The Meadow Pond Dam Tragedy

Human and Physical Failures

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ABSTRACT

On March 13, 1996, Meadow Pond Dam in Alton, New Hampshire failed, releasing its 44-acre impoundment. The failure flood wave swept through a residential area and, in the process, killed one of the fleeing residents. A follow-up forensic investigation identified piping / internal erosion at the spillway slab-embankment interface as the immediate cause of the failure. Seepage and erosion induced the failure of Meadow Pond Dam, but the subsequent tragedy occurred because of human failings. The short story is that the owner did not issue the approved and permitted plans and specifications to the contractor building the dam, hired an inexperienced contractor and field engineer, and made or allowed changes to the original design to save money. Also, some dam design features were not consistent with best practices. In response to this tragedy, the State of New Hampshire made several changes to its dam safety statutes, regulations, and practices.

MARCH 13, 1996 – FAILURE AND DEATH

Lynda Sinclair died on March 13, 1996 at the age of 48. She drowned trying to escape the flood torrent caused by the failure of Meadow Pond Dam in her town of Alton, New Hampshire (see Fig. 1 for location). However, the series of circumstances that led to her death started with the human failures of her upstream neighbor and those he hired to build the dam. Those circumstances should have been avoided.

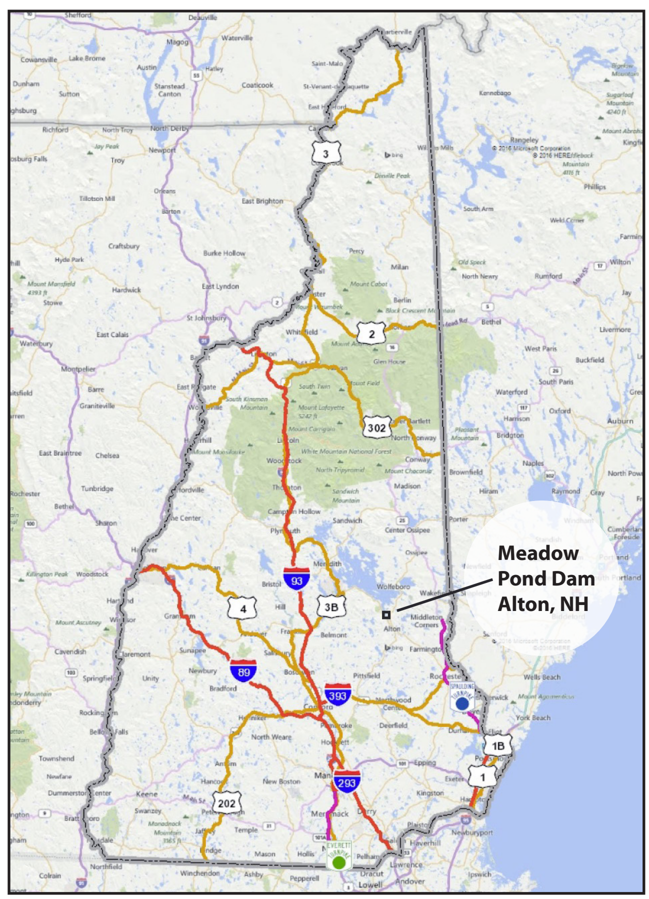

Fig. 1 – Alton, NH Location Map

Bob Bergeron built the Meadow Pond Dam in 1995 to create his own recreational lake. The 30-ft-high dam impounded a 44-acre pond containing 200 acre feet of water, all of which was entirely on Bergeron's property. Bob and his wife Virginia lived in their large house, referred to as the "Castle" by Alton residents, which was set on the lake and located about 0.6 mile above their nearest neighbors, who were on or near state Route 140 (see Fig. 2 for downstream aerial).

Virginia left their house in the early evening of March 13th, about 6:35 p.m., to attend a town meeting when she saw that the water level had risen to the bridge deck where their driveway crossed the stream from their pond about 0.4 mile below the dam. She returned home immediately and told her husband. Bob checked the dam, and, after seeing a 3-ft-diameter plume of water flowing from the face of the grouted riprap spillway channel, called 911 and told the dispatcher that his dam was failing. The Bergerons watched as their dam progressively deteriorated and an upstream vortex grew from a small whirlpool to a horse-shaped waterfall to a 90-ft-wide breach of the full height of the dam.

Downstream of the dam, three homes lay directly within the flood path. The residents in the houses saw the rising water approach or enter their houses, and those who took the time to call 911 were advised by the dispatcher to get out. Chris Whitman was able to flee her house on foot before the flood peak, crossing the highway to the safety of a neighbor's house. Donna and Ralph Flordin were trapped in their house as the flood water surrounded them. Luckily, because their house sat on slightly higher ground, the flood bypassed them and created what locals would call the "Alton Halo" around their undamaged home. One couple, Jennifer Fiorini and Michael Huckins, made it across the Merrymeeting River in separate vehicles, one of which, a small Geo, was partially floated by the flood onto the bridge where it gained traction and crossed out of the flood path.

Lynda and Larry Sinclair had planned to renew their wedding vows that night, but those plans changed when Lynda saw the flood waters rushing downhill in front of their house. Taking the advice of the 911 dispatcher to flee, she and Larry left in separate vehicles – he in his semi-tractor with trailer attached and she in the family pickup. Neither vehicle was a match for the flood, which by now had eroded a

