



William H. Hover, P.E.
Senior Principal/Director of Risk Management

RESUME

Education

B.S., 1977, Civil Engineering,
Northeastern University
M.S., 1979, Civil Engineering,
University of Connecticut

Professional Registrations

1985, Professional Engineer,
Connecticut, 13667
1987, Professional Engineer,
Massachusetts, 34662
1990, Professional Engineer,
South Carolina, 13714
1995, Professional Engineer,
Vermont, 6940
1997, Professional Engineer,
New York, 074410

Areas of Specialization

Foundation Engineering
Civil Engineering
Dam Engineering
Braced Excavations
Bridges & Highways
Landfill Engineering
GeoEnvironmental Engineering

Summary of Experience

William Hover's areas of expertise include: analysis and design of dam rehabilitation; decommissioning of dams; site investigations; underpinning design; shallow and deep building foundation design; slope stability analyses; utility engineering; design of braced excavations; design and construction of ground improvement techniques such as preloading, surcharging, wick drains, and grouting; bridge foundation and highway studies; engineering analyses for settlement, bearing capacity, groundwater flow, and lateral pressure; and studies relative to subsurface environmental issues. Relevant project experience includes:

Relevant Project Experience

Mr. Hover's areas of expertise include static and seismic analyses of existing embankment dams, hydraulic fill dams, gravity dams, stonewall-earth dams, rockfill dams, and timber crib dams; permitting, design and preparation of contract documents for remedial repairs and decommissioning; stability and seepage analyses; seepage control by grouting, pressure relief wells and seepage collection; design of new spillways and hydraulic improvements; construction engineering, performance of dam break analyses, preparation of inundation maps and emergency action plans. Relevant project experience includes:

Principal-in-Charge, Spillway Improvements, Lakeville Reservoir Dam No. 3, Salisbury, Connecticut GZA provided responsive field investigations and design services for expedient repair of the existing un-reinforced concrete spillway including reconstruction of a section that developed a diagonal crack that extended through the spillway and had displaced. Surface deterioration of a second area of the spillway was also recommended, including removal of deteriorated surficial concrete and repair with epoxy modified cement material.

Principal-in-Charge, Inspection and Evaluation of Dam Safety Program for 29 Privately Owned Dams, Western Connecticut and New York. GZA performed safety inspections of 29 water storage and supply dams for a private utility client. They range in size and type from large, high hazard concrete gravity and earth embankment dams more than 100 feet high and 1,000 feet long, to small, low hazard stone masonry and/or earth dams less than 10 feet high. The dams were constructed between about 1890 and 1966, with most constructed before 1935.

The primary objective of GZA's services was to provide the client with a management tool to develop a strategy and plan for continued safe operation and maintenance of their dams. To address this objective, GZA developed a tabular summary of a program of recommended supplemental maintenance activities, engineering investigations, hydrologic and hydraulic investigations, emergency action planning, improvements, repairs and periodic inspections. Activities were prioritized based on condition of dam, hazard potential and reservoir use.

Principal-in-Charge, Evaluation of Seepage at Reservoir No. 2 Dam, West Hartford, Connecticut. GZA was engaged by the Metropolitan District in Hartford, Connecticut, in 1995 to develop an opinion of the



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causes of observed local seepage breakouts in the downstream slope of the dam, and the potential impacts and consequences. GZA installed piezometers, undertook seepage and stability analyses, identified the most likely causes of the seepage, recommended a program of further monitoring, and developed recommendations for further actions for different reservoir operating scenarios.

Project Manager, Design of Repairs, MacKenzie Reservoir Dam, Wallingford, Connecticut. Analysis and design of pressure relief wells and alluvial grouting and toe drainage for seepage control, and new emergency spillway and hydraulic control gate valves for a 30-foot-high earth dam. Prepared project plans and specifications, and managed permitting.

Project Manager, Goodwin Dam, Hartford, Connecticut. Dynamic and static stability analysis of a 140-foot-high zoned earth- and rock-fill dam for compliance with FERC requirements. Design of controlled blasting program at bedrock abutments for powerhouse, as part of retrofit to hydroelectric power.

Project Manager, Analysis and Design of Phase II Repairs, Park Pond Dam, Winchester, Connecticut; and Black Rock Pond Dam, Watertown, Connecticut. Design of repairs to two earth dams, owned by the State of Connecticut, and measuring 30 and 20 feet high, including flattening of embankments, construction of toe drains, replacement of low level outlets and blanketing of upstream slopes.

Associate-in-Charge, Preliminary Design of Repairs, Litchfield Reservoir Dam, Goshen, Connecticut. Safety inspection and preliminary design of repairs to a 400-foot-long, 10- to 30-foot-high stone wall/earth dam to address stability and inadequate spillway capacity.

