ERIC J. SODERLUND

Vice President & Project Director
Sargent & Lundy Consulting Group

Education

- MBA—Kellstadt Graduate School of Business—DePaul University—2015
- MS Civil Engineering—University of Illinois–Chicago—2010
- BS Civil Engineering—University of Illinois at Urbana-Champaign—2007

Registrations

- Professional Engineer (Illinois)
- American Clean Power Association

Proficiencies

- Power Plant Project Development
- Electric Grid Interconnection
- Power Plant Design, Construction, & Modifications
- Power Plant Owner's Engineering
- Power Plant Independent Engineering Technical Due Diligence Reviews
- Power Plant Operations and Maintenance
- Power Plant Cost and Performance Benchmarking
- Power Plant Asset Transactions
- Project Finance
- Expert Testimony
- Wind Power Projects
- Wind Repower Projects
- Wind Turbine Foundation Design & Construction
- Solar Photovoltaic Projects
- Battery Energy Storage Projects
- Hydroelectric Projects
- Hydrogen Production, Transmission, and Utilization
- Electric Vehicle Projects
- Thermal Generation Projects
- Carbon Capture Projects
- Nuclear Generation Projects

Responsibilities

As Vice President and Project Director of Consulting Services, Eric Soderlund sets the strategic direction for Sargent & Lundy's consulting, technical advisory, grid modernization, renewable energy, and decarbonization services. He has led over 400 projects in the past decade and been responsible for their planning, execution, and monitoring.

For over 14 years, Eric Soderlund has been one of Sargent & Lundy's subject matter specialists on project development, design, construction, financing, and maintenance and operations for renewable energy, battery energy storage, decarbonization, and nuclear power projects. He directs development support, interconnection services, owner's engineering, construction monitoring, independent engineering, operations monitoring, asset transaction, and expert testimony services for developers, system operators, constructors, OEMs, utilities, municipalities, IPPs, financial institutions, and other organizations. He has experience performing, managing, and directing assignments throughout the United States and across the globe, including Argentina, Armenia, Brazil, Canada, Israel, Jamaica, Peru, Romania, South Africa, Turkey, and Vietnam. In addition, he has presented at multiple renewable energy conferences.

Experience

Renewable Energy and Battery Energy Storage

Acciona Energy

- 2018–2021 | Texas, United States | Managed design review, construction monitoring, and structural health monitoring of rock-anchored wind turbine foundation for Palmas Altas Wind Farm.
- 2019–2020 | Texas, United States | Managed design review and construction monitoring of soil-anchored wind turbine foundation for Chalupa Wind Farm.
- 2020 | Texas, United States | Managed congestion analysis review for Chalupa Wind Farm.

American Electric Power (AEP)

- 2018–2019 | Texas, United States | Managed independent engineering and construction monitoring services for Santa Rita Wind Farm in support of acquisition.
- 2018 | Nevada, United States | Managed end-of-warranty inspection for Boulder II and Pavant III solar projects.
- 2015 | Ohio, United States | Performed technical due diligence for Racine Hydro Power Plant.

AES Clean Energy (formerly Sustainable Power Group [sPower])

- 2020 | United States | Managed cost estimate preparation for multiple solar PV and BESS projects.
- 2020 | United States | Managed study relating to design of solar PV project medium-voltage systems.

AES Corporation

- 2020 | Texas, United States | Managed RCA for wind turbine fire at Buffalo Gap Wind Farm.
- 2020 | California, United States | Managed RCA for runaway wind turbine at Mountain View Wind Farm.
- 2018–2019 | Hawaii, United States | Managed owner's engineering and field support for the Na Pau Makani Wind Project.

Alstom

- 2014 | Israel | Managed owner's engineering team for evaluation of bids to supply solar receiver tower for Ashalim concentrated solar power facility.

Ares Management

- 2018–2021 | Texas, United States | Managed independent engineering reviews for partial repower of three wind projects, Silver Star, Sherbino Mesa II, and Trinity Hills, in support of tax equity financing.
- 2019–2020 | Texas, United States | Managed independent engineering and construction monitoring in support of financing for Aviator Wind (525 MW).

Blattner Energy

- 2007–2022 | United States | Performed and managed detailed independent engineering reviews and evaluations of wind turbine foundation designs for approximately 100 wind projects throughout the United States.
- 2018 | Texas, United States | Managed data processing and analysis of wind turbine foundation data from operating wind turbines to support partial repowering of the Trent Mesa wind project.

BP Wind Energy

- 2021–2022 | Indiana, United States | Managed front end engineering design (FEED), including NERC compliance studies, in support of partial repower of an operational wind project.
- 2021 | Colorado, United States | Managed wind turbine foundation, wind turbine tower analyses, electrical design studies, and 80/20 analysis in support of wind project potential partial repower.
- 2020 | United States | Managed red flag independent engineering due diligence for potential partial repower of three wind projects.

- 2018–2020 | Texas, United States | Managed full independent engineering due diligence for partial repower of three wind facilities, Silver Star, Sherbino Mesa II, and Trinity Hills, in support of asset sale.
- 2018 | Kansas, United States | Managed independent engineering review of Flat Ridge 1 Wind Farm to support repowering, including preparation of the 80/20 analysis.

Clearway Renewable Energy

- 2020–2022 | Washington, United States | Managed independent engineering reviews and construction monitoring in support of tax equity financing for the Rattlesnake Flat wind project.
- 2020–2022 | West Virginia, United States | Managed independent engineering reviews and construction monitoring in support of tax equity financing for the Black Rock wind project.
- 2020–2022 | Texas, United States | Managed independent engineering reviews and construction monitoring in support of tax equity financing for the Mesquite Sky wind project.
- 2021 | United States | Managed wind turbine design life assessment.
- 2019–2021 Managed independent engineering and construction monitoring in support of tax equity financing for multiple partial repower wind projects.
    - Elbow Creek | Texas
    - Langford | Texas
    - Pinnacle | West Virginia
    - Wildorado | Texas

Competitive Power Ventures (CPV)

2021–2022 | United States | Managed preparation of layouts for multiple new solar projects.

Confidential Clients

- 2020–2022 | Solar PV Tracker Bankability Report | Managed preparation of bankability report for new-to-market solar tracker design.
- 2021-2022 | Solar PV and BESS Owner's Engineering | Managed owner's engineering services in support of new solar PV and BESS project in Hawaii.
- 2021-2022 | Rooftop Solar PV Independent Engineering | Managed independent engineering reviews in support of financing for large portfolio of rooftop residential solar PV projects.

- 2019–2022 | Solar PV Expert Witness Support | Managed expert witnesses, preparing expert witness report, rebuttal report, and deposition testimony regarding EPC contract price for solar PV project.
- 2021–2022 | Wind and Transmission Line Acquisition Support | Managed independent engineering reviews in support of acquisition of wind project and HVDC transmission line.
- 2021–2022 | Distributed Energy Resource Acquisition Support | Managed independent engineering reviews in support of acquisition of a portfolio of distributed energy resources.
- 2022 | Solar Owner's Engineering | Managed independent engineering reviews of ground-mounted solar racking technology.
- 2020–2021 | BESS Owner's Engineering | Managed owner's engineering services for major IPP in development of battery energy storage project including preparation of EPC technical specification and review of EPC bids.
- 2020–2021 | Solar PV and BESS Expert Witness Support | Managed expert witnesses for deposition testimony regarding power purchase bids for two solar PV + BESS projects.
- 2021 | United States | Managed optimization of wind project cabling in consideration of transient loading.
- 2021 | United States | Managed asset acquisition due diligence of construction company supporting the renewable energy, gas, and telecom industries.
- 2018–2020 | Biomass Independent Engineering | Managed due diligence of biomass project under development in Hawaii. Services included technical and financial due diligence in support of tax-equity investment evaluation, including in-depth assessment of boiler design.
- 2020 | Patent Acquisition Support | Managed patent acquisition due diligence reviews of a heat transfer fluid used in transformers.
- 2019 | Wind Independent Engineering | Managed due diligence review to assess technical and financial impact of proposed confidential wind turbine operational strategy to increase generation and overall project value.
- 2018 | Wind Independent Engineering | Reviewed use of alternate materials for use as neutral conductors in wind turbine projection collection systems.

CS Energy

2020–2022 | Managed preparation of energy yield assessments for multiple solar PV projects.

Cycle Power Partners and Sojitz

2019 | Montana, United States | Managed independent engineering in support of partial repower of Horseshoe Bend Wind project.

D.E. Shaw Renewable Investments

- 2021–2022 | California, United States | Managed harmonics and filter sizing study for Rancho Seco II solar project.
- 2021–2022 | United States | Managed preparation of interconnection applications for multiple projects.
- 2021 | Idaho, United States | Managed wind turbine component safe harbor audit.
- 2020–2021 | Idaho and Oklahoma, United States | Managed feasibility studies for two wind projects under consideration for partial repower.

Eastern Generation

2021 | United States | Managed system impact studies in MISO and PJM.

Ecofin

2021 | Texas, United States | Managed independent engineering reviews in support of asset acquisition of the Whirlwind Wind Farm.

Encore Renewable Energy

2021–2022 | United States | Managed interconnection studies and cost estimates for new solar project.

Enel Green Power

- 2020–2021 | Kansas and Minnesota, United States | Managed independent engineering reviews and construction monitoring of three wind repower projects, Smoky Hills I, Smoky Hills II, and Minnesota Wind, in support of tax equity financing.
- 2020 | Kansas, United States | Managed wind turbine component remaining useful life analysis in support of partial repower of Smoky Hills I and Smoky Hills II wind projects.
- 2020 | Managed independent engineering review of remediation plan for wind turbine struck by lightning.

Entergy

2021 | United States | Managed independent engineering reviews of power project design books to optimize specifications.

Eolus North America

- 2020–2021 | California, United States | Managed independent engineering reviews and construction monitoring of Wind Wall project in support of tax equity financing.
- 2020 | California, United States | Managed feasibility study for three wind turbine foundation types considered for wind repower project.

E.ON Climate & Renewables

2018 | Texas, United States | Managed detailed decommissioning cost estimate for Stella Wind Farm on behalf of property owner.

Fagen

- 2021–2022 | Missouri, United States | Managed independent engineering design review of transmission line for wind project.
- 2015–2022 | United States | Managed independent engineering review of several wind projects. Scope generally included reviews of structural and electrical designs.
    - Latigo | Utah, United States
    - Campbell County | South Dakota, United States
    - Bloom Wind | Kansas, United States
    - Cotton Plains | Texas, United States
    - Old Settler | Texas, United States
    - South Peak | Montana, United States
    - Independence | Iowa, United States
    - Palmers Creek | Minnesota, United States
    - Saratoga | Iowa, United States
- 2018 | Minnesota, United States | Managed independent engineering review of precast RUTE Foundation System wind turbine foundation prototype.
- 2007–2018 | United States | Performed independent reviews of wind turbine foundation designs for more than 12 projects.

GE Energy Financial Services

- 2017 | Texas, United States | Managed independent engineering reviews in support of tax equity financing for 12 repowered wind projects. Scope included full analyses of wind turbine foundations, foundation inspections, tower inspections, and electric BOP design as well as construction review.

- 2014 | Texas, United States | Performed independent engineering due diligence and construction monitoring review of the Panhandle Wind Project in support of tax equity financing.