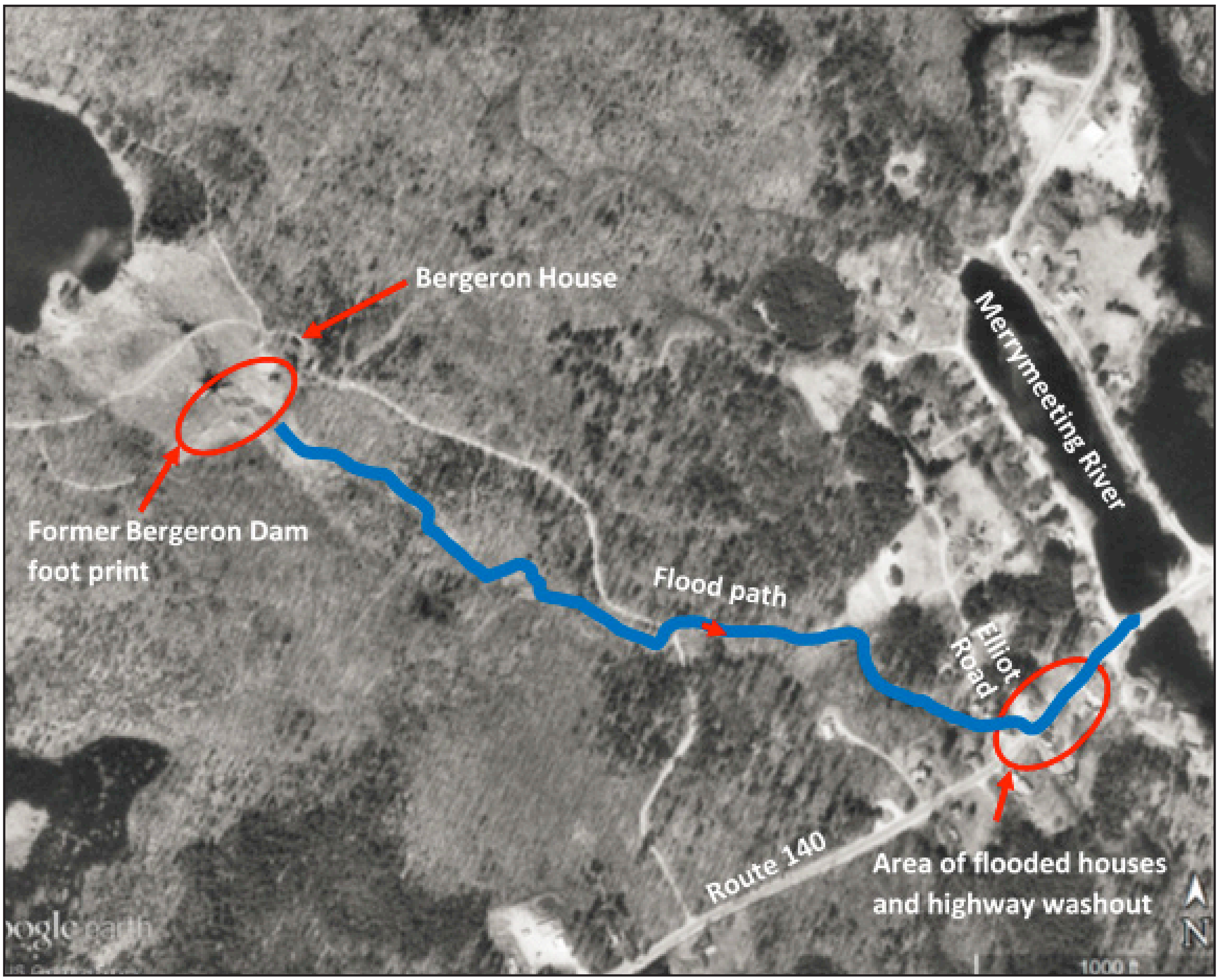

Fig. 2 – Meadow Pond and Downstream Area Aerial (1998 USGS from Google Earth)

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large gully in Route 140. Larry's semi jackknifed and submerged into the gully (Fig. 3; note: all photos, Figs. 3-6, are from NH DES files). He was able to climb out of the cab onto the truck roof, where he was rescued with a rope by John Young who lived across Route 140. The flood waters grabbed, spun, and carried away Lynda Sinclair's pickup. The crushed pickup was found after the flood in a downstream ravine (Fig. 4). Searchers discovered Lynda's body six days later in the debris, which filled the Merrymeeting River (Fig. 5). The Sinclair house was undamaged by the flood.

In addition to killing Lynda Sinclair, the flood damaged about ten houses or properties and eroded a quarter mile section of Route 140 (Fig. 6).

PROJECT DESIGN

Bob Bergeron located his 470-ft-long dam immediately east of his house, which overlooked the enlarged 44-acre Meadow Pond. The new dam was 30 ft in height and replaced a smaller upstream dam, which was reported to be in poor condition. The drainage basin was relatively small at about 0.6 square miles.

The embankment dam consisted largely of silty sand and gravel glacial till (20% to 40% fines, maximum design permeability of 10^{-5} cm/sec) with a vertical filter sand (minimum design permeability of 10^{-3} cm/sec) chimney drain located just downstream of the centerline. The chimney drain connected to a filter sand and sand and gravel (minimum design permeability of 10^{-3} cm/sec) blanket drain across the downstream half of the embankment. Riprap over

Fig. 3 – Larry Sinclair's Tractor Trailer

Fig. 4 – Lynda Sinclair's Pickup Truck

Fig. 5 – The Search for Lynda Sinclair's Body

Fig. 6 – Route 140 after the Flood

a gravel blanket protected the upper 10 ft of the upstream slope. Figures 7, 8, and 9 show the design plan, elevation, and section at the spillway (note: Figs. 7-11 are excerpts taken from the original design drawings).

The feature of most importance to the failure was the spillway, which was located across the left (east) part of the embankment and had the following design requirements:

- A 65-ft-long (~weir length) by 8-inch-thick reinforced concrete level section across the crest of the dam with a top elevation 2.9 ft below the dam crest. The spillway crest slab was to be set on a 2.25-ft-thick layer of gravel.
- A 3-ft-wide weir/stop log section on the upstream edge of the crest, set at the same elevation as the 8-inch slab and tied to the 8-inch slab with reinforcing (Fig. 10). The upstream 1-ft-wide section of the weir was designed as a seepage cutoff extending to a depth of 5 ft, while the downstream 2-ft-wide section of the weir was to have a depth of 18 inches. 11.25-inch-high flashboards topped the weir and were supported by galvanized pipes set in the weir. With the stoplogs, the dam had a freeboard of 2 ft.
- 5H:1V channel side slopes across the crest, also covered by an 8-inch-thick reinforced concrete slab.
- A variable height reinforced concrete wall on the upstream side of the side slopes with a design crest set at the same elevation as the embankment (Fig. 11). This side slope wall was designed with a 5-ft-deep reinforced concrete strip footing, which was to act as a seepage cutoff. Both the wall and the cutoff footing were to extend 27 ft from the level part of the spillway, 12 ft laterally beyond the top of the side channel slopes, on either side.

