Koray Tureyen PhD, PE

Senior Managing Consultant, Civil & Structural

Dr. Koray Tureyen, a Senior Managing Consultant, is deeply committed to probing and resolving a wide array of complex engineering problems at various scales, employing a blend of evidence collection, analysis and research, and insights gained from experience. He started his career as an instructor at Purdue University but his passion for investigation and problem solving quickly led him to forensic consulting at Wiss, Janney, Elstner Associates Inc. and Engineering Systems, Inc. His tenure as a forensic consultant provided him with a broad-based experience on a wide range of engineering and architectural disciplines and sectors, and he developed a deep understanding of mechanical behavior and distress mechanisms of today's engineering materials.

Dr. Tureyen has conducted forensic investigations to identify root causes of failure involving various structural and architectural systems. He has investigated issues with foundations, slabs on ground, parking structures, transportation structures, auditoriums, hospitals, high rise structures of concrete, steel, masonry and wood construction, traditional and renewable energy structures, various building facade systems, roofing and waterproofing systems, and coatings. These forensic investigations have involved utilization of a combination of advanced structural analyses, materials and failure mechanism characterization through chemical, petrographic and metallurgical analyses, and non-destructive inspection and testing methods. Therefore, Dr. Tureyen possesses a robust understanding of cross-disciplinary investigation techniques, which he uses to discern the relationships between symptoms of distress and their root causes.

Dr. Tureyen also has a wealth of experience in assessing damage to the built environment after disasters such as earthquakes, wind, fire, explosion, and water exposure. He has conducted assessments of damage on a wide range of structures constructed of reinforced, pre/post-tensioned concrete, steel, masonry, and wood, as well as architectural components and systems such as facades, roofing and waterproofing. He has also often been involved in the design of repairs, rehabilitation and strengthening of structures he assesses.

Dr. Tureyen's recent work has focused on solar and wind energy generation structures, communication towers, reinforced and post tensioned concrete structures, exterior envelopes of commercial and university buildings and fire research laboratory facility repair and renovations.

Licenses & Certifications

- State of Michigan P.E. License No. 6201052221
- State of Ohio P.E. License No. 92308
- State of Missouri P.E. License No. 2025018554
- State of Florida P.E. License No. 101913
- Fracture Critical Insp/Steel Bridges NHI 130078 Certification

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Education

Ph.D., Civil Engineering. Purdue University, 2001

B.Sc., Civil Engineering. Middle East Technical University. 1997

Areas of Specialization

Failure Investigation
Pre/post-tensioned concrete structures
Explosion/fire damage assessment
Post-earthquake/wind damage assessment
Advanced structural analyses
Earthquake and wind engineering
Renewable energy structures
Telecommunication structures
Non-destructive inspection
Instrumentation and monitoring
Steel, masonry, and wood construction
Building façade systems
Roofing and waterproofing
Transportation structures
Soil Structure Interaction
Geotechnical engineering
Fiber-reinforced polymer materials
Concrete petrography and chemistry
Corrosion, fatigue, and fracture

Positions Held

Engineering Systems Inc., Aurora, Illinois

- Senior Managing Consultant, 2024 – Present

Wiss, Janney, Elstner Associates, Inc.

- Senior Associate, August 2007 – March 2024 (Northbrook, IL)
- Associate I through III, July 2002 – August 2007 (Detroit, Michigan)

Purdue University, West Lafayette, Indiana

- Adjunct Professor, January 2002 – June 2002

Peer Reviewer

- American Concrete Institute, Structural Journal
- American Society of Civil Engineers, Journal of Structural Engineering

Languages

- Fluent in Turkish

Professional Affiliations/Honors

American Concrete Institute

- Committee 408 - Bond and Anchorage (past)
- Committee 445 - Shear and Torsion (past)
- Committee 349 - 00 Concrete Nuclear Structures (current)
- Committee 349 - 0B Nuclear Structures-Design (current)

BSSC 2023 Provision Update Committee

- Issue Team #1- Soil-structure interaction (current)
- Issue Team #6- Two-stage analysis provisions (current)

American Society of Civil Engineers

- Member

Precast-Prestressed Concrete Institute

- Member

Technical Publications

Tureyen, AK, Irfanoglu, A, “2023 Kahramanmaraş, Türkiye Earthquake Sequence”, ISEA Spring Conference, March 7, 2024.

Tureyen, AK, Chancellor, B, "Building and Infrastructure Performance During the Kahramanmaraş Earthquake Sequence", IABSE Webinar, December 12, 2023.

Tureyen, AK, Nelson, T, “It’s Simple! It is Only Concrete Core Compressive Strength Testing,” WJE Webinar Series, December 17, 2020.

Tureyen, AK, “Case study: The mysterious Case of Staining of a Breathable Exterior Coating,” WJE Internal Conference, 2015.

Tureyen, AK, “UIUC Natural History Building Elevated Floor Slabs Assessment, Load Testing and Strengthening,” WJE Internal Conference, 2015.

