

Richard T. Hughes, P.E.

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Education

Master's Degree Engineering Science - The Pennsylvania State University - 1990
B. S. Civil Engineering - The Pennsylvania State University – 1981
OSHA Certification Training - December 2011
OSHA Certification Training (30 hour) – December 2018

Professional Registrations

Professional Engineer, Pennsylvania, 1987	Professional Engineer, Ohio, 1994
Professional Engineer, Maryland, 1987	Professional Engineer, New York, 1998
Professional Engineer, New Jersey, 1993	Professional Engineer, West Virginia, 2000

Professional Associations

The Hazard Information Foundation, Inc. 2005-2012

Years Experience

Total Experience - 38 years

Profile

Mr. Hughes has spent his entire professional career in the engineering field. The first 15 years of his career was spent in the architectural and transportation fields designing buildings, roadways, bridges and infrastructure throughout the Mid-Atlantic States. Projects included a bridge over the Nile in Africa and an addition to the CIA in Langley, Virginia.

In the last 20 years he has operated his own engineering firm which has designed over 200 buildings (industrial, institutional and commercial) and has conducted forensic investigations on over 4,000 buildings and over 1,000 accident investigations including a site inspection at Shanksville, Pennsylvania after 9/11 and over 100 automobile, crane, forklift and construction accidents. Mr. Hughes has testified in state and federal courts as an expert in over 100 cases. Mr. Hughes is a licensed engineer in all of the Mid-Atlantic States and has worked in over 20 states.

Mr. Hughes' duties necessitate public speaking, formal presentations, report writing, accident reconstruction and acting as liaison with architects, engineers, developers, contractors and attorneys.

Mr. Hughes has served on technical committees and has published articles in the areas of accidents, construction disputes, concrete, timber and masonry. His current clients include insurance companies, legal professionals, contractors, architects, concrete companies, timber manufacturing facilities, commercial and industrial institutions.

In 2006 Hughes authored a book titled *Building Design and Construction Hazards* and in 2007 a book titled *Residential Construction Disputes*. For five years he was on the Board of Directors of The Hazard Information Foundation Institute of Sierra Vista, AZ. In 2004 he was named Citizen of the Year in his community.

Technical Expertise

Mr. Hughes' background and technical experience includes building and structural design, transportation systems, sewage facilities planning and design, potable water system design, storm drainage design and analysis, dam design and inspection, geo-technical engineering, and construction inspection. He has extensive experience with state, federal, and local codes such as IBC, NFPA, ANSI, Labor and Industry, AASHTO, and the U.S. Army Corps of Engineers requirements and procedures. Mr. Hughes has performed research and design projects for federal, state, and local municipalities as well as private clients and has testified as an expert witness in the areas of civil and structural engineering.

Structures

Mr. Hughes has extensive experience in the design of commercial, industrial and institutional facilities ranging in size from one to twenty stories. Buildings have been designed to include wind and seismic considerations. Projects have been in compliance with various design codes such as BOCA, Labor & Industry and ADA.

PARKING GARAGES

- **Corning Glass Company Parking Garage, Corning, NY (1997)** – Design three-story precast prestressed parking garage.
- **Hershey Medical Center Parking Garage, Hershey, PA (1986)** - Design Engineer for three-level structure for precast manufacturer consisting of precast prestressed concrete with acid-etched facade.
- **City of Lancaster Parking Authority, Lancaster, PA (1987-1990)** - Project Manager for the maintenance, annual inspection, and rehabilitation for four parking garages for the City of Lancaster Parking Authority.
- **Huntingdon State Correctional Facility Warehouse, Huntingdon County, PA (1990)** - Design Engineer for a 40,000 ft.² warehouse facility for storage of hazardous materials.
- **Towson State University Parking Garage, Towson, MD (1984)** - Incorporated vandalism-proof details into the design of a 600 car, three-story parking garage and pedestrian bridge adjacent to student union building.
- **Atlantic City Medical Center, Atlantic City, NJ (1985)** - Designed two-story hospital addition and adjacent three-story parking garage.
- **Morristown Memorial Hospital Parking Garage, Morristown, NJ (1982)** - Designed Two-story 1700 car parking garage.
- **Central Intelligence Agency Parking Garage, Langley, VA (1985)** - Design Engineer for a 1,500-car, three-level parking garage with landscaping planters around perimeter.
- **Green Acres Shopping Mall Parking Garage, Valley Stream, NY (1984)** - Designed two-story parking garage.
- **St. Agnes Parking Garage, Philadelphia, PA (1985)** - Designed three-story precast prestressed concrete parking garage.

