

Stephen R. Gates, P.E.,
DEE

Tufts University
B.S. in Civil Engineering, Cum Laude

Mr. Gates, who recently joined R. W. Beck as a Client Services Director for the Boston Office Water/Waste Practice, has 29 years of environmental engineering experience providing program management, management consulting, facilities planning, detailed design and construction management for a wide variety of environmental engineering projects throughout Northeastern United States and Canada. He has successfully planned, designed, and managed construction of environmental facilities for public and commercial clients valued well over US\$2 billion. He is highly experienced in alternative project delivery methods, including design/build contracting and program management.

Project Role:
Principal-in-Charge

EXPERIENCE

Public Sector Projects

Project Manager

Mr. Gates directed a wide variety of projects for federal, municipal and county governments. He managed projects, including master planning, facilities and feasibility studies, permitting, design and construction management for water supply and distribution; wastewater collection, conveyance and treatment; solid waste management-land filling and incineration; and hazardous waste management. Mr. Gates managed facilities permitting, including the then largest (3,000 TPD) mass burn solid waste incinerator ever built. He wrote program policy and guidance documents for EPA, COE and HUD.

MWH Global, Inc.

Program Management Global Practice Unit Project Development

In select geography, Mr. Gates led MWH's Program Management Practice, providing vision, strategic direction, leadership and resources to create, acquire and support Program Management engagements. He worked to maintain MWH's highly regarded reputation and track record for successful program management engagements through team building, resource allocation, and the development and deployment of best practices among all MWH programs.

MWH Americas

Client Service Manager New York City/President

Previously, as Corporate Officer-in-Charge, Mr. Gates directed all work performed by MWH for the NYC Department of Environmental Protection, including the East of Hudson Dams Rehabilitation; Hillview Reservoir Chamber Improvements; Facilities Planning for the Interim Upgrade of the Rockaway Water Pollution Control Plant; Citywide



Collection System SCADA System; and the Advanced Wastewater Treatment Program Management Assistance contracts. In this capacity, Mr. Gates directed all project activity and assured the focus of MWH's senior management on high quality service to NYC DEP through appropriate staffing, attention to established quality assurance protocols, and active oversight of project management and contract administration, to meet customer needs and to assure that project goals were met to the satisfaction of NYCDEP. With 9 million customers, NYC DEP is among the largest water utilities in the world. During this assignment, Mr. Gates directed a Needs Analysis and Functional Requirements Report for a comprehensive Project Management Information System (PMIS) to assist the Department with management of its US\$16.5 billion 10-year capital improvement plan, and the implementation of a proof of concept PMIS.

MWH Americas, Inc.

Northeast Region Manager

Until his assignment to serve the needs of NYC DEP on a full-time basis, Mr. Gates was responsible for MWH's operations throughout the Northeastern United States and Canada. He oversaw all project activity, including significant environmental engineering projects for the Massachusetts Water Resources Authority, the New York City Department of Environmental Protection, the Hartford Metropolitan District Commission, the Providence Water Supply Board and the cities of Trenton and Newark, New Jersey, Cambridge, Massachusetts and Ottawa, Ontario.

Collection System SCADA Master Plan

Massachusetts Water Resources Authority Project Director

Mr. Gates managed completion of a comprehensive Master Plan for the implementation of a centralized system for automatic monitoring and control of all facilities owned and operated by the Sewerage Transport Division of the Massachusetts Water Resources Authority (MWRA). The Transport Division is responsible for the operation of all the Authority's Pumping Stations and CSO facilities. The Master Plan evaluated alternative means and defined the most appropriate level of centralized monitoring and control for MWRA's 1.2 billion gallon-per-day (GPD) wastewater collection and transport system, which serves approximately 2 million customers in and around Boston, Massachusetts. The Master Plan also provided detailed implementation recommendations for the proposed SCADA and computerized control system, considering organizational development and training needs, purchasing constraints, and technical requirements.

Central Artery/Tunnel Project

Massachusetts Highway Department - Environmental Services Contract Deputy Project Director

Mr. Gates directed work plan development and managed permitting, engineering, design and construction tasks on a \$50,000,000 services contract for the Massachusetts Highway Department, Central Artery/Tunnel Project. He managed environmental audits, assessments, and remediation designs at 250 sites throughout Boston in support of highway construction involving excavation of 13 million cubic yards of urban fill. Mr. Gates also managed negotiations of Memos of Understanding (MOUs) on the requirements of federal, state and local environmental regulations with stakeholder agencies. Construction progress on the \$14.5 billion project remains largely unimpeded by environmental issues.

Mr. Doran joined R. W. Beck in 2004 and serves as a Senior Water Consultant in the National Owner Advisory Services Practice. Having over 30 years of consulting experience in sanitary, environmental and general civil engineering, Mr. Doran has served in the roles of a Project Manager, an Associate Engineer, a Director and a Principal Engineer. In these various roles, Mr. Doran designed, managed construction and managed major projects in municipal wastewater treatment, industrial wastewater pretreatment, municipal and industrial wastewater collection systems, pumping stations, water distribution systems, water treatment, sewer system evaluation surveys, stormwater abatement, combined sewer overflow abatement, sewer separation, and evaluated the applicability of public/private partnerships through procurement of private industry responses to RFP's. In addition, Mr. Doran has been responsible for the implementation of alternative, decentralized wastewater collection and treatment systems and water and wastewater facilities plan preparation for rural communities.

Prior to joining R. W. Beck, Inc., Mr. Doran was the Director of Engineering for a management consulting firm that specialized in independent engineering reviews and procurement of municipal alternative delivery projects. Mr. Doran also served as Principal Engineer, Department Manager, Senior Project Manager, and Project Engineer for various civil engineering design firms.

DESIGN / BUILD, DESIGN / BUILD / OPERATE, CONTRACT OPERATIONS & OVERSIGHT SERVICES

Mr. Doran utilizes a blend of technical, business and project implementation skills to manage all facets of nationwide Design/Build (D/B), Design/Build/Operate (D/B/O) and Contract Operations (CO) alternate project delivery/contracting approaches for municipal and industrial water and wastewater collection, distribution and treatment projects to include: feasibility studies, goal setting workshops, preparation of comprehensive Request for Proposal (RFP) documents, evaluation of private vendor proposals and detailed technical reviews of proposals, conduct private vendor interviews, development of private vendor technical selection criteria, recommendation of the most advantageous private vendor, negotiation of private vendor contracts, preparation of private vendor service contract technical exhibits, and monitoring private vendor service contract performance.

Mr. Doran's specific activities in public-private partnerships have included: Preparation of Request for Proposals to solicit private vendor solutions to municipal infrastructure problems, evaluation of vendor proposals, selection of the private proposal most advantageous to the municipality, participation in public forums and conferences on public private partnerships, authored private contract exhibits, participation in negotiations of the private vendor contract and monitoring of private contracts on behalf of the municipality.

Northeastern University
B.S. in Civil Engineering
M.S. in Civil Engineering

KEY EXPERTISE

Innovative Procurement of Design/Build and Design/Build/Operate Alternative Project Delivery Options

Negotiation/Monitoring of Private Vendor Service Contracts

Strategic and Business Planning For Utilities

Asset Management Programs for Municipalities and Utilities

Technical and Business Assessments/Reviews of Water/Wastewater Facilities

Independent Engineering Reviews of Water /Wastewater Utilities

Optimization of Water/Wastewater Facilities

Design and Construction Management

Adjunct Faculty in Civil/Environmental Engineering



In addition, Mr. Doran evaluates existing treatment plant equipment useful life and prepares detailed capital and operating cost estimates, which are used as benchmarks to compare private proposals to the traditional municipal design-bid-build project delivery method.