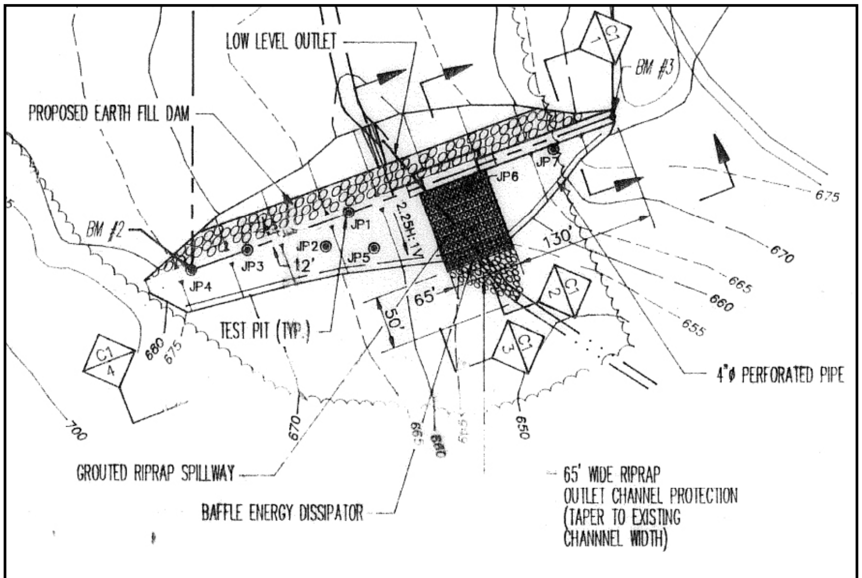

Fig. 7 – Design Plan of Dam

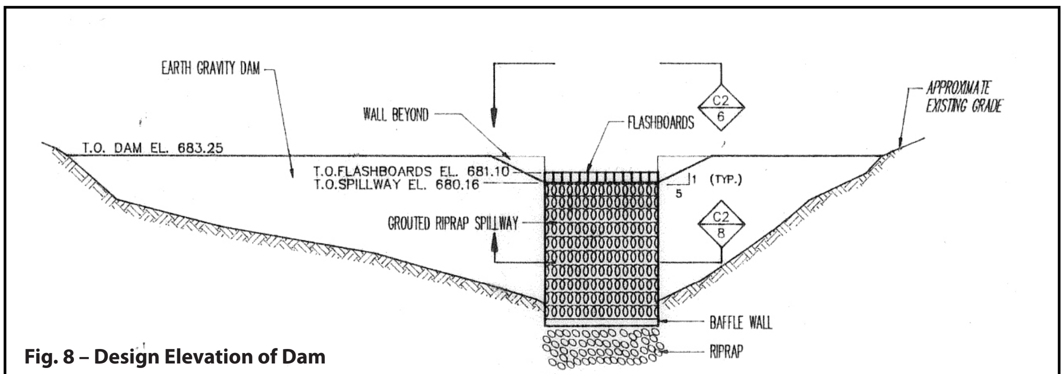

Fig. 8 – Design Elevation of Dam

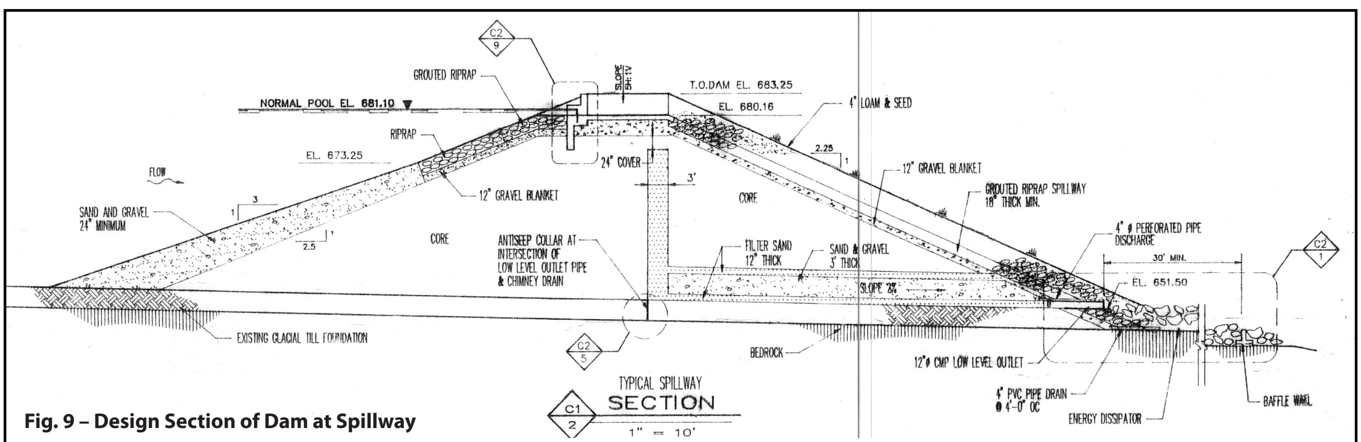

Fig. 9 – Design Section of Dam at Spillway

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- A riprap and grouted riprap approach upstream of the weir. The approach immediately upstream of the weir was to be a 5-ft-wide (upstream to downstream) level bench of grouted riprap, and, upstream of the level section, the channel matched the 2.5H:1V dam slope and consisted of either grouted riprap or riprap. Grouted riprap was to extend approximately 10 ft upstream of the weir, with ungrouted riprap over the remaining upstream channel. All riprap was to be 2-ft-thick over a 1-ft-thick layer of gravel.
- A downstream channel on the 2.25H:1V slope of the dam consisting of an 18-inch-thick layer of grouted riprap over a 12-inch-thick gravel blanket. The slope channel section was 2 ft deep by 73 ft wide with 2H:1V side slopes.
- A riprap energy dissipater downstream section. The energy dissipater consisted of ungrouted riprap over bedrock extending 30 ft downstream of the dam toe to a 28-inch high baffle retaining wall. Beyond the baffle wall the riprap-lined channel narrowed to the natural stream width.

