

# Mohammad Shafiqul Alam

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## EDUCATION

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**Ph.D. in Civil Engineering (Structural)** 2013 - 2019

**Minor in Statistics**

GPA: 3.96/4.00

Oregon State University, Corvallis, OR

Dissertation: Probabilistic Multi-hazard Earthquake-Tsunami Structural Risk Assessment Framework

Advisor: Andre R. Barbosa, Ph.D.

**M.Sc. in Earthquake Engineering and Engineering Seismology** 2006 - 2008

Rose School, University of Pavia, Italy and Joseph Fourier University, Grenoble, France

Thesis: Sensitivity Study of a Seismic Loss Model for Dhaka using a Displacement-Based Method

Advisor: Helen Crowley, Ph.D.

**B.Sc. in Civil Engineering (Structural)** 1999 - 2004

GPA: 3.81/4.00

Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

Thesis: Analysis of Anchored Earth Wall by Finite Difference Method

Advisor: Munaz Ahmed Noor, Ph.D.

## RESEARCH EXPERTISE AND INTERESTS

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- Performance-based Earthquake/Tsunami engineering.
- Coastal community multi-hazard risk and resilience assessment.
- Probabilistic hazard assessment (earthquake, tsunami, hurricane and storm surge) and risk modeling.
- Development and testing of structural systems under tsunami and hurricane wave and surge loading.
- Development, calibration, verification and validation (V&V) of infrastructure fragility and vulnerability models.
- Development of GIS-based tools for lifeline damage and recovery.
- Fragility database development, large scale stochastic simulation, and data analytics involving large dataset.
- Structural dynamics and nonlinear Structural Analysis.
- High-performance and high-throughput computing.
- Linear and nonlinear multivariate statistical analysis.
- Generalized linear models (GLMs) and Bayesian statistical inference.

## TECHNICAL SKILLS

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- **Programming:** Python, MATLAB, R, C++, GIS (ArcGIS API for Python, ArcGIS Pro, GeoPandas).
- **Database:** Python Pandas, SQLite.
- **Data analysis package:** NumPy, SciPy, seaborn, scikit-learn.
- **Community resilience assessment platform:** IN-CORE.
- **Computational job management:** DesignSafe-CI, TACC Stampede2, HTCCondor.
- **Design and assessment:** OpenSees, ETABS, SAP2000, AutoCAD, SP3-risk.

## RESEARCH EXPERIENCE

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**Postdoctoral Scholar**

11/2021 - Present

Department of Civil and Environmental Engineering and Earth Sciences, University of Notre Dame, South Bend, IN

Advisor: Dr. Tracy Kijewski-Correa

**Project: Unified workflow for structural assessments across hazards and typologies**

- Manage Structural Extreme Events Reconnaissance (StEER: <https://www.steer.network>) core operations, particularly during active missions working under the guidance of the StEERING committee and directors and directly interfacing with StEER's members to guide data collection and release community product.
- Research and development of a unified work flow for structural assessments across hazard and typologies.
- Research based on research questions informed by growing datasets assembled by StEER and interactions with its members in mission response.

## Postdoctoral Scholar

06/2019 - 10/2021

School of Civil and Construction Engineering, Oregon State University, Corvallis, OR

Advisor: Dr. Andre R. Barbosa, Dr. Daniel T. Cox, and Dr. Barbara G. Simpson

### Project: Defining Appropriate Fragility Functions for Oregon Lifelines for natural hazards

- Identified, gathered, evaluated, and developed a database of fragility functions in Python pandas for Oregon lifelines (transportation system, electric power system, water and wastewater system) for single and multi-hazards with data gathered from several US (HAZUS, MAEviz, IN-CORE) and European (SYNER-G) databases, and other published literature.
- Developed and conducted a survey to:
  - gather stakeholder's (Oregon utilities) input (hazard, infrastructure, in-house fragility) for the fragility database development.
  - identify important fragility attributes for developing a ranking scheme to quantify fragility function quality.
- Developed a rating metric for evaluating the quality and applicability of the collected fragility functions for single and multi-hazards specific to Oregon (earthquake, tsunami, landslide, liquefaction, flooding, winter storm).

### Project: Elevated Light-frame Wood Residential Building Physical and Numerical Modeling of Damage to Hurricane Waves and Overland Surge

- Performed hydrodynamic testing of 1:6 scale light wood frame near-coast residential buildings subjected to hurricane wave and surge overland flows.
- Performed system identification, damage progression assessment, and parameterized fragility function development for the elevated building typology using numerical simulation of the test specimen.

### Research Grant Proposal

- "Development of WebGIS-based Tool for Probabilistic Damage and Restoration Modeling of Life-line Systems." Agency: Cascadia Lifeline Program (CLiP). PI: Jaehoon, J. and **Alam, M.S.**, Award amount: \$58,964
- "Fragility Function Viewer App." Agency: Cascadia Lifeline Program (CLiP). PI: Simpson, B. and CoPIs: Barbosa, A.R. Award amount: \$25,358. My role: assisted in the proposal development.
- "Multi-Hazard Earthquake-Tsunami Probabilistic Performance-based Optimal Design/Retrofit Framework for Coastal Highway Bridges". Agency: PEER Transportation System Research Program (TSRP). PI: **Alam, M.S.**, CoPIs: Barbosa, A.R., and Scott, M.H. (not funded).

### Other Products

- Developed a web-based user interface "Fragility Function Viewer" for the CLiP (<https://clip.engr.oregonstate.edu/CLiPFragilityDatabase>) Lifeline Fragility Database.
- Developed a web-based user interface "Pipeline Damage Estimation Tool" (<https://clip.engr.oregonstate.edu/CLiPPipeDamageTool/>) for water and wastewater seismic damage assessment.
- Prepared a technical report on the verification and validation (V & V) of NIST **IN-CORE** (Interdependent Networked Community Resilience Modeling Environment) fragility database.