Oversight Services & Preparation of Request for Proposals, Evaluation of Responses, and Contract Negotiations for Long-Term Contract Operations, Sale or Lease of Wastewater Treatment Plant and Pump Stations, and Design/Build for CSO and Other Capital Improvements

Taunton, Massachusetts

Program Manager, Construction Manager, Project Manager. As one of the first D/B/O projects in Massachusetts and the United States, Mr. Doran prepared a comprehensive Request for Proposals for either the 20-year contract operations, or sale or lease of the City's 9 MGD wastewater treatment plant and collection system pump stations. In addition, Mr. Doran also solicited proposals from private contractors to continue the existing City practices of short-term private contract operation. The RFP presented a unique "menu" approach to provide the City with a choice of multiple proposals. Private contractors were to be responsible for financing, design and construction of capital improvements, a portion of which were CSO projects.

Seven strong and competitive proposals were received from national firms in December 1996. Proposal evaluation was completed in November 1997. Mr. Doran then assisted the City with contract negotiations.

Once into construction, Mr. Doran provided the City with design review, construction monitoring, construction management and service contract monitoring and oversight services. Mr. Doran monitored and recommended approval of the start-up services and acceptance testing of the completed facility.

Mr. Doran provided the City oversight services for the first seven years of the private operator's operation and maintenance practices and prepared yearly detailed reports summarizing the performance of the private vendor. Annually, Mr. Doran prepared the year-end financial summary and met with the private contractor to approve the annual settlement statement for operation and maintenance costs.

Oversight Services and Assistance with Preparation of Request for Proposal, Evaluation of Proposals and Contract Negotiations for Design, Construction and the Long-Term Operation and Maintenance of a New Wastewater Treatment Plant

Plymouth, Massachusetts

Project Manager. Mr. Doran assisted the Town in several aspects of their procurement to design, build, operate and maintain a new wastewater treatment plant, and operate and maintain a new pump station and force main for a 20-year term. Mr. Doran provided strategic guidance for this public/private partnership on technical, business, and contract issues to aid in structuring the RFP. Mr. Doran also assisted with RFP preparation, review of proposals, design review, construction monitoring, and operations oversight and monitoring of the D/B/O and D/B private contractors.

Mr. Doran developed detailed estimates of the capital and operating costs associated with the conventional D/B/B procurement of the proposed wastewater plant that were used as a "benchmark" to compare this traditional project delivery method to the private D/B/O option. Mr. Doran then used the benchmark to compare private proposals for D/B/O with the analysis for a traditional procurement approach, thereby allowing the Town to make an informed decision regarding the cost savings of the private approach.

In addition, Mr. Doran recommended to the Town to procure the design and construction of a new main pump station and force main via the D/B route. Mr. Doran also recommended to the Town to convert the existing wastewater operations building into the pump station and have this as an alternative in the RFP. Mr. Doran evaluated proposals and assisted in the Town in service contract negotiations. Retrofitting the existing wastewater treatment operations building into a pump station was ultimately selected and saved the Town considerable capital costs when compared to a new pump station.

Mr. Doran conducted a presentation to Plymouth residents via a Special Town Meeting comparing the public and private options available and the advantages and disadvantages of each. Mr. Doran assisted the Town in completing the contract negotiations of two service contracts, one for the design and construction and one for the operation and maintenance of the new wastewater plant. Mr. Doran also served as Program Manager, overseeing the work of all parties during the design and construction of the new plant.

Oversight Services & Preparation of Request for Proposal, Evaluation of Proposals and Contract Negotiations for Long-Term Operation, Sale or Lease of the Water System and Wastewater Treatment Facilities, and Design/Build for Capital Improvements

Chester Borough, New Jersey

Project Manager. As the Project Manager, Mr. Doran prepared the request for proposals, assisted in evaluation of proposals, and assisted the community with contract negotiations. In addition, Mr. Doran provided oversight and contract monitoring services. Chester Borough owned and operated its water and wastewater systems. It was faced with the dual needs of significant capital facilities improvements and expansion of its water and sewer lines. The Borough was seeking private proposals for long-term contract operations, sale or lease of its water and wastewater systems.

The RFP was released in December 1996. The procurement was conducted in accordance with the New Jersey 1995 Water and Wastewater Privatization Acts.

The Borough decided to sell its water system and to enter into a 20-year operations and maintenance contract for its wastewater system. The private contract operator for the wastewater system is also responsible for financing, designing, and constructing capital improvements. Contract negotiations were completed in 1997.

Oversight Services and Design/Build Procurement, Contract Negotiation, Project Management for Wastewater Treatment Plant and Air Pollution Control Upgrade of the Sludge Incinerators

Upper Blackstone Water Pollution Abatement District Millbury, Massachusetts

Project Manager, Oversight and Construction Manager. Mr. Doran was the Project Manager and Construction Manager for the District's upgrade project at its 56 MGD wastewater treatment plant, the first public/private D/B wastewater project in the Commonwealth of Massachusetts. The project, under a strict DEP Consent Order, included major air pollution retrofits and upgrade to the solids handling/incineration complex.

Mr. Doran conducted the following activities: permitting, developing a procurement strategy, preparing requests for proposals, assisting in proposal evaluation, contract negotiations, design review, construction monitoring, and monitoring of acceptance testing. As part of his project management role, Mr. Doran was responsible for managing the efforts of a consulting engineering firm that provided the detailed resident engineering and construction management services.

Mr. Doran also provided technical review of the design of a pretreatment system for cyanide and heavy metal removal from the air pollution control system's wastewater side-stream. The project was partially funded via a low-interest loan from the MA DEP State Revolving Loan Fund.

Procurement of the private design/build contractor was successfully completed. Construction commenced in July 1995, and was completed in mid-1997. Facility start-up was successfully completed and acceptance testing has been completed. All requirements of the Consent Order were met.

Workshops in Public/Private Partnerships

Greater Lawrence Sanitary District North Andover, Massachusetts

Task Manager. Conducted workshops for staff, Board members, and elected officials of the Greater Lawrence Sanitary District relative to public/private partnership alternatives, and the technical, economic, environmental and financial impacts to existing operations.

Innovative Procurement of Design/Construction Administration/Operation of Wastewater Treatment Facilities and Collection System Pump Stations for 20 Years,
Preparation of the RFP, Evaluated Proposals and Assisted in Contract Negotiations;
Provided Management, Technical and Financial Expertise

Sioux, City, Iowa

Project Manager. Mr. Doran managed an innovative design-operate (D/O) procurement for the City that integrated a number of professional services: preparation of an equipment evaluation report that identified the treatment plant and pumping station upgrades necessary for the next 20-year design period, preparation of an operations evaluation report and preparation of a feasibility study for a new treatment plant to replace the existing plant. Mr. Doran developed an engineering and economic assessment of needs to upgrade the existing 30 MGD wastewater treatment plant and comparing that to an alternative for the relocation, design, and construction of a new facility within the regional service area. The study concluded it would be more economical to upgrade the existing plant and to use its remaining useful life.