- **Jamestown Parking Garage, Jamestown, NY (1994)** - Design Engineer for two-story prestressed concrete parking garage.
- **Corning Glass Parking Garage, Corning, NY (1997)** - Designed three-level, 100,000 ft.² parking garage.
- **City of Hazelton Parking Authority, Hazelton, PA (1985)** - Completed investigation and reported recommendations on cause of internal structure damage.

INDUSTRIAL

- **Goodwill Industries, Falls Creek, PA (2004)**- Designed new 43,000 ft.² facility. Work included mechanical, structural plus permits and site development.
- **Sinterstahl Powdered Metal Plant, Philipsburg, PA (2003)**- Designed 53,000 ft.² manufacturing facility. Work included electrical, mechanical, site development and structural engineering plus permits.
- **City of Lancaster Authority, Beaver Street Facility, Lancaster, PA (1988)** - Rehabilitated one-story facility due to building foundation failures.
- **Kinko's Copy Center, State College, PA (1993)** - Design Engineer for new 15,000 ft.² two-story office building. Work included foundations, superstructure, and site development.
- **Jamestown Paint Company, Jamestown, PA (1994)** - Evaluated existing floor capacities for compliance with BOCA, OSHA, and Labor & Industry standards.
- **Shenango Valley High School Football Stadium, New Castle PA (1994)** - Designed reviewing stands.
- **Monaca Municipal Building, Monaca, PA (1994)** - Design Engineer for a new two-story prestressed concrete and masonry facility.
- **Shippensburg University Water Tower, Franklin County, PA (1985)** - Completed the design and construction observation of a new 250,000 gallon water tank facility. Work investigation, foundation design, and stability analysis. Water heaters were installed as requested by PA Department of General Services.
- **True Value Hardware, Clearfield, PA (1994)** - Completed investigation of potential collapse of metal building due to snow including repair procedures.
- **Rubbermaid Corporation, Winchester, VA (1981)** - Designed two-story office and manufacturing addition to facility.
- **Handley High School, Winchester, VA (1981)** - Designed prestressed concrete and masonry bleachers at football facility.

- **Valvoline Oil Company, East Rochester, PA (1994)** - Design Engineer for new 10,000 ft.² office building including site development, contract documents and construction observation.
- **West Penn Hide, Allentown, PA (1983)** - Design double tee versa space building.
- **Pepperidge Farms, Downingtown, PA (1983)** - Designed two-story addition to factory.
- **Tower America, Jersey City, NJ 1996)** - Designed six-story, 500 car parking garage.
- **Southern, Suitland, Wheaton Metro Stations, Maryland (1998)** - Designed (3) pre-cast concrete terminal stations for the Washington DC Metro System.
- **Riverview Intermediate Unit, Clarion, PA (2001)** - Designed new, two-story, 25,000 ft.² office building and educational center.
- **Pennstar Federal Credit Union, Hermitage, PA (2000)** - Designed new bank building including securing, landscaping and architectural plans.
- **Wickett & Craig, Curwensville, PA (2001)** - Designed two (2) new 20,000 ft.² manufacturing buildings.
- **Lezzer Truss Systems, Curwensville, PA (1999)** - Designed new 20,000 ft.² truss manufacturing plant, including three-phase power system.