PHYSICAL ELEMENTS OF FAILURE – INTERNAL EROSION AT DEFECTS

The constructed dam did not match the design in several important aspects. Constructed deviations from the design that contributed to the failure as discovered by the post-failure forensic investigations included:

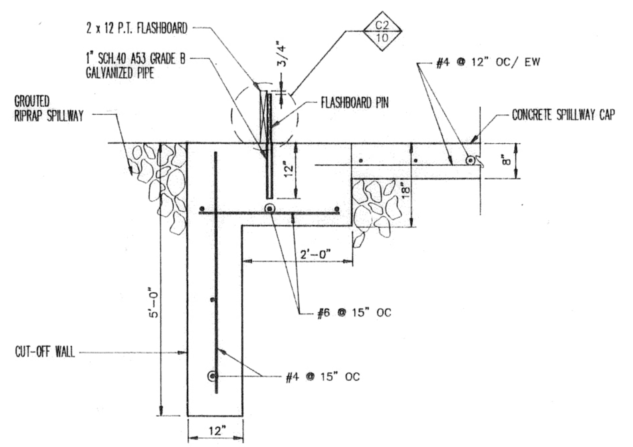

Fig. 10 – Design Section - Spillway Weir and Cutoff

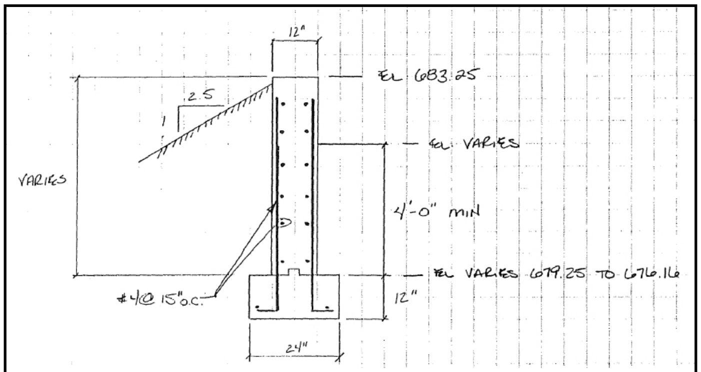

Fig. 11 – Design Section - Side Channel Upstream Wall and Cutoff Footing

- A limited length of cutoff footings on either side of the spillway (Fig. 12). The upstream wall cutoff footings for the sloped side channels extended only 16 ft beyond the level part of the spillway rather than the design length of 27 ft.
- No level approach channel bench (Fig. 13). The channel upstream of the concrete weir was placed at the 2.5H:1V slope of the dam, without the 5-ft-wide design bench.
- Irregular, contaminated, and high-fines spillway gravel blanket. The gravel blanket under the spillway slab ranged in thickness from possibly 0 ft to 2.9 ft thick and contained 0.4- to 1.2-ft-thick layers of embankment till contamination. The design called for an uncontaminated 2.25-ft-thick layer of gravel under the slab. In addition, the gravel blanket material had a higher percentage of fines than specified.
- The riprap immediately upstream of the spillway was not grouted to the extent called for in the design (Fig. 13).
- No horizontal reinforcing in the cutoff wall. The investigators found none of the horizontal reinforcing called for by the design in the cutoff wall.
- A horizontal construction joint between the spillway and the cutoff wall (Figs. 13 and 14). Investigators found that the contractor used a horizontal joint with no waterstop between the spillway slab and the cutoff wall. The design called for this section to be formed without a horizontal joint at this location.

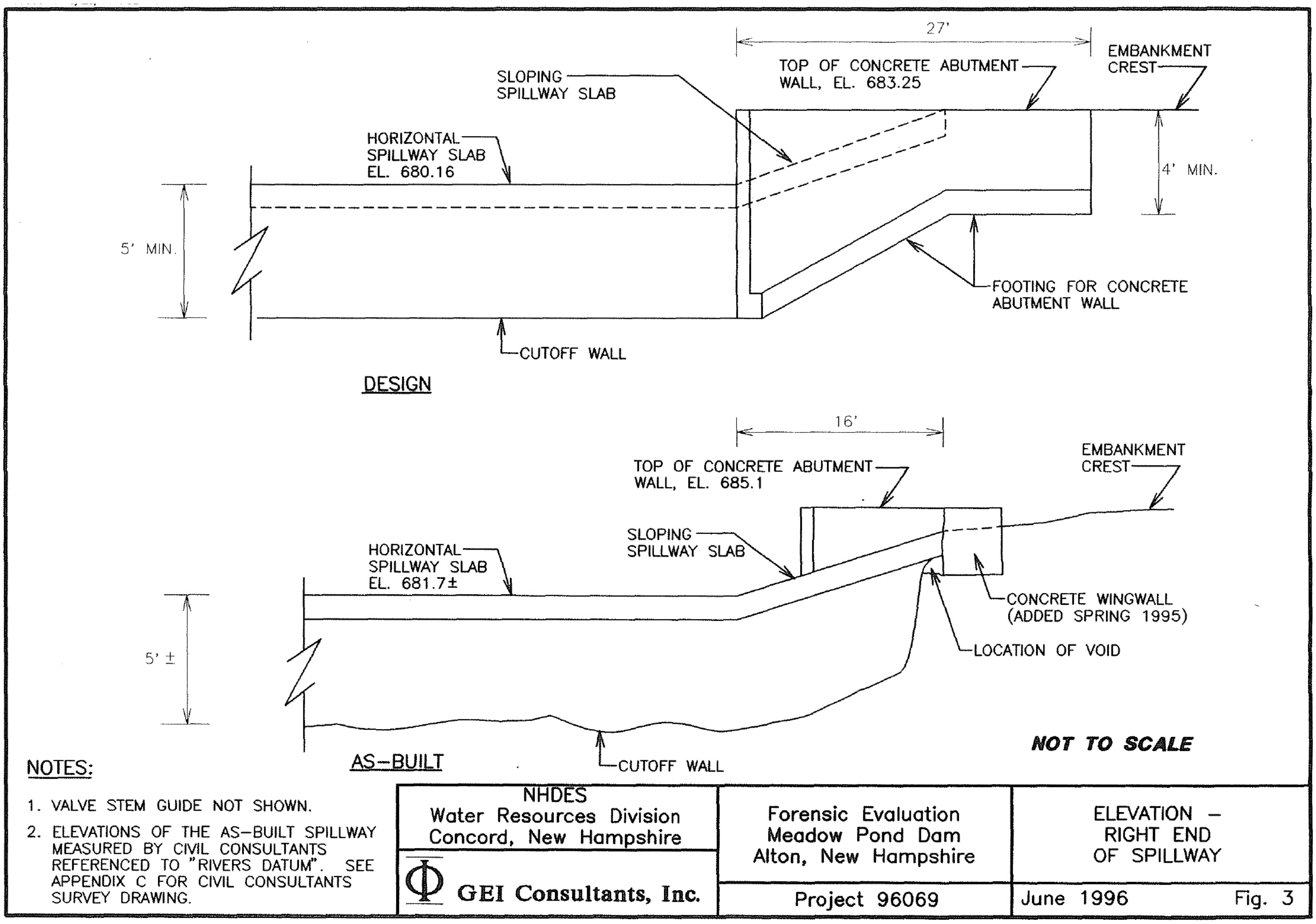

Fig. 12 – Design and As-Built Spillway Cutoff (GEI Consultants, Inc.)