Once the planning studies were concluded, Mr. Doran developed an innovative D/O procurement procedure to comply with Iowa laws that consisted of: preparation of RFP for the D/O procurement for a retrofitted wastewater treatment plant, evaluation of private vendor proposals, selection of a preferred vendor, developed detailed estimates of the capital and operating costs associated with the proposed wastewater plant and negotiation of two contracts with the selected vendor – one for operation and maintenance and the other for design and construction administration.

During the project, Mr. Doran coordinated the efforts of and worked with the Mayor, the City Manager, the Director of Environmental Services, the City Attorney, the Citizen's Advisory committee and a local engineering firm.

Procurement for Short-Term Operations and Maintenance of Water and Wastewater Treatment Facilities and Water Distribution and Sewer Collection Systems;
Preparation of the RFP, Evaluated Proposals and Assisted in Contract Negotiations;
Provided Management, Technical and Financial Expertise

Lee, Massachusetts

Project Manager. Mr. Doran was the Project Manager and Procurement Advisor to the Town for all aspects of the project.

The Town of Lee entered into Administrative Consent Orders with the Massachusetts Department of Environmental Protection which require the upgrade of its Water Treatment and Distribution Facilities and Wastewater Treatment Plant and Collection System. The Town commenced procurement for short-term (2 year) private operations and maintenance of its 2-MGD water and 1-MGD wastewater treatment plants and water distribution and sewer collection systems. The intent was to procure an operator for two years while the Town considered the upgrades necessary to meet ACO requirements. The Town would then consider a long-term D/B/O procurement for these facilities.

Mr. Doran was responsible for the procurement for the short-term Contract Operations of the wastewater treatment plant, water treatment plant, wastewater collection system and water distribution system. Mr. Doran developed the detailed Request for Proposals, contract principles, evaluated private vendor proposals, conducted the vendor interviews, recommended a preferred private vendor to the Town and negotiated the service contract. The procurement was conducted pursuant to the requirements of Chapter 30(B), the Commonwealth's procurement law for services.

Procurement for Operations and Maintenance of 25-MGD Water Treatment Plant; Preparation of an RFP, Evaluation of Proposals and Contract Negotiations for Private Operations Waterbury, Connecticut

Project Manager. A private contractor had operated the City of Waterbury's water treatment plant since it was constructed. Prior to the expiration of the existing contract, Mr. Doran served the City, through its Bureau of Water, by providing technical and financial assistance in preparing an RFP for continued private operation and maintenance of the plant for a period of an additional five years. Mr. Doran also assisted in evaluation of private proposals received, negotiated and prepared the draft service contract for continued private operations and maintenance of the plant.

Assessment of Feasibility of Public/Private Partnership Options Taunton, Massachusetts

Mr. Doran identified options for public/private partnerships to reduce costs and to enhance revenues at the City's 9 MGD wastewater treatment plant and ancillary facilities. In developing the options, Mr. Doran also addressed the City's interest in limiting exposure for potential noncompliance with the plant's NPDES permit.

Mr. Doran presented the privatization options to the Mayor and DPW staff, discussing the pro's and con's of each option, and ultimately recommended the City determine the most economically advantageous option by soliciting private-sector proposals for expanded contract operations, a lease arrangement, or facility sale.

Preparation of Request for Proposal for Upgrade and Long-Term Operation of Wastewater Treatment Plant and Sludge Incinerator

Borough of Naugatuck, Connecticut

Lead Engineer. Mr. Doran was responsible for the procurement of design review and construction monitoring for \$20 million D/B/O upgrade of wastewater treatment plant. Mr. Doran served as member of a team of procurement, technical, financial, and legal specialists for the procurement to upgrade and provide long-term contract operation (20 years) of the Borough's 10-mgd wastewater treatment plant and multiple-hearth incinerators. Mr. Doran was responsible for preparing the RFP, reviewing proposals, and assisting in contract negotiations. Mr. Doran also assisted in preparing the "benchmark analyses" for comparison to the proposals. The project is unique in that the Borough is continuing its history of "no-

cost” for wastewater treatment plant operations (i.e., revenues derived from incineration of outside sludge cover the cost of operating and maintaining the wastewater treatment plant.)

Independent Engineering Review of Water Treatment Plant Upgrade Options

Billerica, Massachusetts

Project Manager. Mr. Doran provided an independent engineers report and review, required under Massachusetts procurement law, of options for the Town to either upgrade its existing water treatment plant or construct a new 14 MGD water treatment plant. Mr. Doran conducted a comprehensive review of the work of the Town’s consulting engineer, from facilities planning, selection of a new plant site, an independent evaluation of the plant site, preliminary calculations, environmental impact study and impacts of new and pending water regulations.

WATER TREATMENT

Mr. Doran has experience and design in the following: municipal well iron and manganese treatment system renovations, water booster pump station designs, variable speed pumping systems, water transmission system improvement, computer modeling of hydraulics of transmission systems, new water supply feasibility reports, and renovating existing recreational water distribution systems.

Third Party Independent Engineering Review of the Water Treatment Options

Billerica, Massachusetts

Project Manager. Mr. Doran provided a third-party independent engineering review, report preparation and economic analysis for the municipal water treatment plant. The study provided the municipality with an independent review of all previous work and a second opinion regarding the construction of a new water plant versus the renovation of the existing water plant. The final project was to be completed by design-build.

Mainline Water Booster Station Design and Bid Documents

Milford and Shirley, Massachusetts

Project Manager/Chief Designer. Mr. Doran designed mainline booster pump stations for each community. Mr. Doran performed the hydraulic design, prepared detailed construction plans and specifications, prepared bidding documents. Special project features included: variable speed pumps used for constant pressure output, designed to float off tank or system pressure.

Water Transmission System Improvements

Londonderry, New Hampshire

Project Manager/Chief Designer. Mr. Doran conducted computer hydraulic modeling of the municipal distribution system to determine various bottlenecks in the system. Mr. Doran performed the modeling analysis and authored a report that presented recommendations for the placement of a new booster station in the existing distribution system. In addition, Mr. Doran recommended various transmission network improvements to restore system pressure and improve hydraulic capacity of the distribution system as a whole.

Water Distribution Study

**Boy Scouts of America
Paxton, Massachusetts**

Project Manager/Chief Designer. Mr. Doran prepared a water distribution study that reviewed the options to improve the existing water supply and distribution system at a summer boy scout camp. The study selected two options for the boy scouts to consider and recommended new water supply facilities for staged construction.

Water Distribution System Computer Modeling Study

Providence, Rhode Island

Task Manager. Mr. Doran conducted water distribution system hydraulic analysis using a computer model to balance two water booster stations, three storage reservoirs and transmission main improvements. Mr. Doran recommended the improvements to the transmission network and modifications to the booster pump stations to increase pumping capacity and pressure, selection of new pumps and control systems.

Design/Build Documents for Iron and Manganese Water Treatment System

Dover, New Hampshire

Project Manager. Mr. Doran prepared the design/build bid plans and specification documents to solicit general contractors to construct a 1.5-MGD municipal well treatment system for iron and manganese removal. The design/build RFP described background information, selection and evaluation procedures, technical requirements for permits, minimum specifications for design and performance criteria.