OFFICE BUILDINGS

- **Grove City Credit Union Bank, Grove City, PA (1997)** – Design one story addition to bank.
- **Point Spring and Brake Drum, Clearfield, PA (2000)** - Designed new 20,000 ft.² service building, including office and radiant heat system.
- **Pennsylvania State Police Barracks, Indiana, PA (1998)** - Designed 6,000 ft.², one-story office building site plan, architectural, structural, mechanical and electrical plans
- **Labor and Industry Building, Clarion, PA (2001)** - Designed new one-story 8,000 ft.² office building.
- **Mitchell Field Office Building, Mitchell Field, NY (1985)** - Designed four-story office structure.
- **Mineola Office Complex, Mineola, NY (1984)** - Designed four-story parking garage and three-story office building.

CHURCHES

- **St. Timothy's Parish Hall, Curwensville, PA (1998)** - Designed 8,000 ft.², one-story social hall including site plan.
- **Community Baptist Church, Curwensville, PA (2000)** - Designed new, two-story, 10,000 ft.² church.
- **Christian Missionary Alliance Church, Indiana, PA (2001)** - Designed 10,000 ft.², one-story addition to existing church. Work included new sound system.
- **Christ The King Parish Center, Houtzdale, PA (2000)** – Designed new heating, lighting, and cooling system for 20,000 ft.², single story facility. Work included an energy study.
- **West Side Methodist Church, Clearfield, PA (2001)** – Design new lighting for church.
- **Saint Calistas Church, Kane, PA (2002)**- Construction managers on a 2 million dollar, 3-story, 15,000 ft.² addition to existing church.
- **Saint Severin Church, Drifting, PA (2004)** - Design 2,000 ft.² addition to social center and completed energy study.
- **First Community Baptist Church, Curwensville, PA (2000)**- Designed new 15,000 ft.² church including structural, mechanical, electrical and interior.
- **Saint Timothy Catholic Church, Curwensville, PA (1999)**- Designed new 8,000 ft.² classroom and social hall additon. Work included commercial kitchen.
- **Emmanuel Methodist Church, Clearfield, PA (2002)** – Designed 6,000 ft.² social center addition including commercial kitchen.
- **Christian Missionary Alliance Church, Indiana, PA (2002)** – Designed 10,000 ft.² worship center. Work included new sound design, mechanical, lighting and site development.
- **Christian Missionary Alliance Church, Curwensville, PA (2004)** –Designed 12,000 ft.² two-story addition work included gymnasium, kitchen and classrooms, all permits, mechanical, electrical and structural work was apart of project.

INSTITUTIONAL

- **Northeast Middle School, Rochester, NY (1994)** - Design Engineer for design of fascia for three-story middle school.
- **Pennsylvania State University Convocation Center, University Park, PA (1995)** - Design exterior precast facade of facility.

- **Riverview Intermediate Unit, Clarion, PA (1995)**- Designed 40,000 ft.² three-story office building
- **South Rock Apartments, Slippery Rock, PA (2003, 2004)**- Designed (8) 23,000 ft.² student apartment building.

RESTAURANTS

- **Coney Island Restaurant, Indiana, PA (1997)** – Designed 75 seat addition to existing facility.
- **Luigi's Italian Restaurant , DuBois, PA (1997)** – Designed 150 seat to single story Restaurant.
- **Chinese Restaurant , Clearfield, PA (2001)**- Designed 50 seat facility including all permits.
- **Daniels Restaurant, Clearfield, PA (2002)**- Designed 100 seat restaurant including commercial kitchen and all permits.
- **Denny's Beer Barrel Pub, Clearfield, PA (2003)** – Designed new 50 seat addition to existing facility.

