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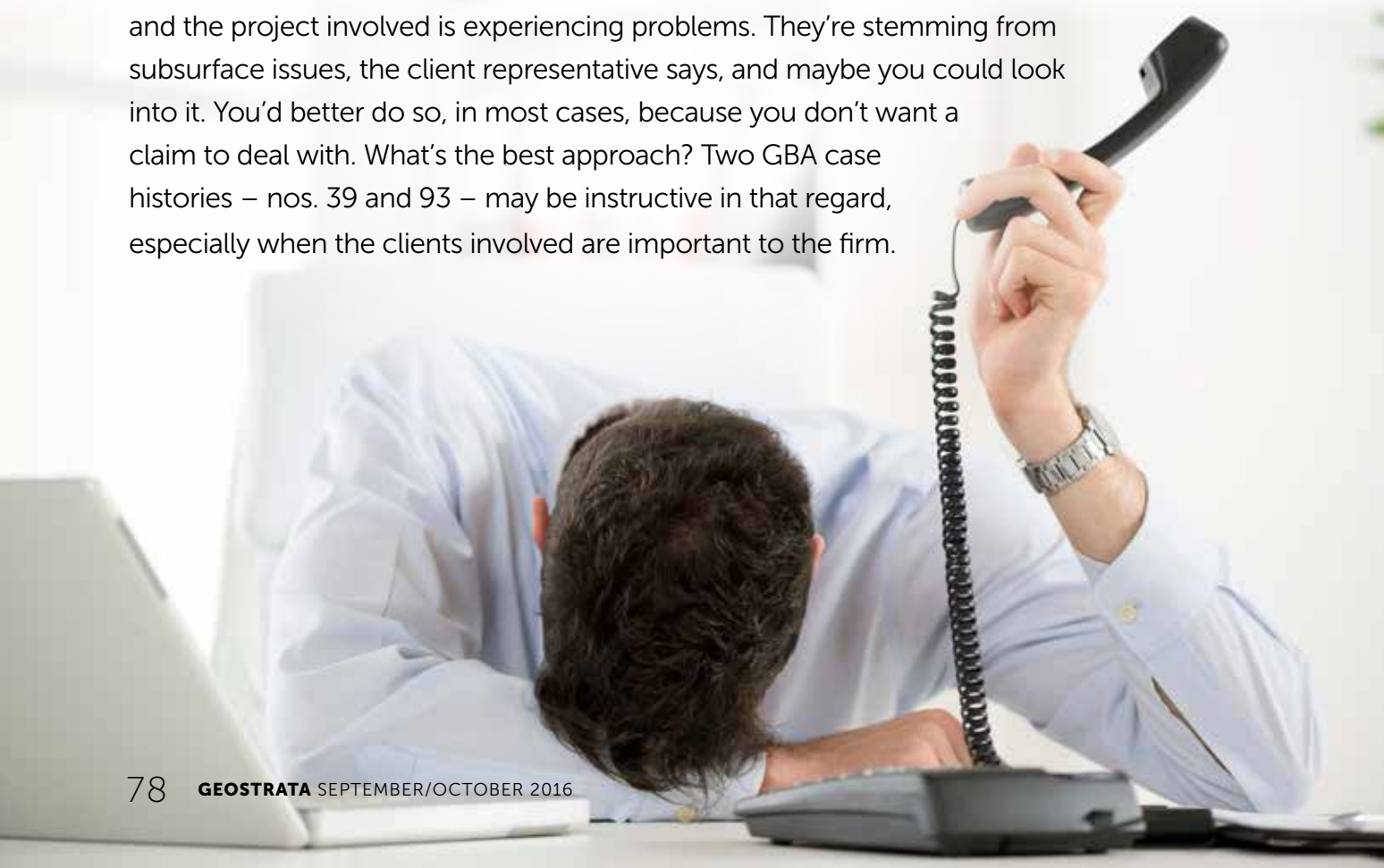
The Call

By John P. Bachner

Those who fail to learn the lessons of history are condemned to repeating mistakes of the past. So true. And insofar as geoprofessional history and mistakes are concerned, nothing is as valuable as the Geoprofessional Business Association's (GBA) collection of more than 100 case histories of projects gone wrong. (Go to *https://www.geoprofessional.org/asset/pubs/catalog/index.html#102* for details.) For example, how would you respond when you get "the call"; you know, the one that comes in from a client representative about a year after you've completed your service and the project involved is experiencing problems. They're stemming from subsurface issues, the client representative says, and maybe you could look into it. You'd better do so, in most cases, because you don't want a claim to deal with. What's the best approach? Two GBA case histories – nos. 39 and 93 – may be instructive in that regard, especially when the clients involved are important to the firm.



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GBA Case History 39 relates the story of a GBA-member firm that a long-term developer/builder client retained to conduct a geotechnical-engineering study for a proposed 21,600-sf retail furniture store. The member firm's subsurface exploration showed that the site was underlain by weak, compressible peat. Given an abbreviated construction schedule, the member firm recommended use of 62 12-in.- and 16-in.-diameter auger-cast piles to support the building and floor slab. The client accepted the recommendation and retained the member firm to observe pile installation.

About one year later, the client advised the member that as much as 8.5 in. of differential settlement had been measured on at least 10 of the pilings. One of the firm's principals immediately responded in writing, expressing concern and advising that the firm was initiating a comprehensive, self-funded study to identify causes of the problem and remedial measures. The member firm then established an internal task account and began its study, inspecting the structure and reviewing settlement-behavior records and pile-capacity analyses that the firm had performed a year before. The firm's work also included nighttime coring through the structure's floor above the piles and, later, tunneling beneath the building to examine connections between pile caps and tops of piles.