Principal-in-Charge, Livermore Dam Breaching, Connecticut. GZA designed and prepared permit applications to the State of Connecticut Department of Environmental Protection and U.S. Army Corps of Engineers for decommissioning of this 300-foot long, 10-foot high earth dam. The dam was severely deteriorated, with numerous sinkholes, significant seepage and no freeboard with reservoir at spillway crest due to a deteriorated stone masonry wall along the dam crest. Designed a partial breach with stream channel improvements to restore the brook to a more natural, free-flowing condition. Improvements included environmentally friendly channel stabilization measures such as stone weirs, coir rolls and boulder clusters to secure stream banks, provided diverse aquatic habitat, and hydrologic conditions conducive to the longevity of wetland plant species.

Principal-in-Charge, Segar Dam Breaching, Kent, Connecticut. GZA prepared preliminary design for the decommissioning of this 15-foot-high, 200 foot long earth dam which was of significant hazard potential. The dam was in fair to poor condition with inadequate freeboard, substantial seepage, steep downstream slopes and inoperable low-level outlet. Designed a partial breach with local stream channel and wetland improvements, to restore the original break to free-flowing conditions in a natural manner. Obtained permits from CTDP and U.S. Army Corps of Engineers. Provided construction oversight services.



Peter H. Baril, P.E.
Principal/Hydrologic Engineer

RESUME

Education

B.S., 1978, Biology, Fairfield University
M.S., 1980, Hydrology,
University of New Hampshire

Professional Registrations

2001, PE, MA, 41619
2003, PE, ME, 10393
2003, PE, CT, 23654
2002, PE, NH, 10895

Areas of Specialization

Dam Engineering
Surface Water Hydrology
Groundwater Hydrology
Open Channel Hydraulics
Emergency Action Planning
Environmental Site Evaluations
Contaminated Soil Management
Environmental Permitting

Summary of Experience

Mr. Baril specializes in urban hydrology and flood control analysis and design. He is a Licensed Professional Engineer with over 28 years of experience in the fields of dam and water resources engineering. He has specific experience in the areas of surface water hydrology and open channel hydraulics. He is well versed hydrologic processes including the use of the latest state-of-the-practice computer applications including rainfall/runoff models such as HEC-WMS, TR-20 and HMR-52, as well as hydraulic modeling of riverine systems using HEC-RAS and the National Weather Service dam break simulation program (DAMBRK). Much of his project experience is focused in the areas of dam safety inspections, emergency action planning and design/improvement of spillways and related hydraulic structures. Mr. heads GZA's Norwood Office's Water Resources Team and is currently Principal-in-Charge for a number of Phase II Dam Safety Investigatory Studies and remedial design repair projects.

Relevant Project Experience

Principal-in-Charge, Phase II Detailed Evaluation of Nepaug Reservoir Dams, New Hartford, CT. (2007 – 2012) Under task order assignment with The Metropolitan District (Hartford, CT), Mr. Baril had direct oversight of a detailed engineering safety inspection and facilities planning study for Nepaug Reservoir Dam. This 90 year old facility is one of the District's main water supply reservoir servicing the greater Hartford region. GZA work involved visual inspection of this 112 foot high concrete gravity dam and related embankment structures (Phelps Brook Dam & East Dike). GZA coordinated sub-contractor field activities including underwater diving and ROV inspection of intake structures and structural inspection of the bridge spanning the Nepaug spillway. Other engineering aspects of the project include drilling of concrete and underlying bedrock as well as shear testing of core samples. Critical analyses include detailed spillway design flood studies to access capacity under the full PMF as well as embankment and gravity section stability evaluations under static and seismic loading conditions. Results of GZA's work are being used by the District for ongoing capital planning. Construction is tentatively scheduled for 2015.

Principal-in-Charge, Dam Safety Repairs at West Hartford (CT) Reservoir Dam No. 2 (2011-2013) Mr. Baril oversaw the design and environmental permit applications for repairs at the West Hartford Reservoir No. 2 Dam. The impoundment has been lowered for the past 15 years due to persistent seepage through the earthen embankment. GZA's design addressed embankment seepage and slope stability issues as well as provide sufficient spillway capacity to pass the Spillway Design Flood and upgrade outlets works to eliminate the original (100-year old) charged pipes through the embankment. Mr. Baril is overseeing the design repairs that will include regrading of downstream face including installation of toe drains for improved stability and seepage control; repairs to low level outlets to provide gate control on upstream side of dam; addition of an auxiliary spillway to provide sufficient capacity and minimum freeboard under the design flood (full PMF), and breaching of a division dike to allow water to flow from the larger main basin to the new auxiliary spillway. The rehabilitation was completed in 2013.



Principal-in-Charge, Design Repairs for Grupes Reservoir Dam, New Canaan, Connecticut. (2012-present) Under contract with the First Taxing District Water Dept. (Norwalk), Mr. Baril directed a detailed field and engineering analyses investigations to provide recommendations for improvements to this 140 year old, stone masonry dam. The dam is a water supply reservoir for the District. GZA is currently developing a final design bid package for stability repairs, upgrades to spillway capacity, and installing three new slides gates into the existing gatehouse. Construction of the improvements is slated for 2015.