HIGHWAY

Mr. Hughes has worked in all phases of highway design including right-of-way acquisition, drainage, pavement design, environmental studies, and plan preparation and construction inspection. Recent projects include:

- **Fatal Flaw Analysis/Corridor Study, Jefferson County, PA (1992)** - Performed a four (4) mile fatal flaw analysis corridor study for proposed interchange and corridor linking I-80 to DuBois-Jefferson County Airport. Duties included preparation of preliminary cultural resources review form, traffic count study, supervision of environmental study, and preparation and presentation of report.
- **Improvements to "A" and "B" Streets, South Philipsburg Borough, Centre County, PA (1992)** -Design Engineer for improvements to existing streets in South Philipsburg Borough including hydrologic and hydraulic design, utility investigation and relocation, preparation of bid documents, and on-site inspection services.
- **Old Boalsburg Pike, Harris Township, Centre County, PA (1992)** - Design Engineer for reconstruction of existing roadway including drainage, resurfacing, striping, construction documents, and observation.
- **Curtin Road Safety Improvements, Pennsylvania State University, Centre County, PA (1993)** -Installed new striping plan with island and planks to prevent pedestrian accidents on campus.

BRIDGES

Mr. Hughes has designed bridges out of steel, concrete, timber and prestressed concrete ranging in length from 20 to 1500 feet long. His experience also includes rehabilitation of sensitive historical structures and increasing load capacities of these structures. He has a thorough understanding of what it takes to complete a typical project from initial conception plans to construction inspection. He has designed bridges in Virginia, Pennsylvania and Maryland. As part of the projects, he has managed people and conducted public meetings. Most of the projects involved right-of-way acquisitions, hydraulic studies, geotechnical investigations, archeological studies, value engineering and contract document preparation. He is familiar with AASHTO, specifications and procedures.

- **Timber Bridge Design Research (1988-1992)** - Project Manager for the establishment of the new PA-DOT standards for timber bridge design. Project entailed research load testing and preparation of standard plans (BLC 560 & 570), specifications (408) and design calculations (DMIV) for implementation throughout the Commonwealth. Project was completed over three (3) years in a joint venture with the Pennsylvania State University.
- **SR 0829 over Juniata River between Union and Henderson Township, Huntingdon County, PA (1989)** - Project Manager for replacement of existing 464 foot, three-span steel truss structure with four-span prestressed concrete girder in PA-DOT/District 9-0.
- **SR 364 over Beech Creek between Clinton and Centre Counties, PA (1987)** - Design Engineer for 143 foot, two-span prestressed concrete live load continuous bridge for PA-DOT/District 2-0.
- **SR 2003 over Cherry Creek, Hamilton Township, Monroe County, PA (1988)** - Project Engineer for replacement of existing single-span, concrete encased steel I-beam bridge for PA-DOT/District 5-0.
- **SR 0423 over Tobyhanna Creek, Coolbaugh Township, Monroe County, PA (1988)** - Project Engineer for rehabilitation of existing 98 foot single-span, steel I-beam bridge for PA-DOT/District 5-0.
- **SR 26 over Standing Stone Creek, Jackson Township, Huntingdon County, PA (1989)**- Project Engineer for replacement of existing 144 foot, three-span reinforced concrete bridge with two-span prestressed concrete spread box beam bridge for PA-DOT/District 9-0.
- **Child's Road over Little Elk Creek, Cecil County, MD (1988)** - Project Manager for rehabilitation of 73 foot, single-span steel stringer bridge. Project entailed concrete deck replacement and widening, approach roadway adjustments, and minor substructure repairs.
- **Razor Strap Road over Stoney Run Creek, Cecil County, MD (1988)** - Project Manager for replacement of existing 53 foot, two-span steel stringer bridge with single-span prestressed concrete adjacent box beam bridge. Project entailed widening, approach roadway adjustments, minor substructure repairs, and utilization of existing abutments.
- **Owens Creek Bridge, Frederick County, MD (1987)** - Design Engineer for 60 foot, single-span prestressed concrete bridge project including approach roadway realignment.

