D.J. SCHEFFLER & NYE, INC. WORKING LARGE IN A SMALL AREA OF MALIBU

FOUNDATION DRILLING

JULY 2022

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BUILDING BIG IN A TINY SPACE

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COVER FEATURE:D.J. SCHEFFLER & NYE, INC. FEATURE

WORKING LARGE IN A SMALL AREA OF MALIBU

BY DALE SCHEFFLER, PRESIDENT, D.J. SCHEFFLER & NYE MIKE HAGY, CONSULTANT/SLURRY ENGINEER, PACO EQUIPMENT

Stretching for 21 miles along the California coast, the City of Malibu has long been known as a popular enclave for Hollywood stars and media moguls living in oceanfront homes with spectacular views of the Pacific.

On the surface, the terrain of Malibu consists of sandy beaches, crescent coves, and rocky headlands meeting the coastal terrace and slopes of the Santa Monica Mountains. For foundation drilling contractor D.J. Scheffler & Nye, the real interest

lies below the surface. It is about having first-hand knowledge of the geological features and soil makeup of the subsurface. It's about truly understanding the lay of this unique stretch of land.

STREET VIEW OF THE CONGESTED JOBSITE

President and founder Dale Scheffler, along with his experienced crew, have been serving the Malibu community since 1989, with projects as diverse as building foundations for large beachfront estates to rescuing homes in the Malibu mountains from landslide damage. All this experience has taught Dale one truth about the Southern California coastline: it's a place where land and space are at a premium.

THE MALIBU ROAD PROJECT: BIG PLANS FOR A SMALL LOT

It was an empty beachfront lot measuring 50 feet by 100 feet sandwiched between two houses, located on a narrow two-lane road. The owner of one of the neighboring homes purchased the land, with an eye to the future. It was a perfect site for the construction of a new two-story family home, complete with an infinity pool overlooking the ocean.

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Enter Scott Halley & Associates, a general contractor who specializes in the construction of high-end homes in Malibu and the surrounding area. Scott Halley knew engineering ingenuity and precise planning would be crucial to the construction of a strong foundation to support the proposed structures. Scott turned to his foundation drilling partner and ADSC Contractor Member D.J. Scheffler & Nye. The two companies have a long history of successfully working together on projects up and down the Malibu coast.

"But the most crucial aspect of the job was constructing the deep foundation piles required to support the proposed structures. Eight of them, in fact.

EQUIPMENT CLEARANCE WAS CAREFULLY CALIBRATED ON THE SMALL JOBSITE

When Dale Scheffler and Vice President Mark Nye sat down to discuss the job specifications, they both agreed there were unique challenges to overcome before laying the groundwork and preparing the land for construction.

The first order of business was building sea wall piles to raise the height of the existing sea wall at a future date. Shoring piles also needed to be installed along the adjoining properties for the future construction of a basement.

But the most crucial aspect of the job was constructing the deep foundation piles required to support the proposed structures. Eight of them, in fact. These piles would go down to depths ranging from 95 to 135 feet.

It was a limited access logistical challenge. The job would require navigating under low and high voltage power lines and communication wires with a clearance space of less than 14 feet. Servicing the job from the narrow roadside would be out of the question. Finally, there could be no stockpiling of equipment and material. The space was so limited that the machinery would not be able to move around freely.

PREPARATION: FIGURING THE ANGLES

Dale Scheffler has never shied away from big projects. Install the pilings to anchor a skywalk over the Grand Canyon? No problem. Put in 10-foot diameter pilings that go 200 feet deep for a vital transportation bridge located on an Air Force base in California? Check. But to work on the Malibu Road project, Dale had to start small.

How small? Scale model small. Office space was set aside to create an exact layout of the jobsite. Scale models of the drill rig, crane, trucks, and rebar cages were created so Dale could coordinate and develop a plan. Dale's calculations were based on exact measurements and countless photos taken of the actual jobsite.

What's the best angle for a driver to back a low boy into a tight area while carrying a 50-foot rebar cage section weighing roughly 20 tons? Should the crane be located *here* to safely lift and store the unassembled rebar cages *there*? The many questions raised were answered by moving the scale models around to find the precise location for each piece of equipment.

