ALLAN M. ZAREMBSKI Ph.D., P.E., F.A.S.M.E., Hon. Mbr. AREMA

Professor and Director of Railroad Engineering and Safety Program

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Summary of Qualifications:

Over forty years of professional engineering responsibility. Extensive experience in all areas of rail operations to include freight and passenger operations, transit, commuter and inter-urban. Internationally recognized expertise in the area of railway track and structures, vehicle-track dynamics, failure and failure analysis, safety, railway operations, and maintenance. Consulting services provided to virtually all major rail operations in North America together with numerous operations worldwide. Teaching of university level (undergraduate and graduate) courses and professional short courses.

PROFESSIONAL HISTORY:

August 2012 to present — **University of Delaware, Department of Civil and Environmental Engineering**

Professor and Director of Railroad Engineering and Safety Program

Develop and teach railroad engineering courses for seniors and graduate students. Develop railroad engineering and safety program to include courses and research activities in the areas of railroad track engineering, vehicle-track dynamics, failure and failure analysis, railway safety, railway economics, and railroad operations and maintenance. Develop and teach professional courses in railroad engineering and safety.

September 2007 to July 2012 — **ZETA-TECH, an Independent Business Unit of Harsco Rail**

Vice President and General Manager

Directed activities in track maintenance planning and planning software, vehicle-track dynamics and interaction, rail and track analyses, economic analyses of railroad operations, and railway costing. Special areas of activity include rail maintenance, rail grinding, railroad track structure, vehicle-track dynamics, fatigue and failure analysis, safety, and risk management.

1984 to 2007 — **ZETA-TECH Associates, Inc., Cherry Hill, New Jersey**

President

Directed activities in track maintenance planning and planning software, vehicle-track dynamics and interaction, rail and track analyses, economic analyses of railroad operations, and railway costing. Special areas of activity include railroad track structure, vehicle-track dynamics, fatigue and failure analysis, safety, and risk management.

1981 - 1984 — **Pandrol Inc./Speno Rail Services Co.**

Director Research & Development

Dual responsibility for both companies in directing all research and development activities for new products, new systems, and future corporate activities. Reported directly to the President. Responsible for all

railroad technology activities including product application, advertising, and technical support.

1976 - 1981 **Association of American Railroads**
Manager - Track Research Division
December 1978 to September 1981
Directed Division Responsible for conducting major research programs on railroad track. Directed AAR Track Laboratory. Conducted extensive field and laboratory tests as well as analytical research programs.

Assistant Manager - Track Research Division
August 1978 to December 1978
Initiated major research programs in Track Strength, Rail Fatigue, Ballast Failure Mechanisms, etc.

Senior Research Engineer
August 1976 to August 1978
Responsible for research programs on freight car fatigue design, rail overturning, and track gage widening. Developed industry standard methodology for fatigue design of freight cars. Developed test plans and procedures for AAR Track Laboratory.

1975 - 1976 **Princeton University**
Research Associate - Dept. of Civil Engineering
Conducted research activities in the area of lateral (railroad) track deformation and track buckling. Conducted laboratory tests at civil engineering laboratory.

1971 - 1973 **Grumman Aerospace Corp.**
Engineer
Responsibility for design and analysis of military aircraft structural components. Also conducted dynamic analyses of aircraft structures.

EDUCATION:

Sept. 1975 Ph.D. Civil Engineering; Princeton University

June 1974 M. A. Civil Engineering; Princeton University

Jan. 1973 M. S. Engineering Mechanics; New York University

Jan. 1971 B. S. (Magna Cum Laude) Aeronautics and Astronautics; New York University

PROFESSIONAL AFFILIATIONS:

Registered Professional Engineer: NJ, NY, PA, IL, MD

MEMBER:

American Railway Engineering and Maintenance of Way Association (Honorary Member)
American Society of Mechanical Engineers (Fellow)
American Society of Civil Engineers (Life member)

HONORS AND AWARDS:

Appointed Professor of Practice, , Department of Civil and Environmental Engineering, University of Delaware, September 1, 2015.

Appointed Research Professor and Director of Railroad Engineering and Safety Program, Department of Civil and Environmental Engineering, University of Delaware, August 1, 2012.

Elected Honorary Member of American Railway Engineering and Maintenance of Way Association (AREMA) in 2010.

Received Federal Railroad Administration's SPECIAL ACT AWARD, February 2001

Elected Fellow of the American Society of Mechanical Engineers in 2000

1992 Rail Transportation Award, American Society of Mechanical Engineers

Associate Editor, Railway Track and Structures Magazine, January 1985 to 1996. Author of monthly column; "Tracking R&D"

Adjunct Assistant Professor, Department of Civil Engineering, Illinois Institute of Technology 1980 - 1981

Instructor: Railroad Engineering Continuing Education Courses
Institute for Railroad Engineering; 1984 – 2004
George Washington University; 1980 - 1981
University of Wisconsin at Madison; 1978 -1981

Member: National Academy of Sciences, National Materials Advisory Board; Committee on Nondestructive Testing of Longitudinal Force in Rails

Member: Office for Research and Experiments of the International Union of Railway; Committee D150

Delegate: American Railway Engineering Association Railroad Delegation to the Peoples Republic of China, 1983

Deputy Director - International Government Industry Research Program on Track Train Dynamics

Patent 8,345,948 Automated Turnout Inspection granted January 1, 2013

Author of over 180 papers on railroad track analysis and behavior, rail fatigue, and freight car design and analysis

Author of over 130 articles on railway operations and maintenance, published in all of the major U.S. and international (English speaking) industry publications

Author of the book Tracking R&D; Research and Development, Simmons Boardman, Omaha, NE, 1993

Author of the book The Art and Science of Rail Grinding, Simmons Boardman, Omaha, NE, 2005