INDUSTRIAL WATER TREATMENT

Mr. Doran has a strong background in industrial water treatment. Specific responsibilities include: water discharge permitting, pilot plant design and evaluation, waste treatment studies, preparation of design plans and specifications, design of water reuse facilities, design of instrumentation and control systems, design of industrial monitoring stations, operator training, and O&M manual preparation. Mr. Doran has the knowledge and application of the following industrial treatment processes: dissolved air flotation; membrane filtration to include microfiltration, ultrafiltration and reverse osmosis; pressure filtration; mixed-media filtration; coagulation; flocculation; carbon adsorption; pH neutralization; carbon dioxide neutralization; metals removal; cyanide destruction; oxidation/reduction techniques; and ion exchange. In addition, Mr. Doran has prepared Stormwater Pollution Prevention Plans for various industrial activities.

Design and Permitting of Industrial Pretreatment System

**Unifirst Corporation, Corporate Environmental Department
Various National Locations**

Principal Engineer. Mr. Doran designed and permitted numerous industrial laundry pretreatment systems throughout the country for the Corporate Division of Unifirst Corporation, treating heavy metals such as zinc, and oil and grease, and heavy automotive and industrial soiled uniforms. All systems included: permit application preparation, regulatory interfacing, design plans and specifications, operation and maintenance manual preparation, and start-up services. Specific locations of these systems include: Portland, Maine; Lebanon, New Hampshire; Nashua, New Hampshire, Springfield, Massachusetts; Stratford, Connecticut; Syracuse, New York; New Kensington, Pennsylvania; Franklin, Ohio; Phoenix, Arizona; and Richland, Washington.

Design and Permitting of the Country's First Nuclear Laundry Pretreatment System

**Interstate Nuclear Services, Corporate Engineering Department
Springfield, Massachusetts and Richland, Washington**

Principal Engineer. Mr. Doran designed and permitted two nuclear laundry pretreatment systems to control the amount of soluble, low-level radionuclides discharged to the municipal publicly owned treatment works. Mr. Doran's responsibilities included: permit application preparation, regulatory interfacing including the Nuclear Regulatory Commission, and detailed project construction plans. The Springfield, Massachusetts, facility was designed and built as a full-scale demonstration system, and was the first nuclear pretreatment system of its kind to be permitted in the Country.

Design and Permitting of Industrial Wastewater Pretreatment Systems

Various Locations in Massachusetts

Principal Engineer/Project Manager. Mr. Doran designed and permitted various industrial wastewater pretreatment systems for metals removal. Treatment process design included hexavalent chromium removal, cyanide oxidation, mercury removal, silver removal, zinc, hydroxide precipitation, pH adjustment, spent bath treatment and removal of other problem metals. Mr. Doran provided plans and specifications, worked with each industry to construct and start-up every system, and gained approval of the Massachusetts Department of Environmental Protection for each system.

Full-Scale Pilot CO₂ Pretreatment System

Innovative Carbon Dioxide Treatment System for pH Control

Lebanon, New Hampshire

Principal Engineer. Mr. Doran Full-scale pilot pretreatment system utilizing liquid carbon dioxide for pH control. Obtained all permits and directed the conduct of the study and construction.

MUNICIPAL WASTEWATER TREATMENT

Mr. Doran's specific activities in the municipal wastewater field have included: feasibility studies; wastewater facilities plans; technical and financial analyses for process selection; detailed engineering design; engineering plans and specification preparation; project bidding, wastewater facility permitting; vendor selection; contract negotiations; construction administration; public presentations, training of personnel and regulatory interfacing.

Mr. Doran provides experience in the total wastewater system to include: planning, conceptual design and process selection to meet treatment goals, liquid and solids process design calculations, preparation of detailed design drawings and specifications for construction, site layout, site drainage, site grading, site process piping, site building layouts, and instrumentation and control engineering; construction management, field construction observation during construction, start-up services, supervision of process acceptance testing, troubleshooting projects and providing operation and training services.

In addition, Mr. Doran advises municipalities on how to establish asset management systems to extend the useful life of equipment and ensure efficient operation and maintenance services. Mr. Doran has also conducted treatment plant operator training classes to prepare personnel to sit for certification examinations and/or be more efficient on the job.

Retrofit of a Small Municipal Treatment System, Prepare Design Plans/ Specification, Obtaining a Rebate through the Local Electric Utility Company

Shelburne Falls, Massachusetts

Project Manager/Chief Designer. Mr. Doran provided detailed design, preparation of plans and specifications for a retrofit to a secondary activated sludge treatment plant. Responsibilities included: sizing a new fine bubble aeration system, preparing an application to Massachusetts Electric for a rebate, obtaining a power company rebate, sizing of new variable speed blowers, construction management, and project permitting.

Design Review, Construction Monitoring and Acceptance Testing for a Septage Only Treatment Facility

Carver, Massachusetts

Project Manager. Mr. Doran provided design review, permitting review, construction monitoring, and facilities acceptance testing for a 100,000-gallon-per-day private, septage-only, treatment facility. The facility utilizes rotating biological contractors, filtration and subsurface rapid infiltration of treated septage. The unique features of this design is its ability to handle septage with a higher than normal grease content and overland flow groundwater infiltration disposal of treated effluent.

Major Combined Sewer Overflow Abatement Project/ Recommended Solution Deep Rock Tunnels and Expansion of Wastewater Treatment Plant

Fall River, Massachusetts

Managing Engineer/Author -Wastewater Facilities Report. Mr. Doran was responsible for managing and directing the efforts of a team of engineers, technicians, : the evaluation of all alternatives and CSO abatement strategies; effects of various abatement strategies on water quality; economic analysis of all alternatives; selection of recommended plan; quality assurance; technical direction for the entire team, client contact, subconsultant coordination. Mr. Doran's analysis included various computer simulations of sewer system response to rainfall events, technical and cost analysis to completely separate sanitary and storm sewers in the City, and recommendations for increasing the capacity of the interceptor network.

Mr. Doran authored four volumes of the six-volume facilities plan study. The results of the study recommended combination of deep rock tunnel and surface storage of combined sewer overflows; alterations of existing best management practices within the municipal collection system maintenance division; and expanding the capacity of the existing treatment plant.

Advanced Wastewater Treatment Plants for Nitrogen and Phosphorus Removal/ Effluent Disposal Through Use of Groundwater Leaching System Disposal

Essex and Cohasset, Massachusetts

Principal Engineer. Mr. Doran provided the selection of the site, conceptual design, process selection, design bid plans preparation and permitting for two advanced wastewater treatment plants for private developments, one in Essex, Massachusetts, and one in Cohasset, Massachusetts. Mr. Doran developed permitting plans for collection and treatment system involving approximately 30,000 LF of gravity sewers, 6,000 LF of forcemain, four pump stations, one 60,000 gpd wastewater treatment facility and one 28,000 gpd wastewater treatment facility. Each treatment facility consisted of rotating biological contactors, nitrification and denitrification facilities, mixed-media sand filters, ultraviolet light disinfection and final disposal of highly treated effluent via subsurface groundwater leaching system. These treatment plants were required due to the high density of individual systems in the area.

Design, Bid and Construction Management of Two Advanced Wastewater Treatment Plants Both Plants Provided Nitrogen and Phosphorus Nutrient Removal

Town and Village of Webster, New York

Project Manager/Construction Manager. Mr. Doran provided preliminary and final design services for a 15.75-MGD and a 3.75 MGD municipal advanced wastewater treatment plant for nitrogen and phosphorus removal. Mr. Doran performed detailed final designs of liquid wastewater and biosolids treatment systems, prepared bid set of plans and specifications, provided construction management and start-up services. Special project design features included: two-stage recirculating trickling filters on two different sites, combination complete mix and conventional activated sludge with fine bubble aeration, modulating control structure for hydraulic control of submerged effluent weirs.