Since there was only room to construct one pile at a time on the actual jobsite, a new scenario would have to be evaluated for each shaft. Dale moved his models

new scenario would have to be evaluated for each shaft. Dale moved his models around like pieces on a chessboard, determining different staging area designs for each of the eight foundation piles. The models demonstrated that the work could be safely done.

CAREFUL STAGING OF EQUIPMENT, TOOLING AND MATERIAL WAS CRITICAL

THE LAY OF THE LAND

After all his years of working on the Malibu coastline, Dale could have guessed what the geotechnical studies and soil boring logs of the property would show. As he expected, the soil formation consisted of beach sand, sandy silt, clayey sand and gravel with some cobble and siltstone.

With Dale's deep understanding of the geological history of the land, he knew the area surrounding the lot was once a canyon winding its way to the ocean. So, it was no surprise when the logs showed water would be encountered upon drilling, and that it would be fresh water coming from an underground river flowing 25 feet below the surface right above the bedrock. This meant the wet hole method of drilling would be required all the way from the surface to the weathered bedrock. It was also determined the CETCO's Shore Pac polymer slurry system would be the most efficient way to keep the holes open and stabilize the excavation.

It was time for the work to begin.

DALE SCHEFFLER ON THE MALIBU ROAD JOBSITE

SETTING THE STAGE

Creating a flat working platform was an important component for the success of the project. The working platform had to provide stability and flexibility for the crew and equipment through all phases of the job.

PLACEMENT OF THE SURFACE CASING

The first part of the process was to prepare the area where each pile would be drilled. At each designated drilling location, a 7-foot diameter surface casing needed to be installed. These casings were placed in shafts that were drilled down to 15 feet below the surface grade. Along with providing the crew more room to make necessary adjustments during the construction of the permanent piles, the surface casings would be integral to the introduction of the polymer slurry into the drilling process. But for the time being, the installed casings were backfilled with native spoils from the excavation.

SLURRY ENGINEER MIKE HAGY SUPERVISING THE SLURRY PREPARATION

Once the casings were installed, 8-foot by 20-foot steel plates were laid over the entire work area. The 1 1/2-inch thick plates provided the stability for the moving and repositioning of the 90-ton Soilmec R-930 drill rig and the 100-ton hydraulic crane required for the work on each pile. Also, two to three rebar cage sections, each weighing up to 40,000 pounds, needed to be placed in different locations on the jobsite. That is approximately 90 to 100,000 pounds of steel. The steel plate platform helped to transfer the heavy load away from both neighboring properties to avoid any foundation related damages.

Since a polymer slurry system was going to be used on the project, the storage of the slurry tanks had to be factored into the staging of the work area. The sloped area of the property above the beach break was the perfect location for a carved-out supported space for the 10,000-gallon and 20,000-gallon tanks needed for the recovery of the Shore Pac slurry.

BRINGING THE SHORE PAC POLYMER SLURRY INTO THE MIX

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It was vital to the success of this project that the shafts be kept open, especially when the drilling extended beyond the 15 foot surface casings and entered the uncased overburden (or soil) area above the bedrock. D.J. Scheffler & Nye turned to Slurry Engineer and Consultant Mike Hagy, of PACO Equipment, to design the Shore Pac slurry program that would support the shafts and keep them from sloughing or caving in during the excavation.

"The Shore Pac slurry permeated and sealed the drilled shaft, exerting horizontal outward pressure against the shaft's walls to keep the excavation open during drilling.

In order to determine how much Shore Pac slurry would be needed on this project, Mike studied and reviewed the geotechnical information and soil boring logs to analyze the formations, soil lenses, static fresh water, and tides, determine proper pH, and Marsh Funnel Viscosity (MFV). Mike calculated the total expected hole volume of the project by combining the diameters and lengths of the temporary casing, the diameters of the shafts, the number of shafts drilled, and the combined average depth of open hole. Also factored into these calculations were the estimated percentage of overbreak, the percentage of fluid loss during the drilling process, the percentage of recycle, and percentage of product refurbishment.