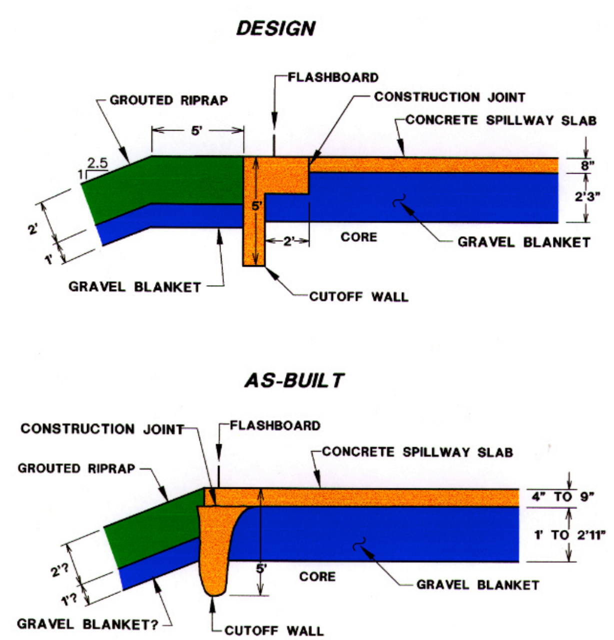

Fig. 13 – Spillway Sections 'A' - Design and As-Built

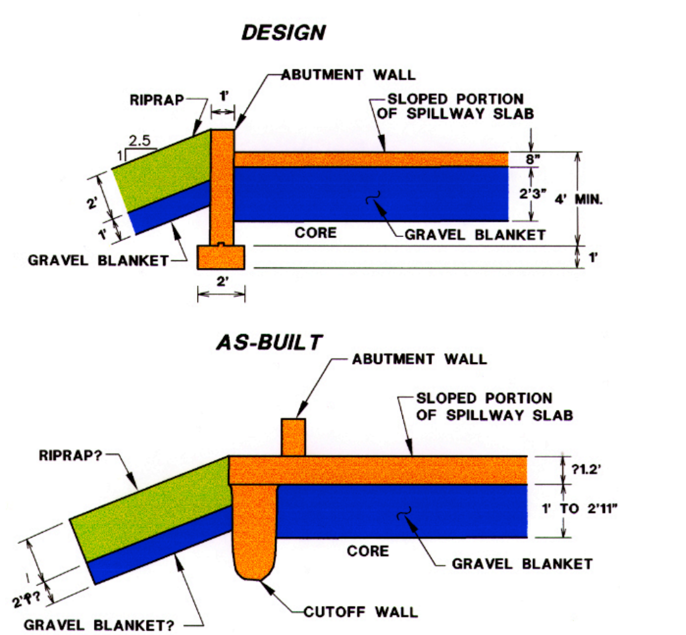

Fig. 14 – Spillway Sections 'B' - Design and As-Built

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- Lower density embankment soil. The forensic testing of the embankment till indicated densities in some areas were as low as 84% of maximum density (ASTM D1557) as compared to the minimum requirement of 92% of maximum density specified by the design.

Numerous other deviations from the design that did not appear to contribute to the failure were documented. Investigators also observed the following relevant post-failure features:

- A void at and behind the right end of the remaining cutoff wall (Fig. 15). The location and extent of the void led investigators to conclude that the void was caused by erosion and piping.
- Ice lenses in the embankment material.
- Evidence that the pond level was slightly above the flashboards at the time of failure.
- Cracks in the intact portions of the spillway slab and cutoff wall. Investigators observed caulking in some of the cracks.
- Heavy rusting in the steel reinforcing bars located (improperly) on the bottom of the spillway slab.

Investigators concluded that Meadow Pond Dam failed due to erosion and piping beneath the spillway slab. Figure 16 shows a likely sequence of conditions during the seepage and erosion failure. Investigators reported the following contributing factors:

- Shortened seepage paths around the end of the cutoff wall resulting from the shorter lateral extent (16 ft versus 27 ft) of the cutoff walls.
- Shortened seepage paths through the cutoff and slab through cracks resulting from a lack of longitudinal steel, settlement of the embankment, and ice lens heaving.
- Shortened seepage paths through the horizontal joint between the spillway slab and the cutoff wall, which was not included in the design and did not include a waterstop.
- Ice heaving of the slab due to contamination of the gravel layer and the lack of sufficient cover for frost-susceptible embankment material.
- Shortened seepage paths between the reservoir and the bottom of the cutoff wall due to lack of a 5-ft-wide level bench and due to poor design.
- Lack of adequate drainage in the spillway gravel layer due to high fines content, contamination, and irregular thickness.

HUMAN ELEMENTS OF FAILURE – OWNER'S MANAGEMENT OF DESIGN AND CONSTRUCTION (THE STORY OF DESIGN AND CONSTRUCTION)

Bob and Virginia Bergeron acquired the dam site and much of the watershed in the early 1990's. The previous owner, from whom they

