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Terracon

INCENTIVE FOR INNOVATION

Assessment Strategies and Tax Incentives Drive Brownfield Site Redevelopment

Safely restoring a contaminated property and helping find purpose in its reuse is one of the most rewarding opportunities an environmental consultant can have. It requires a collaborative team with the creative vision to see beyond the condition of an existing site and instead see the possibilities for redevelopment.

With visions of a new hotel anchoring a project site located within a designated brownfields area in downtown Tallahassee, Fla., the owners of MountainShore Properties, Inc., initially knew they were in need of a partner to perform a Phase I Environmental Site Assessment (ESA). With knowledge and experience far beyond assessment, Terracon was able to support a successful brownfield site redevelopment using innovative assessment strategies and available incentives.

Terracon facilitated a site assessment with the goal of receiving a Site Rehabilitation Completion Order (SRCO) without restrictions from the Florida Department of Environmental Protection (FDEP). The desired SRCO was received within a year of site assessment initiation.

IDENTIFYING COMPLEXITIES AND NAVIGATING ASSESSMENT OBSTACLES

Terracon was selected by MountainShore Properties, Inc. to perform the Phase I ESA based on an existing client relationship founded on a number of previously successful projects. Utilized as a storage and dry goods transfer/loading facility dating back to the early 1900s, the historic site was traversed by three rail spurs. Adding to the development project's complexity, the Phase I ESA revealed recognized environmental conditions (RECS) associated with impacts to soil

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Terracon's environmental consulting resulted in the safe restoration of a contaminated property that will ultimately realize the property owner's vision of redeveloping the site and building a hotel. Rendering credit: LLW Architects, Inc.

related to historic industrial activities that presented an obstacle for site redevelopment.

Following review of the Phase I ESA, Terracon was contacted to facilitate a site assessment. The team knew that if the assessment resulted in a recommendation for site remediation, development of the hotel could only occur if a Site Rehabilitation Completion Order (SRCO) without restrictions from the Florida Department of Environmental Protection (FDEP) could be achieved. The desired SRCO certifies the site as being remediated to regulatory limits with no need for future environmental cleanup.

Our team developed a large-scale comprehensive conceptual site model to adequately assess the site for chemicals of concern (COCs) while gathering data to support an arsenic as natural background assertion. The assessment incorporated the use of offsite and select onsite background sample locations to calculate specific background arsenic concentrations, integrated clay mineral X-ray diffraction testing, grain size sieve analysis, and statistical modeling of laboratory data to definitively prove arsenic was naturally occurring and not originating from human activity. The assessment also documented several metals and low level petroleum constituents in the top 2-feet of site soils. No groundwater impacts were identified. A combined document, Site Assessment Report and Remedial Action Plan, was submitted to the FDEP and subsequently approved. Arsenic was considered naturally occurring below two feet and consequently the top two feet of the site was excavated for proper disposal.

What is a Brownfield?

A brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. It is estimated there are more than 450,000 brownfields in the U.S.

Source: EPA.gov

UTILIZING INCENTIVES

Terracon further assisted the client by identifying and obtaining tax credits under the Florida Brownfields Voluntary Cleanup Tax Credits (VCTC) Program. Through the VCTC program our client recovered fifty percent of cleanup costs in state corporate income tax credits. These tax credits have an estimated value of 85 cents on the dollar. In addition, because the site is in a brownfields area, it is eligible for tax incentives of $2,500 per future hotel employee.

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Our team developed a close working relationship with FDEP which proved paramount to the success of this project. A SRCO was achieved for the property within a year of site assessment initiation. With the brownfield order closed, the owners are currently in the process of redeveloping the site and building a hotel. Terracon is also conducting the construction materials testing and threshold inspections for the hotel construction, and conducted the geotechnical evaluation and recommendations for the hotel project.

KYLE HAYES

Kyle Hayes is a senior scientist at Terracon's Jacksonville, Fla. office with more than 11 years of experience in environmental assessment, remediation, brownfields, permitting, due diligence, natural resources, and compliance for state and federal projects.