GlidePath Advanced Energy

- 2020 | Pennsylvania, United States | Managed cost estimate for decommissioning of Meyersdale BESS project.
- 2019–2020 | Pennsylvania, United States | Managed independent engineering reviews in support of acquisition of two BESS projects.
- 2018 | United States | Managed independent engineering reviews in support of acquisition of seven wind projects.

HelioFocus

2012 | Israel and United States | Performed independent engineering review for new utility-scale concentrated solar power (CSP) technology to be used in Israel and southwestern United States.

Herling Construction

2020–2021 | United States | Managed evaluation of wind turbine felling procedure, including evaluations of existing wind turbine foundations and nearby building structures, for the following wind projects:

- Gulf Wind | Texas, United States
- Big Sky | Illinois, United States
- Cerro Gordo Wind Energy Center | Iowa, United States
- Mendota Hills Wind Farm | Illinois, United States

Hodson Energy

- 2021–2022 | United States | Managed support for obtaining transmission line right of way permitting.
- 2021 | United States | Managed interconnection conceptual design and cost estimate for a new solar project.
- 2021 | Virginia, United States | Managed injection studies and cost estimates for a portfolio of new solar projects.

International Finance Corporation

- 2014–2020 | Jamaica | Managed independent engineering reviews, construction monitoring, and operations monitoring of BMR Jamaica Wind Project in support of financing.
- 2016 | Armenia | Performed independent engineering reviews of Vorotan Cascade consisting of three hydroelectric power plants and five reservoirs generating 404 MW. Scope of work included reviews of design and comprehensive refurbishment program.
- 2012–2015 | Turkey | Performed independent engineering construction monitoring of portfolio of 10 hydroelectric power plants in Seyhan and Ceyhan River Systems in Turkey.
- 2014 | Philippines | Performed independent engineering reviews of biomass project utilizing sugar cane as fuel.

International Finance Corporation and European Bank for Reconstruction and Development,
2012–2013 | Turkey | Performed lenders' independent engineering review of Balikesir Wind Farm in support of financing.

JBS Energy Solutions
2021–2022 | California, United States | Managed independent engineering reviews of the wind turbine foundation designs for the Strauss Wind Project.

J.K. Scanlan Company
2014 | New Hampshire, United States | Performed independent engineering reviews for rock-anchor wind turbine foundation design at Jericho Mountain Wind Project.

John Hancock Infrastructure
2020 | Managed wind project feasibility studies and cost estimates.

Leeward Renewable Energy

- 2021–2022 | New Mexico, United States | Managed independent engineering reviews and construction monitoring in support of tax-equity financing for new wind project.
- 2021–2022 | Colorado, United States | Managed independent engineering reviews and construction monitoring in support of tax-equity financing for new wind project.
- 2019–2022 | United States | Managed submission of approximately 100 interconnection applications with various ISOs and utilities, including PJM, MISO, ERCOT, and CAISO.

- 2019–2022 | United States | Managed approximately 75 renewable energy project power system studies, including feasibility/system impact studies and interconnection analyses, detailed design analyses and studies, steady-state and dynamic facility models (PSS/E), transmission adequacy and reliability assessments, and nonmaterial change determinations.
- 2021 | Illinois, United States | Managed independent engineering reviews and construction monitoring in support of tax-equity investors for the Crescent Ridge Wind Project.
- 2021–2022 | United States | Managed evaluation of collection system, stability study, and fault review for confidential wind project under consideration for repower.
- 2021–2022 | United States | Managed design of existing wind turbine foundation retrofit in support of repower.
- 2021 | United States | Managed electrical design studies in support of additional of new BESS to existing solar project.
- 2020–2022 | United States | Managed multiple wind turbine felling analyses, considering both controlled felling as well as explosive felling, in support of full repower.
- 2019–2020 | Colorado, United States | Managed independent engineering reviews and construction monitoring in support of tax equity financing for Mountain Breeze Wind Project.
- 2019–2020 | Illinois, United States | Managed team of engineers to provide due diligence reviews and construction monitoring in support of tax equity financing for the Lone Tree Wind Project.
- 2019–2020 | Texas, United States | Managed independent engineering reviews in support of tax equity financing for Sweetwater 3 Wind partial repower project.
- 2018–2019 | | Illinois, United States | Managed independent engineering reviews and construction monitoring in support of tax equity financing for Mendota Hills Full Repower Wind Project.
- 2017 | Texas, United States | Managed independent engineering reviews in support of tax-equity investors for Sweetwater I and Sweetwater II partial repower projects.

Mainstream Renewables

- 2012–2013 | Illinois, United States | Prepared decommissioning plans for three counties for a new wind energy project in Illinois.

Marubeni Power International

- 2011–2012 | Illinois, United States | Performed independent engineering review of California Ridge Wind Project.

Mitsui & Co.

- 2018–2019 | Argentina | Performed independent engineering review of Vientos los Hercules wind power project.

M.J. Beck Consulting and Public Service Enterprise Group (PSEG-LI)

- 2016–2019 | New York, United States | Managed oversight of 90-MW Deepwater South Fork Wind Farm, America's first utility-scale offshore wind farm, on behalf of offtaker, PSEG-LI.

National Grid Renewables

- 2022 | Michigan, United States | Managed owners' engineering for the Jackson County solar project.
- 2021–2022 | Texas, United States | Managed owner's engineering for new solar project.
- 2021–2022 | United States | Managed inverter and transformer specification preparation and bid evaluation for new solar project.

NextEra Energy Resources

- 2011–2022 | United States | Managed and/or performed independent engineering reviews, construction monitoring, and completion verification reviews for more than *80 greenfield wind projects* in support of tax equity financing.
- 2017–2022 | United States | Managed independent engineering reviews in support of tax-equity financing for approximately *45 wind partial repower projects*.
- 2021–2022 | United States | Managed independent engineering reviews in support of tax equity financing for seven solar PV plus BESS projects.
- 2021–2022 | United States | Managed useful life assessments for seven solar PV plus BESS projects in support of financing.
- 2021–2022 | California, United States | Managed independent engineering reviews in support of tax equity financing for the Blythe III Battery Energy Storage System.
- 2022 | Canada | Managed independent engineering reviews in support of financing of a new transmission line.
- 2022 | Kansas, United States | Managed wind and O&M interference review on existing wind project due to construction of a neighboring wind project.
- 2020 & 2022 | United States | Managed preparation of decommissioning plan and cost estimate for multiple wind projects.

- 2021 | United States | Managed independent engineering reviews of multiple partially constructed wind projects to confirm production tax credit qualification prior to asset acquisition.
- 2021 | United States | Managed preparation of study addressing wind turbine pricing due to fluctuations in commodity pricing.
- 2020–2021 | United States | Managed preparation of wind turbine foundation anchor bolt O&M protocol.
- 2017–2021 | United States | Managed review of proposed and baseline annual O&M budget for more than 30 wind projects on behalf of project owner and debt lenders.
- 2021 | California, United States | Managed condition assessment of the substation for the Sky River Wind Energy Center in support of repower.
- 2021 | Texas, United States | Managed independent engineering review of winterization plans for ERCOT generating assets.
- 2021 | United States | Managed domestic content review for the Hubbard Wind and Dodge Flat Solar plus Storage projects.
- 2020 | Arkansas, Unite States | Managed independent engineering reviews of Chicot Solar Energy Center with respect to severe weather events.
- 2020 | United States | Managed instrumentation and structural health assessment for multiple repowered wind turbine foundations.
- 2020 | California, United States | Managed independent engineering review of four BESS facilities on behalf of PPA offtaker.
- 2019–2020 | United States | Managed preparation of wind industry O&M cost benchmarking study.
- 2015–2017 | United States | Managed independent engineering design reviews of wind turbine foundation retrofits at two confidential wind projects following discovery of fatigue damage.
- 2013 | Puerto Rico, United States | Performed evaluation of geotechnical conditions and developed conceptual foundation design for portfolio of four solar PV projects.

NextEra Energy Resources and Entergy

- 2021–2022 | Arkansas, United States | Managed independent engineering reviews and construction monitoring services under a build-transfer agreement for NextEra and Entergy for the Searcy Solar and Batter Energy Storage Project.

NextEra Energy Resources and Northern Indiana Public Service Company (NIPSCO)

- 2022 | Indiana, United States | Managed independent engineering reviews and construction monitoring services under a build-transfer agreement for NextEra and NIPSCO for the Dunn's Bridge II Solar Project. Also managed independent engineering reviews in support of tax equity financing.
- 2022 | Indiana, United States | Managed independent engineering reviews and construction monitoring services under a build-transfer agreement for NextEra and NIPSCO for the Cavalry Solar Project. Also managed independent engineering reviews in support of tax equity financing.
- 2021–2022 | Indiana, United States | Managed independent engineering reviews and construction monitoring services under a build-transfer agreement for NextEra and NIPSCO for the Dunn's Bridge I Solar Project.

NextEra Energy Resources and PacifiCorp

2019–2021 | Wyoming, United States | Managed independent engineering reviews and construction monitoring services under a build-transfer agreement for NextEra and PacifiCorp for the Cedar Springs II Wind Project.

NextEra Energy Resources and Portland General Electric

2019–2021 | Oregon, United States | Managed independent engineering reviews and construction monitoring services under a build-transfer agreement for NextEra and PGE for the Wheatridge Wind Project.

NextEra Energy Resources and TECO Energy

2019–2020 | Florida, United States | Managed independent engineering reviews and construction monitoring services under a build-transfer agreement for NextEra and TECO Energy for the Little Manatee River Solar Project.

Oaktree Capital Management

2020 | United States | Managed due diligence in support of acquisition of Signal Energy.

Overseas Private Investment Corporation (formerly OPIC, currently U.S. International Development Finance Corporation [DFC])

2015–2019 | Jamaica | Managed and performed independent engineering reviews and construction oversight of Content Solar PV Project in support of financing.

Patrick & Henderson, LLC

- 2022 | Kansas, United States | Managed instrument data post-processing for wind turbine foundation at confidential wind project.
- 2018–2019 | Hawaii and Texas, United States | Managed instrument data post-processing and structural health monitoring for wind turbine foundations at Desert Sky, Trent Mesa, Snyder, and Auwahi wind projects.
- 2013 | Performed independent engineering reviews of three new wind turbine foundation conceptual designs to confirm technical adequacy and constructability.

PNE USA

- 2022 | United States | Managed preparation of various injection studies and interconnection agreement applications for several new solar projects.
- 2022 | United States | Managed preparation of memo providing outline for interconnection process within PJM.

Potentia Renewables

- 2021–2022 | Canada | Managed owner's engineering services for the Wheatland, Stirling, Jenner 1, Jenner 2, and Jenner 3 wind projects.
- 2021–2022 | Hawaii, United States | Managed owner's engineering services for solar PV and BESS project.
- 2019 | Saskatchewan, Canada | Managed owner's engineering review of wind turbine foundation design.

Power Plant Management Services (PPMS)

2022 | Texas, United States | Managed load flow screening study and adverse effect reviews for operational wind project due to changes to interconnection of neighboring wind project.

RiverCap Ventures

2021 | Iowa, United States | Managed reviews of lifting plans for the Pocahontas Prairie Wind Farm.

RRC Power & Energy

- 2021–2022 | Texas, United States | Managed drainage plan and stormwater pollution prevention plan preparation for the Big Star solar project.
- 2021 | Texas, United States | Managed preparation of 60% civil design for the Armadillo solar project.