- **Cassatt Avenue, Treddyfrin Township, PA (1988)** - Design Engineer for 140 foot, three-span steel plate girder bridge with varying section over Amtrak Rail Lines.
- **Kiskiminetas River between Westmoreland and Indiana Counties, PA (1986)** - Design Engineer for 200 foot, two-span concrete and steel bridge for PA-DOT/District 10-0.
- **US Route 22 Bypass, Altoona, PA (1986)** - Design Engineer for 75 foot, two-span prestressed concrete bridge for PA-DOT/District 9-0.
- **National Park Service at Cuyahoga Valley National Recreation Area, Akron, OH (1985)** - Design Engineer for 100 foot Smith Patent Wooden Covered Bridge.
- **Oldfield Point Road Bridge over Little Elk Creek, Cecil County, MD (1989)** - Project Manager for replacement of existing 220 foot, three-span structure. Project entailed the design of a new three-span live load continuous prestressed concrete adjacent box beam bridge on a tidal wetland marsh.
- **Mifflin County, PA Bridge No. 1 over Beaver Creek (1990)** - Design Engineer for new SGFI span steel, tripper bridge, including approach roadway and foundations for county commissioners.
- **Dr. Jack Road Bridge, Cecil County, MD (1987)** - Design Engineer for 140 foot, two-span prestressed concrete bridge.

SEWAGE FACILITIES PLANNING AND DESIGN

Mr. Hughes' experience includes all aspects of sewage facilities planning from the development of sewage permit and financing plans through construction.

- **Sergeant Township, Village of Clermont DER Act 537 Plan (1995)** - Developed sewage facility plan for community including submission to DER.
- **Biglerville, Adams County, PA, Sewage Treatment Plant (1985)** - Designed new primary and secondary clarifier tanks for 500,000 GPD facility.
- **City of Altoona Authority, Blair County, PA, Easterly Sewage Treatment Facility (1990)** - Designed new sledge drying beds and primary clarifiers.
- **Walker Township, Act 537 Plan, Centre County, PA (1993)** - Completed the Act 537 plans along with organizing financing from FHMA and Penn Vest for the new sewer lines which would collect over 200 homes and convey sewage to Spring-Benner-Walker Authority for treatment.
- **South Philipsburg Borough, Centre county, PA (1992)** - Completed the Act 537 Plan for the community along with PENNVEST applications.

WATER

Mr. Hughes' water projects include conveyance of water for emergency protection, upgrades to facilities and implementation of new environmental standards. He has also conducted construction inspection.

- **South Side Water Study, Beaver County, PA (1994)** - Completed analysis for variable source interconnect and new supply annex for over 1,500 residences in the Southwestern area of Beaver County. Study included four (4) different water authorities, three (3) different sources, water towers, pump stations and over 12 miles of distribution line.
- **City of Altoona Authority, Blair County, PA (1991)** - Design Engineer for new one (1) MGD water filtration facility at their Tipton location. Design included flocculation tanks, mixing tanks, sledge beds, chlorination facilities and entire building which enclosed these systems.
- **Gowen City Authority, Northumberland County, PA (1986)** - Design Engineer and Inspector for new 500,000 gallon storage facility including chlorinating station, spring collection field and two (2) miles of eight (8) inch watermain line.
- **City of Lancaster Authority, Lancaster County, PA (1987)** - Design booster pump stations for a sixteen (16) inch line extension on a main line along SR 30.
- **Shippensburg University, Franklin County, PA (1985)** - Completed the design and construction inspection of a new 280,000-gallon water tank facility. Work included geotechnical investigation, foundation design and coordination with the PA Department of General Services.