Principal-in-Charge, Dam Safety Evaluations at West Hartford (CT) Reservoir Dam Nos. 1, 2, 3, 5, & 6. (2008 - 2012) Working under a task order contract with Water Supply Division of The Metropolitan District, Hartford, CT, Mr. Baril was in charge of a \$300,000 detailed inspection and facilities planning study of the Districts oldest distribution reservoirs. These earth embankment structures were all built in the mid- to late 1800s and still play a vital role in providing potable water to the greater Hartford community. This comprehensive assessment includes visual inspections, underwater diving and ROV surveys, existing spillway capacity analysis and structural stability and seepage assessment for each impoundment. Of special importance is GZA's assessment and recommendations for improvements of each dams low level outlet works. Results of these studies formed the basis of remedial design and construction work being conducted over the next several years to bring the dams into full compliance.

Inspection of Aquarion Co. Dams, Western Connecticut and New York. Mr. Baril was part of GZA field team which performed safety inspections of 29 water storage and supply dams for Aquarion Company of Connecticut (formerly Bridgeport Hydraulics). The dams ranged in size and type from large, high-hazard concrete gravity and earth embankment dams more than 100 feet high and 1,000 feet long, to small, low hazard stone masonry and/or earth dams less than 10 feet high. The dams were mostly constructed before 1935. Mr. Baril was part of the GZA team that provided recommendations for supplemental maintenance activities, engineering investigations improvements, repairs and future periodic inspections.

Principal-in-Charge, Wachusett Dam Spillway Improvements, Clinton, Massachusetts. (2005-2008). The Wachusett Dam is a critical element in the Metropolitan Boston Water Supply system. The stone dam and two earthen dikes were designed in the 1890s and constructed at the turn of the century. Changes in the design standards for the spillway test flood and seismic conditions for the dam and dikes resulted in a design study to recommend improvements. The spillway capacity was inadequate for the increased inflow generated by an HMR52-based Probable Maximum Flood (PMF). As part of the design team, Mr. Baril evaluated and compared various combinations of spillway discharge channel improvements, crest modifications, and reservoir rim raising. Aesthetic constraints to maintain the character of the original structures were also factored into the design process. Mr. Baril was the Principal-in-Charge, responsible for the preparation of final design drawings and specifications for the Massachusetts Water Resources Authority (MWRA). He also took the lead in bringing the project successfully through the MEPA review process. The recommended plan was successfully constructed in 2008.

Principal-in-Charge, Combustible Coal Waste Impoundment Safety Inspections, Nationwide. (2010 to 2012) Mr. Baril coordinating and conducting dam safety engineering inspections of combustible coal ash impoundments for the United States Environmental Protection Agency (EPA) as part of a nationwide program under the Response Engineering and Analytical Contract (REAC) being managed by Lockheed Martin. These inspections, conducted under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) are in response to the December 2008 coal ash dike failure at TVA/Kingston, Tennessee.

Principal-in-Charge, Lake Lashaway Dam & Bridge Rehabilitation Design, East Brookfield, Massachusetts (current). Mr. Baril and the GZA design team is working with the Town on this expedited repair to concrete spillway weir and severely eroded discharge channel that is integral with the Route 9 Bridge. The design and eventual construction (set for the Fall of 2010) is being coordinated with the Massachusetts Dept. of Transportation (MADOT), who will be doing concurrent bridge deck repairs.

Senior Hydrologic Engineer, Mill Pond Dam & Bridge Repairs, Egermont, Massachusetts (2008). Mr. Baril was part of the GZA design team working under subcontract with TranSystems for the dam repair and adjacent State Route 41 Bridge replacement. Oversaw detailed hydrologic & hydraulic design flood analysis



for the Karner Brook, which passes under this MADOT bridge. Project included close coordination with MADOT engineering group.

Principal-in-Charge, Mass. Water Resources Authority Dam Repair Contract 7211, Metropolitan Boston (current). Mr. Baril heads a multidisciplinary engineering team which recently begun detailed assessment and design activities for the repair of the six of the Authority's historic water supply dams located through the metro Boston area. He will also oversee the construction phase services for the repair work to be executed between 2011-2012 for Foss, Weston, Sudbury, Waban, Chestnut Hill and Wachusett Open Channel Lower Dams. All of these impoundments were part of the original water supply storage system built in the late 1800's and early 1900's. The work at the Foss Reservoir Dam will include supplementing existing spillway capacity by designing and installing a labyrinth-shaped fuse gate system.

Principal-in-Charge, Upper Mystic Lake Dam Design Repair, Arlington, Massachusetts (2008-present). Under contract with the Mass. Dept. of Conservation & Recreation (DCR), Mr. Baril is overseeing this extensive design repair for this 140 year old structure. GZA utilized FERC-developed techniques to perform a Potential Failure Mode Analyses (PFMA) for the dam in conjunction with the Owner. Using that information, GZA prepared an Alternatives Analysis which examined multiple options for repair, as well as the "dam breach" option. GZA has recommended the construction of a new auxiliary spillway, the addition of two crest gates for water control, slope flattening, grouting, seepage collection, and enhanced riprap protection. A fish ladder will also be constructed at the dam to permit the passage of alewife and other anadromous fish which spawn in the Upper Lake.