Tureyen, AK, “Slab Strengthening at an Early 20th Century Historic Building: A Forensic Case Study”, CE 691S Structural Engineering Seminars – April 5, 2016.

Tureyen AK, Nelson, T, “Slab-On-Grade: Introduction to Design Considerations,” WJE Internal Webinar, 2012.

Tureyen, AK, Hill, H, “Understanding Then Fixing of a Bungled Seismic Retrofit of a 1960s Hospital Building”, WJE Internal Conference, 2011.

Tureyen, AK, Anderson, NS, Meinheit, DF, ““Permutations of The Combined Tension and Shear (N-V) Interaction for Headed Studs,” 2nd International Symposium on Connections between Steel and Concrete: University of Stuttgart, September 4th - 7th, 2007.

Tureyen, AK, Anderson, NS, Meinheit, DF, “Design Criteria for Headed Studs-Tension and Combined Tension and Shear. Phase 2”, PCI Annual Convention/Exhibition and National Bridge Conference, Grapevine-TX, October 22–25, 2006.

Tureyen, AK, Frosch, RJ, “Proposal for Unification of Slender Beam Shear Strength Equations in ACI 318-08”, Presentation to ACI 445 Committee during the ACI-ASCE 445 Fall meeting in Kansas City, KS, 2005.

Project Experience

Failure Investigation

Failure investigations conducted to date ranged from various materials and structural and architectural systems such as reinforced/prestressed/post-tensioned concrete, steel, and wood. Investigations ranged from determining the root cause of structural failures in steel and wood structures during construction to determining root causes of water intrusion in architectural systems such as windows, curtainwalls, stucco, EIFS and masonry façade systems as well as coating systems. These investigations were often multi-disciplinary in nature and involved advanced structural analyses, petrographic, chemical, and metallurgical analyses for materials and failure characterization and non-destructive testing techniques as well as field instrumentation and testing.

Communication Towers

These projects involved failure investigation of masts on communication towers and design review and consulting for improvement. Failure investigation projects typically involved metallurgical studies and advanced vortex shedding analyses of tower mast and lightning rods which are susceptible to fatigue failure. As part of these services, Dr Tureyen also conducted design reviews of towers designed by others and designed modification to improve fatigue strength of multiple communication tower masts and lightning rods.

Clients for these projects were owners, design services providers, manufacturers and erectors and the Division of State Architect of California, California Highway Patrol and Department of Forestry and Fire Protection.

Solar Power Generating Stations

These projects involved structural design peer review of new solar power generation station trackers from different manufacturers including NexTracker, Array, GameChange, PVH Hardware and others on behalf of owners and contractors. Also investigated failures at multiple solar power generating stations after various wind events as well as after operational failures. Clients for these services were typically contractors.

These projects typically involved the generation of static and dynamic loading from wind tunnel studies conducted on the tracker systems, modeling of trackers and analyses using loads developed, and checking all components and connections of the solar tracker systems as well as their pile foundations.

Dr. Tureyen also provided corrosion engineering services involving peer review findings of soil corrosivity studies by third parties, and design assistance and quality assurance services for corrosion protection of pile supports installed in medium to high corrosion potential soils.

Dr Tureyen also conducted failure investigations of multiple single axis and double axis solar tracking systems, which typically involved component failures due to design errors by the tracker system manufacturer or foundation designer.

Wind Power Generating Stations

These projects typically involved design review of land-based wind turbine foundations, feasibility studies of existing wind turbine foundations for repowering reuse and partially collapsed wind turbine tower demolition plans. Typical clients for these projects were contractors serving owners or designers of these facilities.

Due to the difficulties involved in detailing/placement of reinforcing embedded in the unusually large turbine foundations and estimating their ultimate load and fatigue strength, these projects typically involved significant analytical effort to quantify both demands on and strength of foundation elements.

Safe demolition of partially collapsed wind turbine towers poses unique challenges such as design of direction of full demolition, consideration of wind loads on the partially collapsed structure, stability of partially collapsed structure during preparation for demolition and during demolition activities, among others.

Earthquake Engineering

These projects typically involved desktop assessment of existing structures using ASCE 7 and ASCE 41 evaluation criteria. In one case, Dr Tureyen designed modifications to an erroneous seismic retrofit design by another designer for a six-story reinforced concrete hospital building. In another case, Dr Tureyen studied the seismic robustness of a highly irregular reinforced concrete fire station on a nuclear waste storage and conversion facility and characterized the building's resilience in terms of its ability to resist an earthquake of a given return period. Finally, multiple desktop studies involved assessments for the US Department of State of foreign building assets for seismic robustness. Clients for these projects were the state department, nuclear regulatory commission, and private building owners.

In addition to analytical experience with earthquake engineering, Dr. Tureyen participated in two post-earthquake reconnaissance teams after the 1999 Düzce and Kocaeli earthquakes, and the 2023 Kahramanmaraş and Elbistan earthquake sequence in Türkiye. The team collected data on regional reinforced concrete building stock for the purpose of learning from damage observed, and disseminated the collected information and lessons learned to the general engineering and construction community to improve design and construction of new structures.