- 2020 | New York, Texas, and Wisconsin, United States | Managed grading plan preparation for the Horseshoe Solar, Samson Solar, and Badger Hollow, projects.
- 2020 | Oklahoma, United States | Managed cut/fill plan preparation for the Boiling Springs solar project.
- 2018 | Texas, United States | Managed update to hydraulics and hydrology study for Mo Ranch Solar Project.
- 2018 | Ohio, United States | Managed review of regulatory requirements associated with post-construction stormwater management for Piqua Marnier Solar Project.
- 2018 | Utah, United States | Managed update to hydraulics and hydrology study and independent engineering reviews of flood model for the Sage Solar Project.
- 2018 | Nevada, United States | Managed review of bifacial photovoltaic technology in support of Gemini Solar project.

RUTE Foundation Systems

- 2020–2021 | Managed review of financial model associated with use of new wind turbine foundation design.
- 2018–2021 | Managed review and analysis of several new wind turbine foundation designs including BXG, 31BX, and TG foundations.

RWE Renewables

- 20201–2022 | Managed owner's engineering for the Quartz solar project.
- 2021–2022 | Managed owner's engineering for the Graceland solar project.

Signal Energy

2021–2022 | California, United States | Managed preparation of the fire protection plan and hazard mitigation analysis for a new BESS project.

Standard Bank of South Africa

- 2011–2013 | South Africa | Performed independent engineering reviews of several wind and solar projects in South Africa.
- 2012–2014 | South Africa | Performed construction monitoring on behalf of lenders for the Van Stadens Wind Farm.

Terracon
2019–2020 | United States | Managed due diligence technical review of proposed remediations for several P&H Tensionless Pier wind turbine foundations.

Total
2021–2022 | Texas, United States | Managed owner's engineering and construction oversight for new solar project.

Total / 174 Power Global
2022 | Oregon, United States | Managed owner's engineering for new solar project.

TransAlta
- 2021–2022 | Canada | Managed independent engineering reviews of wind turbine foundation design for the Garden Plain wind project.
- 2021 | Illinois, United States | Managed wind turbine gearbox refurbishment monitoring at Winergy factory.
- 2020 | United States | Managed cost estimates for one wind and multiple solar developments.
- 2020 | Oklahoma, United States | Managed preliminary engineering for Horizon Hill Wind Farm.
- 2019–2020 | New Hampshire, United States | Managed independent engineering reviews in support of tax equity financing for the Antrim wind project.
- 2019–2020 | Pennsylvania, United States | Managed independent engineering reviews in support of tax equity financing for the Big Level wind project.

Tri Global Energy
- 2020–2022 | Illinois, United States | Managed transmission studies in support of interconnection for the Panther Grove Wind Farm.
- 2021 | United States | Managed wind-to-solar non-material change analyses for multiple projects.
- 2021 | Texas, United States | Managed preparation of mock system impact study for the Shannon Wind Project.

U.S. Department of Energy
2010–2011 | United States | Performed independent engineering reviews for several utility-scale CSP projects in southwestern United States in conjunction with the U.S. Loan Guarantee program.

UKA Group

2021 | Illinois, United States | Managed independent engineering reviews of meteorological tower design and setup for the Hickory Wind Project.

Vestas

- 2021–2022 | United States | Managed establishment of as-built parameters for existing wind turbine towers under consideration for partial repower at three wind projects.
- 2021 | Illinois, United States | Managed analysis of existing wind turbine foundations for partial repower of the Big Sky wind project.
- 2020 | Washington, United States | Managed independent engineering review of weld inspection program for wind turbine towers at the Goodnoe Hills wind project.
- 2020 | Kansas, United States | Managed independent engineering review of waste management plan for the Flat Ridge 1 wind project decommissioning and repowering.

Wanzek Construction

- 2021 | Texas, United States | Managed independent engineering reviews of wind turbine foundation design for Hubbard Wind project.
- 2021 | New Mexico, United States | Managed independent engineering reviews of wind turbine foundation design for Borderlands Wind project.

White Construction

2021 | Iowa, United States | Managed independent engineering reviews of wind turbine foundation design for Heartland Divide II project.

Hydrogen Generation, Transmission, and Utilization

Confidential Clients

- 2021 | United States | Managed detailed independent engineering reviews of steam methane reform hydrogen generation system in support of potential investment.
- 2021–2022 | United States | Managed development of hydrogen forecasting tool that is capable of estimating hydrogen demand for various regions of the United States based on different decarbonization scenarios.

Thermal Generation and Carbon Capture

Banco Itaú

2014 | Brazil | Performed independent engineering reviews for approximately 1,200 MW of simple, combined-cycle, and natural gas-fired reciprocating engine Parnaíba Power Project.

Celfin Capital and Corporación Andina de Fomento

2012 | Peru | Performed independent engineering services for Eten Cold Reserve Plant, a new simple-cycle plant.

Confidential Clients

- 2020 | United States | Managed independent engineering reviews in support of asset acquisition of company specializing in coal-ash management and recycling.
- 2014 | Brazil | Performed independent engineering review of the Porto do Itaqui coal-fired power project.
- 2014 | Brazil | Performed independent engineering review of the Porto do Pecém coal-fired power project.

Crédit Agricole

2016 | Vietnam | Performed operations monitoring of Phu My 3 power project.

Inkia Energy

- 2011 | Chile | Prepared portions of turnkey engineering, procurement, and construction agreement for new coal-fired power plant in Chile.
- 2011 | Dominican Republic | Prepared portions of turnkey engineering, procurement, and construction agreement for new coal-fired power plant in the Dominican Republic.

International Finance Corporation

2014–2015 | Turkey | Performed independent engineering reviews of the new 595.6-MW Bandirma II Combined-Cycle Power Plant.

Marson Energy

2014 | Kentucky, United States | Evaluated circulating fluidized bed boiler parts inventory for potential acquisition.

NextEra Energy Resources
2016 | Pennsylvania, United States | Managed independent engineering reviews of combined-cycle Marcus Hook Energy Center in Pennsylvania to support asset acquisition.

Panda Energy

- 2016 | Texas, United States | Performed owner's engineering services in support of construction of the combined-cycle Temple I Power Project.
- 2016 | Texas, United States | Performed owner's engineering services in support of construction of the combined-cycle Sherman Power Project.
- 2012–2013 | Virginia, United States | Performed owner's engineering services in support of construction of the combined-cycle Stonewall Power Project.

Scotiabank Peru and Banco de Crédito del Peru
2016–2017 | Peru | Performed construction monitoring of TermoChilca Santa Domingo de los Olleros power plant in Peru for combined-cycle expansion.

South Jamaica Power Company
2012 | Jamaica | Developed turnkey engineering, procurement, and construction agreement for new combined-cycle facility.

YPF Luz
2021–2022 | Argentina | Managed steam and generator analyses for the San Miguel de Tucuman combined-cycle facility.

Zomet Energy
2013 | Israel | Served as owner's engineer developing bid package and evaluating bids for EPC contractor.

Nuclear Power

American Electric Power

- 2007–2008 | Michigan, United States | Performed the following engineering tasks for the Donald C. Cook Nuclear Generating Station:
    - Designed new and reevaluated existing pipe, conduit, and instrument supports.
    - Designed new and reevaluated existing structural steel access platforms.
    - Designed and evaluated containment sump debris interceptors.

- Designed and evaluated new Hot Machine Shop steel building structure for seismic loading.
- Reevaluated existing concrete floor in auxiliary building for new seismic loads.
- Designed and evaluated new trolley system in auxiliary building.
- Performed heavy-haul path evaluation for dry cask storage.

Borealis Infrastructure (formerly Borealis, currently OMERS Infrastructure)

- 2014–2016 | Canada | Managed independent engineering reviews of Major Component Replacement (MCR) plan and Asset Management Plan for six CANDU nuclear reactors at the Bruce Nuclear Generating Station on behalf of project equity holders.

Exelon

- 2007 | Illinois, United States | Designed new and reevaluated existing pipe and instrument supports for the Braidwood Nuclear Generating Station.
- 2007 | Illinois, United States | Designed new and reevaluated existing pipe and instrument supports for the LaSalle County Nuclear Generating Station.

NextEra Energy Resources

2010–2011 | Wisconsin, United States | Performed the following engineering tasks for the Point Beach Nuclear Plant:

- Performed operations office's structural analysis for high-energy line break loads.
- Designed and evaluated new seismic HVAC ducts and duct supports.
- Designed and evaluated replacement circulating water pump anchorage.
- Designed and evaluated new circulating water pump anti-vortex cages.
- Designed and evaluated new seismic pipe, instrument, conduit, and cable tray supports.

Ontario Power Generation

2013 | Canada | Prepared conceptual design report to evaluate effectiveness, provide cost estimates, and create schedule for design and construction of temporary infrastructure in support of reactor refurbishment at the Darlington Nuclear Generation Station.

Progress Energy

- 2008–2011 | North Carolina, United States | Performed the following engineering tasks for the Brunswick Nuclear Plant:
    - Designed and evaluated new concrete building foundations.
    - Designed and evaluated steel building structures.
    - Designed and evaluated new seismic pipe, instrument, conduit, and cable tray supports.
- 2010 | Florida, United States | Performed the following engineering tasks for Crystal River 3 Nuclear Power Plant:
    - Prepared modification package to replace fuel handling crane.
    - Prepared structural designs and analyses in support of control complex chiller replacements.
- 2009–2010 | North Carolina, United States | Performed the following engineering tasks for the Shearon Harris Nuclear Plant:
    - Designed and evaluated new concrete equipment foundations.
    - Designed and evaluated steel building structures.
    - Designed and evaluated new seismic pipe, instrument, conduit, and cable tray supports.
- 2009 | South Carolina, United States | Performed heavy-haul path evaluation for lower-pressure turbine replacement for the Robinson Nuclear Plant.

SN Nuclearelectrica

2020 | Romania | Managed preparation of financial model as part of an integrated business plan for the Cernavodă Nuclear Power Plant considering refurbishment of existing operational units, construction of new units, and addition of a tritium reduction facility.

Trivista

2021 | United States | Managed independent engineering reviews in support of asset acquisition of a nuclear power plant instrument and controls manufacturer.

Memberships

- American Institute of Steel Construction
- American Clean Power Association

ABIGAIL J. BUCHTA

Senior Energy Consultant
Sargent & Lundy Consulting

Education

- BS Architectural Engineering—Milwaukee School of Engineering—Wisconsin, USA—2008
    - Minor: Business Management

Registrations

Professional Engineer (Illinois)

Proficiencies

- Owner's Engineering
- Independent Engineering
- Due Diligence Reviews
- Wind Power Project Repowering
- Wind Power Project Greenfields
- Structural Lead, Project Management
- Structural Engineering
- Experience with SAFEv12, STAADv8i, SAP2000, SIMQKE, APLAN and RSG

Responsibilities

As a Senior Energy Consultant and Project Lead, Abigail (Abby) Buchta is responsible for the day-to-day planning and management of a wide range of projects in the power industry. She has over 12 years of cumulative experience in the energy sector, working on generation technologies including wind, solar and nuclear. In support of these projects, Abby has provided a range of services, including technical due diligence reviews, budget and contract reviews, and benchmarking for renewable energy facilities such as wind, solar and geothermal power. Outside of the Sargent & Lundy Consulting group, Abby prepared calculations and specifications to support new and existing nuclear power plant projects. She also spent 1.5 years as a project manager for a general contractor, supplementing her engineering knowledge with practical construction experience. Abby has a BS in architectural engineering from Milwaukee School of Engineering and is a licensed professional engineer in Illinois.