Value Engineer Team Member, Reconstruction of Gilboa Dam and Low Level Outlet, Catskill Region, New York. (2007 & 2009). Mr. Baril was part of a panel of experts, hired by the New York City Office of Management & Budget, to provide detailed engineering review of the proposed improvements the NYCDEP's Gilboa Dam. Constructed between 1919 and 1927, the dam created the Schoharie Reservoir impoundment which is a key component of the City's Water Supply System. City of New York proposed to reconstruct the Gilboa Dam and its appurtenances to ensure its operation for another 100 years and to meet the current NYSDEC dam safety guidelines for existing dams. Mr. Baril evaluated the hydrologic and hydraulic aspects of the proposed reconstruction during week-long value engineering sessions held both at the 30 and 60% design phase.

Principal-in-Charge, Knightville Dam Hydrologic Deficiency Study, Huntington, Massachusetts. Mr. Baril is directing a hydrologic review of the spillway capacity for the Corps of Engineers' Knightville Dam, a 160-foot high, 1,200 foot long earthen flood control structure located in western Massachusetts. Mr. Baril and his engineering staff are re-assessing the spillway design flood hydrograph for the 162 mi² water shed and estimating the magnitude of "Threshold Flood". As part of the work, GZA will evaluate various structural modifications to the spillway to pass the design flood (full PMF). Review of outlet works operation and conduct dam break routing simulations is also part of GZA scope of work with the New England District of the Corps

Principal-in-Charge, Centennial Dam Design Repair, Dedham, Massachusetts. (2008-present). Working with the dam owner and operator, the DCR, Mr. Baril heads a team of GZA engineers currently conducting a Phase II safety investigation leading to significant design repairs to this high hazard dam. The dam formerly known as the United Waste Company day is a 20.5 foot high earthen embankment/masonry gravity structure located on Mother Brook. The dam is located within a large former mill building complex which now houses condominiums and apartments. The dam has been determined to be in poor condition and is in need of rehabilitation. The final design is underway and will include: embankment overtopping protection; new slide gate controls for the mid-level outlet and structure repairs to the stone masonry downstream face.

Principal-in-Charge, Charles River Dam, South Natick, Massachusetts. (2008 to present) Mr. Baril is overseeing a Phase II and remedial design effort for this town-owned dam originally constructed in 1934. Phase II investigations conducted in 2008 included, exploratory borings in the earth embankment, spillway capacity analysis, and underwater inspection of the currently inoperable slide gate low level outlet. Final design is planned for the Spring of 2009.



Principal-in-Charge, Allen Pond Dam, Walpole, Massachusetts (2008). Working for the Town of Walpole, Mr. Baril and a team of GZA dam engineers have recently complete a Phase II investigation of this 30year old flood control structure. Embankment seepage noted on the downstream face of the embankment during a routine Phase I-level inspection, led to the execution of soil borings, permeability tests as well as seepage and stability analyses.

Deputy Project Director, Investigation of Catskill and Delaware District Dams. (1998 – 2006) Mr. Baril had day-to-day DEP liaison and project management responsibilities for this investigatory contract, including: task/schedule oversight, coordination with sub-consultants, and preparation of partial payment requests. He was the technical lead for all engineering work associated with hydrology, hydraulics, PMF and related spillway capacity studies, and Emergency Action Plan development. His role also included coordinator of intake and release chamber inspections and underwater surveys and facilitation of Hydrology, EAP, and Inspection Reports.

Principal-in-Charge, Phase 1 Engineering Inspection of Massachusetts DCR - Owned Dams (2006). Working under a task order contract for the Mass. Dept. of Conservation and Recreation (DCR) – Office of Dam Safety, Mr. Baril was in responsible charge for conducting 60 Phase 1 – level engineering inspections of DCR-owned dams located throughout the Commonwealth. The work provided the DCR with updated, formal Phase 1 inspections for DCR-owned dams in order for DCR to maintain compliance with State Dam Safety Regulations pertaining to inspection frequency. GZA’s visual dam inspections culminated in evaluation and recommended remedial actions items presented in separately bound Inspection / Evaluation Reports. Over a dozen GZA engineers were involved in this two month long project.

Publications

Baril, P. “Case Studies of Dam Break Modeling for Several Large New England Dams”, Paper presented and published in the proceedings of the American Institute of Hydrology, 1996 Annual Conference: Hydrology and Hydrogeology of Urban and Urbanizing Areas, Boston, Massachusetts, April 21-24, 1996.

Baril, P. “Inspecting the Core Water of the Big Apple”, article published in *International Water Power and Dam Construction*, Wilmington Publishing Ltd., Kent, UK, June 2001.

Baril, P., Leone, D.L., Costa, P. “*Spillway Capacity Analyses for New York City Dams in the Catskill and Delaware Watersheds*”, Paper presented and published in the proceedings of the United States Society on Dams (USSD), 2003 Annual Conference, Charleston, South Carolina, April 16, 2003.

