The City of New Orleans is known for many things—Mardi Gras, the French Quarter, and Cajun cuisine, to name a few. This unique, diverse city located along a bend of the Mississippi River will celebrate its tri-centennial in 2018. As a tribute to this historic milestone, a new world class airport terminal was planned—the Louis Armstrong New Orleans International Airport.

The airport is one of the critical infrastructure projects the City of New Orleans initiated after Hurricane Katrina devastated the area in 2005. The $950 million terminal complex will include three concourses encompassing more than 1 million square feet of space, 35 gates, a 2,000-space parking garage, and elevated access roads.

The new, world-class, Louis Armstrong New Orleans International Airport is a critical infrastructure project for the city. Ricky Simon (left) and Daren Thomas (right), serve as project executive and project manager for this important project.

Terracon was selected by the global engineering design firm, WSP, to serve on the Quality Assurance (QA) team along with other consultants on behalf of the New Orleans Aviation Board.

**MATERIALS TESTING CHALLENGES**

The new airport site, along with much of the city, is developed on very unstable soils that can be considered swamp land. To build on these subsurface conditions, significant ground improvement is necessary. Deep pile foundations were required to support...
applied and intumescent fireproofing, and technicians for concrete sampling and testing.

As the project progresses, more testing will be required. We are also performing special inspection of masonry construction for the concourses, fireproofing inspection, and roofing observation for the terminal and concourses. On the site, utility installation continues with Terracon technicians performing density tests of backfill, as well as cement treatment of pavement subgrade soils.

The Louis Armstrong New Orleans International Airport is currently scheduled to open in early 2019. Terracon’s team of engineers, technicians, and partners are making a major contribution to keeping this momentous project on track for a safe, quality, and timely completion.

VALUE-ADDED SERVICES
As the project has continued over the past two years, our scope has evolved and grown to include not only QA, but also special inspections, and building enclosure testing services for this massive project.

To support the project’s extensive materials inspection needs, the team provided field engineers to perform pile integrity testing on 100 percent of the precast piles supporting the buildings, and pile-driving analyzer (PDA) on 2 percent (150+ piles) of the precast piles driven for the project. We also provided special inspectors for reinforcing steel and concrete, masonry construction, structural steel connections, spray

Louis Armstrong North Terminal Project
• has 35 airline gates.
• has 2,000 space parking garage and surface parking.
• required testing on more than 7,600 piles.
• is scheduled to open in early 2019.
• is a $950 million terminal complex.

DAREN THOMAS, P.E.
Daren is a principal and senior materials project manager in our New Orleans office, and has more than 30 years of experience with geotechnical and materials engineering projects. Daren serves as project manager for the New Orleans Airport project and has extensive experience with the area’s challenging soil conditions.

RICKY SIMON
Ricky serves as the project executive responsible for the overall project execution. He was involved in winning the project and in negotiating contracts and budgets. He is a senior principal with Terracon and oversees operations in Louisiana, Mississippi, and south Alabama.
WE HAVE AN APP FOR THAT
Bringing Efficiency to Process

Prior to the development of the app, each assessor would take a site reconnaissance form, note pad, camera, or mobile phone into the field to complete each reconnaissance. Then, back at the office, photos would need to be uploaded to the project file and notes taken would be transcribed into the applicable sections of the Phase I report.

Now with Terracon’s ESA Field App, all the assessor needs is a mobile phone! Once on site, our assessor collects necessary data to populate several sections of the ESA report, including the interview, site observations, adjoining properties, and if applicable, additional services such as limited sampling of building materials. The content of the app is structured based on the ASTM standard requirements. Additionally, the assessor can take representative photos and begin a site diagram all within the app.

With questions and user-friendly answering options, the app allows the assessor to streamline site reconnaissance and be confident the necessary information was collected in the field. Once the required questions in the app are answered, the data can be uploaded to Terracon’s server. The ESA report draft can be generated, with information entered in the interview, site observation, adjoining properties, and additional services sections of the app transferred to the applicable sections of the report. Photos taken in the app will be uploaded to the project file, and the site diagram features will be uploaded to Terracon’s GIS Toolbox.