## Graduate Research Assistant

04/2013 - 06/2019

School of Civil and Construction Engineering, Oregon State University, Corvallis, OR

Advisor: Dr. Andre R. Barbosa

### Project: Probabilistic Multi-hazard Earthquake-Tsunami Structural Risk Assessment

- Developed probabilistic formulations for seismic fragility and risk assessment of structures accounting for finite element model class uncertainty.
- Evaluated the effect of seismic demand model class uncertainty in the seismic loss assessment of building infrastructures following FEMA P-58 methodology.
- Developed a probabilistic framework for physics and simulation-based parameterized tsunami fragility function development accounting for structural member failure.

- Designed three variants (earthquake-only design, earthquake-tsunami design with single column size, and earthquake-tsunami design with varied column size) of four-story and eight-story special moment-resisting frame (SMRF) RC office buildings as per ASCE 7-16 provisions for earthquake-tsunami risk assessment of those design variants.
- Developed three-dimensional (3D) FEMs of the design variants in OpenSees and performed sequential earthquake-tsunami simulations in TACC Stampede2.
- Derived vector-valued analytical earthquake-tsunami fragility surfaces and quantified the geospatial variation of the structural risk of these design variants, for the earthquake only hazard, for the tsunami only hazard, and for the earthquake-tsunami multi-hazard.

**Project: Coastal Community Probabilistic Multi-hazard Risk and Resilience Assessment**

- Developed a probabilistic seismic and tsunami hazard assessment (PSTHA) framework for coastal community prone to seismic (ground shaking, liquefaction, landslides) and tsunami (flood and flow) multi-hazard.
- Developed a probabilistic seismic and tsunami damage assessment (PSTDA) framework for coastal community subjected to seismic and tsunami multi-hazard.
- Developed a probabilistic decision support framework for community resilience accounting for multi-hazards, infrastructure inter-dependencies, and community resilience goals (based on Oregon Resilience Plan and NIST Community Resilience Planning Guide).
- Applied these frameworks for the earthquake-tsunami risk and resilience assessment of building, transportation, water, and electric power infrastructure systems in Seaside, OR.

**Project: Collaborative Research: Experimental Investigation of Tsunami-like Wave-induced Pressure, Forces, and Debris Impact on Elevated Coastal Structures**

- Conducted a collaborative large-scale hydraulic experiment, with researchers from University of Washington (UW), on a physical model of an elevated coastal building structure in the large wave flume of Hinsdale Wave Research Laboratory (HWRL) at Oregon State University.
- Instrumented the test specimen and wave flume (pressure gauges, load cells, velocity meter, wave gauges) and performed hydrodynamic testing considering flow shielding and channelling effect, and debris impact and damming.
- Quantified the horizontal and vertical pressured distribution and the stream-wise and vertical forces acting on the elevated structure for broken and unbroken tsunami-like waves
- Developed a dataset of measured pressures and forces for numerical bench-marking of future validation analyses that can be used towards the tsunami-resistant design of elevated coastal buildings.

**Erasmus Mundus Fellowship**

09/2006 - 12/2008

Rose School, University of Pavia, Italy Joseph Fourier University, Grenoble, France  
 Advisor: Dr. Helen Crowley

**Project: Sensitivity Study of a Seismic Loss Model for Dhaka Using a Displacement-based Method**

- Performed a seismic loss assessment of Dhaka, the capital city of Bangladesh, using a displacement-based earthquake loss assessment (DBELA) methodology.
- Quantified the effect of uncertainty of input parameters (ground motion demand, site classification, building stock characteristics, response mechanisms) on the seismic loss through a sensitivity study.

**TEACHING EXPERIENCE**

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**Assistant Professor**

01/2011-03/2013

Department of Civil and Environmental Engineering  
 Islamic University of Technology (IUT), Bangladesh

**Senior Lecturer**

01/2009-12/2010

Department of Architecture  
 Brac University, Dhaka, Bangladesh

**Lecturer**

11/2005-08/2006

Department of Civil Engineering  
 Presidency University, Dhaka, Bangladesh

**Responsibilities**

- Taught courses on Engineering Mechanics, Mechanics of Solids, Structural Analysis and Design, Design of Reinforced Concrete Structures, Structural Dynamics, Construction Technology.