Lecturer (2005), University of Connecticut, Civil & Environmental Engineer, Masters-level course in Earth Dam Engineering, topics covered: Hydrology, Hydraulics, and Emergency Action Planning.

Speaker (2008), *Wachusett Reservoir Dam Spillway Improvements*, presented at the Boston Society of Civil Engineering Section – Geo-Institute/Environmental & Water Resources Group Meeting, January 29, 2008, Boston, MA

Speaker (2008), *More Capacity Please! Improvements to Boston’s Wachusett Reservoir*, presented at the Annual Conference of the Association of State Dam Safety Officials, September 29, 2008, Indian Wells, CA Indian Wells, CA,

Lecturer (2010), University of Rhode Island, Civil Engineering Senior Class Capstone Project: Hydrology & Hydraulic Concepts for the Design of Fisherville Brook Dam.



Matthew A. Taylor, P.E.
Associate Principal

RESUME

Education

B.S., 1994, Civil Engineering,
University of Rhode Island
M.S., 2000, Civil Engineering
Northeastern University

Professional Registrations

2001, Professional Engineer
Massachusetts, 41669
2001, Professional Engineer
Maine, 9901
2002, Professional Engineer
Rhode Island, 7599
2008, Professional Engineer,
Connecticut, 26480
2013, Professional Engineer,
New Jersey, 24GE05100000

Areas of Specialization

Dam and Levee Engineering
Geotechnical Engineering
Subsurface Explorations
Construction Monitoring

Professional Activities

Geo-Institute of the Boston Society of Civil
Engineers Section, Past Chair
American Society of Civil Engineers
Association of State Dam Safety Officials
United States Society on Dams
Environmental Business Council
Dam Management Committee
Leadership Team
Society of American Military Engineers

Summary of Experience

Mr. Taylor has over nineteen years of geotechnical engineering experience which include dam safety inspection and rehabilitation design, dam removal, levee safety inspections and evaluations, subsurface investigations and instrumentation installations, foundation design, lateral earth support, controlled blasting, ground improvement techniques, settlement analyses, seepage and slope stability analyses, gravity stability analyses, liquefaction analyses, technical specifications and contract documents preparation, environmental permitting, and construction monitoring and documentation. Prior to joining GZA, Mr. Taylor worked for CDM and The Geotechnical Group, Inc. where his geotechnical work focused on dam safety inspections, water/wastewater treatment plants, and commercial/office/retail developments.

Relevant Project Experience

Project Manager, Phase II Evaluations, Final Design and Permitting of Nepaug Dam, Phelps Brook Dam and East Dike - The Metropolitan District, New Hartford, Burlington, and Canton, Connecticut. Mr. Taylor managed the Phase II engineering evaluation, final design and permitting for the 100-year old, 113-foot tall cyclopean concrete, curved, gravity dam (Nepaug Dam), 65-foot tall earthen embankment Phelps Brook Dam and the 30-foot tall earthen embankment East Dike. Tasks included testing borings, geophysical exploratory methods, vibrating wire piezometer installations, detailed hydrologic and hydraulic analyses, 2D and 3D analytical gravity stability analyses of Nepaug Dam, and seepage, slope stability, and liquefaction analyses for Phelps Brook Dam and East Dike. A detailed relief well inspection program and in the drilling of test borings and installing vibrating wire piezometer were performed inside the inspection gallery at Nepaug Dam. Mr. Taylor managed a Subconsultant who performed a Deterministic Seismic Hazard Analysis for the Nepaug Dam. Final design included the preparation of a completed bid package including final plans and specifications for repairs to each dam. The repairs to Nepaug Dam will include the installation of 1,500 kip design capacity, post-tensioned, strand anchors passive bar anchors, bridge repairs, plunge pool repairs, and embankment raising. Permitting has included filing with CT DEEP Dam Safety Division, US Army Corps of Engineers, and CT NDDB. Construction will begin in the fall of 2014.

Project Manager, FERC Part 12D Dam Safety Inspection- -The Metropolitan District- Goodwin Dam, Hartland, Connecticut. Mr. Taylor performed the field inspection and detailed review of the existing information including previous FERC Part 12D inspections, design and construction information, hydrologic and hydraulic analyses, and stability analyses. Mr. Taylor managed the Potential Failure Mode Analysis (PFMA) update and review as well as the updating of the Supplemental Technical Information (STI) Document for the dam. Evaluated the MDC's instrumentation and monitoring program at Goodwin Dam and prepared a Dam Safety Surveillance and Monitoring Plan (DSSMP) and Dam Safety Surveillance and Monitoring Report (DSSMR). The DSSMP includes a summary of the current instrumentation program. The DSSMR includes an assessment of the available data and recommendations to improve the current program. Both reports are specifically correlated with the PFMA for the dam. Mr.



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Taylor was the primary author of the 6th FERC Part 12D Dam Safety Inspection Report, which was prepared under the supervision of the FERC Approved Independent Consultant: William H. Hover, P.E.

