INDEPENDENT EXTERNAL PEER REVIEW PANEL

for the

WESTMINSTER, EAST GARDEN GROVE, CA FLOOD RISK MANAGEMENT FEASIBLITY STUDY LOS ANGELES DISTRICT

The U.S. Army Corps of Engineers submits the following information per requirements in the Water Resources Reform and Development Act of 2014, Section 1044(c)(4)(B).

Entity Conducting the Review	
Outside Eligible Organization:	Battelle 505 King Avenue Columbia, OH 43201
Dates of Review	
Review Initiation:	12 December 2018
Type I IEPR Final Report Submittal:	4 February 2019
Reviewer Names and Qualifications	
Marvin Feldman	**Plan Formulation/Economics**

Dr. Feldman, an independent consultant and principal economist at Resource Decisions, has more than 38 years of experience in water resource and environmental economics. He earned an M.S. in water resource management in 1969 and a Ph.D. in natural resource economics in 1979 from the University of Wisconsin. Dr. Feldman is experienced in the evaluation and conduct of complex multi-objective public works projects with high public and interagency interests, including flood risk analysis. As a senior economist at Dames & Moore under contract to the U.S. Department of Energy, he worked on developing a multi- attributable site selection model for evaluating risks of alternative sites for the Preliminary Nevada High level Nuclear Waste Siting Analysis. For the Smith Lake Improvement and Stakeholder Association (SLISA), Alabama, he provided economic evaluation of alternative costs and benefits of municipal and industrial, navigation, recreation, and hydroelectric water uses and non-power evaluations for recreation, property values flood control, navigation, and erosion control to support SLISA's negotiations with the Federal Energy Regulatory Commission and Alabama Power. For the Alaska Department of Natural Resources, he applied risk/cost/benefit analysis to environmental protection methods for petroleum exploration in the Beaufort Sea. As a member of IEPR teams (under contract to Battelle), he reviewed flood Civil Works planning and economic issues related to the Ala Wai Canal in Hawaii, Mamaroneck River in Connecticut, and Moose Creek in Alaska. Dr. Feldman is familiar with the USACE plan formulation process, procedures, and standards as they relate to flood risk management and has more than 10 years of demonstrable experience dealing directly with the USACE Six-Step Planning Process, governed by Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook. Most notably, he applied the Six-Step Process to his work on the USACE/Bureau of Reclamation Central Arizona Water Control Study. Dr. Feldman has experience related to the economic evaluation of traditional

National Economic Development (NED) plans, notably participating in the University of Wisconsin test team that helped develop the original U.S. Water Resources Council Principles and Guidelines. In conjunction with the USACE/Bureau of Reclamation Central Arizona Water Control Study, he designed a multi-attribute utility analysis framework for selecting preferred alternatives. This framework included flood risk management and National Ecosystem Restoration (NER) attributes and structured the tradeoffs among hundreds of alternative plans with regard to these and other attributes. The framework allowed the specification of minimum and maximum acceptable attribute values. Identification of attributes and the importance of weighting these attributes was a key aspect of the public involvement program. By focusing the public involvement on NER and flood control, as well as other key attributes, the plan selection process was more cooperative and less competitive. While working as a consultant to the USACE Sacramento District, he developed and applied a methodology for the cost-effectiveness and incremental analysis (CE/ICA) of alternative mitigation measures to enhance the habitat of the endangered winter-run salmon on the Sacramento River. Dr. Feldman has a strong working knowledge of USACE economic benefit calculations. Throughout his career, he has conducted studies requiring economic benefit analysis for flood risk management. For example, he evaluated the state-of-the-art municipal and industrial water conservation benefit evaluation techniques for the California Urban Water Conservation Council (CUWCC) and identified promising methods for application by CUWCC member water agencies in evaluating their conservation options. His advanced expertise and extensive experience in flood damage analysis and risk and decision analysis is reflected in his work on such studies as the Smith Lake-Black Warrior River (Alabama) benefit-cost analysis of lake levels, studies of cost-benefit tradeoffs for the North Fork of the Feather River (Pacific Gas and Electric, California), and an economic analysis of agricultural diversion alternatives for the Glenn-Colusa Irrigation District (California). Dr. Feldman has worked with numerous socioeconomic impact models including IMPLAN and REMI as well as the earlier RIMS models. He has completed projects utilizing socioeconomic impact models for oil and gas companies, the California Environmental Protection Agency, and the Alaska Power Authority. He is generally familiar with the RECONS model. Dr. Feldman is also familiar with methodologies for estimating damages, including the Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) software. His familiarity with HEC- FDA includes his knowledge of inputs, assumptions, calculations, and results attributed to the program. He has applied his knowledge of USACE flood risk management and damage calculations/analysis in his work as economist/planner on the USACE/Bureau of Reclamation Central Arizona Water Control Study. This study was a flood control and dam safety study involving the consideration of feasibility alternatives and the selection of preferred alternatives. Other studies requiring the assessment of risk and damage included the aforementioned Preliminary Nevada High-level Nuclear Waste Siting Analysis and the SLISA studies. Dr. Feldman has participated on a previous USACE IEPR (model certification review) panel as an economics expert for the Institute for Water Resources (IWR) Planning Suite Model II Review.