BEYOND DRILLING

Using Geophysics to Understand What Is Beneath the Surface

Drilling and soil sampling has traditionally been the way to explore subsurface conditions. But what if your project site encompasses 18 acres and you know that highly variable conditions exist? Consider a site where drilling and sampling alone can't sufficiently characterize the site.

Terracon's regional geophysicists collaborate with our engineers and geologists to design the optimal geophysical survey to meet the client's budget and needs. Terracon has an arsenal of geophysical tools and methods to supplement and complement these more traditional site characterization methods. Electrical Resistivity Imaging (ERI), is one such geophysical method and is a great tool for locations where drilling and sampling alone can't get the job done. ERI measures relative average electrical resistivity of subsurface materials—or how strongly a given material opposes the flow of electric current—then processes the values into a 2-D cross-section of the subsurface beneath the survey line.

Geophysical methods such as ERI allow the identification of conditions underneath an entire area, as opposed to drilling and sampling soil borings which provide a finite extent of subgrade data at discrete locations. Using ERI as the first step in geotechnical site characterization is a perfect way to develop a smart exploration plan whereby borings and other intrusive sampling methods can be focused in critical or high interest areas identified by the ERI.

Starting an exploration program with ERI data may actually allow the reduction in the overall number of soil borings while painting a more thorough picture of the subsurface when complex geological conditions exist. Terracon's team of geophysicists work with our geotechnical engineers to blend the use of geophysics with traditional drilling and sampling to better understand the subsurface in ways that have historically been impossible.

ERI measures relative average resistivity of subsurface materials—how strongly a given material opposes the flow of electric current—then processes the values into a 2-D cross-section of the area surveyed. ERI is usually performed in conjunction with or prior to drilling. It narrows down areas in need of further exploration to prevent "drilling blind."

ERI IN ACTION

Sometimes it's not just geology that can create a complex subsurface that requires geophysics to understand. A client recently asked Terracon for help determining the condition of an area which formerly housed multiple coal mines.

Because our client planned to develop the site for commercial use, determining the extent and condition of the mines was essential to plan for future development. The existence of a non-operational coal mine could cause settlement and other foundation issues.

Our team started the exploration process with ERI, which provided data to predict the presence of the mine areas to approximately 120 feet below the surface. Our geophysicists evaluated the data and delineated certain areas and depths as anomalies potentially associated with previous mining operations. The geophysical survey allowed us to determine intact and collapsed areas, and areas with voids. We were able to hand this prediction of mine locations to our geotechnical engineers to perform an intrusive exploration with traditional soil borings to supplement and confirm the ERI results.

REVEALING WHAT LIES BENEATH

This example is just one way that ERI can be used to reveal the subsurface conditions. We also recently used ERI to determine depth to bedrock below a guide wall at a lock and dam; identify karst (cave) features around a wind turbine farm; and locate water infiltration zones along levees. We even discovered a former tunnel near a clock tower.

Terracon has experienced geophysicists and the capability to execute numerous geophysical methods for site characterization throughout the entire country. In addition, NORCAL Geophysical Consultants, Inc. *a Terracon Company*, based in California, recently joined the firm greatly increasing our expertise in that region. The use of geophysics for subsurface characterization for geotechnical and environmental applications is rapidly growing. We continue to expand our knowledge of advanced geophysical methods such as ERI to bring reliable, cost-effective solutions to address the unique challenges of each site or project.

Shown here is a typical ERI survey layout consisting of 112 pins hammered into the ground connected by a cable.

JOSH LOPEZ

Josh Lopez is a field geophysicist in our Bettendorf, Iowa, office. He is responsible for performing varied geophysical field work across the country, and has led numerous geophysical projects including underground storage tanks locates for environmental departments, seismic and electrical resistivity surveys, and ground penetrating radar concrete surveys.

MAKING A SPLASH!

There's More to Aquatic Facilities Than Just Water

When you think of swimming pool design, the first image that might come to mind could be a large pool of crystal clear water. Before putting the first shovel in the ground or upgrading an older center, many factors need to be addressed for these unique aquatic facilities. The programming, planning, and rehabilitation of aquatic facilities for both recreational and competitive use include collaborating with clients, the design team, and even end users to create a plan that enhances and optimizes their vision and goals.