“It was really fun to be part of the team that was given the time and creative freedom to design this app,” said Emily Blakeway, field scientist in Terracon’s Seattle office. Emily was part of the app development team that included several assessors and IT personnel from Terracon offices across the country.

“We are fortunate to have an incredibly dynamic team who enjoy rising to the challenge of creating efficiencies that help us serve our clients better each day.”

John Sallman, P.G., Assistant Director of Environmental Services
A HISTORIC HOMECOMING

Relocation of the Livermore Depot

Without tracks, trains, passengers, or freight, is a railroad depot still a railroad depot? Old buildings, no matter their significance, are always inextricably connected to the ground they sit on. However, when a historic building loses its context, it can also lose its significance. 

Redevelopment can often mean a dismal end for historic buildings, even if they are recognized by the community as an important local landmark. Yet, Terracon’s historic preservation specialists in the Facilities division are adept at creating innovative strategies to care for historic structures and plan for their future maintenance. The Terracon team jumped at the opportunity to collaborate with the general contractor to relocate the California Southern Pacific depot in Livermore, Calif. The depot, which was originally built in 1892, was to be safely moved to a nearby location adjacent to the long-since rerouted tracks.

PREPARING FOR A SAFE DEPARTURE

The first step in the move process was an evaluation of the depot’s existing historic fabric and execution of a treatment plan to ensure the depot’s safe and intact arrival at a new location as soon as possible.

Although documentation about how to move a train station didn’t exist, the team did find records in the Southern Pacific Railroad architectural catalog from 1892 providing details about the balloon frame structure. Used as a passenger train station until the 1940s, the building later handled freight and served several commercial uses. The train tracks next to the depot were rerouted in the 1970s. When Terracon’s preservation team arrived on site, the train station appeared to have lost its identity.

After visiting two other historic #18 depots along the west coast, the Terracon preservation team created plans to survey, inventory, and record every piece of historic fabric removed from the building, without damaging the material. Ultimately, the intention was to create a manual to return each historic component to its exact location and correctly reassemble the building on its new site.

DISCOVERING NEW WAYS TO PRESERVE ARCHITECTURAL DETAILS

Several surprises were found during the deconstruction process, and at times, it seemed the 125-year-old building just did not want to be taken apart. One discovery included the identification of the previously unknown original interior redwood tongue-and-groove siding which was dormant, but intact, behind the modern sheetrock walls. As it needed to be removed to accommodate the interior bracing framework, Terracon devised an experimental method to remove the century-old square nails without damaging the siding boards themselves. Our historic preservation specialists were on site for two weeks, working closely with the contractor’s crews to instruct them how to preserve nearly every component of the structure.

To avoid disruption from street closures and power line relocation, an overnight move was planned for the depot. Terracon was part of the on-hand team to ensure the depot remained undamaged during the journey, which took nearly five hours.

More than forty years after the tracks were relocated, the depot followed. Now situated directly alongside the rails, the building that stewarded train passengers long ago will once again serve as a modern train station.

Traditional historic preservation convention relies on the notion buildings belong in the places they were built. Yet, when a small train station has lost its purpose, to restore its original use in a new and rightful location, is nothing short of a homecoming.

ARIA URBAN

Arianna has a Master of Science in historic preservation and is a field facilities professional in Terracon’s Concord office. She is a member of a new practice area within Terracon’s Facilities division to responsibly repair and maintain historic structures.
SAVE WITH SEISMIC SITE EVALUATIONS

Piedmont Atlanta Hospital's Expansion

The science of structural design serves to protect the wellbeing of facility patrons and surrounding communities. The International Building Code (IBC) requires that structural design must account for the forces imposed by a potential seismic (earthquake) event. The design is governed by three factors:

1. The Seismic Design Category (the critical or non-critical nature of the structure),
2. The Site Class (a function of the subsurface conditions to 100 feet), and
3. The proximity and magnitude of a probable seismic event.

The first factor, Seismic Design Category, is based on the anticipated use of the structure and occupancy, and leaves no room for interpretation. The IBC usually puts a hospital among the most rigorous design categories. Similarly, the third factor, probability of a seismic event, is based upon published information. The real work goes into determining the second factor; Seismic Site Class. When designing a hospital, it is important to get the second factor, Site Class, right.