- Conducted lab sessions on Mechanics of Solids, Engineering Materials and Design of Concrete Structures.
- Advised final year undergraduate thesis with Structural Engineering concentration.
- **Syllabus of Courses Taught**
  - **CEE 4201: Analytic Mechanics (Islamic University of Technology, Bangladesh)**  
Coplanar and non-coplanar force systems, moments; Analysis of two dimensional frames and trusses; Friction; Flexible chord; Centroids of lines, areas, and volumes; Moments of inertia of areas and masses; Plane motion; Principles of work and energy; Impulse and momentum; Virtual work principle for rigid bodies.
  - **CEE 4311: Mechanics of Solids I (Islamic University of Technology, Bangladesh)**  
Concepts of stress and strain, constitutive relationships; Deformations due to tension, compression and temperature change; Beam statics: Reactions, axial force, shear force and bending moments; Axial force, shear force and bending moment diagrams using method of section and summation approach; Elastic analysis of circular shafts, solid non-circular and thin walled tubular members subjected to torsion; Flexural and shear stresses in beams; Shear center; Stress transformation.
  - **CEE 4312: Mechanics of Solids Lab (Islamic University of Technology, Bangladesh)**  
Tension, direct shear and impact tests of mild steel specimen, compression test of timber specimen, slender column test; Static bending test; Hardness test of metals; Helical spring tests; Determination of shear center; Load-deflection behavior of simple beam.
  - **CEE 4511: Design of Concrete Structures (Islamic University of Technology, Bangladesh)**  
Fundamental behavior of plain reinforced concrete; Introduction to WSD and USD methods; Analysis and design of singly reinforced, doubly reinforced and T- beams according to strength design method; Shear, diagonal tension and torsion of beams; Bond anchorage; Design of one-way slabs; Prestressed Concrete.
  - **CEE 4817: Construction Technology (Islamic University of Technology, Bangladesh)**  
Construction contracts; Value engineering in construction; Project network analysis (CPM); Selection of construction equipment; Fundamentals of earth moving; Soil stabilization and compaction; Tractor and related equipment, scrapers, excavating equipment, trucks and wagons, operation analyses; Belt-conveyor systems; Compressed air; Drilling rock and earth; Blasting rocks; Tunneling; Foundation grouting; Pile and pile driving equipment, pumping equipment; Production of crushed-stone aggregates; Concrete technology; Scaffolding and form works.
  - **CEE 4513: Structural Analysis and Design-I (Islamic University of Technology, Bangladesh)**  
Stability and determinacy of structures; Analysis of statically determinate trusses and arches; Influence lines; Moving loads on beams and trusses; Analysis of suspension bridge. Wind and earthquake loads; Approximate analysis of statically indeterminate structures, e.g. braced trusses and multi storied building frames (portal and cantilever method for lateral load analysis and approximate method for vertical load analysis); Deflection of beams, trusses and frames by virtual work method.
  - **CE 335: Structural Analysis and Design-I (Presidency University, Dhaka, Bangladesh)**  
Analysis of statically determinate trusses and arches; Deflection of beams by direct integration, moment area, elastic load and conjugate beam methods. Influence lines; moving loads on beams, frames and trusses; Cables and cable supported structures. Deflection of beams, trusses and frames by virtual work method; Wind and earthquake loads; Code equations.
  - **CE 431: Structural Analysis and Design-II (Presidency University, Dhaka, Bangladesh)**  
Stability and determinacy of structures; Approximate analysis of statically indeterminate structures, e.g. braced trusses, portal frames, mill bent and multi storied building frames; Analysis of statically indeterminate structures by consistent deformation. flexibility method; stiffness method; moment distribution method; slope-deflection methods of analysis.
  - **CE 435: Dynamics of Structures (Presidency University, Dhaka, Bangladesh)**  
Formulation of equation of motion; free vibration response; SDOF and MDOF systems; response to harmonic and impulse loading and vibration analysis by Rayleigh's method. Dynamics of multi degree of freedom systems. Evaluation repair and retrofitting of existing structures.
  - **CEE 212 Structure II (Brac University, Dhaka, Bangladesh)**  
Basic mechanics of solids. Fundamental concepts of stress and strain. Mechanical properties of materials. Stresses and strains in members subject to tension, compression, shear and temperature changes. Joints welded and riveted. Shear force and bending moment diagrams and implications in design of statically determinate beams and frames.
  - **CEE 212 Structure III (Brac University, Dhaka, Bangladesh)**  
Flexural and shearing stresses in beams. Principal stresses. Direct integration and area moment method for finding slopes and deflections in statically determinate beams. Indeterminate beam analysis. Buckling of columns.

## Teaching Assistant

04/2015-04/2018; 04/2021-06/2021

### CE 580 – Performance-based Seismic Design

Department of Civil and Construction Engineering, Oregon State University

- Guest lectured on two classes titled “Step-by-step seismic analysis and analysis model building” using ETABS and SAP2000.
- Helped students clarifying concepts taught during the course and with the Finite Element Model (FEM) development.
- Provided feedback on the final seismic design and assessment project.

## Guest Lecture

- “**Tsunami resistant building design per ASCE 7-16 tsunami provisions**” for CE 580 – Building Loads and Systems at Oregon State University on February 8, 2019.
- “**Earthquake fundamentals and local site effects**”- invited talk at the Public Works Department (PWD), Government of Bangladesh on November 22, 2009.

## Teaching Workshop

09/2019-12/2019

### Tuesday Teaching and Tech Talk, Center for Teaching and Learning, Oregon State University

- Learned several active learning strategies and pedagogical teaching methods.
- Discussed strategies for improving course design, effective communication, assessing student work, providing feedback, and conflict resolution.
- Discussed strategies for promoting diversity and equity in the classroom.

## Mentoring

### Graduate Student Mentor

04/2016 - 04/2017

- Alessandro Rizzi, visiting Masters Student from Politecnico di Torino (Spring and Summer 2016)  
Research topic: “Vulnerabilities of Building and Highway Bridges to the Combined Effect of Earthquake and Tsunami.”
- Micaela Capozzo, visiting Masters Student from Politecnico di Torino (Spring and Summer 2016)  
Research topic: “Tsunami Resilience Assessment of a Coastal Community in the Pacific North-West, USA.”
- Andy Troung, Masters Student at Oregon State University (Spring 2017)  
Project topic: “Performance-based Seismic and Tsunami Design of a Four-story Reinforced concrete (RC) Special Moment-Resisting Frame (SMRF) office Building”

## Undergraduate Student Mentor

### Summer Undergraduate Research Fellowship (SURF) Program

04/2017 - 06/2017

- Glen Galant, Summer Undergraduate Research Fellowship (SURF) student at Oregon State University (Summer 2017)  
Project topic: “Experimental Investigation of Tsunami Load on an Elevated Coastal Structure Considering the Effect of Structural Stiffness and Flow Shielding.”
- Anna C.T. Tsai, Summer Undergraduate Research Fellowship (SURF) student from University of Washington (Summer 2017)  
Project topic: “Experimental Observation of Debris Impact and Damming Loads for Elevated Coastal Structures Subjected to Transient Waves.”