Operation and Maintenance Manual Preparation

Six Municipal Wastewater Treatment Plants

Project Engineer. Mr. Doran prepared the Operation and Maintenance Manuals for six (6) municipal wastewater treatment plants. Treatment processes covered in these manuals included: preliminary treatment to include screening and degritting, flow equalization; primary clarification; conventional, complete mix, plug flow, contact stabilization, extended aeration activated sludge processes; rotating biological contactors; final clarifiers; coagulation, flocculation, pressure and mixed-media filtration; chlorination; dechlorination; nitrification, denitrification and phosphorus removal; chemical storage & feed systems; belt filter press, gravity and centrifuge sludge thickening; anaerobic digestion and aerobic digestion; belt filter press and plate/frame sludge dewatering; hydraulics and pumping systems.

Design, Bid and Construction Management of a Retrofit to a Secondary Wastewater Treatment Plants

Massena, New York

Project Manager/Construction Manager. Mr. Doran performed detailed final designs of liquid wastewater and biosolids treatment systems, liquid and solids process calculations, prepared bid set of plans and specifications, provided construction management and start-up services for a 2.75 MGD municipal wastewater treatment plant. Special project design features included: compressed anaerobic digester gas mixing system, traveling bridge secondary clarifiers with rapid sludge return, and disk nozzle centrifuges for waste activated sludge thickening.

Municipal Wastewater Facilities Plans

Mountour Falls, Odessa, Village and Town of Victor, and Farmington, New York

Project Manager. Mr. Doran prepared the wastewater facilities reports for several upstate New York Villages and Towns namely: Mountour Falls, New York; Odessa, New York; Village and Town of Victor, New York; Farmington, New York. Studied regional advanced treatment modifications for each of these towns, provided alternative analysis and costing, determined collection system modifications, evaluated the effectiveness of existing treatment systems in meeting new discharge permit requirements, and overall preparation of conceptual designs and economic analyses of chosen alternatives. These facilities studies were the first step planning document required by the Federal Construction Grants program.

Innovative Small Diameter Gravity Sewer Collection System and Aerated Lagoon Treatment System

Village of Interlaken, New York

Project Manager. Mr. Doran prepared a detailed wastewater facilities plan and conceptual design documents for an innovative collection and treatment system using small diameter gravity sewers, septic tank effluent pumping and aerated lagoons for wastewater treatment. The facilities plan contained the complete planning, conceptual design, economic analysis and environmental impact analysis for the project. The aerated lagoons utilized a state-of-the-art aeration system and an innovative ozone injection system for post aeration and algae control. Mr. Doran obtained an innovative/alternative Federal grant for the Village to fund the project at the highest level. The project utilized ozone for both disinfection and algae control.

Mr. Doran obtained a Federal and State grant for the project that funded 92.5% of the total project cost.

Demonstration Grant for Construction of New Municipal Cogeneration Facility

New York State Energy Research and Development Authority

Project Manager. Mr. Doran obtained a Demonstration Grant for the Village of Avon, New York, to be used to implement the cogeneration of electricity via the utilization of anaerobic digester gas. The proposal was selected out of 85 applicants Statewide. Mr. Doran provided the complete planning, conceptual design, capital and O&M analysis, life-cycle cost analysis for the cogeneration facility and obtained the money for Avon to use in its construction.

Innovative Small Diameter Gravity Sewer Collection System and Recirculating Sand Filter Treatment System

Village of Rushville, New York

Project Manager. Mr. Doran authored the wastewater facilities report for the new innovative wastewater collection and treatment facility for a small Village community in New York State. The facilities report contained the complete planning, conceptual design, capital and O&M analysis, life-cycle cost analysis for an innovative treatment and collection system for the dense area of the core parts of the Village. The collection system consisted of using small diameter gravity sewers, 3-inch and 4-inch in diameter, after the individual septic tanks and larger, community septic tanks for intermediate treatment. The treatment system consisted of a nitrifying recirculating sand filter with surface discharge into an intermittent stream. In addition, Mr. Doran prepared the required environmental impact analysis and conceptual design documents for the project. This was one of the first innovative processes of its type in New York State.

Mr. Doran obtained a Federal and State grant for the project that funded 92.5% of the total project cost.

Offshore Wastewater Treatment Facilities – USS Missouri

Department of the Navy Fort Kamehameha, Pearl Harbor, Hawaii

Managing Engineer. Mr. Doran was in responsible charge of the design and preparation of contract bid documents for the modifications of the wastewater treatment facility at Pearl Harbor, Hawaii. These modifications were made to accommodate the final resting place of the USS Missouri. The improvements included major modifications and additions to the secondary biological treatment system, secondary clarification and return sludge processing facilities.

Innovative Pressure Sewer, Small Diameter Gravity Sewer Collection System

Town of Milo, New York

Project Manager. Mr. Doran conducted detailed facilities planning, environmental impact analysis, and implementation of an innovative collection system which gathered wastewater from approximately 250 lakefront homes along one of New York State's Finger Lakes premier resort towns. Mr. Doran designed and applied low-pressure force mains, grinder pumps and septic tank effluent pumps to mitigate negative impacts of failing septic systems on the water quality of the lake.

Mr. Doran produced conceptual designs and layout, complex hydraulic designs that required positive displacement pumps to interface with mainline centrifugal pump stations. Once the calculations were made, Mr. Doran prepared preliminary design plans and specifications, final designs and bid set of contract documents. Mr. Doran was responsible for all management aspects of the projects, including meeting with individual residents to obtain project easement. Project consisted of over six miles of mainline force main, four major mainline booster pump stations, 250 individual home grinder pump stations and 2,500 LF of conventional gravity sewers.

Mr. Doran obtained a Federal and State grant for the project that funded 92.5% of the total project cost.

Design, Bid and Construction Management of New Municipal Nutrient Removal Treatment System, Revision of Municipal Sewer Use Ordinance, New Industrial User Agreement

Village of Avon, New York

Project Manager. Mr. Doran diagnosed existing treatment system operational problems, prepared design calculations, prepared bid plans and specifications and performed construction management services for the modification to an existing 2.5-MGD wastewater treatment facility to correct seasonal SPDES permit violations. The project consisted of implementing chemical treatment with Odophos™ and polyelectrolytes for phosphorus removal; improved solids capture in secondary settling and gravity thickening. After the renovations were made, the plant was able to consistently meet NPDES discharge permit requirements.

In addition, Mr. Doran conducted negotiations with a significant industrial user for an increase in sewer use fees for the Village; rewrote portions of the municipal sewer use ordinance; and prepared a new industrial use agreement with the industry to reflect current conditions. The new sewer use ordinance and industrial agreement resulted in an increase of sewer use revenue to the Village.

New Interceptor Sewer Project and Renovation to Six Combined Sewer Overflow Structures

Monroe County Water Division

Rochester, New York

Project Manager. Mr. Doran provided the technical analysis and prepared the technical design report and preliminary plans for a major extension to the existing City interceptor sewer network. Project consisted of replacement of 5,000 LF of 84 inches to 96 inches prestressed concrete interceptor sewer and renovations to six combined sewer overflow structures.