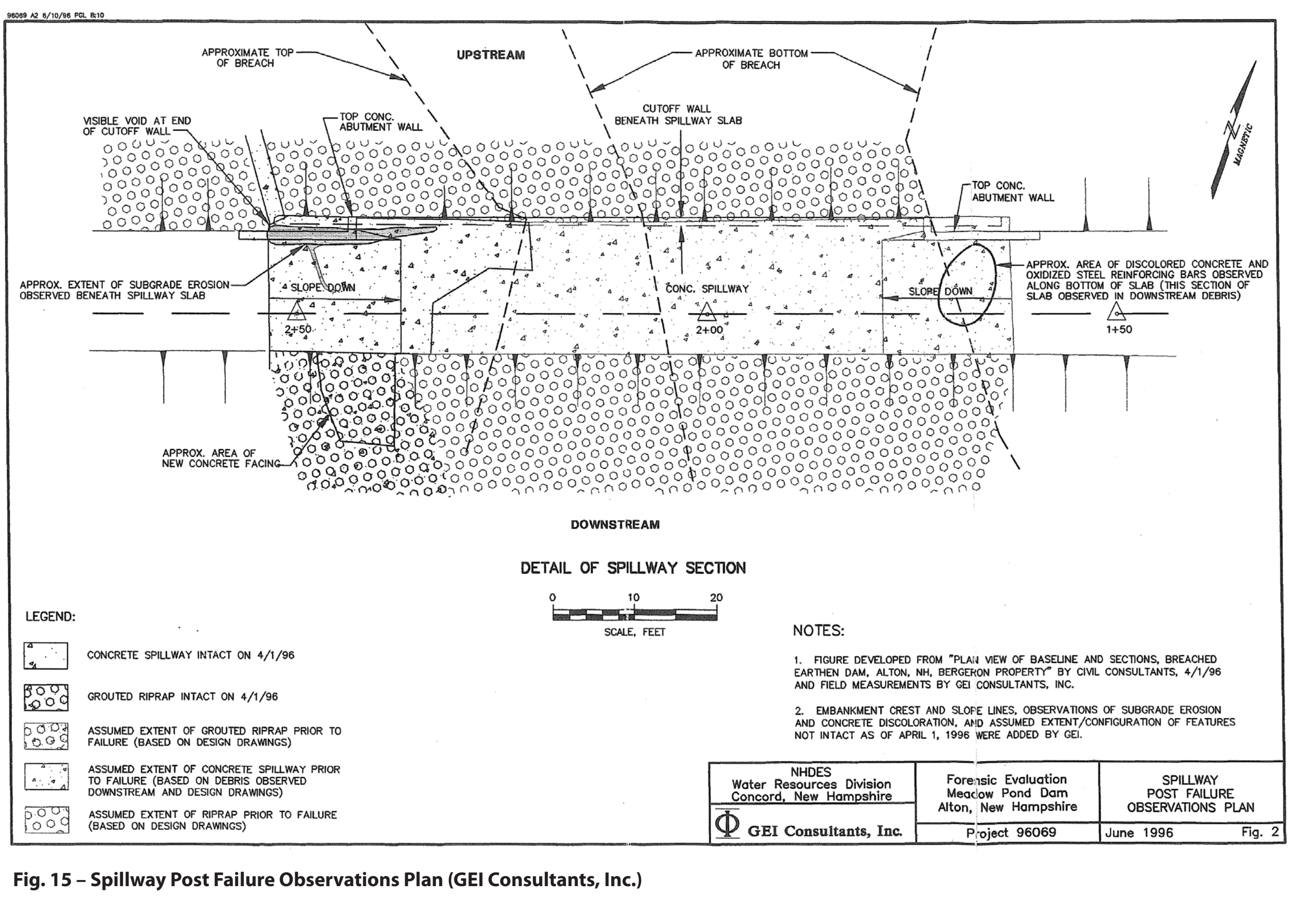

Fig. 15 – Spillway Post Failure Observations Plan (GEI Consultants, Inc.)

bought the property, had wanted to build a dam on the property, and had hired a design engineer, who submitted an application for construction of the dam to the New Hampshire Department of Environmental Services Dam Bureau in February 1990. The proposed dam had a concrete gravity spillway, flanked by earth embankments. The Dam Bureau needed more detail before they could issue a permit for construction, and a permit was never issued for that dam.

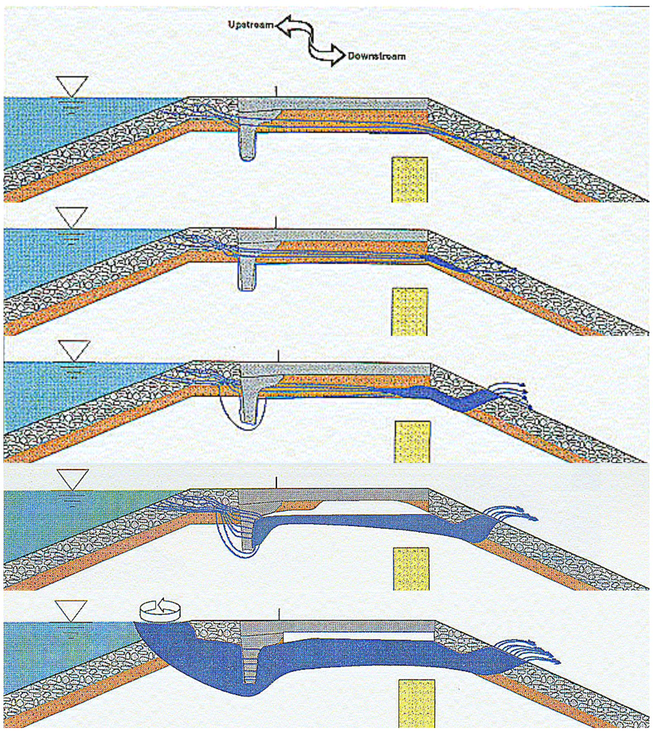

Fig. 16 – Likely Seepage and Erosion Failure Sequence (figures prepared by GeoTesting Express)

The Bergerons, who founded and owned a marine instrumentation business, were attracted to the property because of the ability to build a dam with a large impoundment on which they could boat. Once they acquired the property, they retained the services of the engineers who prepared the previous dam design and submitted another application in June of 1992 to construct a dam of the same height but with the spillway consisting of the concrete slab over the earth embankment - a less expensive but less reliable design than the original concrete gravity section. Design details were revised several times in response to Dam Bureau comments, and final plans dated December 3, 1992, were submitted for approval. The Dam Bureau was concerned about the frost susceptibility of the soils that were proposed to be placed beneath the spillway slab. The design was revised to address those concerns, and a letter report and new final plans, dated December 17, 1992, and marked "NOT FOR CONSTRUCTION" were submitted by the design engineer. On December 31, 1992, the Dam Bureau then issued a permit for construction of the dam in accordance with the approved plans and specifications and the letter report. With that, the design engineer's involvement on the project ended.

Bob Bergeron, who had never owned a dam before, much less constructed one, effectively became the supervisor of the construction of the project. In 1993, he requested bids from contractors to build the project, and selected Connie's Septic Service, Inc. as the construction contractor. As implied by the contractor's name, the contractor's expertise was not in dam construction. The company had never built a dam, but was hired to perform the earthwork and build the concrete structures. However, the concrete subcontractor that Connie's had planned to use could not meet the Bergeron's schedule so Mr. Bergeron hired Putman Concrete and removed the concrete work from Connie's contract.