## SELECTED PUBLICATIONS

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Google scholar: <https://scholar.google.com/citations?user=ardEmZYAAAAJ&hl=en>

### Peer Reviewed Journal Articles

#### Published

- J1. **Alam, M.S.**, Simpson, B., Barbosa, A. R. (2022). Fragility and Recovery Models of Energy, Water, and Wastewater systems for seismic regional risk and resilience assessment: state-of-the-art review and database. *Natural Hazards Review* (accepted).
- J2. **Alam, M.S.**, Simpson, B., Barbosa, A. R., Jung, J., Parulekar, N. (2022). Probabilistic Seismic Damage and Loss Assessment Methodology for Wastewater Network Incorporating Modeling Uncertainty and Correlations. *Earthquake Spectra* (accepted pending revision).
- J3. Duncan, S., Cox, D. T., Barbosa, A.R., Lomonaco, P., Park, H., **Alam, M. S.**, and Yu, C. (2021). Physical Modeling of Progressive Damage and Failure of Wood-Frame Coastal Residential Structures Due to Surge and Wave Forces. *Coastal Engineering*, DOI: <https://doi.org/10.1016/j.coastaleng.2021.103959>.

- J4. Park, H., Koh, M.J., Cox, D. T., **Alam, M. S.**, and Shin, S. (2021). Experimental study of debris transport driven by a tsunami-like wave: Application for non-uniform density groups and obstacles. *Coastal Engineering*, 166, 103867. DOI: <https://doi.org/10.1016/j.coastaleng.2021.103867>.
- J5. Romano, F., **Alam, M.S.**, Faggella, M., Zucconi, M., Barbosa, A.R., Ferracuti, B. (2020). Seismic Demand Model Class Uncertainty in Seismic Loss Analysis for a Code-Designed URM Infilled RC Building. *Bulletin of Earthquake Engineering*, 19, 429-462, DOI:<https://doi.org/10.1007/s10518-020-00994-x>.
- J6. **Alam, M.S.**, Winter, A.O., Galan, G., Shekhar, K., Barbosa, A.R., Motley, M.R., Eberhard, M.O., Cox, D. T., Arduino, P., and Lomonaco, P. (2020). Tsunami-like Wave Induced Lateral and Uplift Pressures and Forces on an Elevated Coastal Structure. *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 146(4), 04020006. DOI: [https://doi.org/10.1061/\(ASCE\)WW.1943-5460.0000562](https://doi.org/10.1061/(ASCE)WW.1943-5460.0000562).
- J7. Winter, A.O., **Alam, M.S.**, K. Shekhar, K., Motley, M.R., Eberhard, M.O., Barbosa, A.R., Lomonaco, P., Arduino, P., and Cox, D. T. (2020). Tsunami-like Wave Forces on an Elevated Coastal Structure: Effects of Flow Shielding and Channeling. *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 146(4), 04020021. DOI: [https://doi.org/10.1061/\(ASCE\)WW.1943-5460.0000581](https://doi.org/10.1061/(ASCE)WW.1943-5460.0000581).
- J8. Shekhar, K., Winter, A.O., **Alam, M.S.**, K., Arduino, P., Miller, G.R., Motley, M.R., Eberhard, M.O., Barbosa, A.R., Lomonaco, P., and Cox, D. T. (2020). Conceptual Evaluation of Tsunami Debris Field Impact and Damming Forces. *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 146(6),04020033. DOI: [https://doi.org/10.1061/\(ASCE\)WW.1943-5460.0000600](https://doi.org/10.1061/(ASCE)WW.1943-5460.0000600).
- J9. Park, H., **Alam, M. S.**, Cox, D. T., Barbosa, A. R., and van de Lindt, J. W. (2019). Probabilistic seismic and tsunami damage analysis (PSTDA) of the Cascadia Subduction Zone applied to Seaside, Oregon. *International Journal of Disaster Risk Reduction*, 101076. DOI: <https://doi.org/10.1016/j.ijdrr.2019.101076>.
- J10. Kameshwar, S., Cox, D. T., Barbosa, A. R., Farokhnia, K., Park, H., **Alam, M. S.**, and van de Lindt, J. W. (2019). Probabilistic Decision-Support Framework for Community Resilience: Incorporating Multi-Hazards, Infrastructure Interdependencies, and Resilience Goals in a Bayesian Network. *Reliability Engineering and System Safety*, 106568, DOI: <https://doi.org/10.1016/j.res.2019.106568>.
- J11. **Alam, M.S.**, and Barbosa, A. R. (2018). Probabilistic Seismic Demand Assessment Accounting for Finite Element Model Class Uncertainty: Application to a Code-Designed URM Infilled Reinforced Concrete Frame Building. *Earthquake Engineering and Structural Dynamics*, 47(15), 2901-2920. DOI: <https://doi.org/10.1002/eqe.3113>.
- J12. **Alam, M.S.**, Barbosa, A. R., Scott, M. H., Cox, D. T., and van de Lindt, J. W. (2018). Development of Physics-Based Tsunami Fragility Functions Considering Structural Member Failures. *Journal of Structural Engineering*, 144(3), 04017221. [https://doi.org/10.1061/\(ASCE\)ST.1943-541X.0001953](https://doi.org/10.1061/(ASCE)ST.1943-541X.0001953).
- J13. Park, H., Cox, D. T., **Alam, M. S.**, and Barbosa, A. R. (2017). Probabilistic Seismic and Tsunami Hazard Analysis Conditioned on a Megathrust Rupture of the Cascadia Subduction Zone. *Frontiers in built environment*, 3, 32. DOI: <https://doi.org/10.3389/fbuil.2017.00032>.
- J14. **Alam, M. S.**, Sajjad, M. R., Yasir, Z., and Haque, F. M. M. (2013). A Statistical Study on Structural Characteristics of RC Building Stock of Dhaka City for Seismic Loss Assessment Application. In *Applied Mechanics and Materials*, Vol. 330, pp. 884-888. Trans Tech Publications. DOI: <https://doi.org/10.4028/www.scientific.net/AMM.330.884>.
- J15. **Alam, M. S.**, Sakib, N., and Mumtaz, M. (2011). Seismic Loss Assessment of Dhaka for Scenario Earthquakes Using a Displacement-Based Method. *International Journal of Civil and Environmental Engineering*, 11(5), 29-33. DOI: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.660.3120&rep=rep1&type=pdf>.