ABIGAIL J. BUCHTA
Senior Energy Consultant
Sargent & Lundy Consulting

Sargent & Lundy Experience

Renewable Energy

Leeward Energy, Inc. | 2021 - Present

Responsible engineer for due diligence technical reviews and feasibility studies of the WTG foundation designs, geotechnical report, and project history for wind projects. Conducted site walkdowns to assess foundation conditions in support of repower projects. Performed monthly onsite construction monitoring visits to assess progress and monitor issues/schedule delays for greenfield projects.

Ørsted Onshore Development North America, LLC | 2021 - Present

Perform OE services for the development of solar PV projects including review of EPC design deliverables (service may include but are not limited to EPC bid process support, review of design basis and technical specifications, 30%, 60%, 90%, and IFC design drawings and calculations) and technical support as requested.

NextEra Energy Resources, LLC | 2021 - 2022

Project Lead/Responsible Engineer for due diligence review of the wind turbine foundation, balance of plant (BOP) electrical systems, and wind turbine towers for financing a wind generation repowering project in the U.S.

Blattner Energy, Inc. | 2019 - 2020

Perform detailed independent engineering reviews of wind facility foundation design drawings and calculations to determine whether the engineer-of-record has developed the design in compliance with the requirements established by the wind turbine manufacturer, the geotechnical report, and applicable design codes and industry standards.

Power Delivery Services

Southern California Edison | 2018 – 2019

- Power Delivery Services – Various Substations
    - Determined required resources for present and upcoming projects to ensure resources with the appropriate experience and expertise are available for upcoming work.

Nuclear Power Services

Exelon Nuclear | 2011–2019

- Byron/Braidwood Generating Stations
    - DCS Storage Buildings – Structural Lead

- RHUT existing steel evaluations – Structural Lead
- HELB Block Wall evaluation, modification and time history generation
- Car shed slab evaluation for ISFSI project
- Five-month staff-aug. assignment at Braidwood station (2013)
  - Worked directly with Fukushima project team
  - Provided support for containment liner inspections and evaluation

- Peach Bottom Nuclear Generating Station
  - New ISFSI/DCS Storage Building – Structural Lead
  - Oversight of building superstructure specification and development of concrete and cask transfer facility specifications.
  - ISFSI Expansion Study
- Clinton Power Station
  - Dry Type Transformer Replacement – Structural Lead
  - C1R18 Outage support for Dry Type Transformer Replacement
- Dresden Generating Station
  - ISFSI Expansion Study – Lead
  - Evaluation of Cask Washdown Area Slab for ISFSI project using SAFEv12
- Lasalle Generating Station
  - Evaluation of existing ISFSI turning pad using SAFEv12
  - Drywell steel evaluations, motor cart evaluation and surface plating design in support of the 1A and 2B RR Motor Moves
- Quad Cities Generating Station
  - Pipe support, steel and rigging evaluations
  - ISFSI Expansion Study

Talen Energy/PLL | 2016–2017

- Susquehanna Steam Electric Station (2016–2017):
  - Feedwater Heater Replacement (Units 1 & 2) – Structural Lead
    - Coordinated completion of buried utility/foundation calculation
    - Managed Independent Third-Party Review (ITPR) of rigging drawings and calculations completed by commercial vendor
  - Hardened Containment Vent System – Structural Lead
    - Rigging evaluations per NUREG 016 (single failure-proof) Requirements

South Texas Project Units 1&2 | 2014

- Worked directly with STP FLEX team to resolve field issues quickly and efficiently
- Ensured field issues were tracked and resolved
- Designed exhaust plenum for diesel generator as a part of STP FLEX modifications

Westinghouse AP1000 | 2014

- Performed Project Manager responsibilities for the Westinghouse AP1000 Code Compliance Review project, including:
    - Managing personnel based on strengths and availability
    - Tracking budget and schedule to ensure project remained on track

South Texas Project Units 3 & 4 | 2008–2011

- Hydrodynamic analysis and computer modeling
- Tornado Missile Evaluation
- Response Spectra Generation
- Extensive SAP2000 Modeling Experience

Other Experience

STUCKEY CONSTRUCTION COMPANY, INC
(2020 – 2021)

RESPONSIBILITIES

Ms. Buchta reviewed and processed submittals, RFIs and change orders in support of construction activities

- She worked to ensure projects stayed within budget and schedule
- She managed client communication to communicate status, construction issues, and manage expectations
- Projects managed ranged from $80K to $14.7M. Clients included public school districts, public library boards, fire departments and the State of Illinois.

MOURAD Y. RIAD
Structural Analytical Specialist
Senior Structural Associate
Energy and Industrial Group

EDUCATION

Ph.D. West Virginia University, Civil and environmental Engineering, May 2006.

Dissertation: Detection and Analysis of Deck Cracks in a Long Span Empirically Designed Bridge Deck through Embedded Sensory Systems.

MSCE. West Virginia University, Civil and environmental Engineering, May 2001.

Thesis: Stress Concentration around Dowel bars in Jointed Rigid Concrete Pavements.

Post Graduate Diploma, Structural Engineering Alexandria University, Egypt, May 1994.

B.Sc. Alexandria University, Egypt, Civil Engineering, May 1991.

REGISTRATIONS

Professional Engineer, State of Ohio, license # PE 75641.

Registered Structural Engineer, Egypt.

EXPERTISE

-Structural analysis and design of Reinforced concrete and Steel structures.

-Dynamic analysis of vibrating structures and dynamic design of foundation systems with vibratory equipments.

-Experience in instrumentation, development and execution of instrumentation plans, sensory systems, and programming data acquisition systems for testing and monitoring of large structures such as Bridges and pavement structures.

-Field and experimental stress and strain analyses.

-Non-linear 3D Finite Element Modeling using software packages ADINA, STAAD.Pro, SAP2000, ANSYS and SAFE.

RESPONSIBILITIES

-Prepare complex analytical models to determine the response of structures and equipment to forced vibrations.
-Prepare structural design calculations to support construction drawings and specifications.

-Perform optimization studies to determine practical design solutions for new structures and equipment subject to dynamic loading.
-Assess existing deteriorated structures and those with equipment with excessive vibrations to determine root cause.
-Perform 3-D and 2-D finite element analysis of plate-type structures.

EXPERIENCE

- **Sargent & Lundy LLC, Sep. 2013 – current, Structural Analytical Specialist. Highlights include:**

- Herling Construction: Gulf Wind (Kennedy Co., Texas):

Analysis for removal of existing 118 MWT95 / 2.4 MW wind turbine generators using the tilt method. Through finite element modeling, the analysis provided stresses and factor of safety for the base tower segments and the cable used to fell the wind turbine while considering critical wind directions and speed during the removal process.

- Herling Construction: Big Sky Wind Project (Bureau & Lee Co., Illinois):

Performed an analysis related to the removal of the existing 114 Suzlon S88 wind turbine generators from the Big Sky Wind project using the tilt method. The analysis includes evaluation of the impact of the tower on the existing foundations.

-Leeward Renewable Energy : Mendota Hills Wind Project:

Performed an analysis related to the removal of 63 wind turbines as part of the effort to perform full repower. Based on finite element modeling, the analysis provides estimated stresses and factors of safety for the base tower segments of the wind turbines and the cable used to pull and fell the wind turbines in consideration of the critical conditions during the removal procedure.

- Herling Construction: Cerro Gordo Wind Project (Cerro Gordo Co., Iowa):

Analyzed the removal of the existing 55 Micon 750 wind turbine generators using the tilt method. The analysis provides estimates of the safety factor in the base tower segments and the cable used to pull and fell the wind turbines.

- **Leeward Renewable Energy : Crescent Ridge Wind Project (Bureau Co., Illinois):**

Performed an analysis related to the removal of the existing 33 Vestas V82-1.65 wind turbine generators. The analysis comprised two removal methods: the tilt method and the energetic

method. Additionally, the impact of the tower felling on nearby structures as well as the existing foundations components was evaluated.

- **NextEra Energy Resources:**

Oliver III Wind Project
Design helical anchors to resist guywire tension loads for various transmission towers along Oliver III wind project in North Dakota.

Rush Springs Transmission Line Project
Design helical anchors to resist guywire tension loads for various transmission towers along Rush Springs wind project in Oklahoma.

Horse Hollow II and IV Repower (Nolan and Taylor Co., Texas)
Detailed independent review for foundation designs for P&H type foundations supporting Siemens SWT-2.3-93 wind turbines. A detailed finite element analysis of the wind turbine foundation design was performed, including strength, serviceability, and fatigue checks.

Capricorn Ridge II Wind Energy Facility (Goat Mountain, Texas)
Verification of existing foundation design to support Siemens SWT 2.3-108-80m HH wind turbine. Foundations consist of a raft type slab, 56ft diameter and 4ft-10in deep at pedestal. Verification is conducted through finite element modeling to check stability, structural strength, and fatigue analysis.

Post-Processing of raw instrument data for Wind Turbines at Trent Mesa and Desert Sky (Pecos Co., and Nolan Co., Texas)
Performed post-processing of raw instrument data measured from instruments installed on 15 wind turbine towers at Desert Sky and 12 wind turbine towers at Trent Mesa to determine:

- The overturning moments corresponding to the wind speeds during the test period
- The tower inclination corresponding to the wind speeds during the test period
- The foundation rotational stiffness for the test period
- The fundamental frequency of the wind turbine foundation system
- Summary of response to startup and stop events
- Maximum bending moment time series for the test period
- Minimum displacement time series for the test period
- Fast-stop time series

Indian Mesa Wind Energy Facility (Texas)
Verification of existing foundation design supporting Vestas 0.66 MW V47 wind turbines for repower using Gamesa G470VH turbines. Foundations consist of rock sockets, 12ft diameter and depths of 13ft, 17ft, 19ft, and 21ft. Verification is conducted through finite element modeling to check stability (sliding, overturning, rotational and translational stiffness, deflections), structural strength (concrete, grout, anchors, embedded steel elements) and fatigue analysis (concrete, anchors, and grout).

New Mexico Wind (Quay and DeBaca Co., New Mexico)
Verification of existing P&H Tensionless pier foundations supporting GE 1.5 xle 1.5-MW turbines with 70.5m rotor diameter for repower using GE 1.5-MW turbine generators with 82.5m rotors. The analysis includes finite element modeling of P&H foundations 14ft diameter and 28ft deep. Checks include global stability, structural strength and fatigue resistance.

- **Brady II Wind Turbine Foundation Project (North Dakota):**

Detailed independent review for foundation designs including 51.5-ft diameter, 56-ft diameter and 60-ft diameter foundations for GE 1.7 & 2.x MW Wind Turbines. The review includes verification of foundation strength, stability, and fatigue resistance to forces by the WTG self-weight, operational, wind, and seismic loads. The review also verified incorporation of design recommendations from the most current industry codes, standards, and guidelines. The review also verified appropriateness of foundation materials and components including concrete specifications, rebar configuration, anchorage system, and soil subgrade and backfill specifications. Finally, the review verified foundation constructability relating to soil conditions, concrete placement, and anchorage tensioning.

- **BP Alternative Energy – Sherbino Mesa II (Fort Stockton, Texas):**

Foundation design for Clipper 2.5MW C96 IEC IIB wind turbine with 80M HH. Foundations consist of a raft type slab, 56ft diameter and 6ft deep at pedestal. Performed fatigue resistance checks as part of verification of foundation strength and stability.

- **BP Alternative Energy – Silver Star I Repower Wind project (Stephenville, Texas):**

Foundation design for raft type foundation 56ft diameter and 5ft deep at pedestal. Performed fatigue resistance checks as part of verification of foundation strength and stability.