New Hampshire's dam safety rules at the time required that the dam owner provide a qualified construction inspector to ensure compliance with the approved plans and specifications, and that the inspector be a professional engineer registered in New Hampshire and familiar with dam construction. At the recommendation of one of the bidding contractors, Bob Bergeron hired Tom Varney, a registered engineer in New Hampshire who resided in the same small town of Alton. Mr. Varney's expertise was in septic design, permitting, and site development for homeowners, but he had never been involved in construction of a dam. Bob Bergeron never asked about his familiarity with dam construction.

During the forensic investigation of the failure and depositions associated with the litigation resulting from the failure, it was revealed that Connie's had communications with only Bob Bergeron and, to a lesser degree, Mr. Varney, the construction quality control engineer. According to the construction contractor, Mr. Bergeron supervised most aspects of the construction and addressed most of Connie's questions. He identified the on-site borrow areas and survey control points, supervised and assisted with the installation of the low level outlet, laid out the location of the spillway structure, and assisted the concrete contractor he hired with the setting of forms and the placement of the concrete. It was also revealed that Mr. Varney did not inspect any of the concrete work, except for the cradles for the low level outlet. Thus, it was under the supervision of Mr. Bergeron, who was not an engineer, that all the shortcuts in the construction of the dam were taken, including the insufficient compaction of the embankment, the shortened length of the concrete cutoff wall, the reduction in the reinforcing steel in the concrete cutoff wall, the creation of a cold joint with no waterstop between the cutoff wall and the spillway slab, and the elimination of the upstream bench and the use of frost susceptible soils beneath the spillway slab—all of which contributed to failure of the dam as described previously. None of the parties involved in the construction of the dam—including the owner, the construction contractors, and the construction quality control engineer—had any experience or knowledge of dam design or construction to know the importance of the design details, and that the changes they were making during construction, while simplifying the construction process and reducing the cost of the project, seriously jeopardized the integrity of the dam.

Like many state dam safety agencies, New Hampshire's dam safety staff was already stretched thin performing regularly scheduled inspections of the state's 840 hazardous dams, and reviewing and approving the applications, plans, and specifications for the repair and reconstruction of, on average, 25 dams per year. Thus, New Hampshire's dam safety engineers inspected the Meadow Pond Dam only twice: once during construction of the low level outlet, and once after the construction was completed, before approval was given to fill the impoundment, but after many of the features that led to failure could no longer be viewed. Instead of having its dam safety engineers continuously inspect the construction, New Hampshire relied on the owner's construction quality control engineer to closely monitor the construction of the dam, and the state's dam safety regulations at the time required that the construction quality control engineer submit an affidavit of compliance with the approved plans and specifications along with a report documenting any changes in design. Despite not having inspected any of the construction of the concrete spillway and cutoff walls, Mr. Varney submitted the required affidavit, stamped with his Professional Engineer's stamp, stating that he visited the site daily, and that the dam was constructed in accordance with the plans and proper construction methods. The only change in the design documented in his report was the use of a PVC pipe instead of a corrugated metal pipe for the low level outlet—a change that had already been approved by the New Hampshire Dam Safety Office.

POST FAILURE EVENTS

Immediately following the failure, the New Hampshire Department of Environmental Services issued a Request for Proposals, interviewed three highly qualified geotechnical engineering firms, and selected GEI Consultants, Inc. to perform a forensic investigation to determine the cause of the failure. GEI began its investigation six days after the failure before potential evidence from the remains of the dam could be altered by weather. GEI also coordinated the field investigation with the other engineering experts who had been retained by representatives of the owner and the others involved in the construction of the dam. The causes of the failure, previously described in this paper, are the findings from these forensic investigations.

Also, soon after the failure, lawsuits were filed, the first being a series of suits by the downstream property owners and the estate of Lynda Sinclair against the dam owners, the construction quality control engineer, and the design engineer. The second was a suit filed by the dam owner against the designer, the construction quality control engineer, and the construction contractors. The lawsuits brought by the downstream property owners were settled for over $5 million, with the defendants and/or their insurance companies contributing to the settlement. The only party that did not contribute to the settlement of the claims was the construction quality control engineer.

The State of New Hampshire was not involved in any of the claims, but incurred significant costs in repairing the downstream state road and other public infrastructure that were destroyed by the dam failure flood. Approximately a year and a half after the failure, the State of New Hampshire settled with the owner, the designers, the construction contractors, and the construction quality control engineer, agreeing not to pursue any claims against these parties in return from their not pursuing claims against the State associated with the State's approval and inspection of the dam. As a result of this settlement, the construction quality control engineer was able to avoid disciplinary action by the New Hampshire's Joint Board of Licensure and Certification for failure to perform his responsibilities and for submitting a stamped affidavit that was not truthful.

The Bergerons later sued their insurance company, State Farm Fire and Casualty Company, for damages sustained to the dam, claiming that the dam met the definition of a building under the homeowners' insurance policy and that the damage sustained by the dam was covered because it occurred as a "collapse" due to either an explosion or a hidden defect. The case ultimately ended up in the New Hampshire Supreme Court, which decided that the dam was not a building in the context of the insurance policy, and that the Bergerons were not entitled to be paid for damages to it.

Within months after failure of the dam, the Bergerons hired the engineering firm that had represented their insurance company during the forensic investigation, and applied for a permit from the New Hampshire Dam Bureau to reconstruct the dam. After a significant review period, the Dam Bureau ultimately denied the application. The Bergerons appealed the decision to the New Hampshire Water Council, which hears appeals of all decisions of the New Hampshire Department of Environmental Service's Water Division, and upheld the Department's decision. To this day, the breached dam remains in place in much the same condition as it was immediately after the failure and forensic investigation.