#### Under Review

- JS1. **Alam, M. S.**, Barbosa, A.R., Mugabo, I., Cox, D. T., Park, H., Lee, D., and Shin, S. (202X). Elevated Light-frame Wood Residential Building Physical and Numerical Modeling of Damage due to Hurricane Surge and Waves. Submitted to *Engineering Structures* on December 2021.

#### In Preparation

- JP1. **Alam, M. S.**, Kijewski-Correa, T., Mosalam, K., Robertson, I., Prevatt, D., and Roueche, D. (Fall, 2022). Tiered Infrastructure Performance Assessment Framework for Field Reconnaissance of Built Environment Across Hazards (Seismic, Windstorm, and Coastal) and Infrastructure Typologies. Manuscript in preparation for *Frontiers in Built Environment*.
- JP2. **Alam, M. S.**, Kijewski-Correa, T., Mosalam, K., Robertson, I., Prevatt, D., and Roueche, D. (Fall, 2022). Probabilistic Decision-Support Model for StEER Tiered Field Reconnaissance Mission: Incorporating Hazards, Exposure, and Feasibility. Manuscript in preparation for *Natural Hazards Review*.

#### Conference Proceedings

- C1. Cox, D., Barbosa, A. R., Park, H., Alam, M.S., Kameshwar, S., Sanderson, D., and Amini, M. (2022). Community-scale Risk Assessment to Multi-hazard Earthquake and Tsunami Applied to a Coastal Urban Area in the U.S. Pacific Northwest. *2nd International Conference on Urban Risks*, June 23-25, Lisbon, Portugal.



- C2. Romano, F., **Alam M.S.**, Zucconi M., Faggella M., Barbosa A.R., and Ferracuti B. (2021). Seismic Loss Analysis of a Code-Designed Infilled RC Building Accounting for Infill Model Class Uncertainty. *8th International Conference COMPDYN 2021*, June 27-30, 2021, Athens, Greece.
- C3. **Alam, M. S.**, Barbosa, A. R., Scott, M. H., Cox, D. T., and van de Lindt, J. W. (2019). Multi-hazard Earthquake-Tsunami Structural Fragility Assessment Framework. *13th International Conference on Application of Statistics and Probability in Civil Engineering, ICASP13*, May 26-30, 2019, Seoul, South Korea.
- C4. Romano, F., **Alam M.S.**, Faggella M., Zucconi M., Barbosa A.R., and Ferracuti B. (2019). Seismic Loss Analysis of a Modern RC Building Accounting for Uncertainty of Infill Strut Modeling Parameters. *7th International Conference COMPDYN 2019*, June 24-26, 2019, Crete, Greece.

### Conference Presentation

- CP1. **Alam, M.S.**, Barbosa, A.R., Mugabo, I., Cox, D. T., Park, H., Lee, D., and Shin, S. (2022). Physical and Numerical Modeling of Damage of Elevated Light-frame Wood Residential Building due to Hurricane Surge and Waves. *SimCenter Symposium, Austin, TX*, November 3-4, 2022
- CP2. **Alam, M.S.** and Jung, J. (2022). Development of WebGIS-based tool for Probabilistic Seismic Damage and Loss Modeling of Wastewater Network. *Cascadia Lifelines Program Webinar*, May 19, 2022.
- CP3. **Alam, M.S.**, Simpson, B., and Barbosa, A.R. (2022). Fragility Function Viewer for Oregon Lifelines. *ASCE Lifelines Conference*, February 7, 2022.
- CP4. **Alam, M.S.**, Simpson, B., and Barbosa, A.R. (2021). Fragility Function Database and Web-tool for Oregon Lifelines. *Cascadia Lifelines Program Webinar*, October 21, 2021.
- CP5. Jung, J., and **Alam, M.S.** (2021). Development of WebGIS-based Tool for Probabilistic Damage and Restoration Modeling of Lifeline Systems. *Cascadia Lifelines Program proposal*, February 23, 2021.
- CP6. Simpson, B., **Alam, M.S.**, and Barbosa, A.R. (2020). Defining an Appropriate Fragility Function Database for Oregon Lifelines. *45th Annual Natural Hazard Research and Application Workshop*, Boulder, CO, July 12 – 15, 2020.
- CP7. Park, H., **Alam, M.S.**, Barbosa, A.R., and Cox, D.T. (2019). Probabilistic Seismic and Tsunami Damage Analysis for Community Resilience Assessment. *ASCE Engineering Mechanics Institute Conference*, ASCE, Pasadena, CA, June 18 – 21, 2019.
- CP8. **Alam, M.S.**, Barbosa, A.R., Park, H., and Cox, D.T. (2017). Probabilistic Seismic and Tsunami Hazard Analysis (PSTHA) Conditional on A Megathrust Rupture of the Cascadia Subduction Zone. *EERI Annual Meeting*, March 7-10, 2017, Portland, OR.
- CP9. **Alam, M.S.** and A.R. Barbosa. (2016). Infill Strut Model Class Uncertainty of Seismic Response of Reinforced Concrete Masonry Infilled Frames. *ASCE Engineering Mechanics Institute Conference*, ASCE, Nashville, TN, May 22 – 25, 2016.
- CP10. **Alam, M.S.**, Barbosa, A.R. (2015). Modeling Uncertainties in Reinforced Concrete Masonry Infilled Frames. *ASCE-SEI Structures Congress, ASCE-SEI*, April 23-25, 2015, Portland, OR.