Lara Rachowicz	**Environmental Law Compliance**

Dr. Lara Rachowicz, a consultant at Ascent Environmental, Inc., holds a Ph.D. in ecology from the Department of Integrative Biology at the University of California, Berkeley. She has 20 years of technical and project management experience in wildlife ecology throughout California. As an environmental consultant, she manages and supports the preparation of Environmental Impact Statements (EISs), Environmental Impact Reports (EIRs), and other environmental documents required under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) for large infrastructure projects and resource management programs. She evaluates environmental impacts and plans mitigation and monitoring programs; supports project permitting under the Endangered Species Act (ESA) and Clean Water Act (CWA), and the negotiation of mitigation agreements; and manages construction, compliance, and mitigation activities. She also has experience in the Migratory Bird Treaty Act, Marine Mammal Protection

Act, and the Magnusson-Stevens Fishery Conservation and Management Act for designated Essential Fish Habitat. Dr. Rachowicz has been involved with the Ecological Society of America and the Declining Amphibian Populations Task Force, and has given several presentations about her research at meetings of these professional organizations. She is also involved with the Association of Environmental Professionals (AEP), and she regularly attends professional trainings about CEQA, NEPA, state and Federal Endangered Species Act, and Clean Water Act updates. Dr. Rachowicz manages and provides senior technical reviews and quality assurance of NEPA and CEQA documents and environmental permit applications. She works on proposed energy infrastructure projects (e.g., electrical transmission systems, pipeline facilities, and renewable energy facilities), transportation infrastructure projects (e.g., rail facilities), and resource management programs (e.g., restoration of aquatic ecosystems, fire fuel management programs). Ascent Environmental, Inc. is currently preparing a CEQA/NEPA document and environmental permit applications for geotechnical investigations for the California High-Speed Rail San Jose to Merced Project Section. Dr. Rachowicz recently conducted a senior technical review of the biological resource analysis section, which evaluated impacts from activities on a variety of sensitive resources in the greenfield area of Pacheco Pass, including within critical habitat designated under the ESA. She developed a mitigation strategy to reduce impacts on sensitive species, including California red-legged frog and California tiger salamander, in support of the project's ESA compliance, and wrote an associated Biological Assessment for submittal to the U.S. Fish and Wildlife Service (USFWS). She also provided permitting support for compliance with the Clean Water Act for impacts to waters of the U.S. For four years, Dr. Rachowicz served as the project manager of a third-party EIR for a natural gas turbine replacement project on behalf of the California Public Utilities Commission (CPUC), which involved the installation of new electric-driven compressors, a new compressor station, a new substation, over 25 miles of new fiber optic cable, and replacement of more than eight miles of existing transmission line in southern California. For this multijurisdictional project, she managed oversight of the Southern California Gas Company's and Southern California Edison's compliance with Final EIR mitigation commitments during project construction. She ensured that all conditions of approval were met through her proactive approach in coordinating with the utilities and regulatory agencies (e.g., USFWS, CDFW). Through her detailed and persistent management of the Mitigation Monitoring and Reporting Program, she assisted the CPUC in fulfilling its responsibility of holding project applicants to a high standard of compliance. In addition, she provided a senior technical review of the biological resources section of the EIR and helped develop mitigation measures to reduce impacts on golden eagles, sensitive riparian vegetation, coastal California gnatcatchers, and USFWS-designated critical habitat for coastal California gnatcatchers Dr. Rachowicz served as deputy project manager and senior ecologist of a third-party CEQA environmental document on behalf of the CPUC, which involved the proposed construction of an approximately 45-mile-long natural gas pipeline in southern California. She worked closely with the lead agency to ensure document compliance with NEPA and CEQA and served as an effective liaison to other permitting agencies for this controversial project, including USACE, USFWS, and United States Marine Corps. She oversaw a large group of technical experts from multiple disciplines, supervised the alternatives and cumulative analysis, developed a template for the document that incorporated NEPA and CEQA requirements, provided QA/QC review of the biological resources section, and worked with an engineering team to develop the CEQA objectives. Her attention to detail and understanding of NEPA and CEQA requirements helped develop a comprehensive draft document that contained a legally defensible environmental analysis, on behalf of the CPUC. Dr. Rachowicz was the lead biologist on several other third-party EIRs for large energy infrastructure projects on behalf of the CPUC in southern California and California's central valley. These biological impacts analyses required extensive coordination with CDFW, USFWS, and the National Marine Fisheries Service. She collaborated with these agencies to develop feasible mitigation measures and strategies to reduce potential impacts on several special-status species,