Project Manager, Preliminary Design - Reservoir No. 6 Rehabilitation - The Metropolitan District, West Hartford and Bloomfield, Connecticut. Mr. Taylor managed the Preliminary Design for the 100+ year old, dams and dikes at Reservoir No. 6 in the MDC's West Hartford water supply reservoir. West Hartford Reservoir No. 6 consists of five major components; (1) East (Main) dam; (b) Spillway (c) Southeast Dam, (d) South Dike; and (e) South Dam .The embankments range between 14 and 432 feet tall and range in length from 250 feet to 3,500 feet long. Field tasks included conducting test borings and piezometer installations, wetland flagging and topographic survey, and dive and ROV inspections of low-level outlets. Engineering tasks included detailed hydrologic and hydraulic analyses and spillway augmentation evaluation; seepage, slope stability, and liquefaction analyses; and preliminary design of low-level outlet modifications. A preliminary design report will be generated with a summary of field investigations, engineering analyses, rehabilitation options including an alternatives analysis, identification of permitting requirements, and conceptual cost estimates. The preliminary design report will be issued in the summer of 2014.

Project Manager, Phase I Inspection of Dams, Six City-Owned Water Supply Dams, City of Northampton, Massachusetts. Mr. Taylor has performed Phase I Dam Safety Inspections for the six of the City of Northampton's Water Supply Dams in 2006, 2008, 2010 and 2012. The dams included Francis Ryan Reservoir Dam in Whately, MA, West Whately Reservoir Dam in Whately, MA, Mountain Street Reservoir Dam, Upper Roberts Meadow Reservoir Dam, Middle Roberts Meadow Reservoir Dam and Lower Roberts Meadow Reservoir Dam. All of the dams are all high hazard structures that range in age from 38 to 125 years old. The dams consist of earthen embankments and concrete gravity dams. Mr. Taylor performed the visual inspections and oversaw the preparation of the Phase I Inspection Reports for the six dams. The visual inspections were conducted in accordance with the Commonwealth of Massachusetts's regulations from the Office of Dam Safety. Mr. Taylor prepared Phase I Inspection reports, which included recommendations for repair, improvements or further studies for each dam.

Project Manager, Phase II Inspections/Evaluations, Six City-Owned Water Supply Dams, City of Northampton, Massachusetts. For the City of Northampton, Mr. Taylor managed the execution of six, Phase II Evaluations of the City's water supply dams (2008, 2010, 2011 and 2012). The Phase II Evaluations included the following: topographic survey, wetlands delineations, test borings, borehole permeability testing, piezometers installations, ROV and dive inspection of the low-level outlets, detailed hydraulic and hydrologic analyses, and seepage analyses, slope stability analyses, and gravity method stability analyses. Incremental Damage Assessment/Inflow Design Flood methods were used where appropriate to determine if a less severe spillway design flood was appropriate for the structure. Alternative analyses were performed for each dam and a preferred alternative was selected for dam to address the identified dam safety deficiencies at each dam. Phase II Engineering Evaluation and Alternatives Analysis Reports were prepared and submitted to the City. The estimated repairs to each dam ranges between \$1M and \$4M. Upper Roberts Meadow Reservoir Dam was in Poor condition and was recommended for removal. The other five dams will be rehabilitated as part of the City's capital planning over the next ten years. Mr. Taylor will assist the City in prioritizing the dam repairs projects.

Project Manager, Updated Emergency Action Plans, Six City-Owned Water Supply Dams, City of Northampton, Massachusetts. In 2012, Mr. Taylor managed the updating of the Emergency Action Plans (EAPs) for the six of the City of Northampton's Water Supply Dams. All of the dams are all high hazard structures. GZA had prepared the original EAPs and inundation mapping for the dams in 2007. The updating included converting the EAPs to follow the suggest EAP Format contained in the "Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners"(FEMA 64). Mr. Taylor facilitated a kick off meeting with the City of Northampton and all of the downstream communities, which included Whately, Hatfield, and Williamsburg. Updated emergency personnel contact information was obtained to update the notification flow charts. After the updated EAP's were competed, Mr. Taylor facilitated an orientation meeting with the City and the downstream communities to review the notification procedures in the event of a dam safety emergency at each of the dams. GZA submitted the updated EAP's to the MA-DCR – Office of Dam Safety.