SITE DEVELOPMENT

- **Fort Loudon Historical Grounds, Peters Township, Franklin County, PA (1986)** - Worked with Historical Society and Pennsylvania Museum Commission to lay out the limits of the park, proposed buildings, and boundaries. Used dendra chronology to establish the age and area of two (2) log cabins to see if they existed on the grounds during the Revolutionary War Fort's life.
- **Lowes, Patton Township, Centre County, PA (1993)** - Assisted in the design and construction inspection of the new 20 acre 80,000 ft.² facility. Work included 90,000 yd.³ of cut and fill, highway occupancy permits, material testing and field inspection.

BRIDGE CONDITION INSPECTIONS

- **National Bridge Inspection Safety Program (1985, 1994)** - Field Inspector for over 200 bridges ranging in size from 20 feet to 1,500 feet. Responsibilities included field inspection, rating calculations, completing DOT forms, and final report submission. Several structures required rigging and others required experience with dated and unusual structures.

- **80 structures for DER Park Service (1986)** - Inspector for various bridges including historical camel back bridges on the Delaware River Canal.
- **108 Franklin County Bridges in conformance with PA-DOT NBIS Format, 1987** - Inspector for various bridges including stone arches, wrought iron, timber, steel, concrete ramp, and prestress concrete bridges.
- **Ambridge Aliquippa Bridge in Beaver County over the Ohio River (1994)** - Inspector for the six-span 1,500 foot long thru-truss. The discovery of serious damage led to emergency repairs of bridge.
- **Conrail Bridge No. 317 over Mainline, Westmoreland County (1994)** -Inspector and engineer for increased load rating from 3 to 25 tons along with raising the entire bridge 3'-0".

CONSTRUCTION INSPECTION

- **Centre County Rehabilitation Center, Harris Township, Centre County, PA (1993)** - Soils and concrete testing for new three-story facility.
- **Lowes Companies, Patten Township, Centre County, PA (1993)** - Soils compaction, concrete testing, asphalt inspection and reinforcement inspection of a new 80,000 ft.² 20 acre facility.
- **Gowen City Water Line (1986)** - Inspected over 5,000 feet of water main including service connections to over 70 homes.

PARK AND HISTORICAL EXPERIENCE

- **National Park Service, Cuyahoga Valley National Recreational Area, Akron, OH (1985)** - Design Engineer for reconstruction of replica of 110 year old timber covered bridge over Furnace Run. Project included historical research to duplicate original structure.
- **PA Department of Environmental Resources, Harrisburg, PA (1986)** - Analyzed and rated more than 80 bridges spanning the historic Delaware River Canal. Twenty-five (25) of these structures were historical camel back timber bridges. Made recommendations for repair and rehabilitation were made.
- **Rock Creek State Park, Washington, D.C. (1981)** - Designed a 100 foot span three (3) barrel stone arch/concrete pedestrian bridge. Project included matching proposed structure's Ashular Stone to existing bridges in the park.
- **Ft. Louden Revolutionary Fort, Franklin County, PA (1985)** - Headed a team including the Pennsylvania Museum Commission to locate, delineate and establish a plan of protection. Project included historians, archeologist, planners, engineers and archivist. Indian and revolutionary soldier remains and original structures were located and preserved.