The exceptionally strong and heavy molecular backbone of the user-friendly Shore Pac slurry proved to be the ideal solution for the stabilization of the eight drilled shafts, with no fluid loss to the formation or the need of any additives.

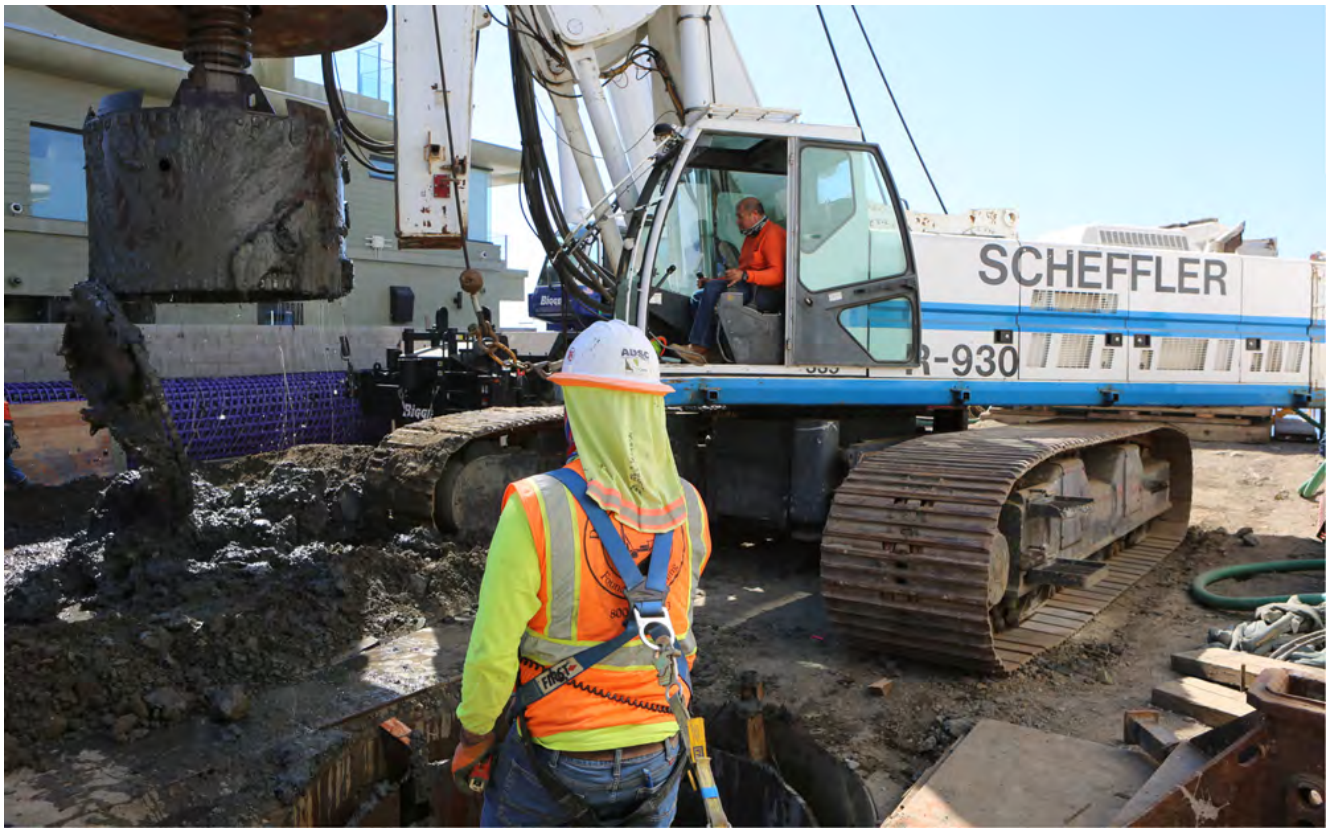
TESTING THE SHORE PAC SLURRY

Mike trained the crew to mix, monitor, test, and control the properties of the slurry during the drilling process. It was important for Mike to not only train the personnel in the operation of a slurry system, but to also demonstrate how the system works and why it was essential to the overall project. His approach can be summed up by two of his favorite adages: "Not all classrooms have four walls," and "Tell me, I forget; teach me, I remember; involve me and I learn."