The investigation revealed that several piles were not connected properly to the pile caps, and some were not connected at all. Some of the piles' reinforcing steel had been bent such that only fill existed between the tops of the piles and the bottoms of the pile caps. At other piles, reinforcing steel extended through several inches of fill over the tops of the piles and into the pile caps. As the underlying weak, compressible peat layer consolidated, the fill between the piles and pile caps settled, causing the floor slab to settle in a severe, irregular manner.

The member firm followed suggestions provided by its professional-liability insurer, and, ultimately, the constructor-in-charge's surety accepted full liability, with the client insisting that the member firm had to be paid for its forensic study. (The fee involved was far larger than the fee for the original geotechnical study, but likely far smaller than what the firm would have paid in litigation had it not performed the forensic research.) While the client was not delighted in general, it was delighted with the member firm's professional response and, since then, has made the firm its "go-to" geotechnical engineer.

GBA Case History 93 involves a prominent commercial-property developer that retained a GBA-member firm to conduct geotechnical services needed for a five-city-block cluster of high-profile, mixed-use, high-rise buildings designed to transform an abandoned industrial district into a lively neighborhood and destination-shopping area. The member firm's CEO – who had a strong relationship with the developer's CEO – served as the company's project manager. He designed a comprehensive exploration program that the firm executed without incident.

The shoring constructor hired for the project worked on a design-build basis, retaining its own engineer who designed a tie-back, soldier-pile earth retention system. The developer retained the GBA-member firm to review the

shoring system's design and observe the design's execution. Installation of the soldier piles took about five months. The piles were terminated at the top of the very dense gravel formation underlying the project site.

During completion of the excavation, three soldier piles plunged downward between 12 and 18 in. and rotated about 12 in. toward the basement excavation. The following day, representatives of the developer, the shoring constructor, the constructor-in-charge, and the GBA-member firm met to discuss the situation. The member firm's CEO warned that movement of the soldier piles could increase stresses in the anchors, creating an unquantifiable risk of complete shoring failure. The shoring constructor's representative discounted that notion, but was sure to mention that changed conditions were involved, so all remedial work would comprise an extra. Then came the following week, when the entire north wall of shoring plunged downward and rotated into the basement excavation, rupturing an 8-in., high-pressure water line, blowing out more than 30 ft of lagging, and flooding the basement excavation. Earth movement and tension cracks were damaging streets, sidewalks, and adjacent buildings, some of which were historic. Over the next three weeks, more than 700 ft of shoring settled between 12 and 18 in. and rotated into the excavation by more than 12 in. The GBA-member firm's CEO feared that the shoring's rotation had distorted the alignment of the tie-back anchors and possibly increased the load on them. The constructor proposed installation of micropiles adjacent to the failed solder piles to prevent further settlement of the shoring system, as well as installation of another row of tie-back anchors to limit rotation of the shoring system.

Remediation costs quickly climbed to more than $3 million. Fearing the worst, the member firm's CEO decided to invest in an independent investigation, putting in more than $100,000 of the firm's money to do so. The investigation revealed that failure occurred when H-sections plunged through 25-psi lean-mix backfill at the tips of the piles. Where soldier piles had not failed, the lean-mix backfill exhibited strengths of 800 psi and more. Clearly, two markedly different concrete mixes were supplied to the project during backfilling of the soldier piles.

The member firm's CEO interviewed a representative of the concrete supplier and learned that the shoring constructor directed the supplier to deliver a weak mix that included no fly ash and had a more-than double water-to-cement ratio. The member firm's CEO also reviewed the paperwork, discovering that the soldier piles that failed were installed on days when the weaker mix was delivered to the construction site.

With guidance from its professional-liability insurer, the member firm's CEO presented his findings to the design and construction team, concluding that the shoring failure was caused by the shoring constructor's decision to delete fly ash from the concrete mix. Over the following weeks, the shoring constructor installed additional tie-back anchors and micropiles under all of the failed soldier piles. The constructor-in-charge absorbed the cost of construction delays and redesign of the basement walls. The developer's project insurance covered the cost to repair damaged buildings and infrastructure. And the developer insisted that the constructor-in-charge reimburse the GBA-member firm for the cost of its investigation.

In essence, an evolving dispute forces geoprofessionals to think in terms of "pay me now or pay me later." Later can be a lot more expensive.

While, certainly, it's easier for larger, more financially secure firms to undertake studies that they may not be paid for, doing so may be even more important for smaller firms, given the far larger costs that disputes can engender. One of the costliest of these is the loss of a potential client for life, something that, in these two cases, the GBA-member firms prevented. In essence, an evolving dispute forces geoprofessionals to think in terms of "pay me now or pay me later." Later can be a lot more expensive.

JOHN P. BACHNER is an independent consultant who served as the Geoprofessional Business Association's (GBA's) executive vice president from 1973 through 2015. GBA is a not-for-profit association that develops programs, services, and materials to help its member firms and their clients confront risk and optimize performance. GBA-Member Firms provide geotechnical, geologic, environmental, construction-materials engineering and testing (CoMET), and related professional services (*en.wikipedia.org/wiki/Geoprofessions*). GBA invites geoprofessional constructors, educators, and government officials to become involved. Contact GBA at *info@geoprofessional.org*.