including the Federally endangered southern California steelhead distinct population segment, Federally threatened coastal California gnatcatcher. Dr. Rachowicz and several colleagues from the University of California-Berkeley assisted in the development of a population model for the southern San Joaquin River fall-run chinook salmon. The team summarized, evaluated, and analyzed field data and constructed and calibrated a salmon population model used to evaluate the efficacy of salmon management strategies. In addition to her environmental consulting work, Dr. Rachowicz's research and Federal resource Management experience has focused on threats to vulnerable wildlife populations, primarily amphibian and avian species. Her Ph.D. research focused on the epidemiology and ecology of an infectious chytrid fungus on threatened frogs in California's Sierra Nevada. In addition, she evaluated at-sea sampling regimes for an endangered seabird, the marbled murrelet. With the National Park Service (NPS), Dr. Rachowicz was the lead manager and biologist responsible for overseeing the monitoring of regionally significant water bird populations on Alcatraz Island, including populations of western gull, California gull, Brandt's cormorant, pelagic cormorant, pigeon guillemot, snowy egret, and black-crowned night heron. Lara contributed to the NPS NEPA process by evaluating actions and projects whose proponents were seeking a Categorical Exclusion, developing natural resource guidance for projects with a Categorical Exclusion, and monitoring projects to assure compliance with the guidelines. She assisted the NPS in maintaining compliance with the Federal ESA, Migratory Bird Treaty Act, Marine Mammal Protection Act, and Magnusson-Stevens Fishery Conservation and Management Act for designated essential fish habitat. She also developed and implemented guidelines to restrict visitor and staff access to priority bird nesting areas, as well as to remove bird nests in priority visitor areas, initiated and developed research priorities and proposals, and developed and provided training for citizen science and docent programs.As an Aquatic Ecologist with NPS, Dr. Rachowicz was the lead biologist and manager responsible for the aquatic ecosystem monitoring and restoration program in Yosemite National Park. The program focused on amphibians, including the mountain yellow-legged frog, foothill yellow-legged frog, Pacific tree frog, and Yosemite toad. Responsible for initiating the park's NEPA process for an aquatic ecosystem plan that focused on the protection and restoration of threatened and endangered amphibian species, she managed the scoping and alternative development processes, supervised field technicians, and supervised the removal of non-native amphibian species, and prepared publications and grant proposals.

Felix Kristanovich	**Hydrology and Hydraulic (H&H) Engineering**

Dr. Felix Kristanovich has 30 years of experience in hydrologic and hydraulic engineering, including flood risk management and numerical modeling. He holds a Ph.D. in civil engineering from Louisiana State University and an M.S. from CALTECH. He is a registered professional civil engineer (civil) ().E.) in California, Oregon, and Washington, and a certified floodplain manager (CFM). A senior water resources engineer, Dr. Kristanovich has extensive experience in hydraulic, hydrologic, and water quality engineering. He is expert in developing models for watersheds and streamflow systems and sediment transport. He has broad expertise in the use of:

- Hydrologic models developed by USACE: HEC-HMS, its GIS support tool GeoHMS, its predecessor HEC-1, and Watershed Analysis Tool (HEC-WAT).
- Hydraulic and sediment transport models developed by USACE: HEC-RAS, its predecessors HEC-2, HEC-6 (1-dimensional sediment transport model), GIS support tool Geo-HECRAS, reservoir system simulation tool HEC-Res-Sim, and real time simulation tool (HEC-RTS).
- Floodplain mapping-based models, including HEC-RAS (2-dimensional), SRH-2D, FLO-2D models.