- **RRC Power & Energy: Wildcat Ranch Wind Project (Cochran Co., Texas):**

Detailed independent review of tube type foundation supporting GE 2.5-116 90m hub wind turbines. The review determines whether the design has been developed in compliance with the requirements established by the wind turbine manufacturer, the geotechnical investigation, and applicable design codes and industry standards.

- **Leeward Renewable Energy: Sweetwater 1 power plant (Nolan Co., Texas):**

Performed an independent engineering evaluation of the existing foundations in consideration of the 1.6-MW power uprate. Performed a detailed analysis of the foundations—including strength, serviceability, and fatigue checks—using a finite element model (FEM) created using SAP2000 software. The loads and stresses calculated within the model were compared to applicable design codes, industry codes and standards, and the WTG manufacturer's specifications.

- **King Mountain Wind Projects (King Mountain Mesa, Texas):**

Verification of existing P&H Tensionless pier foundations (14ft diameter) supporting GE 1.5 MW W/77M turbines for an additional 20 years of repower. The analysis includes finite element modeling of three foundation depths; 15ft, 22ft, and 24ft. Checks for global stability, structural strength and fatigue resistance.

- **American Electrical Power (AEP) Northeastern Power plant Unit 3 Project:**

Structural analysis of Flue Gas Ductwork:

Performed Structural design and analysis (calculations and drawings) of Flue Gas Steel Ductwork according to the project specific design criteria, S&L design standards and AISC Allowable Stress Design Manual of Steel Construction, 13th Edition. The scope of work includes design of rectangular as wells as round duct tubes for global and local stresses, Intermediate Stiffeners, Ring Girders at supports, internal bracings, supporting system including stub columns and support assemblies, and all steel connection details. This work includes design and analysis of 4 steel ducts:

1-Steel Duct between the booster fan outlet and the chimney inlet ductwork (23 ft diameter, 77 ft length).
2- Transition steel duct attached to existing Induced Draft Fan No. 3N (part circular 20 ft Diam., part rectangular and its supporting structures.
3- Transition steel duct attached to existing Induced Draft Fan No. 3S (part circular 20 ft Diam., part rectangular and its supporting structures.
4-Round Steel duct between Booster Fan outlet ductwork and the chimney inlet ductwork (23 ft diameter, 78 ft long).

Dynamic analysis of Foundation system for ID fan system:

Conducted analysis on the dynamic behavior of the foundation mat supporting the new Induced Draft Fan and designed the concrete mat sections to comply with the dynamic requirements set by the fan manufacturer using 3D Finite Element Modeling. Work tasks include:
1. Determine the dynamic properties of the soil supporting layers including dynamic stiffeness and damping values considering soil-foundation dynamic interaction.
2. Conduct a three-dimensional (3D) Finite Element (FE) dynamic model study of the ID fan doundation system and perform vibration analysis using the FE model.
3. Complete the dynamic analysis of the foundation system in two stages; 1) determination of the natural frequencies and mode shapes and 2) calculate the fan-foundation system response caused by dynamic forces. Based on the results, we can verify if the dynamic characteristics of the foundation meets the dynamic requirements of the fan.

- **American Electrical Power (AEP)-Flint Creek Power Plant:**

Performed structural design and analysis of two round steel flue gas ducts connecting Induced Draft Fan outlets to rectangular steel duct inlet (Two steel ducts 15 ft diameter, 48ft and 26 ft long). The scope of work includes design of round duct tubes for global and local stresses, Intermediate Stiffeners, Ring Girders at supports, internal bracings, and supporting system including stub columns.

Conducted detailed review of foundation design and calculations for support tower No.4 including application of loads, Finite Element analysis using SAFE Program and design of concrete sections according to ACI Codes.

- **Duke Energy Cayuga Stations No. 1&2:**

Performed Dynamic analysis of foundations carrying exhauster blower vacuum units and offered 3 different solutions for the foundation system. The work includes analysis of the dynamic behavior of the foundation system and design the concrete foundation sections according to the dynamic acceptance criteria in order to avoid possibilities of resonance due to vibrations. The scope of work includes:
1. Determination of the dynamic properties of the soil supporting layers including dynamic stiffness and damping values considering soil-foundation dynamic interaction.
2. Building a three-dimensional (3D) Finite Element (FE) dynamic model of the Blower Vacuum foundation system and perform frequency spectrum analysis using the FE model.
3. Determination of the natural frequencies and mode shapes of the foundation system and verify if the dynamic characteristics of the foundation are acceptable and if possibilities of resonance could be ruled out.
4. Theoretical calculations for alternative solution using isolated foundation system

- **Indianapolis Power and Light (IPL) Petersburg Unit 3:**

Performed Dynamic analysis on two existing foundations carrying new Induced Draft Fan systems. The objective of this investigation is to study the dynamic behavior of the existing foundation systems and verify their compliance with the dynamic requirements set by the fan manufacturer. The scope of this investigation includes of the following:
1. Determine the dynamic properties of the pile supporting system including dynamic stiffeness and damping values considering soil-foundation dynamic interaction.
2. Conduct a three-dimensional (3D) Finite Element (FE) dynamic model study of the ID fan foundation system and perform vibration analysis using the FE model.
3. Complete the dynamic analysis of the foundation system in two stages; 1) determination of the natural frequencies and mode shapes and 2) calculate the fan-foundation system response caused by dynamic forces. Based on the results, verification of the dynamic characteristics of the foundation to meet the dynamic requirements of the fan could be accomplished.

- **Ontario Power Generation - Darlington Nuclear Generation Station (Safety related)**

- Performed dynamic analysis of turbine generator foundation system at Emergency Power Generator 3 (EPG3). The analysis determines the foundation pile cap size based on turbine generator loading and acceptance performance criteria provided by the manufacturer and Canadian engineering codes.

- Structural design of piles supporting the turbine generator at EPG3 including detailed calculations, bill of materials and construction drawings.

- Structural design of pile cap supporting turbine generator at EPG3 and its anchoring system.

-Structural design of exhaust steel duct between turbine generator and stack. The exhaust duct is designed for 1100^{o}F temperature, seismic load, and displacements due to tornado missile impacts.

- **Ontario Power Generation - Pickering Nuclear Generation Station (Safety related)**

-Seismic robustness of H-Line block wall: designed reinforcing system for the H-Line block wall to resist review level earthquake.

-Structural engineer for breathing air and service air refurbishment project.

- **Arkansas Nuclear One:**

Performed maintenance rule inspections and evaluation of structural components within the scope of flood protection project.

- **Wildcat Point Generation Facility Units 1&2:**

Conducted dynamic analysis of the behavior of the monolithic pile cap foundation supporting 4 new Boiler Feed Water Pumps and 4 new TCA pumps using 3D Finite Element Modeling. Work tasks include:

1. Determine the dynamic properties of the soil supporting layers including dynamic stiffness and damping values considering soil-foundation dynamic interaction.

2. Conduct three-dimensional (3D) Finite Element dynamic study of the various pumps foundations.

- **Duke Energy, Gibson Station:**

Examination of precast prestressed box girder bridge and developing recommendations for maintenance and repair.

- **Basin Electric Power Cooperative , Dry Fork Station:**

Design of intake steel tower, intake steel duct, and foundations for Unit 1 Carbon Capture Test Center.

Perform dynamic evaluation of foundations supporting new ID fan unit for Carbon Capture Test Center.

- **Basin Electric Power Cooperative , Laramie River Station Unit 1:**

Dynamic analysis of ID fan foundation for upgraded ID fans 1-A and 1-B.

- **TVA Nuclear Power Group , Watts Bar Station:**

Dynamic analysis of steam turbine foundation for peak-to-peak displacement acceptance criteria for upgrading STG Unit 1, and review of static and dynamic analysis of STG foundation.

- **DYNEGY , Miami Fort Station:**

Field examination of natural draft cooling tower and canopy structure: included examination of hot water basin and canopy double tee beams, interior ring girders, interior columns, prestressed concrete beams, exterior post-tension tendons, and cold water basin tunnels.

- **Nebraska Public Power District , Sheldon Station - Unit 2:**

Qualification the steel structural members supporting the stack due to 36-ft stack extension. Qualification includes identifying new loads and designing reinforcement to existing support steel members as needed.

- **Entergy – Waterford 2 Steam Electric Station:**

Static analysis of turbine generator foundation for upgraded turbine, and review of dynamic analysis of same foundation.

- **West Virginia University, Dept. of Civil and Environmental Engineering, April 2008 – Aug. 2013, Research Assistant Professor.**

-Structural Health Monitoring and instrumentation of the steel towers of suspended steel bridge “Market Street Bridge, Follansbee, WV” (1300 ft long) along with its finite element modeling.

-Analysis of stress concentrations produced by Stay-in-place forms in bridge decks through instrumentation and monitoring of real life bridges along with 3D Finite Element simulation.

-Monitoring the growth of longitudinal cracks on Star City Bridge deck and evaluating the structural deck performance through long-term sensory systems.

-Development of Carbon Fiber Reinforced LMC and MSC for Crack-resistant Bridge Deck Overlays.

-Field investigating of out-of plane deformation of steel curved bridges.

-Research in novel Electromechanical Systems for wind and vibrations energy harvesting.

-Development of innovative cementitious materials with self crack detection capacity trough nano-technology.

-Performance evaluation of empirically versus traditionally designed bridge decks through Finite element modeling.

-Long-term monitoring program (WV smart road): Analysis of rigid concrete pavement response to environmental and traffic loads on Corridor H, West Virginia through sensory systems.

-Field analysis of rigid pavement joints fitted with various load-transferring devices through falling weight deflectometer testing.

-Investigating curling of concrete pavement slabs on grade through theoretical analysis, finite element modeling, and field testing.

-Investigating effects of skewed joints on developed stresses around dowel bars in rigid pavement joints through finite element modeling.

-Field measurements and analyses of heavy weights and traffic patterns on rigid concrete pavement on I-33 and Star city in West Virginia through weigh in motion sensors.

-Development of new concrete pouring sequence and curing procedures for uniform thermo-mechanical properties of large pours to minimize early age cracking.

-Development of guidelines and testing of healer-sealer materials for concrete bridge deck repairs.

<u>-Teaching experience:</u>

Assigned to teach CE-493P “Civil Engineering Measurements” in Spring 2006. SEI overall rating = 4.89 / 5.00
Participated in teaching the finite element modeling software “ADINA” in CE-552 “Finite Element Method” in Spring 2005.
Participated in teaching MAE-653 “Advanced Vibrations” in Spring 2005.
Participated in teaching MAE-243 “Strength of Material” in Fall 2005.

-Research Grants:

"Bridge Deck Crack Reduction through Uniform Setting and Curing Procedures" (RP#216), $192,248 from WVDOH: Principal investigator.

"Evaluation and Guidelines for Healer/Sealer products for Concrete decks", (RP#261), $ 99,975 from WVDOH: Principal Investigator.

"Long-Term Performance of West Virginia Smart Road" (RP#235) $ 186,285 from WVDOH: Co-Principal Investigator.

"Effects of SIP Forms on the Performance of RC Bridge Decks" (RP#241) 397,856 from WVDOH: Co-Principal Investigator.

"Novel Electromechanical Systems for direct wind energy harvesting", (Project 10012996), award NT10042R: $50,000 from WVU Advanced Energy Initiative-Energy Research Grants: Co-Principal Investigator.