Major Combined Sewer Overflow Abatement Project/ Computer Modeling for Quantity, Quality Impacts to Receiving Waters

City of Rochester, New York

Project Engineer. Mr. Doran was a Project Engineer assigned to the City of Rochester Combined Sewer Overflow Study. In this capacity, Mr. Doran developed the complete technical quantity and quality database and input data that was used in the sophisticated German QQS hydraulic and pollution control

computer model simulation. Simulation of CSO discharges via computer modeling was used in the study for the assessment of combined sewer overflow pollutant quantity and quality impacts on receiving water of the City. Mr. Doran also developed various abatement strategies used to mitigate the effects of CSO discharges.

Treatability Studies

Town of Webster, New York

Project Engineer. Mr. Doran performed laboratory pilot testing, jar testing and chemical addition analysis for phosphorus removal for the purposes of determining the initial dosages of all chemicals to be used in design of full-scale treatment plant modifications.

GENERAL MUNICIPAL CIVIL ENGINEERING PROJECTS

Mr. Doran has designed, constructed and managed major municipal projects in site design, roadway design, utilities design, municipal and industrial collection systems, pumping stations, stormwater abatement, combined sewer overflow abatement, sewer separation. In addition, Mr. Doran has designed, constructed and managed general civil engineering projects to include: major residential development, industrial development, utilities layout and design, site layout and grading, drainage design, roadway layout, horizontal and vertical geometric highway design and water/wastewater pump station designs.

During preparation of design plans and specifications for 10 residential, 8 commercial, and various industrial development projects, Mr. Doran's experience included the design and application of the following: water main design, sewer design, drainage and electrical utilities design; drainage detention ponds, drainage collection systems, stormwater detention facilities and management systems, erosion and sedimentation control plans, flood studies, computer model applications of TR 55 and TR 20 for drainage and detention pond design, stormwater management plans and runoff control plans.

In addition to the preparation of various bid contract documents, Mr. Doran has experience in obtaining all permits, interfacing with State and local Planning Boards, Conservation Commissions, and Zoning Boards of Adjustment for all types of development projects.

The following are representative of the development projects Mr. Doran has provided professional civil engineering services.

Utility and Site Work Hillside Estates and Art Lot Acres Subdivision

Grafton, Massachusetts

Performed site grading, drainage design, detention pond design, sewer and water main design for 2-200 home adjoining subdivisions. Managed wetland protection issues. Permitted and gained approval through the Conservation Committee, Planning Board, and Zoning Board of Adjustment.

Design Plans Specifications for Industrial Access Road

Naugatuck, Connecticut

Performed the horizontal, vertical, and drainage design for a new industrial access road to a chemical manufacturer's site. Mitigated sensitive site issues and local resident noise concerns.

PROFESSIONAL REGISTRATION

Registered Professional Engineer: New York, Massachusetts, New Hampshire.

Licensed Designer of Subsurface Disposal Systems: New Hampshire.

PROFESSIONAL AFFILIATIONS

University of Massachusetts – Lowell, Member of Adjunct Faculty Mr. Doran teaches courses in Wastewater Operations and Maintenance, Industrial Waste Treatment, Wastewater Treatment Plant design, Hydraulics, Pumps and Compressors. Courses were developed to prepare wastewater plant operators for State certification and prepare civil engineering students for their Bachelors Degree.

Northeastern University, Member of Adjunct Faculty Mr. Doran teaches modules in the Professional Engineers Preparation Course reviewing concepts and problem solving in wastewater treatment.

Mr. Doran is a member of the following organizations:

- American Society of Civil Engineers
- American Water Works Association
- New England Water Works Association, Member, Filtration Committee
- Water Environment Federation
- New England Water Environment Federation.

AWARDS, PUBLICATIONS, PRESENTATIONS

Mr. Doran was nominated for the **Haskell Memorial Award** given annually to the best performing Adjunct faculty member at the University of Massachusetts – Lowell.

Doran, P., January 2003, Conducted Seminar, "Delivery Methods for Public Works Projects" Massachusetts Municipal Association, Annual Conference, Boston, Massachusetts.

Doran, P., January 2001, Conference Speaker, "Implementation of Design-Build-Operate Project – The City of Taunton, Massachusetts Experience – Part 1", New England Water Environment Association Annual Conference, Boston, Massachusetts.

Doran, P., May 2000, Conducted Seminar, "Design-Build and Design-Build-Operate project delivery approaches", New England Environmental Expo, Boston, Massachusetts.

Doran, P., April 1997, Conducted Workshop, "Revitalizing Water and Wastewater Infrastructure: Municipal Partnering with the Private Sector," New England Environmental Expo, Boston, Massachusetts.

Doran, P; January 1997, Seminar Speaker at Boston Society of Civil Engineers, Engineering Management Group's Seminar on Privatization, Boston, Massachusetts.

Doran, P; January 1997, Participant in Workshop, "Procurement for Public/Private Partnerships," City of Newport, Rhode Island.

Doran, P; August 1996, Participant in Workshop, "Assessment for Public-Private Partnerships for Wastewater Treatment Facilities," presented at IBC USA's Contract Operations Conferences, Chicago, Illinois.

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John M. Henderson, P.E.
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EDUCATION AND SPECIAL TRAINING

B.S., Civil Engineering, Worcester Polytechnic Institute, 1984
B.A., Geography, Middlebury College, 1976

REGISTRATIONS / CERTIFICATIONS

Professional Engineer: Massachusetts, 1989

ARTICLES

Noonan, David C., and John M. Henderson, "Groundwater Development and Management Planning for the Coastal Plain of New Jersey." Proceedings of Eastern Regional Groundwater Conference, 1985.

Henderson, John M., William A. DiTullio, Paul M. Williams. "Risk Driven Site Investigations: Two Case Studies of Leaking Underground Storage Tanks." Proceedings of Eastern Regional Groundwater Conference, 1987.

Henderson, John M. "Groundwater Quality and Treatment." Proceedings of the Groundwater Protection and Development Technical Assistance Program. 1991.

Henderson, John M. "Use of Particle Counting for Treatment Plant Optimization." New York Water Works Association, 1993.

Henderson, John M. "Streaming Current Detection for Optimization of Coagulation." Proceedings of Operational Control of Coagulation and Filtration Processes Seminar. 1994.

Kroll, G., J. Henderson, J. Slivka, J. McMahon. "Innovative Plant Renovation with High-Rate Clarification." Proceedings AWWA Convention. 1995.

Henderson, John M., A. Pincince, P. Heidell. "Disposal of Residuals from Walnut Hill Water Treatment Plant" WEF/AWWA Joint Residuals and Biosolids Management Conference. 1999

Henderson, John M., C. Udden. "UV Upgrades and Retrofits – Case Studies in MA, CT and NY", New England Water Works Association, 2003.