Site Class is determined by the shear wave velocity of soil and rock within the upper 100 feet at the site. This can be estimated from Standard Penetration Test N-values (STP N-values), the geotechnical engineer’s experience and laboratory test results. But estimation of such a value must exercise conservative assumptions, and the cost of such conservative estimates may be very large for structures such as hospitals. Direct measurement of shear wave velocity can be accomplished, but at greater expense than simple estimations. When is it appropriate to directly measure this critical parameter, and when will estimations from STP N-values suffice?

MEETING CHALLENGES WITH EXPERIENCE

In 2014, Piedmont Healthcare began planning and designing a new inpatient tower and subsurface parking deck at the Piedmont Atlanta Hospital. This top-rated acute-care community hospital, originally built in 1954, needed a major update. The project, totaling more than $800 million, included approximately 900,000 square feet of new construction and 47,000 square feet of renovations. Terracon’s skilled consulting and specialized field services allowed the seismic design for the hospital to be optimized, and resulted in estimated savings in the hundreds of thousands of dollars.

This hospital is an IBC Seismic Design Category IV, requiring the highest level of protection during seismic events. Understanding the impact of conservative estimates on this large structure, the Site Class was initially established during the geotechnical exploration using surface measurement techniques of shear wave velocity, a common approach for typical projects. This geophysical testing approach resulted in a Site Class C. This Site Class requires significant foundation and structural elements to address the stability of the structure in the event of an earthquake.

DEFINE THE PROBLEM TO CREATE THE SOLUTION

The initial structural designs for the Site Class C conditions would require a significant outlay of funds to meet structural code requirements. Thinking proactively, Terracon collaborated with the structural engineer and architect to consider options that would alleviate this costly condition.

We developed an innovative solution to the challenging seismic evaluation and approached the problem from two fronts; reducing the amount of softer materials below the building and refining the shear wave velocity measurements with more rigorous geophysical site characterization.

The bottom floor of the facility was lowered to within 10 feet from the top of rock. In addition, a more comprehensive downhole seismic test was employed to optimize shear wave velocity measurement. This testing approach utilized a single deep borehole drilled into bedrock using a downhole pneumatic hammer. A temporary casing was inserted to protect a sensitive geophone that was lowered to test depths throughout the profile. The geophone measured the first-arrival times of surface-generated shear waves. By comparing shear wave arrival times at different depths, the average shear wave velocity profile, well into bedrock, was calculated.

Staff from three Terracon offices worked together to perform the downhole seismic testing and successfully determined the necessary conditions were present to recommend a more favorable Site Class B.

THE VALUE OF PARTNERSHIP

Following work on the design phase, Terracon’s Materials professionals addressed specific needs of materials testing and special inspections. Our partnering approach, knowledge of site conditions, the use of experienced field personnel, and multi-year commitment to working with the design and construction team, all contributed to Piedmont Healthcare’s selection of Terracon for construction materials testing and inspection services.

JOHN LAWRENCE, P.E.

John is a geotechnical consultant in Terracon’s Atlanta office. John helps lead a diverse practice including engineering services for projects ranging from multifamily, commercial retail, medical offices and hospitals, to state office and university facilities.
CONSTRUCTION INSPECTION UNCOVERS DINOSAUR DISCOVERY

One of the most complete triceratops skeletons ever found was uncovered last summer by the watchful eye of Dan Wagner, engineering technician in Terracon’s Denver office. While Dan was working on site, inspecting drilled piers, he noticed something out of the ordinary, grabbed a shovel, and discovered a bone. “Right away, the initial reaction was, ‘Wow, look at that; that really could be a dinosaur,’” said Dan.

One bone became a handful, and soon, the remains of the 66-million-year-old triceratops were brought to the surface. The skeleton will become part of the Denver Museum of Nature & Science’s permanent collection with Dan and other construction team members being noted for their role in the find as part of the display.

Ali Bagherian (materials department manager, left) with Dan Wagner (right) on the site.

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