"Development of Reinforced LMC and MSC for Crack-resistant Bridge Deck Overlays" (RP#217), $ 240,697 from WVDOH: Co-Principal Investigator.

"Monitoring the Structural Performance and Bridge Deck Crack Growth: Star City Bridge (RP#215), $ 282,609 from WVDOH: Co-Principal Investigator.

"Evansville Bridge: Early age Cracking of Concrete Bridge Decks: Phase 2" (RP#201), $ 183,058 from WVDOH: Co-Principal Investigator.

"Remote Bridge Condition Monitoring" (RP#185) $ 187,618 from WVDOH, and its supplement (RP#189) $ 391,661 from WVDOH: Co-Principal Investigator.

"Longitudinal Cracking of Concrete Bridge Decks: Model Calibration" (RP#240), $ 547,094 from WVDOH: Co-Principal Investigator.

- West Virginia University, Dept. of Civil and Environmental Engineering, Dec. 2002 – Apr. 2008, Engineering Scientist.

-Development and execution of instrumentation plans, data acquisition systems, and data-base for research projects for remote long term monitoring pavement structures and bridges.

-Construction of full scale rigid pavement test section on Goshen Road and its long-term instrumentation system for investigating effects of environmental loads on behavior of concrete slabs on grade.

-Conduct field testing, acquire and analyze data for long term monitoring of rigid pavement structures and bridge decks for ongoing research projects in the experimental test section in Elkins, Evansville Bridge and Star City Bridge, WV.

-Field instrumentation of Star City bridge in Morgantown with more than 700 sensors and long-term monitoring of the structure for analysis of new LRFD bridge deck designs.

-Developing new methodology for detection of cracks in concrete bridge decks through sensory systems.

-Conducted detailed finite element modeling of Star City Bridge (1000 ft long) in West Virginia and studied effect of environmental loading configurations including temperature variation as well as temperature gradient profiles on bridge behavior.

-Instrumented Evansville Bridge in West Virginia for long-term monitoring and investigation of early age cracks in bridge decks.

-Write journal publications, technical notes and research reports.

-Write research proposals and initiate new research activities.

-Assist graduate students working in laboratories and field tests and construct test setups and specimens in the laboratory.

-Development of 3D finite element models for concrete pavement response and validate the models versus laboratory and field experimental data.

- West Virginia University, Dept. of Civil and Environmental Engineering, Jan. 1999 – Dec. 2002, Research Assistant.

Conduct research work on rigid pavement slabs and joints employing finite element analysis, as well as experimental and field studies. Major research projects include:

-Stress concentration around dowelbars: Performed experimental laboratory study on full scale rigid pavement joints to record the state and magnitudes of stress concentrations around regular dowel bars, and performed 3D finite element models of rigid pavements including skewed and straight joints for prediction of dowel/concrete interface stresses due to traffic loads.

-Evaluation of “Shokbar”, new load transfer device across pavement joints through experimental and finite element modeling: conduct a set of laboratory study on simulated rigid pavement joints with different designs of dowel bars in order to evaluate the performance of “Shokbar” along with 3-D finite element study to perform modeling of specimens and testing conditions.

-Long term monitoring of rigid pavement slabs and joints through the instrumented test section on Corridor “H” near Elkins, WV: Construction of instrumented pavement section to monitor response of rigid pavement slabs to environmental changes and traffic loads, examine response of slabs with various dowel bar designs, and test the performance of new dowel bar design “Shokbar” in the field.

-Placing instrumentation to monitor the behavior of Mason County Bridge, WV. A project requested by WVDOT to evaluate the performance of an under-designed reinforced concrete bridge.

-Intensively used 3D finite element techniques for modeling and analysis of rigid pavement structures.

- **Consultative Bureau for Civil Constructions, Alexandria, Egypt, March 1992-Dec. 1998, Structural Engineer.**

Responsible for the detailed design and preparation of drawings as well as technical specifications and calculations for civil eng. Structures such as R.C. and steel bridges, R.C. culverts, weirs, water retaining structures as regulators, locks, and other various structures as retaining walls, siphons, factories and workshops both steel and R.C., dwelling buildings, bank branches, etc. Also responsible for representing the Bureau in site inspection, quality control for ongoing projects and selected geotechnical field testing such as soil compaction, soil water content, and standard penetration test and administering the execution of bore holes for soil classification. Also represented the Bureau before major clients and agencies such as the Ministry of Irrigation and Water Resources and managed projects that required substantial interaction with contracting companies.

Sample major projects:

-Design of Menoufy regulator and lock on river Nile.

-Design of more than 70 R.C. highway bridges on Sheikh Zayed Canal in Sinai.

-Design of 5 trussed steel bridges for Petrojet Company pipe lines in Alexandria.

-Design and supervision of construction of Bank of Alexandria branches in Abou Hommos, and Bourg-El-Arab.

MEMBERSHIPS

-ASCE (American Society of Civil Engineers) Member, 2000-2017.

-ACI (American Concrete Institute) Member, 2003-2013.

-AISC (American Institute of Steel Construction), member, since 2013.

-Reviewer for multiple international journals including ASCE Journal of Structural Engineering, International Journal of Pavement Engineering, ACI Structural Journal, Journal of Construction and building materials, Journal of Engineering Structures, and International Journal of Systems Science, International journal of pavement research and technology, and journal of Structural health monitoring.

-Transportation Research Board (TRB), participated in paper reviews for committee AFS20, committee AFD80, and AFF40.

PUBLICATIONS

- Peer Reviewed Journal Papers:

William, G.W., S.N. Shoukry, **M.Y. Riad**, J.C. Prucz (2014). "Carbon-Fiber Reinforced Latex Modified Concrete for Bridge Deck Overlays," *WIT Transactions on Engineering Sciences* 87: 147-154, February 2014.

Samir N. Shoukry, Gergis W. William, **Mourad Y. Riad** and Jacky Prucz (2014), Effect of FWD Testing Position on Modulus of Subgrade Reaction, Applied Mechanics and Materials Vol. 518 pp 53-59.

Samir Shoukry, Yan Luo, **Mourad Riad**, Gergis William (2013), Bridge load testing and rating: a case study through wireless sensing technology, International Journal of Smart Structures and Systems, Vol. 12, No. 6 pp 661-678.

Riad M. Y., Gergis William and Samir Shoukry (2012), "*Concrete Bridge Deck Stresses Induced by Stay-in-place Forms*", Journal of Bridge Engineering, Institution of Civil Engineers (ICE), Vol. 167, No. 2, pp. 111-121.

William G.W., Samir N. Shoukry, **Mourad Y. Riad** (2012), "*Study of Thermal Stresses in Skewed Integral Abutment Steel Girder Bridges*", Structural Engineering International (IABSE), Vol. 22 No. 3, pp 308-317.

William G.W., Samir N. Shoukry, **Mourad Y. Riad**, (2011). "*Monitoring of longitudinal cracks in an empirically designed reinforced concrete bridge deck*", Bridge Structures 7 (2011) 139–149

Riad M. Y., Samir N. Shoukry, Eduardo M. Sosa, and Gergis W. William, (2011). "*Prediction of concrete initial setting time in field conditions through multivariate regression analysis*" Materials and Structures, Vol. 44 Issue 6, pp.1063-1077

Samir N. Shoukry, Gergis W. William, Kevyn C. Mcbride, **Mourad Y. Riad**, and Jimmy D. Wriston (2011). "*Performance evaluation of empirically versus traditionally designed bridge decks*", ASCE Journal of Bridge Engineering Vol. 16, Issue 6 pp. 768-776

Samir N. Shoukry, Gergis W. William, Brian Downey, and **Mourad Y. Riad** (2011). "*Effect of Moisture and Temperature on the Mechanical Properties of Concrete*", Journal of Construction and Building Materials, Vol. 25 Issue 2, pp. 688-696.

Riad M.Y., Samir N. Shoukry, Eduardo M. Sosa, and Gergis W. William, (2011). "*Concrete mix pouring sequence for uniform setting and curing of bridge decks*". Journal of Construction and Building Materials, Vol. 25 Issue 4, pp. 1653-1662.

Shoukry S.N., G.W. William, K. McBride, **M. Y. Riad**, and J.D. Wriston (2010). "*Buffalo Creek Bridge: A case study of empirical versus traditional bridge deck design*" Bridge structures, Vol. 6 No. 4 pp. 139-153.

Samir N. Shoukry, **Mourad Y. Riad** ,and Gergis W. William, (2009). "*Longterm sensor-based monitoring of an LRFD designed steel girder bridge*", Engineering Structures, Vol. 31 No. 12 pp. 2954-2965.

Riad, M.Y., Shoukry, S.N., G.W. William, and Michael Fahmy, (2009). "*Effect of Skewed Joints on the Performance of Jointed Concrete Pavements through 3D Dynamic Finite Element Analysis"*. International Journal of Pavement Engineering, Vol. 10, Issue 4, pp. 251 – 263.

William G.W., S.N. Shoukry, **M. Y. Riad**, and K. McBride (2009). "*Stability of Steel Girders under the Effect of Temperature Variations and Moving Loads in Integral Abutment Bridges*", Journal of Bridge Structures Vol. 5 No. 1, pp. 45-59.

Shoukry, S.N., G.W. William, **M.Y. Riad**, and Yan Luo (2008). "*Enhancement of Bridge Live Loads based on West Virginia Weigh-in-Motion data*", Journal of Bridge Structures, Vol. 4, No. 3, pp. 121-133.

William, G.W., S.N. Shoukry, and **M.Y. Riad**, (2008). "*Development of Early age shrinkage stresses in reinforced concrete bridge decks*". Journal of Mechanics of Time-dependent Materials, Vol. 12, No. 4, pp. 343-356.

Shoukry, S.N., E. Sosa, G.W. William, and **M.Y. Riad**, (2008). *"Short Carbon Fiber Reinforced Latex Modified Concrete for Crack Resistant Bridge Deck Overlays"*. Bridge Structures, Vol. 4, No.3, pp. 155-168.

Riad, M.Y., S.N. Shoukry, G.W. William, and D. Rao. (2008). "*Curling of Concrete Slabs on Grade: Experimental vs Theoretical Analysis*". International Journal of Structures and Infrastructure Engineering, Vol. 4 Issue 1, pp. 57-72.

Shoukry, S.N., G.W. William, and **M.Y. Riad**, (2007). "*Effect of Thermal Stresses on Mid-Slab Cracking in Dowel Jointed Concrete Pavements*", International Journals of Structure and Infrastructure Engineering, Vol. 3, No.1, pp. 43-51.

Shoukry, S.N., G.W. William, **M.Y. Riad**, and K. McBride, (2006). "*Dynamic Relaxation: a Technique for Detailed Thermo-Elastic Structural Analysis of Transportation Structures*", International Journal of Computational Methods in Engineering Science & Mechanics, Vol.7 No.4 pp. 303-311.

William, G.W., S.N. Shoukry, and **M.Y. Riad,** (2005), **"***Early age cracking of reinforced concrete bridge decks***"**, Bridge Structures, Assesssment, design, and construction, Vol 1 No. 4 pp.379-396.

William, G.W., S.N. Shoukry, **M.Y. Riad** (2005)."*Thermal Stresses in Steel Girder Bridges with Integral Abutments*", Journal of Bridge Structures, Vol 1, No. 2, pp.103-119.

Shoukry, S.N., G.W. William, **M. Y. Riad**, (2004). "*Validation of 3DFE Model of Jointed Concrete Pavement Response to Temperature Variations*", International Journal of Pavement Engineering, Vol. 5, No. 3, pp. 123-136.