- Sediment transport analysis models: HEC-RAS and HEC-6 models, RMA/SEd-2D models, EFDC sediment transport/water quality model, CEQUAL-W2 reservoir/sediment transport model.
- Hydrologic statistical evaluations using USGS NSS (National Streamflow Statistics) and its online version StreamStats; flood frequency analysis using PeakFQ tool; and VB programming in Excel for customized applications.
- Engineering design using USACE Engineer Manual EM 1110-2-1601, Hydraulic Design of Flood Control Channels, to assess (a) channel stability analysis and riprap protection design and (b) hydraulic design of flood protection walls, levees, and in-stream hydraulic structures.
- Design of biotechnical protection using bioengineering methods (with vegetation) to stabilize slopes and enhance in-stream fish habitat (i.e., using Washington Department Fish of Wildlife Integrated Stream Protection Guidelines, and USACE guidelines for installation of Engineering Log Jams in river systems).
- Design of shoreline protection structures using Coastal Engineering Design Analysis Software (CEDAS), including application of ACES, DYNLET, NEMOS, SBEACH, GENESIS, RCPWAVE, and SPWAVE. He has designed shoreline protection against wind waves, ship waves, and river currents.

Dr. Kristanovich has managed or led streamflow restoration projects in the Pacific Northwest and California and has conducted numerous hydrologic evaluations of watersheds and streamflow systems in the United States and overseas. He has also incorporated impacts of changing climate in hydrologic modeling of high-elevation watersheds by modeling the effects of changed temperature, precipitation, and other meteorological variables on snowmelt and glacier runoff, as in a hydrologic study of the River Rioni watershed in the Republic of Georgia. He has conducted modeling work on numerous streamflow restoration projects (Skagit River Delta, Nisqually Wildlife Refuge, Chinook River/Estuary, Black River, and Goldsborough Creek in Washington) and numerous wetland mitigation sites and rivers in California. He has performed flood insurance studies for FEMA via LOMR, CLOMR, and LOMA processes, and prepared dam design documents in compliance with the Department of Ecology Dam Safety. As a coastal engineer, Dr. Kristanovich has assessed dredging and hydraulic modeling at numerous international ports: construction of a port in Dhamra, India, port expansion and relocation at Port of Poti on the Black Sea (Republic of Georgia), and dredging and modeling at several Brazilian ports. Using CEDAS software, he has designed shoreline protection against wind-waves, ship-waves and river currents on the Columbia and Willamette rivers, and along shorelines at different Puget Sound harbors. He has also evaluated and provided calculations to estimate flooding risk under different sea level rising scenarios for City of Ventura in Ventura County, California. Dr. Kristanovich is actively involved in the American Water Resources Association (AWRA). He helped organized 2005 and 2009 AWRA national conferences in Seattle, the 2013 conference in Portland, Oregon, and numerous AWRA-Washington conferences in Washington State. He has organized several professional award events and served as Acting Secretary, Acting Treasurer, and the President of the AWRA Washington State Section. Dr. Kristanovich is a member of the Seattle Section of the American Society of Civil Engineers and the Northwest Regional Floodplain Manager Association.

Abdul Shakoor	**Geotechnical Engineering**

Dr. Shakoor is an emeritus professor of engineering geology at Kent State University and an independent consultant. He earned a Ph.D. in engineering geology from Purdue University in 1982. He is a registered professional geologist (P.G.) in Pennsylvania and a certified professional geologist (CPG.) by the American Institute of Professional Geologists. He has more than 45 years of academic and practical experience in physical geology, structural geology, engineering geology, environmental geology, soil mechanics, rock mechanics, rock slope stability, foundation