"For the majority of aquatic facilities, project planning for environmental, facility, geotechnical, and material factors is critical," says Matt Reynolds, P.E., aquatics department manager for Terracon. "By assisting our clients in evaluating sites and identifying goals and objectives, we create a strategy to design new aquatic facilities or renovate existing aquatic facilities, optimizing end-user benefits."

THE IMPORTANCE OF BALANCED ENVIRONMENT

Many existing indoor natatorium facilities have poor air quality and moisture migration that are the result of years of deferred maintenance, ill-advised HVAC adjustments, and failing envelope systems (allowing water intrusion). To better plan for project needs, it is often necessary to conduct environmental studies to determine indoor air quality and assess whether the systems (building enclosure and HVAC) are contributors to the moisture imbalance and result in less than desired performance. These factors must be considered to truly rehabilitate a failing facility. The resultant remediation plan should address all of the systems beyond just the water-related pumps and treatment systems.

As an example, a collaborative effort of our building enclosure and HVAC specialists was required for a higher education project in San Antonio, which included a natatorium and gym with a common wall constructed circa 1990. Initially assessment findings identified a myriad of building issues indicating obvious water intrusion; gaps in mortar joints, debonding of Concrete Masonry Units (CMU), missing weep openings, deteriorated sealant expansion joints, unsealed openings at through-wall penetrations, however, the effort required additional review to address staining and mold growth on exterior walls, efflorescence of exterior split face CMU, corrosion of metallic surfaces in the pool building and fouling of mechanical equipment. A truly multi-disciplined team of professionals with expertise in building enclosure, mechanical and aquatic evaluation, testing, design and commissioning provided the university with recommendations followed by a comprehensive remedial design program to renovate the facility to meet the future needs of the growing higher education campus, restoring it as a showpiece.

MINIMIZING RISK - MOVEMENT

Aquatic projects have the potential to pose interesting challenges. A unique one is known as a "floating shell." This occurs when hydrostatic pressure below the pool floor is so significant that when a pool is empty, it pushes the shell upward, creating large cracks, leaks, and destroying pool piping. Once again, several different disciplines are needed to accurately address the related issues—geotechnical study which provides structural engineers with the best information to minimize foundation design issues while meeting applicable building codes and standards. Additionally, design standards to the pool engineering should be developed by a plumbing engineer to ensure that the system provides hydrostatic relief valves in each main drain sump and a sight sump to allow pool operators to view the in-ground water level with respect to the bottom of the pool prior to any pool draining procedures, thereby avoiding movement of the pool shell.

WHAT IT'S MADE OF MATTERS

Swimming pool shell engineering is critical component of the overall aquatic design, not only for slab-on-grade pools, but exposed or elevated shells. As an example, on an indoor natatorium project in Pittsburgh, Pa., Terracon was retained to determine the cause of leaking of a pool shell over occupied space below, that was installed only months prior to the evaluation. A pool shell water tightness test detailed leaks from many locations around the 8-lane by 25-yard competition pool into occupied space below the deck. There were obvious indications of design, installation, and materials quality issues. Concrete remediation recommendations and compatible waterproofing membranes were designed and remedial actions taken such that the tile setting manufacturer warranty was not voided. As a result, a water tight pool shell was restored and 25-year tile warranty was provided for the desired result on this new facility.

Making a splash with an aquatic facility is the easy part. Maintaining the facility performance for the intended use and long-term return on investment requires awareness of a myriad of issues to be addressed during the design and construction of any new facility. In addition, due to the complex nature of these facilities and their operational and often hostile environments related to building components, rehabilitation requires a team of multi-disciplined professionals working together to assess and restore the facility for its intended use. This will continue to challenge the industry as owners look to provide even more complicated and sophisticated aquatic facilities in a variety of building settings.

MATT CAPPELLO, P.E.

Matt Cappello, a senior engineer in our St. Louis office, supports the development and growth of Terracon's aquatic design and swimming pool engineering services and also provides facility mechanical and plumbing design and assessment.

MATTHEW A. REYNOLDS, P.E.

Matt Reynolds, as a department manager in our Concord, Ca. office, is an integral part of the aquatic design and swimming pool engineering services.