Samir N. Shoukry, G. William & **M. Y. Riad**, (2003). "*Nonlinear Temperature Gradient Effects in Dowel Jointed Concrete Slabs*", International Journal of Pavement Engineering, Vol. 4, No. 3,pp. 131-142.

Samir N. Shoukry, Gergis William & **Mourad Y. Riad**, (2002)"*Characteristics of Concrete Contact Stresses in Doweled Transverse Joints*", International Journal of Pavement Engineering, Vol. 3, No.2 pp 117-129.

- Book:

Bruce C. Kates, **M. Y. Riad**, Raj Valluvan, Qun Zhong-Brisbois, Barney T. Martin Jr. (2012), ACI 343.1R-12 Guide for the Analysis and Design of Reinforced and Prestressed Concrete Guideway Structures, ISBN 13: 978-0-87031-804-7 American Concrete Institute, Joint ACI-ASCE Committee 343.

- ARTICLES IN BOOK CHAPTERS:

Mourad Y. Riad, Samir N. Shoukry and Gergis W. William, (2012), Characterization of Minerals, Metals, and Materials, Part V: Characterization of Environmental and Construction Materials, "Setting Time of Concrete Material; Laboratory Measurements Versus Field Applications". Print ISBN: 9781118291221. Online ISBN: 9781118371305

G.W.William, S.N. Shoukry & **M.Y. Riad** (2012), "Monitoring of field performance of longitudinally cracked concrete bridge deck", Bridge Maintenance, Safety, Management, Resilience and Sustainability, Edited by Fabio Biondini**,** Dan M. Frangopol, CRC press (800 pages) Pack - Book & CD: 978-0-415-62124-3.

- Peer Reviewed Conference Papers:

G.W.Willam, S.N.Shoukry, and **M.Y.Riad**, (2017) "Structural health monitoring of a historical suspension bridge", Proceedings of the 9th New York Bridge Conference, NY City, USA.

Sai P. Guntru, P. Anipindi, **M. Riad**, J. Feeney, C. Simien, and D. Simien (2013), "Defect detection in concrete structures using homogeneous length sorted single walled carbon nanotube sensors, ASNT 22nd research symposium, Memphis, TN, USA.

G.W.William, S.N. Shoukry & **M.Y. Riad** (2012), "Monitoring of field performance of longitudinally cracked concrete bridge deck", Proceedings of the Sixth International IABMAS Conference, Stresa, Lake Maggiore, Italy, 8-12 July 2012

Gergis William, Samir Shoukry, **Mourad Riad** (2012), "Development of Crack Resistant Carbon-Fiber Reifocred Latex Modified Concrete for Bridge Decks", proceedings of Symposium: Failure Analysis and Prevention, Materials Science & Technology 2012 Conference, Pittsburgh, Pa.

Mourad Y. Riad, Samir N. Shoukry and Gergis W. William (2012), "Setting Time of Concrete Material; Laboratory Measurements Versus Field Applications", 2012 Minerals, Metals & Materials Society (TMS) annual meeting, March 11-15, Orlando Fl.

Samir N. Shoukry, **Mourad Y. Riad**, and Gergis W. William (2012), "Effect of Stay-in-Place Metal Forms on Early-Age Stresses in Concrete Bridge Deck Material", Compendium of papers, 91st annual Transportation Research Board meeting, January 2012, Washington DC.

Shoukry S.N., GW William, and **M.Y. Riad** (2010), "Longitudinal crack monitoring in an LRFD designed bridge deck", Proceeding of Structural Faults & Repair-2010: June 2010, Edinburgh, UK.

Shoukry, S.N., G.W. William, **M.Y. Riad**, and B. Downie, (2009). "*Effect of Moisture and Temperature on the Mechanical Properties of Concrete*", Proceeding of 2009 SEM Annual Conference, Albuquerque New Mexico USA, June 2009.

Shoukry, S.N., **M.Y. Riad**, G.W. William**,** "*Buffalo Creek Bridge: A Case Study of Empirical Versus Traditional Deck Design*", (2008). Proceeding of the 12th International Conference on Structure Faults and Repair, Edinburgh, Scotland, June 2008.

Shoukry, S.N., **M.Y. Riad**, and G.W. William, & Jimmy Wriston, (2008). "*Field Monitoring and Instrumentation of Star City Bridge, West Virginia",* 25th Annual International Bridge Conference, Pittsburgh, Pennsylvania June 2-4, 2008.

Shoukry, S.N., G.W. William, & **M.Y. Riad**. (2008) "*Response of an Integral Abutment Bridge to Temperature Variations*", Proceeding of 2008 Structures Congress, *ASCE***,**Vancouver, Canada, April 2008.

Shoukry, S.N., G.W. William, & **M.Y. Riad**, (2008). "*Development of Early Age Shrinkage Stresses in Reinforced Concrete Bridge Decks*", Proceedings of the Mechanics of Time Dependant Materials Conference, Monterey, California, USA, April 2008.

Samir N. Shoukry, Adel W. Sadek, & **Mourad Y. Riad**, (2007). "*Prediction of Straining Actions in Rigid Pavements Dowel Bars Through Artificial Neural Networks"*, Intelligent Engineering Systems through Artificial Neural Networks, Vol. 17, Proceedings ANNIE 2007.

Samir N. Shoukry, Gergis W. William, & **Mourad Y. Riad**, (2006). "*Response of an Integral Abutment Bridge to Temperature Variations*" the 7th International Conference on Short and Medium Span Bridges, Montreal, 2006.

Samir N. Shoukry, Gergis W. William, **Mourad Y. Riad** & Kevin McBride (2006). "*Field Monitoring and 3D FE Modeling of an Integral Abutment Bridge in West Virginia*" Compendium of papers CD, Transportation Research Board 85th meeting, Washington DC.

Shoukry, S.N., **M.Y. Riad**, and G.W. William, (2006). "*Remote Health Monitoring and Modeling of Star City Bridge, WV*", Compendium of papers CD, Transportation Research Board 85th meeting, Washington DC.

Shoukry, S.N., G. William, & **M.Y. Riad**, (2006). "*Application of Dynamic Relaxation in Thermo-Elastic Structural Analysis of Highway Pavement Structures*", Proceeding of the Eighth International LS-DYNA User's Conference, Dearborn, Michigan, pp. 8.43-8.53, May 2006.

Shoukry, S.N., G. William, & M.Y. Riad (2006). "*Structural Behavior of an Integral Abutment Bridge under Environmental Conditions*", Proceeding of 2006 Structures Congress, *ASCE*, *St. Louis, Missouri, USA, May 2006.*

Shoukry, S.N., **M.Y. Riad**, and G.W. William, (2005). "*Instrumentation and Health Monitoring of Star City Bridge,WV*", Proceedings of the 3rd New York City Bridge Conference, New York.

Shoukry, S.N., G. William, **M.Y. Riad**, (2005) "*Effect of Temperature Variations on Stability of Steel Girder Bridges with Integral Abutments*", Proceedings of the 3rd International Conference on Structural Stability and Dynamics, Kissimmee, Florida.

Shoukry, S.N., G. William, **M.Y. Riad**, (2004). "*West Virginia Smart Road Structural Health Monitoring of Highways and Bridges*", Proceedings of the 3rd China-Japan-US Symposium on Structural Monitoring and Control, Dalian, China.

Shoukry, S.N., G. William, **M.Y. Riad**, (2004). "*Effect of Thermal/Moisture Gradient on Stresses around Dowel Bars*", Proceedings of the 28th International Air Transport Conference, Arlington, Virginia, USA.

Shoukry, S.N., G. William, **M.Y. Riad** (2004). "*Effect of Temperature Decrease on Mid-Slab Cracking in Jointed Concrete Pavements*", CD Proceedings of the 12th Cold Regions Engineering and Construction Conference, Edmonton, Alberta, Canada.

Shoukry, S.N., G.W. William, **M. Y. Riad**, (2004). "*Application of LS-DYNA in Identifying Critical Stresses around Dowel Bars"*. CD Proceedings: Eighth International LS-DYNA User's Conference, Detroit, Michigan, pp. 6-45-6-51.

Samir N. Shoukry, G. W. William & **M. Y. Riad**, (2004). "*Effect of Temperature Variations on Mid-Slab Cracking in Jointed Concrete Pavements*", proceeding of the 5th International RIELM Conference, PRO 37: Cracking in Pavements - Mitigation, Risk assessment, and Prevention. Limoges, France.

Adel W. Sadek, Samir N. Shoukry & **Mourad Y. Riad**, (2003). "*Dynamic Artificial Neural Networks for Dowel Bending Moment Prediction from Temperature Gradient Profile in Concrete Slabs*", Proceedings 82nd Annual meeting, Transportation Research Board, Washington DC.

Samir N. Shoukry, **Mourad Y. Riad**, Gergis William, (2003). "*West Virginia Smart Road: Early Age Behavior of Doweled Concrete Pavements*", proceeding of the International Conference of Highway Pavement Data, Analysis and Mechanistic Design Applications, Vol. 1, Columbus, Ohio, pp. 51-62.

Samir N. Shoukry, Gergis William & **Mourad Y. Riad**, (2003). "*Field Validation of 3D Finite Element Models of dowel Jointed Concrete Pavement*", CD Proceedings of the 16th ASCE Engineering Mechanics Conference, Seattle, Washington. Also available at: http://www.ce.washington.edu/em03/proceedings/papers/634.pdf

Samir N. Shoukry, Gergis William & **Mourad Y. Riad**, (2001). "*Effect of Dowel bar Looseness on Measured load Transfer Efficiency using FWD Load*", proceedings of SPIE Vol. 4330, pp. 505-510.

Samir N. Shoukry, Gergis William & **Mourad Y. Riad**, (2001). "*Finite Element Modeling of rigid pavements*", CD proceeding of the Second International Symposium on Maintenance and Rehabilitation of Pavements and Technological Control, Auburn, Alabama, paper number 01-120.

- Research Projects Technical Reports:

Mourad Y. Riad, Samir N. Shoukry & Gergis W. William (2013). **"**Evaluation and guidelines for Healer/Sealer products for concrete decks" Final Report No. RP # 261, West Virginia Division of Highways.

William, G.W., S.N. Shoukry, **M.Y. Riad** (2013). Monitoring of Market Street Bridge. Draft Final Report No. RP#276, West Virginia Division of Highways.

Samir N. Shoukry, Gergis W. William, **Mourad Y. Riad**, Christopher Beckett (2012). "Evaluation of Empirically Designed Bridge Decks and Bearings for Horizontally Curved Bridges" Final Report No. RP # 245, submitted to West Virginia Division of Highways.

Samir N. Shoukry, **Mourad Y. Riad**, Gergis W. William, (2011). "Effects of Stay-in-place forms on the performance of RC bridge decks", Draft Final Report No. RP # 241, submitted to West Virginia Division of Highways.

Samir N. Shoukry, Gergis W. William, **Mourad Y. Riad** (2011). "Longitudinal Cracking of Concrete Bridge Decks: Model Calibration", Draft Final Report No. RP # 240, submitted to West Virginia Division of Highways.

Samir N. Shoukry , **Mourad Y. Riad**, Gergis W. William, (2010). "Long-Term Performance of West Virginia Smart Road", Draft Final Report No. RP # 235, submitted to West Virginia Division of Highways.