Jonathan D. Andrews, P.E.
Geotechnical Engineer

RESUME

Education

A.S.- *Magna Cum Laude*, 1989, Engineering &
Science Transfer,
Springfield Technical Community College

B.S.- *Magna Cum Laude*, 1991, Civil Engineering,
University of Massachusetts, Amherst
S.M., 1993,
Civil & Environmental Engineering,
Massachusetts Institute of Technology

Professional Registrations

2006, Registered Professional Engineer,
Massachusetts, 46462

2009, Licensed Professional Engineer,
Connecticut, 26993

2012, Licensed Professional Engineer,
Arkansas, 15264

Areas of Specialization

Geotechnical Engineering
Dam Engineering
Construction Monitoring
Braced Excavations
Subsurface Explorations
Structural/Geotechnical Engineering
Hydrogeology

Summary of Experience

Mr. Andrews has been employed at GZA since 1991. His experience includes a variety of environmental, soil and foundation engineering projects. He has acted as a field engineer, project engineer and project manager for projects involving environmental and geotechnical site investigations, foundation engineering, geotechnical design, excavation support system design, reinforced concrete design, marine engineering, hydrogeologic investigations, Phase 1 and 2 dam evaluations, bridge remedial repair, soil and rock testing and instrumentation, nuclear waste storage siting and geotechnical design, and design of repairs to dams and ancillary structures. Relevant project experience includes:

Dam Engineering

Senior Project Manager, Dam Safety Evaluations at West Hartford (CT) Reservoir Dam Nos. 1, 2, 3, 5, and 6, West Hartford, Connecticut. Working under a task order contract with Water Supply Division of The Metropolitan District, Hartford, CT, GZA performed a detailed inspection and facilities planning study of the Districts oldest distribution reservoirs. These earth embankment structures were all built in the mid- to late 1800s and still play a vital role in providing potable water to the greater Hartford community. This comprehensive assessment included visual inspections, underwater diving and ROV surveys, existing spillway capacity analysis and structural stability and seepage assessment for each impoundment. Of special importance was GZA's assessment and recommendations for improvements of each dams low level outlet works. Results of these studies will be the basis of remedial design and construction work over the next several years to bring the dam into full compliance with dam safety requirements.

Senior Project Manager. Six MWRA Dam Repair Projects, Eastern Massachusetts. Mr. Andrews is acting as the Senior Project Manager for an ongoing \$1.5 million contract with the MWRA to provide engineering assessment, final design and construction phase services for upgrades to six of their secondary water supply dams located throughout the metro-Boston region. The most notable safety modification will occur at Foss (No. 3) Reservoir Dam in Framingham, where the 100 year old structure will be retrofitted with a 7-foot high, reinforced concrete Fusegate required to safely pass the spillway design flood (½ PMF), along with structural repairs to the gatehouse masonry to mitigate leakage. To provide sufficient minimum freeboard under design flood conditions at Foss Dam as well as at Weston Dam, GZA has embarked on a design to raise the dams through a combination of earthfill and concrete parapet wall structures. The contract also includes minor repairs at four other MWRA-owned backup water supply reservoirs.

Senior Project Manager, Dam Safety Repairs at West Hartford (CT) Reservoir Dam No. 2, West Hartford, Connecticut. (ongoing) GZA is currently designing repairs and submitting permit applications for repairs at the West Hartford Reservoir No. 2 Dam. The impoundment has been lowered for the past 15 years due to persistent seepage through the earthen embankment. GZA's design is intended to address embankment seepage and slope stability issues as well as provide sufficient spillway capacity to pass the Spillway Design Flood and upgrade outlets works to eliminate the original (100-year old)



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charged pipes through the embankment. The repairs will include regrading of downstream face including installation of toe drains for improved stability and seepage control; repairs to low level outlets to provide gate control on upstream side of dam; addition of an auxiliary spillway to provide sufficient capacity and minimum freeboard under the design flood (full PMF), and breaching of a division dike to allow water to flow from the larger main basin to the new auxiliary spillway.

Senior Project Manager, MWRA Wachusett Dam Spillway Improvements, Clinton, Massachusetts. The Wachusett Dam is a critical element in the Metropolitan Boston Water Supply system. The stone gravity dam and two earthen dikes were designed in the 1890s and constructed at the turn of the century. Changes in the design standards for the spillway test flood and seismic conditions for the dam and dikes resulted in a GZA design study to recommend improvements. The spillway capacity was inadequate for the Probable Maximum Flood (PMF). Mr. Andrews was the Project Manager, responsible for the preparation of final design drawings and specifications for the Massachusetts Water Resources Authority (MWRA). He coordinated the resident inspections services during construction, which includes the installation of a 100-foot long bottom hinged crest gate and earthwork consisting of creating an auxiliary spillway and improvements to the dam's North Dike. The recommended plan has prepared the dam for another century of service.

Senior Project Manager, Ancillary Structures Investigations at Ten MWRA/DCR Reservoirs, various locations in Massachusetts. GZA performed preliminary evaluations of off-dam and through-dam structures such as gatehouses, valves, gates, inlet/outlet structures and pipes, and drainage structures at ten dams located across Massachusetts, including the five largest dams and dikes in the Commonwealth. The preliminary evaluations consisted of non-intrusive surficial inspections, historic document review, and planning of intrusive investigations for each ancillary structure. Further evaluations were chosen by the MWRA at four of the dams. These intrusive further investigations included surveys of gatehouse interiors, exteriors, spillways and training walls using divers and remote-operated vehicles (ROVs), internal (dewatered) pipe inspections using confined space entry techniques, and dewatered wet well inspections using rope-access entry techniques. At one 100+ year old structure, a submerged outlet pipe that was not shown on any of the historic drawings was found during the further investigations. The further investigations included a summary report for each reservoir with condition assessments and future repair, replacement, and monitoring recommendations.