### Book Chapters

- B1. Miyoshi, O. and **Alam, M.S.** (2015). “Manuals on Seismic Design of New Buildings”, developed as a part of the collaborative project “Capacity Development on Natural Disaster Resistant Techniques of Construction and Retrofitting of Public Buildings (CNCRP)” between the Public Works Department (PWD), Government of Bangladesh and Japan International Cooperation Agency (JICA).

### Technical Report

- TR1. **Alam, M.S.**, Simpson, B.G., and Barbosa, A.R. (2022). Defining Appropriate Fragility Functions for Oregon Lifelines. DesignSafe-CI. <https://doi.org/10.17603/ds2-44yx-g092>.
- TR2. Alam, M.S., Simpson, B.G., and Barbosa, A.R. (2022) Seismic Fragility Functions and Recovery Models for Energy, Water, and Wastewater Systems - Tabular Summary. DesignSafe-CI. <https://doi.org/10.17603/ds2-dtdz-7827>.

### Dissertation/Thesis

- T1. **Alam, M.S.** (2019). Probabilistic Multi-hazard Earthquake-Tsunami Structural Risk Assessment Framework. Ph.D. Dissertation, Oregon State University. [https://ir.library.oregonstate.edu/concern/graduate\\_thesis\\_or\\_dissertations/xs55mj46r](https://ir.library.oregonstate.edu/concern/graduate_thesis_or_dissertations/xs55mj46r).
- T2. **Alam, M.S.** (2008). Sensitivity Study of a Seismic Loss Model for Dhaka using a Displacement-Based Method. M.Sc. Thesis, Rose school, University of Pavia, Italy.
- T3. **Alam, M.S.** (2004). Analysis of Anchored Earth Wall by Finite Difference Method. B.Sc. Thesis, Bangladesh University of Engineering & Technology.

### Datasets

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- DS2. Cox, D., Barbosa, A., **Alam, M.S.**, Amini, M., Kameshwar, S., Park, H., Sanderson, D. (2022) “Social Systems”, in Seaside Testbed Data Inventory for Infrastructure, Population, and Earthquake-Tsunami Hazard. DesignSafe-CI. <https://doi.org/10.17603/ds2-gsr8-jq81>.
- DS3. Cox, D., Barbosa, A., **Alam, M.S.**, Amini, M., Kameshwar, S., Park, H., Sanderson, D. (2022) “Earthquake Hazards”, in Seaside Testbed Data Inventory for Infrastructure, Population, and Earthquake-Tsunami Hazard. DesignSafe-CI. <https://doi.org/10.17603/ds2-451w-2z18>.
- DS4. Cox, D., Barbosa, A., **Alam, M.S.**, Amini, M., Kameshwar, S., Park, H., Sanderson, D. (2022) “Tsunami Hazards”, in Seaside Testbed Data Inventory for Infrastructure, Population, and Earthquake-Tsunami Hazard. DesignSafe-CI. <https://doi.org/10.17603/ds2-a1t2-c650>.
- DS5. Cox, D., Barbosa, A., **Alam, M.S.**, Amini, M., Kameshwar, S., Park, H., Sanderson, D. (2022) “Buildings”, in Seaside Testbed Data Inventory for Infrastructure, Population, and Earthquake-Tsunami Hazard. DesignSafe-CI. <https://doi.org/10.17603/ds2-y5mj-y128>.
- DS6. Cox, D., Barbosa, A., **Alam, M.S.**, Amini, M., Kameshwar, S., Park, H., Sanderson, D. (2022) “Transportation Network”, in Seaside Testbed Data Inventory for Infrastructure, Population, and Earthquake-Tsunami Hazard. DesignSafe-CI. <https://doi.org/10.17603/ds2-vyqn-ms27>.
- DS7. Cox, D., Barbosa, A., **Alam, M.S.**, Amini, M., Kameshwar, S., Park, H., Sanderson, D. (2022) “Water Network”, in Seaside Testbed Data Inventory for Infrastructure, Population, and Earthquake-Tsunami Hazard. DesignSafe-CI. <https://doi.org/10.17603/ds2-65v4-gw10>.
- DS8. Cox, D., Barbosa, A., **Alam, M.S.**, Amini, M., Kameshwar, S., Park, H., Sanderson, D. (2022) “Electric Power Network”, in Seaside Testbed Data Inventory for Infrastructure, Population, and Earthquake-Tsunami Hazard. DesignSafe-CI. <https://doi.org/10.17603/ds2-wwv6-bd26>.
- DS9. Barbosa, A., Cox, D., **Alam, M.S.**, Mugabo, I., Park, H., Duncan, S., Lomonaco, P. (2021) “Static and Dynamic Structural Characterization Tests of Wave Basin Hydrodynamic Experiments of Scaled Wood Frame Shear-Wall Residential Buildings”, in *Progressive Damage and Failure of Wood-Frame Coastal Residential Structures Due to Hurricane Surge and Wave Forces*. DesignSafe-CI. <https://doi.org/10.17603/ds2-v287-t615>.
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- DS11. **Alam, M. S.** and Barbosa, A. R. (2019). Earthquake-Tsunami Design of Special Moment Resisting Frame (SMRF) Reinforced Concrete (RC) Buildings Following ASCE7-16 Provisions. DesignSafe-CI, DOI: <https://doi.org/10.17603/ds2-gms5-ym53>.
- DS12. Motley, M., Eberhard, M., Arduino, P., Winter, A., Barbosa, A., Maddux, T., Shekhar, K., **Alam, M. S.** (2019) “Breaking Wave”, in *Probabilistic Assessment of Tsunami Forces on Coastal Structures*. DesignSafe-CI. <https://doi.org/10.17603/ds2-ndr1-wv04>.
- DS13. Motley, M., Eberhard, M., Arduino, P., Winter, A., Barbosa, A., Maddux, T., Shekhar, K., **Alam, M. S.** (2019) “Broken Wave”, in *Probabilistic Assessment of Tsunami Forces on Coastal Structures*. DesignSafe-CI. <https://doi.org/10.17603/ds2-2y18-rh47>.
- DS14. Motley, M., Eberhard, M., Arduino, P., Winter, A., Barbosa, A., Maddux, T., Shekhar, K., **Alam, M. S.** (2019) “Unbroken Wave”, in *Probabilistic Assessment of Tsunami Forces on Coastal Structures*. DesignSafe-CI. <https://doi.org/10.17603/ds2-2b78-qc48>.
- DS15. Arduino, P., Motley, M., Eberhard, M., Cox, D., Barbosa, A., Lomonaco, P., Shekhar, K., **Alam, M.S.**, and Winter, A. (2018) “Debris Impact Experiments”, in *NHERI Debris Impact Experiments*. DesignSafe-CI. <https://doi.org/10.17603/DS2P66H>.