In order to support the shaft from surface to bedrock during the excavation and to

keep it from caving in, the slurry level was maintained at 10 feet above the bottom

of the surface casing for proper hydrostatic head pressure. The slurry permeated and sealed the drilled shaft, exerting horizontal outward pressure against the shaft's walls to keep the excavation open during drilling.



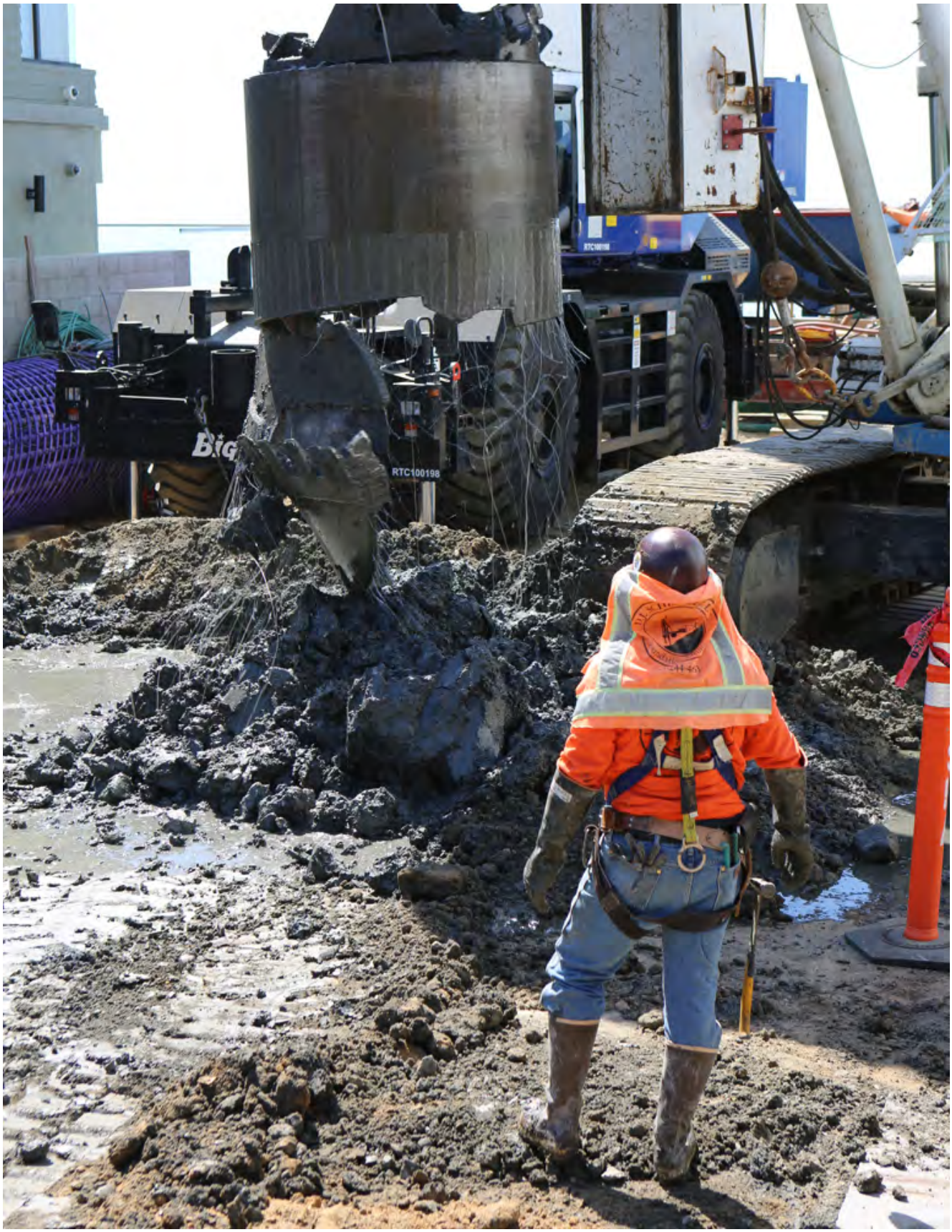
Slurry samples were taken from the bottom and mid-point of the shaft excavation with a point source bailer as well as from the supply tanks at regular intervals during the excavation process. The slurry needed to be constantly monitored to ensure the stability and integrity of the drilled hole. This was especially crucial when the drilling extended past the 15-foot surface casing and entered the open hole of uncased overburden (or soil) area above the bedrock.