Senior Project Manager Rising Pond Dam, Housatonic, Massachusetts. (ongoing) Responsible for management of long-term piezometer and observation well data collection program. Used a two-dimensional finite element analysis program to model flow conditions under dam spillway. Compared modeled conditions to collected piezometric data. Made predictions of cutoff wall performance based on modeled and collected data. Analyzed pump test data to derive soil permeability parameters for use in model. Acted as field engineer to observe and inspect tiedown installation, sheetpile grouting and vibrations caused by sheetpile removal. Performed remedial investigation of embankment subsidence.

Dam Safety Engineer, Dam Safety Emergency Response, Statewide Massachusetts. In October 2005, heavy rains cause emergency situations at many dams throughout Massachusetts. At the request of the Massachusetts Office of Dam Safety, GZA rapidly inspected more than two dozen poor or unsafe conditions dams as part of the overall emergency inspection effort ordered by the Governor.

Publications & Speaking Engagements

“More Capacity Please! Improvements to Boston’s Historic Wachusett Reservoir Dam” Association of State Dam Safety Officials, Dam Safety 2008 Conference Proceedings, J. Andrews et al.

Speaker (2008), “Wachusett Reservoir Dam Spillway & North Dike Improvements”, presented at the Boston Society of Civil Engineering Section – Geo-Institute/Environmental & Water Resources Group Meeting, January 29, 2008, Boston, MA “

“The Design of a Rotating Annular Flume to Study the Erosion of Cohesive Sediments”, 1993 S.M. Thesis, Massachusetts Institute of Technology

Guest Lecturer (2008 and 2010) University of Massachusetts - Lowell Department of Civil and Environmental Engineering Graduate Soil Engineering class CE14.356.



Thomas E. Jenkins, P.E.
Associate Principal

RESUME

Education

Bachelor of Civil Engineering
Georgia Institute of Technology

Professional Registrations

Registered Professional Engineer
Massachusetts
Connecticut

Affiliations

American Society of Civil Engineers
Boston Society of Civil Engineers
Association of State Dam Safety Officials
North American Lakes Management Society

Areas of Specialization

Freshwater Hydraulic Dredging
Freshwater Mechanical Dredging
Stormwater Management
Hydrologic/Hydraulic Modeling
Flood Control and Protection
Historic Dam Restoration
Water Resources Engineering
Construction Cost Estimation

Summary of Experience

Mr. Jenkins is a civil engineer who serves as an Associate Principal and engineer for GZA, with a focus on projects involving natural and water resource protection, development, and restoration. His extensive background has provided both design and construction experience, with wide exposure to all aspects of civil engineering. This experience record has included the design and construction of commercial, industrial and municipal infrastructure systems and their respective components, especially for water conveyance. Other significant project experience includes dam reconstruction especially historic restoration, levee investigations, channel stabilization and improvement works, flood control facilities, freshwater dredging, stormwater systems, water supply facilities, and in-lake recreational structures.

Relevant Project Experience

Freshwater Pond and Park Restoration Program, Enfield, Connecticut. This project included pedestrian boardwalks and paved walkways, fishing pier, access points for winter activities, landscaping, and structured and hydraulic modifications to the freshwater pond dam.

Mr. Jenkins has served as lead engineer and manager on numerous projects involving floodway determination and floodplain analysis using HEC-2, WSP2, and HEC-RAS. He has over twenty years experience in watershed and stormwater system modeling with TR-20 and HydroCAD®. Mr. Jenkins has recently led the preparation of several Emergency Action Plans (EAPs) for high hazard dams, including dam break modeling and unsteady flow analysis, using HEC-RAS, HEC-GeoRAS, and HEC-HMS. Currently, he is modeling the potential conversion of two-thousand feet of urban perennial stream, converting a closed conduit drainage system into a fully functioning riparian corridor providing enhanced wildlife benefits and aesthetic appeal for a developing municipal parkland setting.

As Associate Principal, Mr. Jenkins has worked closely with the municipal, state, and federal agencies in major water resources projects. He has led design and permitting teams for numerous commercial and municipal dredging and drainage projects. Currently, he is the senior project engineer for the hydraulic dredging of Silver Lake in Berlin and Meriden, for Connecticut DEP, the largest on-going freshwater hydraulic dredging project in New England.

Mr. Jenkins was the project engineer for the reconstruction of Mill Pond Dam in Springfield, MA, a 300-year old structure that is believed to be the oldest dam in Hampden County still in operation.

Mr. Jenkins is well-versed in the preparation of estimates of probable construction cost for civil projects of all types. He interfaces on a regular basis with the firm's environmental personnel and also with other design professionals outside of BEC. His agency experience has included extensive permitting through various State agencies, the USEPA, and the U.S. Army Corps of Engineers. Mr. Jenkins is highly regarded as a technical writer and has authored numerous highly technical reports in lay language for various municipal groups and for political and community leaders.