- **Sand Island Recreational Park, Allentown, PA (1989)** - Project Manager for the dismantling and relocation of a historic wrought iron thru-truss vehicular bridge to be used in the new park as a pedestrian crossing. The park was once a foundry and the bridge was fabricated at the site 120 years prior to its new use.
- **Temple Park, Reading, PA (1984)** - Design Engineer for 40 foot prestressed double pedestrian bridge for access to recreational park.
- **Circa 1848 Martin's Mill Bridge, Greencastle, Franklin County, PA (1985)** - Inspected, calculated load rating, and designed emergency repairs to 102 foot, two-span Ithiel Towne type lattice truss covered bridge.
- **Circa 1796 Fannettsburg Bridge, Franklin County, PA (1985)** - Design Engineer and Supervisor of Construction for rehabilitation of three-barrel stone arch bridge.
- **Frederick County Department of Public Works, Stevens Road over Hunting Creek in Frederick County, MD (1989)** - Design Engineer for plans and specifications for rehabilitation and repair of 95 foot wrought iron thru-truss single-span bridge. Project involved replacement of one (1) abutment on late 19th century structure. Also conducted construction inspection.
- **Jefferson County Fairgrounds, Halen, PA (1994)** - Design Engineer for 40 foot span glued-laminated timber arch bridge for the main entrance into fair grounds.
- **Sportsmens Road Bridge, Crawford County, PA (1993)** - Design Engineer for the existing wrought iron Warren Truss on the National Historical Register. Completed the design and oversaw the construction which increased the load rating from three (3) tons to H5-25 while not harming or altering the existing bridge.
- **Jefferson/Elk County, PA, Rails-to-Trails (1993)** - Design Engineer for 40 foot span red maple glued- laminated hardwood stringer beam bridge on existing rail line for pedestrian use.
- **Centre/Clearfield County, Rails-to-Trails (1994)** - Inspected two (2) 500 foot long stone arch railroad tunnels plus two (2) 1,500 foot span wrought iron historical railroad viaduct bridges for safety and reuse as pedestrian walkway.
- **Norwich Township T-362 Box Culvert Over Robbins Brook (1995)** - Completed design and contract documents including permit application for 25 foot single span concrete box culvert.

GEOTECHNICAL EXPERIENCE

Part of every structure is foundation engineering and Mr. Hughes has completed numerous investigations requiring the evaluation of subsurface conditions.

- **Greenfield Township Bridge, Blair County (1992)** - Completed geotechnical investigation to PA-DOT of two (2) span prestressed concrete bridge, including report.

- **Mine Subsidence Evaluation of Moshannon Valley Industrial Park 1993, Philipsburg, PA (1993)** - Completed geotechnical reconnaissance of proposed park addition for evaluation of undermining.
- **State College School District, Sink Hole Investigation (1993)** - Completed investigation study of Sink Hole Activity near proposed Middle School.
- **Teaberry Ridge Residential Plan Sinkhole Repairs (1993)** - Completed the design and construction observation of three (3) large sinkholes located on proposed building sites.
- **Moshannon Valley YMCA, Philipsburg, PA (1995)** - Completed geotechnical investigation of two-story building addition. Work included settlement analysis, soil classification and bearing capacity calculations.
- **Norwich Township, McKean County, Box Culvert (1995)** - Completed field reconnaissance including core borings, gradation, classification, bearing capacity, settlement, scour and detailed report for submission to PA-DOT.
- **City of Lancaster Sewer Authority, Rock Excavation Suite (1988)** - Developed three (3) dimensional modeling of limestone in effort to identify actual rock quantities excavated.

DAM DESIGN & INSPECTIONS

Mr. Hughes' dam experience includes new facilities, upgrades and inspections of old facilities. He has managed teams of inspectors along with in-house staff to ensure earthen and concrete dams are up to Corps of Engineers standards.

- **Mercer County Commissioners, PA (1994)** - Completed emergency action plan and dam inspection of new flood control facilities North of Greenville.
- **Lewistown Authority, Mifflin County, PA (1990)** - Completed annual dam inspection of Laurel Valley Reservoir located on Seven Mountains. Inspection included intake, spilling breast and toe of dam, and controls.
- **City of Altoona Authority, Blair County, PA (1989)** - Design Engineer for improvements to Lake Altoona to increase peak maximum flow to a 500 year event. Work included new intake tower, raising breast of dam, new spilling and stilling basin, and new controls.
- **City of Altoona Authority, Blair County, PA (1990)** - Completed DER dam inspections of the authority's twelve (12) dams including repair recommendations.
- **Clearfield Municipal Authority, Clearfield County, PA (1990)** - Completed DER annual inspection report for two (2) Earthen Dam Reservoirs.