Testing the sand content of the slurry was a vital operation performed at the completion of the excavation, prior to setting the cages and pouring concrete. A clean shaft and bottom needed to be established to mitigate the possibility of anomalies. Sand content samples were taken from the bottom of the excavation and found to be consistently less than .25% or a trace, which was perfect.

Due to the Shore Pac slurry's excellent flocculating ability, sand and fines dropped very quickly to the bottom of the shaft for easy extraction with a clean out bucket and without the use of any additives.

TIME TO GO BIG

The time had come for the actual drilling. Every step of the operation had been meticulously planned. The work staging area had been prepared. Scale models gave way to the real deal.



The work started on the pile located closest to the road and the crew would work their way down toward the beach. The first two days of the week were dedicated to the excavation and introduction of the slurry. The rebar cage assembly and placement would be accomplished on Wednesday. The site would be made ready for the concrete pour on the fourth day. Finally, the last day of the week was saved for site clean-up, slurry recovery, and re-staging the equipment and material to begin work on the next pile. It was time to set the plans into motion.

DAY 1 AND 2: EXCAVATION AND POLYMER SLURRY—THE WET HOLE METHOD

Monday morning. The drill rig and crane are in place. The crew is ready to work.

The crane lifts the first plate, exposing the embedded surface casing. The drill rig operator centers the auger over the surface casing. Crew members stand ready to add the Shore Pac slurry. The drilling begins.

"The work is hard. Tons of steel are moving through the air. The men need to work over an open drilled shaft in the earth. Safety is paramount.

To support the shaft from surface to bedrock during the excavation and keep it from caving in, the slurry level was maintained at 10 feet above the bottom of the surface casing for proper hydrostatic head pressure. The slurry permeated and sealed the drilled shaft, exerting horizontal outward pressure against the shaft's walls to keep the excavation open during drilling. The Shore Pac slurry is constantly monitored during the drilling process to ensure that the stability and integrity of the drilled hole is maintained.


XTRA


Bigge


CAT
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Once the drill reaches bedrock, a 6-foot diameter inner casing is inserted inside the 7-foot diameter surface casing and dropped down the shaft until it reaches bedrock. A seal is formed to hold off intruding water when the casing is twisted into the bedrock.

PREPARING TO COUPLE CAGE SEGMENTS ON SITE

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The diameter of this inner casing matches the shaft size of the pile specified by the engineer. With the casing in place, the drilling of the shaft continues into the rock socket to the depth needed to install the rebar cage.

ADJUSTING THE REBAR CAGE PLACEMENT PRIOR TO THE CONCRETE POUR

As the pile construction gets closer to the ocean, the level of the bedrock drops lower. A longer inner casing is required to reach the bedrock. The drilling in the rock socket goes deeper for the installation of a 134-foot long rebar cage.

Because the Malibu jobsite is so limited in size, the excavated soil is constantly being hauled away throughout the two-day process.

DAY 3: PLACING THE CAGE

This is the day when the skill and knowledge of the crew is on display. The work is hard. Tons of steel are moving through the air. The men need to work over an open drilled shaft in the earth. Safety is paramount.

Due to the small size of the work area, the rebar cages are delivered to the jobsite in two or three sections. Since D. J. Scheffler & Nye builds and assembles its own

in two or three sections. Since D.J. Scheffler & Nye builds and assembles its own rebar cages, each rebar cage is built to exact engineerapproved specifications.