### Reconnaissance Report

- RR1. **Alam, M.S.** Rodgers, J., Pilkington, S., Arora, P., Gurley, K., Robertson, I. (2022). “StEER Typhoon Merbok Preliminary Virtual Reconnaissance Report (PVRR)”, in StEER 17 September 2022 Typhoon Merbok. DesignSafe-CI. <https://doi.org/10.17603/ds2-4az4-v122>.
- RR2. Mosalam, K. Gunay, S. **Alam, M.S.** Robertson, I. (2022) “27 July 2022, Philippines, Mw 7.0 Earthquake Event Briefing”, in StEER - 27 July 2022, Philippines, Mw 7.0 Earthquake. DesignSafe-CI. <https://doi.org/10.17603/ds2-ga1r-cb39>.
- RR3. Mosalam, K. Gunay, S. Archbold, J. **Alam, M.S.** Kijewski-Correa, T. (2022) “2022 Afghanistan Earthquake Event Briefing”, in StEER 22 June 2022, Afghanistan, Mw 5.9 Earthquake. DesignSafe-CI. <https://doi.org/10.17603/ds2-6pk3-cy06>.
- RR4. Roueche, D. Bagheri Jeddi, A. Do, T. Prevatt, D. **Alam, M.S.** (2022) “Texas and Louisiana March 2022 Tornado Outbreak Event Briefing”, in StEER - 21-22 March 2022 Tornado Outbreak. DesignSafe-CI. <https://doi.org/10.17603/ds2-9xvm-6667>.



- RR5. **Alam, M.S.**, Robertson, I. Mosalam, K. Gunay, S. Kijewski-Correa, T. (2022) “Tonga Tsunami Event Briefing”, in StEER - 14-15 January 2022 Tonga Volcanic Eruption and Tsunami. DesignSafe-CI. <https://doi.org/10.17603/ds2-8b5b-jx16>.
- RR6. Pilkington, S., Roueche, D., Gutierrez Soto, **Alam, M.S.**, Napolitano, R. Kijewski-Correa, T., Prevatt, D., Kaushal, S., Nakayama, J., Saleem, M., Ibrahim, H., Lyda, A., Lester, H., Caballero Russi, D., Gurley, K., Robertson, I., Lombardo, F. (2021). “StEER: 10 December 2021 Midwest Tornado Outbreak Joint Preliminary Virtual Reconnaissance Report and Early Access Reconnaissance Report (PVRREARR)”, in StEER - 10 December 2021 Midwest Tornado Outbreak. DesignSafe-CI. <https://doi.org/10.17603/ds2-2b2k-ws96>.
- RR7. Fischer, E., Hakhamaneshi, M., **Alam, M.S.**, M. Alberto, Y. Aranha, C. Derakhshan, S. Djima, W. Greenwood, W. Haro, G. Hassan, W. Hudson, K. Julius, A. Laughery, L. Ma, X. Maddalozzo, W. Mulchandani, H. Rodriguez-Nikl, T. Tsai, Y. Unal, M. Wong, J. Yoo, D. Ziotopoulou, K. (07-08-2019). EERI VERT Searles Valley Earthquake Phase 1 Report. DesignSafe-CI. <https://doi.org/10.17603/ds2-sz1p-3839>.
- RR8. Fischer, E., Hakhamaneshi, M., **Alam, M.S.**, Y. Alberto., Aranha, C., Guillermo, D., Wilfrid, D., Mikael, G., Wael, H., Brisid, I., Edwin, L., Chiara, M., Tonatiuh, R.N., Mehmet, U., Hartanto, W., David, Y. (12-05-2019). EERI VERT Albania Earthquake Phase 1 Report. DesignSafe-CI. DOI: <https://doi.org/10.17603/ds2-fv1f-6v64>
- RR9. Fischer, E., Hakhamaneshi, M., **Alam, M.S.**, Alberto, Y., Aranha, C, Calderon, V., Carballo, D.C., Djima, W., Fans, G.D., Gartner, M., Haro, A. G., Hasan, W., Irizarry, A.P, Kakoty, P., Maalouf, S., Martin A., Mulchandani, H., Nikolaou, S.,, Ramirez J., Segura, C., Unal, M., Wibowo, H. Yoo, D. ( 01-15-2020). EERI VERT Phase 1 Indios, Puerto Rico M 6.4 Earthquake. DesignSafe CI. DOI: <https://doi.org/10.17603/ds2-ay64-dt05>