HONORS

American Consulting Engineers Council, National Excellence Award - Environmental Studies, 1988

American Society of Civil Engineers, Chairman, Outstanding Engineering Management Group, 1992

Diamond Award for Engineering Excellence from the Consulting Engineers Council of PA for Innovation in Water Treatment Plant Design, 1998

Boston Society of Civil Engineers Presidents Award, 1999



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QUALIFICATIONS

Mr. Henderson is the Water Program Director for Tetra Tech in the North East and has more than 20 years of experience in all aspects of the study, piloting, design, construction and startup of water treatment plants for both municipal and industrial water supplies and for engineering studies and reports including water supply master plans, groundwater management remediation and development plans, distribution system studies, and design of distribution storage and large diameter transmission and pumping facilities. Specific areas of expertise include DAF, membrane treatment, Cryptosporidium control, disinfection byproducts control, ozone and biologically active granular-activated carbon filters and all aspects of conventional treatment. Mr. Henderson has been responsible for the engineering for water supply master plans and capital improvement programs and system facilities design for numerous local, regional and international clients including Waterville Me, Shrewsbury Ma, Stoughton Ma, the Massachusetts Water Supply Authority (MWRA), Allentown PA and Sao Paulo, Brazil. As the vice chair of the New England Water Works Association's Filtration Committee, Mr. Henderson was invited to participate on the New England Water Works Association's Ad Hoc Committee to provide comment to EPA on the proposed Disinfection Byproducts Rule and the Stage 2 Long Term Enhanced Surface Water Treatment Rule.

RELEVANT EXPERIENCE

Water — Municipal

- **South Weymouth Naval Air Station (SoWey NAS) Redevelopment Project, LENNAR Partners, Weymouth MA.** Mr. Henderson is the project manager responsible for developing the water and wastewater infrastructure for the redevelopment of the SoWey NAS. The project is a sustainable, "smart growth" approach to development and is currently the largest single development project in the State of Massachusetts. The project requires the development of a regional water supply capable of meeting the average day base demand of 1.0 mgd or more of potable water, 0.5 mgd of irrigation water and an on-site wastewater treatment plant designed for a maximum day flow of 2.0 mgd and capable of treating the wastewater to reuse standards required for irrigation water. A membrane bio-reactor process has been proposed for the wastewater treatment facility. A 5-10 mgd seawater desalination plant with membrane filtration followed by Reverse Osmosis RO membranes has been proposed and is being studied as the most attractive water supply alternative capable of economically meeting the Base demands as well as a well documented regional water supply deficit.
- **Blue Hills Covered Storage Facility, Massachusetts Water Resources Authority (MWRA), Boston, Massachusetts.**



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- Mr. Henderson is the project manager for the conceptual design and Owners Representative Services for the design-build delivery of two 10 million gallon covered water storage tanks. Both cast-in-place and wire wound pre-stressed concrete (AWWA D10 Type III) tanks are being considered. The conceptual design included the siting, sizing and hydraulic design for the tanks and conceptual cost estimates as well as an evaluation of the pros and cons of the two basic construction methods for water storage tanks. The hydraulic evaluation included extensive Computational Fluid Dynamic (CFD) modeling of the distribution system and the storage tanks to determine the appropriate hydraulic elevation and tank design to promote fill and drain cycles and to recommend an inlet-outlet design to maximize mixing within the tanks to best maintain chlorine residual and water quality within the tank.
- Chicopee Valley Aqueduct (CVA) Ultraviolet (UV) Disinfection Treatment Study, Massachusetts Water Resources Authority (MWRA), Boston, Massachusetts. Mr. Henderson is a senior technical advisor for the MWRA UV Disinfection Treatment Study which is piloting a 6 mgd Trojan Swift medium pressure (MP) UV reactor over a 9-12 month period in order to evaluate operating characteristics under the full range of seasonal water quality conditions. The testing and data collection will address practical and performance issues associated with UV technology such as bulb life, tube degradation and fouling, tube cleaning methods, sensor types and reliability, dose delivery algorithms and long-term effects of polychromaticity on dose delivery. In addition, two 100 gpm Wedeco low pressure high output (LPHO) small scale reactors will be used to evaluate the effects of pre-chlorination on UV treatment and lamp sleeve fouling rates. The CVA is an unfiltered water supply from the Quabbin Reservoir which provides an average flow of 16 MGD to several communities in western Massachusetts. UV will provide the second means of primary disinfection that is required for unfiltered surface water supplies under the Long Term 2 Enhanced Surface Water Treatment Rule.
- Lake Whitney Water Treatment Plant, South Central Connecticut Regional Water Authority (RWA). Mr. Henderson was the project manager for the new 15-mgd Lake Whitney water treatment plant design for the Regional Water Authority, New Haven, Connecticut. The plant will have an innovative treatment process including: dissolved air flotation (DAF), ozonation, and deep bed granular activated carbon (GAC) filters with the ability to add UV disinfection in the future. In addition the treatment facility is being designed with a ground source heat pump heating system, a "green" vegetated roof system, a natural stormwater and site runoff treatment system and a number of other ecologically and environmentally friendly features that will make this an educational model for ecological designs. The LWWTP is replacing an existing 100 year old slow sand filter plant that is located in a very publicly sensitive area. Therefore, the cornerstone of the project is public involvement and community relations, to ensure that the plant can be sited without difficulties. The architectural features of the plant are being designed by Steven Holl Architects and the project has been selected



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for an international architecture exhibit on Architecture and Water at New York's Van Allen Institute of Architecture.

- Shipyard Development Desalination Facility, Massachusetts American Water Works Company, Hingham, Massachusetts. Project manager for the site selection and conceptual design 0.5-mgd seawater desalination facility. The study evaluated permitting, water quality, and hydro-geology in selecting a site and developing preliminary capital and operating cost estimates for a desalination facility to augment Hingham's potable water supply. The study included water quality sampling and bench scale testing to look at both a direct sea water intake and a saltwater infiltration intake to determine the intake impacts on process requirements and capital and operating costs.
- Walnut Hill Water Treatment Plant, Massachusetts Water Resources Authority (MWRA), Boston, Massachusetts. Project manager for the site selection and conceptual design of a 405-million gallons per day (mgd) filtration facility and a 50-million gallon (mg) clear well for the MWRA. The process facilities include dissolved air flotation clarifiers, ozonation, biologically active carbon filters, and corrosion control. The conceptual design includes the evaluation and optimization of process performance and design criteria, as well as facilities layout and control strategies.
- Design manager for final design of chemical feed systems, residuals treatment and handling systems, the supply system intake modifications and rehabilitation, and the plant waste system for the Walnut Hill WTP.
- Design manager for rehabilitation of the 100 year old Wachusett Aqueduct Intake to replace existing manual control valves and piping with modern automated valves and piping. The project required the demolition of existing 48 inch gate valves and turbine generator piping in this Historic Landmark facility. New sleeve valves and piping were designed to control flows from 25 mgd to 325 mgd and to burn more than 100 feet of excess hydraulic head without damage to the valves, piping or historic structure and will be used as a stand-by water supply for the Walnut Hill WTP.
- Design Manager for the rehabilitation and upgrade of the 35 year old Cosgrove Intake and Power Station, including maintenance on all intake screens and sluice gates, rehabilitation of the existing Turbine Power Generators, replacement of existing Howell-Bunger valves with new, fully automated sleeve valves capable of providing flows of up to 450-mgd to the Cosgrove Tunnel.
- Project manager for the evaluation and conceptual design of renovations to rehabilitate the 100-year old Wachusett Aqueduct. This 100 year old 14 ft diameter, horse shoe shaped gravity aqueduct is 9 miles long. Alternative methods of rebuilding, slip lining, cleaning and



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relining, and/or grouting this stand-by aqueduct were evaluated and a shotcrete liner was recommended as the most cost-effective repair for the aqueduct.