engineering, geohydrology, and remote sensing. Dr. Shakoor's primary research focuses on the engineering behavior of weak rocks (shales, claystones, mudstones, etc.), stability of slopes in both soils and rocks, evaluation of construction materials, influence of geologic characteristics on engineering properties/behavior of soils and rocks, and environmental hazards such as lakeshore erosion, mine subsidence, and structural damage due to expansive soils and blasting operations. His research in these areas involves extensive field and laboratory studies with a number of his research projects regularly conducted in collaboration with local engineering firms or government organizations, such as the Ohio Department of Transportation, state geological surveys, the National Park Service, and the US Environmental Protection Agency. Since his advanced engineering geology course focuses on rock mass classification systems, dams, and tunnels, he is very familiar with dam hydraulics, failure mode analysis, risk assessment, risk reduction measures, empirical methods for evaluating erodibility of soils and rocks, especially spillway erodibility, drilling and logging techniques, and pressure testing. He is also well versed in using rock and soil properties for evaluating their erodibility potential. Dr. Shakoor is familiar with all applicable USACE guidance criteria, including USACE dam safety guidance and procedures. He is familiar with the probability-based analysis currently used by USACE and has working knowledge of all applicable USACE design criteria and related documents. Having served as an engineering geology expert on IEPR panels for the Dover, Bolivar, and Mohawk Dams (Ohio), Zoar Levee and Diversion Dam (Ohio), Bluestone Dam (West Virginia), the Lake Isabella Dam (California), the Center Hill Dam (Tennessee), and the Joe Pool Dam (Texas), he has gained considerable experience in failure mode analysis (both the embankment and the foundation), risk assessment of spillway, risk assessment for embankment dams and levees, and the evaluation of risk reduction measures for dam safety projects. He is very familiar with empirical and one-dimensional (1D) spillway erosion techniques, calculation of material strength values (Headcut Erodibility Index), exploration techniques, and in-situ and laboratory rock and soil testing. Examples include reviews of Lake Isabella and Bluestone dams. Dr. Shakoor is familiar with empirical methodologies (streampower vs. erodibility index), 1D (SITES, WINDAMB), and case studies related to erosion of materials at spillways. He is proficient in calculating erodibility index values for rock and soil from field, drilling, and laboratory testing results that relate to rock (rock strength, RQD measurements, rock joint description and orientation) and soil (blow counts, gradations, plasticity data). He evaluated and conducted similar work for Lake Isabella and Bluestone dams. Dr. Shakoor is thoroughly familiar with rock and soil drilling techniques, as well as pressure testing and downhole camera-geophysical techniques. He teaches these techniques in several of his courses (engineering geology, advanced engineering geology, and rock slope stability).

Michael Hartley	**Civil/Cost Engineering**

Mr. Hartley is a past senior vice president of PND Engineers, Inc. and currently provides consulting services as a senior civil and geotechnical engineer through PND Engineers, Inc. He earned an A.A. degree in surveying technology in 1973 and an M.S. in civil engineering specializing in geotechnical engineering in 1979. He is a registered professional engineer in Washington and Alaska. Mr. Hartley has 39 years of experience in civil, structural, coastal, and geotechnical engineering services for projects throughout the United States and internationally in Russia, Iraq, Canada, Brazil, and Panama. His geotechnical civil and geotechnical engineering experience includes reconnaissance, studies, and design for marine infrastructure, levees, dams, buildings, roads, trails, bridges, breakwaters, and dredging projects. Mr. Hartley has also served as an expert witness and is recognized in Federal court as an expert in civil, coastal, and geotechnical engineering. Mr. Hartley is knowledgeable and experienced in the analysis, design, and construction of embankment dams and levees, including rehabilitation of these structures. Since 1979 he has been active in the evaluation of seepage and piping potential failures modes in the foundations of embankment dams and levees. He has knowledge and experience in the evaluation of backward erosion piping (BEP) potential failure modes in the foundations of embankment dams and levees, and in the development,

