Rubin, A,J., and Ho, C.L. (2017, June). *Estimating Thermal Conductivity from Time Domain Reflection (TDR) Measurements*. Paper presented at the IEEE 9th International Workshop on Advanced Ground Penetrating Radar - IWAGPR2017, Edinburgh, UK. DOI 10.1109/IWAGPR.2017.7996062

Rubin, A,J., and Ho, C.L. (2017, March). *A Review of Two Methods to Model the Thermal Conductivity of Sands*. Paper presented at the ASCE Geotechnical Frontiers Conference, Orlando, FL, USA. DOI: 10.1061/9780784480472.085

Rubin, A,J., and Ho, C.L. (2016, June). *A Theoretical Method to Relate the Relative Permittivity and Thermal Conductivity of Sands*. Paper presented at the 16th International Ground Penetrating Radar Conference 2016, Hong Kong. DOI: 10.1109/ICGPR.2016.7572641

Whiteside, S.L., Dunn, T.C., Rubin, A.J., and Dawe, R. (2011, April). *Emergency Response and Rehabilitation of Spillway Damage Caused by a Mother's Day Storm*. Paper presented at the 31st Annual USSD Conference, San Diego, CA, USA.

Whiteside, S.L., Dunn, T.C. and Rubin, A.J. (2010, September). *Prioritizing Challenges Posed to a City by New Dam Safety Regulations*. Paper presented at the ASDSO Dam Safety Conference, Seattle, Washington, USA.

Lutenegger, A.J. and Rubin, A.J. (2008, July). *Tensile strength of some compacted fine-grained soils*. Proceedings of the 1st European Conference on Unsaturated Soils, Durham, UK, pp. 201-212.

PRESENTATIONS:

Oral:

Rubin, A.J. (2024, June). *Design Reviewers: Peers vs. Faculty*. Capstone Design Conference, Knoxville, USA, June, 2024.

Rubin, A.J. (2024, March). *Ground Penetrating Radar: In Practice and Future Work.* University of Massachusetts Amherst Geotechnical Department seminar guest speaker.

Rubin, A.J. (2023, April). *Ground Penetrating Radar (and Why Engineers Can't Quit Empirical Models).* SciTech Café. https://youtu.be/e0bcjHNabYg?si=9fYpLTxdifWdcXLZ

Rubin, A.J. (2021, October). *Railroads, Research, and Repeatability: A Look back at SURF 2019.* Smith College Lunch Forum.

Rubin, A.J. (2019, January). *Ground Penetrating Radar: Field and Research Experiences*. Smith College Lunch Forum.

Rubin, A,J., and Ho, C.L. (2018, May). *A Modified Method for Estimating the Thermal Conductivity of Sands*. GeoShanghai International Conference, Shanghai, China.

Rubin, A.J. (2017, March). *A Review of Two Methods to Model the Thermal Conductivity of Sands*. Oral session presented at the 2017 Geotechnical Frontiers, Orlando, Florida, USA.

Rubin, A.J. (2016, October). *Application for Ground Penetrating Radar for Thermal Conductivity Site Investigation*. Oral session presented at the 2016 Northeast Geotechnical Graduate Research Symposium, Amherst, Massachusetts, USA.

Rubin, A.J. (2010, October). *Alternative Energy North Conway, NH*. Oral presentation on geothermal energy to 100 participants prepared for CDM, Cambridge, Massachusetts, USA.

Poster:

Rubin, A.J., Howe, S., and Kinsinger, M., *Implementing Individual Performance Reviews in an Engineering Capstone Design Course,* Capstone Design Conference, Dallas, USA, June, 2022.

Rubin, A.J., Ho, C.L., and Oden C.P. (2018, January). *A Comparison of Railroad Ballast Elastic Modulus as Estimated from Lightweight Deflectometer (LWD) and Dynamic Cone Penetrometer*. 2018 Annual Transportation Research Board (TRB), Washington, D.C.

Rubin, A.J. (2017, June). *Estimating Thermal Conductivity from Time Domain Reflection (TDR) Measurements*. Poster session presented at the 9th International Workshop on Advanced Ground Penetrating Radar - IWAGPR2017, Edinburgh, Scotland, UK.

Rubin, A.J. (2016, June). *A Theoretical Method to Relate the Relative Permittivity and Thermal Conductivity of Sands*. Poster session presented at the 16th International Ground Penetrating Radar Conference, Hong Kong.

SERVICE

Smith College:

- Subcommittee on Inclusion Equity and Community 2023-present
- Undergraduate engineering advising 2023-present
- FE Exam Coordinator Fall 2020-present
- Subcommittee on Honors in Engineering, Fall 2019-2023
- Second Reader for Lily Li Honors Thesis: "Design and Performance Modeling of a Vertical Ground Source Heat Exchange System for the Smith College Field House", 2019
- Second Reader for Yihui Jiang Honors Thesis: "Dynamic Model of Coaxial Ground-source Geothermal System", 2020

<u>Undergraduate Research and Thesis Students:</u>
Keona Edwards – Fall 2024 - present
Taylor Agena – Fall 2024 - present
Aline Valenzuela-Lucero – Fall 2024 - present
Esther Villanueva Alvarez – Fall 2024 - present
Almanzo Gao – Spring 2024 - present
Ginger Silverman – Fall 2023 - present
Lilliana Frantz – Fall 2023 - present
Hadeel Shwwa – Fall 2023
Annah Mutaya – Summer 2020
Sophia Yates – Fall 2020 – Spring 2021
Emily Katherine Akey – Summer 2019 - Spring 2020
Mariel W. Jones – Summer 2019 - Spring 2020 (Thesis Work)

Reviewer:

- NSF Engineering for Civil Infrastructure (ECI) review panel, 2022
- Geotechnical Frontiers Conference, Orlando March 12-15, 2017
- Construction & Building Materials, 2017 – present

University of Massachusetts Amherst:

- Session Chair of Undergraduate Research Conference - Civil Engineering Session – 2017
- Graduate New Student Orientation Diversity Programs – 2016 and 2017

AWARDS:

- NSF ERI: Dielectric Mixing Models for Coarse Aggregate – $149,330 – Fall 2023
- Student Fulbright Scholar Semi-Finalist – UK Open Research Award – Spring 2018
- Invaluable Contribution to Graduate Student Orientation from the Dean of the Graduate School – Fall 2017
- University of Massachusetts Amherst Graduate School Dissertation Research Grant - $1000 - Spring 2016
- 2016 Northeast Geotechnical Graduate Research Symposium – Third Prize – Fall 2016
- Distinguished Teaching Nomination for ENGIN 191 Freshman Seminar - Fall 2016
- University of Massachusetts Amherst Graduate School Travel Grant - $625 – Spring 2018
- University of Massachusetts Amherst Graduate School Travel Grant - $250 – Spring 2017

COMPUTER SKILLS:

- Programing languages: Visual Basic, LabVIEW, Python
- Engineering Software (used in consulting): AutoCAD, MathCAD, All-Pile, SHAKE, Geostudios Software (SLOPE/W, SEEP/W, etc.)
- Engineering Software (research): Mala RADExplorer (GPR), GSSI RADAN (GPR), COMSOL Multiphysics, GeoTrack

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INTERESTS: International Travel, Mushroom Foraging, Carpentry, Comic Books, Urban Farming, D&D + gaming