- **Water Treatment Plant Evaluation, Lee Massachusetts.** Expert review of treatment process, hydraulics, capital costs and design costs for a 1-mgd water treatment plant and 1.6 million gallon water storage tank. The new treatment facility failed to perform as intended due to a number of design and construction deficiencies. Hydraulic control improvements, blending of raw water supplies, modifications to the chemical feed and modifications to the process controls were recommended and implemented to correct the performance problems with the treatment facility.
- **Water Treatment Plant, Allentown, Pennsylvania.** Designed a 30-mgd upgrade/expansion of the city's conventional water treatment plant that incorporated high-rate, inclined-plate settlers and dual media filtration. Treatment options for two springs with a combined capacity of 13-mgd were evaluated and designed to satisfy the state's treatment requirements for groundwater under the influence of surface water. The design received the 1998 **Diamond Award for Engineering Excellence** from the **Consulting Engineers Council of PA for Innovation in Water Treatment Plant Design.**
- **Water Treatment Plant, Patriot Paper Corporation, Hyde Park, Massachusetts.** Designed a 3.25-mgd adsorption/clarifier filtration water treatment plant to treat water from the Neponset River for use by Patriot Paper as process water. This design/build project required the piloting of three different process systems, including dissolved air flotation clarifiers, to determine the most cost-effective treatment process and the necessary design criteria.
- **Water Treatment Plant Evaluation, Burlington Vermont.** Expert review of treatment process and plant performance as part of comprehensive performance evaluation for the City of Burlington's water treatment plant. The focus of the evaluation was to determine if the 1970's facilities including super pulsator high rate clarifiers and shallow sand automatic backwash (ABW) filters could perform adequately and reliably to produce water with a turbidity of less than 0.5 NTU for the city's drinking water supply as well as supply to an IBM chip factory.
- **Groundwater Facilities, Stoughton, Massachusetts.** Responsible for the exploration testing, design, and development of the remaining groundwater supplies within the town. This work included a town-wide hydrogeology study, the testing, permitting and design of the required pumping and treatment facilities for the Cedar Swamp well field, and a fractured bedrock test well investigation program. As part of an evaluation of the town's overall water supply system, a distribution study has also been completed.
- **Water Treatment Plant, Kennebec Water District, Waterville, Maine.** Project manager/engineer for the piloting and design of a 12-mgd adsorption clarifier/filtration water



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treatment plant. The design and construction of two 6-mg and one 4-mg pre-stressed concrete water storage tanks are also a part of this project.

- **Water Facilities Improvement Project, Shrewsbury, Massachusetts.** Project manager for the water facilities improvement project, which included the design of a 4.4-mgd water treatment plant designed to remove volatile organic chemicals, control dissolved manganese, and lower the corrosivity of the water from the largest single groundwater production well in Massachusetts. Also responsible for the design of two large diameter gravel packed wells to augment the town's water supply, a computer analysis of the town's distribution system, and the design of a new 1.25-mg steel water storage tank. Currently designing a new 1-mgd booster pumping station for Shrewsbury. Also currently the project manager for the design and construction of a 1.25-mg pre-stressed concrete water tank for the town.
- **Teaching Assistant - Lenox Institute of Research, Lenox Massachusetts.** Taught international students and engineers water chemistry and process engineering for dissolved air flotation (DAF) water treatment facilities and equipment.

Groundwater — State

- **Hydrogeologic Assessment and Groundwater Management Study, Camden, New Jersey.** Project engineer for a hydrogeologic assessment and groundwater management study for the New Jersey Department of Environmental Protection, which won the 1988 American Consulting Engineering Council National Excellence Award for environmental studies. In this study of the greater Camden Metropolitan area, coordinated the field investigations and the preliminary design work required to establish a regional groundwater management and water supply plan, as well as the 54-mgd water treatment plant and large diameter distribution facilities required to implement the recommended plan.
- **Well Projects, Massachusetts.** Project engineer for a 2-1/2 inch test well investigation and the design of three 12 by 8-inch gravel packed production wells and a pumping station for Attleboro, Massachusetts. Also the project engineer for the design, installation, and new source approval process for a fractured bedrock water supply well for MIT/Lincoln Laboratories in Groton, Massachusetts.

Design/Feasibility Study — State

- **Preliminary Design and Feasibility Study, Rhode Island.** For the Rhode Island Water Resources Board, conducted a preliminary design and feasibility study of a 10-mile long, large diameter (24 to 42-inch) transmission main and pumping facilities to convey potable water from Providence, Rhode Island, across the Narragansett Bay to the east bay communities of Barrington, Bristol, and Warren. For the Bristol County Water Authority, was involved in the final design of the cross-bay pipeline and was responsible for the final



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design of an 8.2-mgd booster pumping station required to deliver water to portions of the east bay communities.

Water — International

- **Water and Wastewater DB Proposal, Iraq Reconstruction Program.** Process lead design engineer to evaluate, assess and design a 5 mgd brackish water desalination treatment plant and develop cost estimates for an Indefinite Duration Indefinite Quantity (IDIQ) DB proposal for the \$1.1 Billion Iraq Reconstruction Program. The project entailed collecting, analyzing and bench scale testing of water quality samples from the Euphrates River near Al Ramadi Iraq and selecting the most reliable and appropriate process design to meet the project objectives. The selected treatment process included Pall membrane pretreatment followed by Reverse Osmosis.
- **Wadi Main Treatment Plant, Amman Jordan.** Process lead design engineer to evaluate, assess and design a 10 mgd brackish water desalination treatment plant and develop cost estimates for a firm fixed price design build proposal. Both high rate conventional and micro-filtration membrane pretreatment systems were evaluated to treat the feed water for Reverse Osmosis membranes required for desalination. Super pulsators, actiflow and up flow clarifiers were compared with Norit and Zenon membrane systems for the RO pretreatment process.
- **Alto Boa Vista Water Treatment Plant, Sao Paulo, Brazil.** Project manager for 1-year pilot study to investigate process improvements for the plant. The study investigated process modifications to address recurring and increasing problems of taste and odor and to increase the plant capacity from 12 m/s to 16 m/s. The study recommended the addition of new potassium oxidation chemical feed systems, conversion of the existing sedimentation basins to two-tray clarifiers, the addition of intermediate ozonation facilities, and the conversion of the existing anthracite/sand filters to granular activated carbon filters. Developed a complete construction phasing plan to accomplish \$100-million capital improvement plan while maintaining operations at the 30-year-old treatment plant.
- **Residuals Treatment Facility, Mansuora Egypt.** Performed an evaluation of residuals handling and treatment alternatives for the 55-mgd Mansuora WTP and developed preliminary design of sand drying beds sized for the seasonally variable residuals production and the seasonal climate variations.
- **Water Treatment Plant Preliminary Design, Al Awat Jordan.** Evaluated treatment alternatives for three spring fed water supplies. Developed preliminary designs for membrane filtration and UV disinfection of the three supplies with a combined capacity of 2.2 mgd.



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PROFESSIONAL ORGANIZATIONS / ASSOCIATIONS

American Society of Civil Engineers
Chairman, 1998 ASCE National Convention, Local Organizing Committee
ACEC Environmental Affairs Committee
Boston Society of Civil Engineers
- Management Committee, Chair
American Water Works Association
New England Water Works Association
- Groundwater Committee
- Filtration Committee, Vice Chair
- Program Committee
- Ad Hoc Committee on Stage 2 DBP/LT2 Rule
National Water Well Association
Water Environment Federation