IMPROVEMENTS TO THE NEW HAMPSHIRE DAM SAFETY PROGRAM BASED ON LESSONS LEARNED FROM THE MEADOW POND DAM FAILURE

The risks posed by the construction of dams are generally deemed to be acceptable in consideration of the public benefit the dams provide. However, the New Hampshire legislature felt that it is unreasonable to expect the public to assume the risk of significant property damages, personal injury, or death for those dams where there was no significant public benefit. So in 2000, they passed a law that would allow construction or reconstruction of Significant or High Hazard Dams (i.e., dams that pose a threat to public health and safety) only if they serve a public purpose by providing one or more of the following public benefits: public water supply; flood control; storage and treatment of liquid industrial, agricultural, commercial wastes or municipal sewage; hydropower production for the public; public recreation; or preservation of historic or cultural resources. Low Hazard dams - those which by definition do not pose a threat to public health and safety - may still be permitted even absent a public purpose. The law also allows reconstruction of a Significant or High Hazard dam if the reconstruction is ordered by the Dam Bureau to correct a deficiency it identified. Under this law, a dam like the Meadow Pond Dam, a High Hazard dam that provided no public benefit, could not be constructed or reconstructed.

In addition to changes in state law, changes were also made to New Hampshire's dam safety regulations within a year of the Meadow Pond Dam failure as result of lessons learned from that failure. Before the failure, the design engineer was only required to be a Professional Engineer registered in the State of New Hampshire. After the failure, the rules were revised to require that New Hampshire Professional Engineer also have a minimum of 5 years of engineering experience related to the design and construction of similar dam projects, as determined by the Dam Bureau after a review of the engineer's resume.

The requirements for construction inspection were also made significantly more stringent. The Construction Engineer also has to be a New Hampshire Professional Engineer with a minimum of 5 years of engineering experience related to the design and construction of similar dam projects, and must be approved by the Dam Bureau based on a review of the engineer's resume. Prior to any work on the dam starting, the construction engineer must sign, date, and submit to the Dam Bureau a completed acknowledgement form which includes, among other things, the date of the plans, specifications, supporting assumptions, and calculations reviewed by the construction engineer, and a certification that he or she has reviewed the plans, specifications, supporting assumptions, and calculations, and understands the design and the intent of the design. Also, prior to any work on the dam, the owner must submit a written inspection plan, that must be approved by the Dam Bureau, and that must include, at a minimum, which activities shall be monitored and by whom, field tests to be performed and the frequency of testing, material testing requirements, and documentation and reporting requirements, including inspection reports and construction progress photographs. Inspections during construction or reconstruction must be performed in accordance with the approved plan. Unlike the rules that were in effect at the time of the Meadow Pond Dam failure, the rules now specify that, at a minimum, the construction engineer must inspect, document, and photograph the excavation and sub-grade preparation, pipe placement, placement of graded aggregate drain materials, earthfill, cut-off construction, steel placement, final grading, and pouring of concrete. In addition, all construction inspections of Significant Hazard and High Hazard dams must be conducted continuously by on-site inspectors unless specifically exempted by the approved inspection plan for particular items of work.

With these changes, some of the human factors that led to the failure of the Meadow Pond Dam have been reduced.

CONCLUSIONS / RECOMMENDATIONS

The seepage and erosion induced failure of Meadow Pond Dam and the subsequent tragedy occurred because of human failings. Bob Bergeron disregarded the original design, hired an inexperienced contractor and field engineer, and made or allowed changes to the original design to save money. Although the original design had deficiencies that could have contributed to the failure, in our opinion, the poor construction and deviations from the original design were egregious and should be considered the primary failure causes.

We group our recommendations into two categories – those that address human failings and those that address technical issues. We expect that the technical issues are easier to address on most dam projects.

Recommendations Relative to Human Failings

- Require monitoring of critical aspects of dam construction by the design engineer.
- Require notice from the owner and design engineer to regulators at the start of construction, during or at significant construction milestones, and at substantial completion.
- Explicitly determine and state which aspects of construction must be observed full time by a representative of the design engineer.
- Require documentation by the design engineer of critical construction elements, deviations from the design, and construction operations and features that were and were not observed.
- Require an EAP as part of any permit of a high or significant hazard dam. In addition, require an EAP for construction conditions where a high or significant hazard could result.

Recommendations Relative to Design / Construction / EAP Technical Issues

- Pay attention to all possible seepage paths in design, especially at structure-embankment interfaces.
- Provide filtered seepage collection systems consistent with current state-of-the-practice guidance for filter materials, geometry, and drainage capacity.
- Consider and protect against frost heave in the final as-built condition and during construction. Near structures that could be heaved, provide good drainage and either use non-frost susceptible materials or insulate to prevent heaving.
- Advise EAP evacuated populations to move to high ground along routes that are out of the water and that travel through water must be avoided, especially if they are in a vehicle.

Dams are difficult to build safely even if one is an experienced dam designer. Owners or contractors who build or modify a dam without the knowledge of an experienced dam designer put downstream residents at risk, which, in the case of the Meadow Pond Dam, resulted in Lynda Sinclair's death.

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Lee Wooten is a civil engineer specializing in soil mechanics, dam engineering, foundation engineering, underground engineering, and geohydrology. He received his BSE from Duke University in 1974 and, after four years of driving ships for the Navy, studied for (and received) his MS at MIT. He joined GEI in 1980 and has served as a geotechnical engineer, director of the laboratory, project manager, division manager, and principal. His experience includes a practice focused on inspections, analyses, and remedial designs for dams as well as geotechnical support for a wide range of infrastructure projects. ASDSO has twice presented awards for remedial projects designed by GEI teams on which Lee was the lead designer or project manager - in 1992 with the first Innovative Rehabilitation Designer of the Year award for remedial designs of the Blue Ridge Parkway Dams and in 2009 with the Project of the Year award to the City of Norfolk's Lake Burnt Mills Dam project. He has served on a ASCE Geo-Institute reconnaissance team and on two Geoengineering Extreme Events Reconnaissance (GEER) Association reconnaissance teams following hurricanes Katrina, Gustav, Ike, and Sandy.

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Jim Gallagher is the chief water resources engineer of the New Hampshire Department of Environmental Services. He has been in this position since entering state service in 1998. In this position, he is responsible for ensuring the safety of over 2,600 active dams in the State of New Hampshire. He is also responsible for the operation and maintenance of 113 Department-owned dams and 103 dams owned by the New Hampshire Fish and Game Department, and for the design and construction of repairs needed on 278 State-owned dams. Jim has served ASDSO in numerous capacities including as president from 2006 to 2007 and as a member of the board of directors from 2002 to 2008 and from 2010 to 2016. He presently serves on FEMA's National Dam Safety Review Board. Jim is a registered professional civil engineer with over 44 years of experience in water resources and dam engineering.