## RELEVANT COURSEWORK

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### MAJOR IN CIVIL ENGINEERING

#### Structural Analysis

- CE531 - Structural Mechanics
- CE532 - Finite Element Analysis
- CE585 - Matrix Structural Analysis
- CE537 - Nonlinear Structural Analysis

#### Structural Design

- CE581 - Reinforced Concrete
- CE586 - Prestressed Concrete
- CE588 - Probability-based Analysis & Design
- Seismic Design of Steel & Composite

#### Structural Dynamics

- CE534 - Structural Dynamics
- CE580 - Advanced Seismic Design
- Displacement-based Seismic Design
- Geotechnical Earthquake Engineering

### MINOR IN STATISTICS

- ST521 - Introduction to Mathematical Statistics-I
- ST522 - Introduction to Mathematical Statistics-II
- ST511 - Method of Data Analysis-I
- ST512 - Method of Data Analysis-II
- ST513 - Method of Data Analysis-III
- ST557 - Applied Multivariate Analysis
- ST559 - Bayesian Statistics

## AWARDS & HONORS

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- NHERI DesignSafe Artificial Intelligence Workshop on Natural Hazard Engineering Travel Fellowship, 2020
- NHERI SimCenter Programming Bootcamp Travel Fellowship, 2018
- Oregon Lottery Graduate Scholarship, Oregon State University, 2017-2018
- Graduate Research Assistantship, Oregon State University, 2013-2019
- Erasmus Mundus Scholarship, European Commission MEES program, 2006-2008

## PROFESSIONAL SERVICE

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- Secretary, EERI Oregon State University Student Chapter (February 2016 - February 2018)
- Beta user for the NIST **IN-CORE** (Interdependent Networked Community Resilience Modeling Environment).
- Volunteer of EERI Virtual Earthquake Reconnaissance Team (VERT)

- Volunteer of StEER Virtual Assessment Structural Team (VAST)
- Volunteer of StEER Field Assessment Structural Team (FAST)
  - December 10, 2021 Midwest Tornado Outbreak in Mayfield, Kentucky, StEER Level-2 FAST, December 14-16, 2021.
  - Hurricane Ian, 2022, Florida, StEER Level-3 FAST, October 18-23, 2022.
- Reviewer for:
 

(a) Journal of Engineering Structures	(f) Arabian Journal for Science and Engineering
(b) Bulletin of Earthquake Engineering	(g) Journal of Rehabilitation in Civil Engineering
(c) Journal of Structural Engineering	(h) Journal of Building Engineering
(d) Material and Structures	(i) Journal of Waterway, Port, Coastal, and Ocean Engineering
(e) Energies	

## TRAINING

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- NHERI RAPID Facility Intensive Training on Reconnaissance Equipment and Data, Seattle, WA, July 25-29, 2022.
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization, June 2022, (<https://coursera.org/share/7a3111820197e035876f6f3e95f74d00>)
- Neural Networks and Deep Learning, DeepLearning.AI, August 2021, (<https://coursera.org/share/68799663ceb14f95ff377dfc125e5d73>)
- 2021 DesignSafe Academy: July 26-30, 2021, (<https://www.designsafe-ci.org/learning-center/training/webinars/ds/2021/designsafe-academy/>).
- NHERI-SimCenter 2020 Programming Bootcamp: Python, December 14-18, 2020, (<https://nheri-simcenter.github.io/SimCenterBootcamp2020/>).
- Machine Learning with Python, IBM, Coursera, October, 2020, (<https://www.coursera.org/account/accomplishments/certificate/TLWFTM262WMS>)
- Machine Learning, Stanford|Online, Coursera, December, 2020, (<https://coursera.org/share/32750f77376bed73dbc5c5bc8d49cc23>).
- NHERI DesignSafe workshop on artificial intelligence/machine Learning/deep learning (AI/ML/DL) and their application in Natural Hazard Engineering (NHE), Texas Advanced Computing Center, TX, February 18-19, 2020.
- ATC-20, Post-earthquake Safety Evaluation of Buildings, and Rapid Observation of Vulnerability and Estimation of Risk (ROVER), Springfield, OR, September 11, 2014.
- FEMA 395, Earthquake Safety and Mitigation for Schools, organized by Federal Emergency Management Agency (FEMA), September 6, 2017.
- Update to FEMA P-154, Rapid Visual Screening of Buildings for Potential Seismic Hazard, organized by Applied Technology Council (ATC), November 21, 2014.

## AFFILIATIONS

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- Young Professional Member, Earthquake Engineering Research Institute (EERI)
- Associate Member, American Society of Civil Engineering (ASCE)
- Member, Bangladesh Earthquake Society (BES)
- Member, Institute of Engineers Bangladesh (IEB)

## COLLABORATORS

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- Pedro Arduino, University of Washington, USA
- Marc Eberhard, University of Washington, USA
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- Dayeon Lee, Hanyang University, South Korea