design, and construction remediation alternatives for correcting BEP issues. Studies have involved many intermediate and high head earth fill dams and levees. Mr. Hartley has performed many dam safety inspections for cities, counties, boroughs, and government agencies meeting the requirements of Federal Energy Regulatory Commission (FERC), and the State of Alaska Dam Safety Division of Department of Natural Resources requirements in Alaska and the Department of Ecology requirements in Washington State. He has also performed dam design or rehabilitation assessment for concrete gravity, concrete arch, earth dams and levees, and tailings dams. This has included many challenging projects such as the design of a 1,000-foot-long, 30-foot head earth fill dam and 1.5 miles of stream diversion adjacent to a 350-foot open pit mine. The dam was constructed in temperatures down to -30 degrees Fahrenheit. He previously served as a senior geotechnical engineer responsible for quality assurance, oversight, and training of personnel in flow net, seepage, and piping analysis at PND and provided training for culvert design and dam safety evaluation. He recently assisted in quality assurance (QA) for slope stability, piping, and seepage analysis, and recommended a geotechnical monitoring plan in the design of three football-size cofferdams constructed in New Orleans for the Permanent Canal Closures and Pumps project (PCCP) using USACE guidelines. He also recently conducted civil and geotechnical peer reviews for Zoar Levee, Dover Dam in Ohio, and Moose Creek Dam in Alaska that also included evaluation of BEP for the Huntington District. Mr. Hartley is experienced in the development, design, and construction of remediation alternatives for correcting seepage and piping issues and has evaluated various dam and levee structures for remediation using hydromax panels, clay cores, sheetpile, and other techniques to mitigate piping and seepage issues. He has served on numerous panels as a geotechnical engineer expert involving large high-head dams, performing peer review of proposed seepage corrections. Relevant design modifications include Campbell Lake Dam safety studies and design of rehabilitation measures using sheetpile. He is experienced in both failure mode analysis and risk assessment of embankment dams and using risk- based procedures, most recently having reviewed the risk assessment for levees in Mt. Vernon and Burlington. He evaluated the procedures used by two separate geotechnical firms for levee stability assessments as part of the USACE Skagit River, Washington IEPR. Mr. Hartley has experience in the evaluation of risk reduction measures for dam safety assurance projects, reflected in his efforts in support of USACE IEPR dam safety assurance projects for the Dover, Bluestone, and Bolivar Dams, as well as other construction-phase review services. He has testified in Federal court on risk-based assessment analysis and is very familiar with probabilistic methods of geotechnical assessment of levees, recently performing an IEPR review for the Skagit river levee system in Washington State. Other relevant projects include Sherwood Estates Dam, Squaw Harbor Dam, Lyon Lake Dam, Upper Petersburg Creek Dam, Cabin Creek Dam, Campbell Lake Dam, Valdez Creek Dam, Moose Creek Dam and levee assessment for Skagit County. He is very familiar with USACE dam safety guidance and has used USACE publications in the design, risk-based assessment, and review of flood control dam and levee reviews and cofferdam design. For example, he has worked on USACE peer reviews of the Backslope Armoring Manual for the New Orleans District and the recently completed cofferdam design for the PCCP project for USACE New Orleans District. He is also familiar with all applicable USACE design criteria and USACE engineering manuals and has used these in the design of projects and in the peer review of designs by others. Examples include the West Bank Levee designs peer review for WBV 12, 14f.2, and 18 levees, and the geotechnical design analysis QA analysis and geotechnical monitoring plan development for the PCCP cofferdams in New Orleans. Mr. Hartley has extensive design experience in developing construction costs, construction methods, sequencing and schedules for dams, levees, rural and urban roads and highways, airports, and bridges. The following projects demonstrate this experience. He provided geotechnical, civil design, and cost engineering for the DeLong Mountain Regional Transportation System with more than 50 miles of road design in ice-rich to massive permafrost. He participated in the concept study development of a $1.8 billion project for the San Francisco Airport Authority. He was Principal-in-

Charge, Project Manager, and lead civil and geotechnical engineer for a $50 million expansion of road infrastructure, parking, marina modifications, and a cruise ship terminal in Ketchikan, Alaska. He was Project Manager and lead civil designer for 11 miles of road rehabilitation and geotechnical engineer for 45 miles of road rehabilitation design of the Dalton Highway in Alaska for the Alaska Department of Transportation. He was responsible for road design, road decommissioning, and fish passage structure design at hundreds of projects in Washington, Oregon, California and Alaska as part of many indefinite delivery contracts for the USDA Forest Service. He was also involved in evaluation of constructability issues for a proposed $44 million port facility at the Umm Qasr Naval Base in Iraq as part of a design-build project for the USACE. Finally, he has been the lead designer on many bank erosion and stabilization projects, including emergency designs following bank failures.