Steel templates are included on the connecting ends of the rebar cages so the sections can be aligned in the right order, avoiding any difficulties on the job.

The crane lowers the first section of the rebar cage into the shaft. A rigging system, consisting of I-beams and hoisting chains, suspends the rebar cage in place, with the top end projecting above the surface of the ground. This section of rebar cage is ready to be coupled to the next section.

Using the templates to align the two sections of cages, the crew couples the two sections together, and the rebar cage, now weighing approximately 80,000 pounds, is lowered into position. One securely tied crew member is tasked with the assignment of going inside the rebar cage as it is suspended in the shaft. He makes the final adjustments and attachments to hold the rebar in place for the concrete pour and then removes the temporary hoisting chains. If a third section is needed, the process repeats itself until the cage is at its proper finished elevation.

The stage is set for the concrete pour.

DAY 4: POURING THE CONCRETE, DISPLACING THE SHORE PAC SLURRY

It is 8:30 a.m. on the fourth day. The first concrete truck has arrived with its delivery of concrete.

With the Shore Pac slurry properties and sand content within specification and with the rebar cage set in place, the crew builds a platform for the insertion and assembly of the tremie pipe. This is done by installing one 20-foot section of pipe at a time. The pipe is lowered until the end is just above grade. The platform has swinging gates that close to hold the pipe section suspended over the shaft. The crane lifts the next section of the tremie pipe over the already-suspended pipe, and the two sections are connected. The swinging gates are opened, and the pipe is lowered furthered down the shaft, ready for another section. This process is repeated until the assembled tremie pipe reaches the bottom of the hole. The concrete pour is ready to begin.

"Timing is critical at this stage. The pour must be coordinated with the concrete trucks arriving every half hour.

Every step must be coordinated for the work to proceed smoothly. The crew must always be aware of the level of the concrete, maintaining the end of the tremie pipe 10 feet below the concrete surface. As the concrete is pumped down the tremie pipe, the clean slurry is displaced and pumped back to the tank to be used on the next shaft.

Timing is critical at this stage. The pour must be coordinated with the concrete trucks arriving every half hour. Depending on the depth of the pile, a total of 15 to 20 ready mix concrete trucks will be making the trek to the jobsite.

The poured concrete will begin to set to support the rebar cage. Once the rebar cage is secured in the shaft, the rigging holding it in place can be detached.

As the concrete reaches the height of the inner casing, the setting time of the concrete must be controlled. Concrete with set retarders is delivered for this stage of the pour. This allows for the removal of the inner casing once the pour is finished.

"Every morning began with a safety meeting to maintain a heightened awareness of jobsite safety throughout the day.

The concrete is poured to the bottom of the surface casing, making the cutoff point 15 feet below grade. The inner casing is removed at this time. To ensure a clean pour, the concrete is overpoured 18 to 24 inches. With this one pile done, it's time to get ready to move onto the next.

DAY 5: PREPARING TO DO IT AGAIN

The last day of the week begins with the delivery of a truckload of sand to backfill the surface casing. This helps to protect the casing and maintain its stability during future excavations of the property. Finally, the week ends with the re-staging of the equipment and materials. The recycled Shore Pac slurry is prepared for reuse on the next drilled shaft. Everything is in place to begin the work again on Monday.

GETTING THE JOB DONE RIGHT

By following the day-to-day procedures, the crew was able to efficiently complete the project with good timely production. All the planning had laid the groundwork for a successful project.

The most important planning went into keeping the crew safe on the job. Every morning began with a safety meeting to maintain a heightened awareness of jobsite safety throughout the day. This approach made it possible for every crew member to make it home safely every night.

Working with the length and weight of the rebar cages needed to build eight foundation piles in such tight quarters was a daunting task. Using large equipment on a small piece of land was a challenge, to say the least. But it was all the preparation and homework beforehand, starting with the small-scale

models, that made it possible to get the job done right.

D.J. Scheffler & Nye demonstrated that starting small can lead to a big success.

SPECIAL THANKS

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