REAL-TIME INFO SAVES TIME AND MONEY

Maturity Meter Speeds Up Completion of Concrete Construction Projects

Many materials testing activities are used to evaluate when certain construction activities can move to the next stage. Soil compaction testing of fill materials determines if additional fill can be placed or if paving or foundation work can begin. Concrete compressive strength testing dictates whether post-tension cables can be stressed or concrete formwork can be removed. Failing tests or insufficient test results can delay construction activities and impact the overall construction schedule.

TIMELY REPORTS ARE KEY TO DECISION MAKING

To assist our clients, Terracon focuses heavily on getting critical information to the project team quickly so a timely decision can be made. Our use of technology to efficiently collect and report our test results is key in making this happen. We also use technology to support how testing is performed to further create efficiencies in the construction schedule and accelerate the decision-making process. One area where we do this is in the testing of field cured cylinders for concrete form removal or post-tension cable stressing. Terracon can use the maturity meter method (ASTM Standard is C 1074 "Standard practice for estimating concrete strength by the maturity method") to provide real-time data to be used to assess when form removal or stressing operations can occur or be used to augment when field cured cylinders should be tested.

We have found that with proper application, use of a maturity meter has the potential to save an average of one day per impacted concrete pour on typical commercial projects. In some cases, this has resulted in reducing a project schedule by months and saving thousands of dollars in construction costs.

PLANNING LEADS TO EFFECTIVE SOLUTIONS

By taking time prior to the start of concrete placements or during initial concrete placements to use the maturity meter on initial batches of the approved concrete mix, maturity index values can be correlated with the compressive strength of early-age cylinders. This in turn provides the baseline for future placements and the critical decision making process of when to remove formwork or when to stress post-tension cables by the construction team in a timely manner.

The initial costs in trial batches and correlation testing to develop the maturity curves and the actual maturity monitoring during placement is a minimal and worthwhile investment that can be quickly recovered. The form removal and stressing decision process, the significant construction schedule time savings, as well as reduction in the number of cylinder test specimens required per the project, all result in accelerating the construction of concrete construction projects.

Mike Poore, a construction inspector in our Denver office, installing a maturity meter logger onsite.

INSTALLATION OF MATURITY DATA READER

Using the maturity meter method for early strength assessment can provide more accurate data in assessing when:

- Post-tensioned tendons may be stressed.
- Concrete formwork may be removed.
- Shoring and re-shoring operations can begin.
- Floor slabs and pavements may be opened to traffic.

In addition, the maturity meter can also be used to measure:

- Concrete curing temperatures.
- Cold-weather temperature effects on the curing process.
- Temperature differentials in mass-concrete placements.

JON DOUDNA, P.E.

Jon Doudna is a project engineer in our Denver office. He has 31 years of experience in construction engineering inspection and design including materials testing, field investigations for construction defects and materials distress, and construction observation supervision. Jon has managed residential, commercial, education, medical, and public infrastructure improvements.

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TERRACON NAMES SRINIVASAN NEW PRESIDENT

Swaminathan "Vasan" Srinivasan, P.E., is now president of Terracon Consultants, Inc. Srinivasan assumes leadership of Terracon's operating company, including the firm's geographical operating groups, service lines, business sectors, and quality group, which provide professional services across the country. He succeeds David Gaboury, P.E., who has served as president of Terracon since 1997. Gaboury continues as Terracon's chairman and CEO.

"Vasan has been a large part of Terracon's success. His drive to advance innovation in all we do, his initiative, and his commitment to our employees, clients, and communities make him a highly effective leader," Gaboury said. "He represents the outstanding quality and dedication of the employee-owners at Terracon."

Since joining the firm in 2007 as part of Terracon's acquisition of H.C. Nutting in Cincinnati, Srinivasan advanced from senior engineer to geotechnical engineering manager to division manager. His progression continued while serving as Western Operating Group manager and executive vice president. He has held a seat on the company's board of directors since 2013, and recently served as Terracon's chief operating officer.

"It is an exceptional honor to be entrusted with leading Terracon into the next phase of our journey as a company," Srinivasan said. "I look forward to working together with our employee-owners to build on our strong foundation and find new, innovative ways to serve our clients, contribute to the advancement of our industry, and make a positive impact in the communities where we live and work."

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