Edward M. Sabolsky, Samir Shoukry, Wade Huebsch, Gergis William, **Mourad Riad** (2010). "Novel Electromechanical Systems for Direct Wind Energy-Harvesting", Final Report submitted to WVU- Advanced Energy Initiative-(Energy Research Grants).

Mourad Y. Riad, Samir N. Shoukry , Eduardo M. Sosa, & Gergis W. William (2009). **"**Bridge Deck Crack Reduction through Uniform Setting and Curing Procedures" Final Report No. RP # 216, submitted to West Virginia Division of Highways.

Gergis W. William, Samir N. Shoukry , **Mourad Y. Riad**, and Eduardo Sosa, (2009). "Development of Reinforced LMC and MSC for Crack Resistant Deck Overlays", Final Report No. RP # 217, submitted to West Virginia Division of Highways.

Samir N. Shoukry , **Mourad Y. Riad**, Gergis W. William, (2009). "Monitoring the Structural Performance and Bridge Deck Crack Growth – Star City Bridge", Final Report No. RP # 215, submitted to West Virginia Division of Highways.

Shoukry, S.N., **M.Y. Riad**, and G.W. William, (2007). "*Star City Bridge Condition Assessment*", Final Report No. RP # 189, submitted to West Virginia Division of Highways.

Shoukry, S.N., **M.Y. Riad**, and G.W. William, (2007). "*Remote Bridge Condition Monitoring*", Final Report No. RP # 185, submitted to West Virginia Division of Highways.

Shoukry, S.N., **M.Y. Riad**, and G.W. William, (2007). "*Long-Term Monitoring of WV Smart Road-Corridor H"*, Final Report No. PR # 186, submitted to West Virginia Department of Transportation, Division of Highways.

Shoukry, S.N., G.W. William**, M.Y. Riad**, and K.C. Mcbride (2007). "Evansville Bridge: *Early Age Cracking in Concrete Bridge Decks (Phase II)*", Final Report No. RP#201 submitted to West Virginia Division of Highways.

Shoukry, S.N., G.W. William**, M.Y. Riad**, and K.C. Mcbride (2007). "Assessment of Current WVDOH Bridge Deck Design Practices Task-B Thermal Loading", Final Report No. RP#203-Task B submitted to West Virginia Division of Highways.

Shoukry, S.N., **M.Y. Riad**, G.W, William, and D. Rao, (2005). "*Effect of Temperature, Shrinkage and Moisture on Slab Stresses*", Final Report No. RP # 172 submitted to West Virginia Division of Highways.

Shoukry, S.N., **M.Y. Riad**, and G.W. William, (2005). "*Effect of FWD Testing Position on Modulus of Subgrade Reaction"*, final report No. WVU-2002-04 submitted to Mid-Atlantic Universities Transportation Center (MAUTC).

Shoukry, S.N., G.W. William, and **M.Y. Riad**, (2005). "*Evaluation of Load Transfer Efficiency*", Final Report No. WVU-2002-04, Mid-Atlantic Universities Transportation Center (MAUTC). http://www.pti.psu.edu/mautc/docs/WVU-2002-04.pdf

Shoukry, S.N., G.W. William**, M.Y. Riad**, (2004). "*Early Age Cracking in Concrete Bridge Decks*", Interim Report No. T646-76-4.56 submitted to West Virginia Division of Highways.

Shoukry, S.N., **M.Y. Riad**, G.W. William, (2004). "*Field Performance of Shok Bar*", Final Report No. RP # 170 submitted to West Virginia Division of Highways.

Shoukry, S.N., **M.Y. Riad**, G.W. William, (2003). "*Performance Evaluation of Shok Bar*", Final Report submitted to West Virginia Division of Highways.

Shoukry, S.N., G.W. William, **M.Y. Riad**, and S.S. Motamarri, (2003). "Effect of Bonding Force on Stresses in Concrete Slabs", Final report MAUTC # 12 submitted to Mid-Atlantic Universities Transportation Center (MAUTC).

XUAN WANG

Lead Structural Analytical Specialist
Energy & Industrial Group

Education

WUHAN UNIVERSITY OF HYDRAULIC AND ELECTRICAL ENGINEERING; Wuhan, China
B.S. in Civil Engineering – June 1994

WUHAN UNIVERSITY OF HYDRAULIC AND ELECTRICAL ENGINEERING; Wuhan, China
M.S. in Solid Mechanics – June 1998

UNIVERSITY OF ILLINOIS AT CHICAGO; Chicago IL
Ph.D. in Civil Engineering – July 2005

Registrations

Professional Engineer – Texas

Proficiencies

- Finite Element Modeling
- Structural Dynamic and Static Analysis
- Structural Fatigue and Thermal Analysis
- Reinforced Concrete Design
- Steel Structure Design

Responsibilities

As the lead structural analytical specialist, Xuan supervises the engineers of EIG structural analytical group performing analysis and design of various types of structures. He ensures that designs follow Sargent & Lundy policy and procedures, project design criteria, applicable codes and standards, and all vendors' requirements.

As the S&L process owner of turbine & vibratory equipment foundation design, Xuan develops and maintains the process procedures and structural design guidelines for machine foundations including wind turbine foundations, trains and qualifies engineers for equipment foundation design. He also performs verification & validation for engineering software.

As a member of ACI technical committee 351 (Dynamic Machine Foundation), ASCE Task Committee (Turbine Foundation) and ACPA technical committee 61400-6 (Tower and Foundation Design), Xuan is responsible for the development of ACI 351, ASCE Turbine Generator Foundation Design and ACPA Wind Turbine Foundation Design Standards.

Sargent & Lundy Experience

Xuan has extensive experience in dynamic and static analysis and design for supporting fossil, nuclear, solar and wind energy projects.

His specific experience includes:

Structural Analytical Specialist, P.E. (2005 to Present)

- Analyzed structures using the following engineering software: ABACUS, ADINA, ANSYS, DYNA5, FANFDN, GTSTRUDL, LUSAS, SAP2000, and STAAD
- Designed structures using the following codes/standards: ACI, AISC, API, ASCE, ASME, DIN, DNV, EPRI, EUROCODE, HI, IBC, ISO and MODEL CODE

Lead Structural Analytical Specialist (2012 to Present)

- Performed structural analysis, design and review for fossil/nuclear/solar/wind energy projects. Working experience includes:
  - Development of S&L wind turbine foundation design guidelines
  - Dynamic and static analyses of equipment supporting systems
  - Fatigue analysis of wind turbine foundation
  - Thermal analysis of chimney and tank shell
  - Static analysis and design of steel silo and absorber tower
  - Dynamic analysis and design of pipe and ductwork support
  - Vibration isolation design
  - Review for concrete and steel structure design
- Performed verification & validation for engineering software
- Trained, qualified and supervised engineers for dynamic analysis of concrete and steel structures
- Developed and maintained the process procedures and structural design guidelines as the S&L process owner of turbine & vibratory equipment foundation design
- Developed Foundation Design Standards as a member of ACI Technical Committee 351 (Dynamic Machine Foundation), ASCE Task Committee (Turbine Foundation) and AWEA Technical Committee 61400-6 (Tower and Foundation Design)

Structural Analytical Specialist (2005 to 2012)

- Performed structural analysis, design and review for supporting fossil/nuclear/wind energy projects. Working experience includes:
  - Dynamic and static analyses of combustion turbine generator (CTG), steam turbine generator (STG), and single-shaft turbine generator foundation systems
  - Dynamic analysis and design of induced draft (ID), forced draft (FD) and primary air (PA) fan foundation systems
  - Dynamic analysis and design of absorber recycle pump, circulating water pump and boiler feed water pump foundation systems
  - Dynamic and static analyses of crusher and ball mill foundation systems
  - Fatigue analysis of wind turbine foundation and transmission line
  - Thermal analysis of chimney steel liner

- Impact analysis of chimney brick liner
- Strength analysis and design of concrete chimney shell
- Stability analysis and design of concrete chimney foundation
- Preparation of project seismic design specifications
- Review of concrete structure and steel building design
- Verification & validation for engineering software

Other Experience

University of Illinois at Chicago; Chicago, IL

Research / Teaching Assistant (2000 to 2005)

- Performed structural analysis for two US and two China bridge projects
- Designed and conducted field static and dynamic tests and performed FEA model updating using the test results
- Assisted professors in the courses of Finite Element Method, Structural Dynamics, Structural Analysis, Random Vibration, and Pre-stressed Concrete Design

Publications

- Wang X., Shu-jin Fang, "Comparison of Fatigue Design Code Requirements for Wind Turbine Foundations." ACI *Special Publication SP-348*, p. 145-158, March 2021.
- Wang X., "Dynamic Evaluation of ID Fan Foundation System." *Structures Congress 2018: Bridges, Transportation Structures, and Nonbuilding Structures*, James Gregory Soules, Editors, p. 392 - 399, ASCE, Fort Worth, Texas, 2018.
- Wang X., M. L. Wang, Y. Zhao, "Bridge Health Assessment System with Fatigue Analysis Algorithm." *Smart Structures and Materials 2005: Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Masayoshi Tomizuka, Editors, Vol. 5765, p. 901-911, SPIE, San Diego, 2005.
- Wang X., M. L. Wang, Y. Zhao, H. Chen, L. L. Zhou, "Smart Health Monitoring System for a Prestressed Concrete Bridge." *Smart Structures and Materials 2004: Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Shih-Chi Liu, Vol. 5391, p. 597-608, SPIE, San Diego, 2004.
- Lloyd, G., M. L. Wang, and X. Wang, "Thermo-mechanical Analysis of Long-term Global and Local Deformation Measurements of the Kishiwaukee Bridge Using the Bootstrap." *Earthquake Engineering and Engineering Vibration*, Vol. 3, No. 1, p. 107-115, June, 2004.
- Lloyd, G., M. L. Wang, X. Wang, "Thermo-mechanical Analysis of the Kishwaukee Bridge from global and local deformation measurements." *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Shih-Chi Liu, Vol. 5391, p. 618-623, SPIE, San Diego, 2004.
- Lloyd, G., M. L. Wang, X. Wang, "Components of a Real-time Monitoring System for a Segmental Pre-cast Concrete Box Girder Bridge", Structural Materials Technology (SMT): NDE/NDT for Highways and Bridges 2004, Buffalo, NY, 2004.
- Lloyd, G., M. L. Wang, X. Wang, J. Love, "Recommendations for Intelligent Bridge Monitoring Systems: Architecture and Temperature-Compensated Bootstrap Analysis." *Smart Structures*

and Materials 2003: Smart Systems and Nondestructive Evaluation for Civil Infrastructures, Shih-Chi Liu, Vol. 5057, p. 247-258, SPIE, San Diego, 2003.

- Lloyd, G., M. L. Wang, X. Wang, J. Halvonik, "Bootstrap Analysis of Long-Term Global and Local Deformation Measurements of the Kishwaukee Bridge." *The 4th International Workshop on Structure Health Monitoring*, Fu-Kuo Chang, p. 163-171, Stanford University, Stanford, 2003.
- Wang, X., M. L. Wang, "Smart Health Monitoring System of a Prestressed Box Girder Bridge." *HK Proceedings of ICANCEER 2002*, p. 603-610, The Hong Kong Polytechnic University, Hong Kong, 2002.

Memberships

- American Concrete Institute (ACI), Technical Committee 351, Member
- American Society of Civil Engineers (ASCE), Task Committee (Turbine Generator Foundation), Member
- American Clean Power Association (ACPA), Structures Committee 61400-6, Member
- American Institute of Steel Construction (AISC), Member