Rembco
Geotechnical Contractors, Inc.

The Stabilizing Force

A Quarterly Bulletin of Geotechnical Knowhow

OCTOBER 2010

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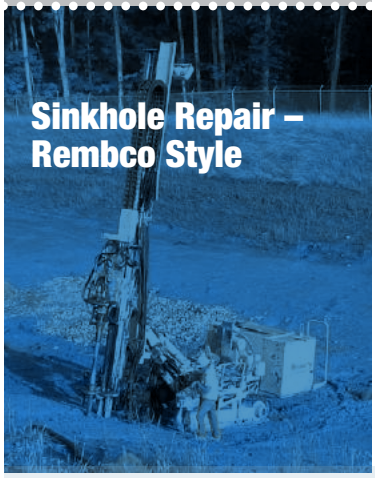
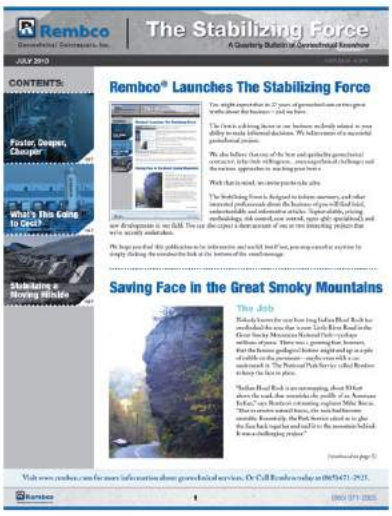


Rembco® Launches The Stabilizing Force


Rembco The Stabilizing Force
A Quarterly Bulletin of Geotechnical Knowhow
JULY 2010
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You might expect that in 27 years of geotechnical construction we would have unearthed one or two great truths about the business – and we have.

The first is a driving factor in our business model – that as a client, your satisfaction is closely related to your ability to make informed decisions. We believe that an informed client is an essential element of a successful geotechnical project.

We also believe that one of the best and quickest ways to tell if you're dealing with a quality geotechnical contractor, is by their willingness…even eagerness…to help you understand your geotechnical challenges and the various approaches to reaching your best solution.

With that in mind, we invite you to take advantage of our new quarterly publication.

The Stabilizing Force is designed to inform our clients, potential clients, construction partners, and other interested professionals about the business of geotechnical construction. Each quarter, you will find brief, understandable and informative articles. Topics will include: technical services that are available, pricing methodology, risk control, cost control, types of equipment used (typical, unique and highly specialized), and new developments in our field. You can also expect a short account of one or two interesting projects that we've recently undertaken.

We hope you find this publication to be informative and useful, but if not, you may cancel at anytime by simply clicking the unsubscribe link at the bottom of the email message.

Saving Face in the Great Smoky Mountains

The Job

Nobody knows for sure how long Indian Head Rock has overlooked the area that is now Little River Road in the Great Smoky Mountains National Park—perhaps millions of years. There was a growing fear, however, that the famous geological feature might end up as a pile of rubble on the pavement—maybe even with a car underneath it. The National Park Service called Rembco to keep the face in place.

"Indian Head Rock is an outcropping, about 50 feet above the road, that resembles the profile of an American Indian," says Rembco's estimating engineer Mike Bivens. "Due to erosive natural forces, the rock had become unstable. Essentially, the Park Service asked us to glue the face back together and nail it to the mountain behind. It was a challenging project."

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Visit www.rembco.com for more information about geotechnical services. Or Call Rembco today at (865) 671-2925.

Faster, Deeper, Cheaper

$800,000-drill ramps up Rembco capabilities

As a leader in the geotechnical services business, Rembco has always been adept at drilling holes; it just comes with the territory. But now that the Knoxville, Tennessee based company has added the Soilmec® PSM 20 to its arsenal, the work goes faster, the holes go deeper and the project is cheaper for Rembco clients. This is one amazing drill.

Different Strokes

"If ever there was a versatile drill," says Rembco Director of Operations, Bill King, "the PSM 20 is it. We've used it for micropiles, tie-back anchors, coring and drains. Virtually every operation goes smoother and faster with this drill."

The primary reasons for the increase in efficiency are the PSM 20's large stroke and its mechanized rod handling capability. Unlike smaller rigs, the PSM 20 can drill a full 30 feet on its first stroke. To go deeper, two 6-inch X 25-foot rods can be added from the rig's carousel. But it's at this point that the PSM 20 really shows its stuff. Instead of bringing in a couple of burly guys to manually add the rod, a single operator can do the job with no additional help. The PSM 20 loads the new rod in one, fully mechanized operation. Then it's right back to drilling, to depths up to 80 feet!

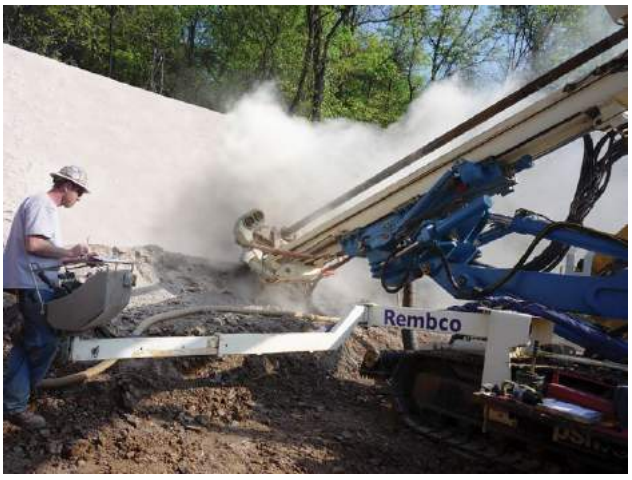
A Few New Angles

Besides saving time and man power, the PSM 20 can drill at angles that are impossible for less sophisticated rigs. "Now we can drill at angles ranging from vertical to just 15° from horizontal," says King. "That capability allows us to take on jobs we would have passed up just a year ago."

Nobody appreciates the Soilmec® more than Rembco Project Manager Ken Bowman. "We recently completed a 55-foot retaining wall for Jack Daniels Distillery," says Bowman. "The 30-foot initial stroke allowed us to install most of the needed soil nails without stopping to add a rod. We were also able to complete nine or ten 50-foot-long rock anchors in a single day. Both the soil nailing and anchor work required drilling at a variety of angles which was no problem for the PSM 20."

More Options, More Capability

In addition to the rod carousel, Rembco's PSM 20 came with options including a lifting crane, a top hammer and a jet grouting kit for fluids treatment. (The rig can drill a hole in sandy soil and inject grout in one operation—before the hole collapses). It can also drill a hole and install a casing in a single operation. The hydraulic casing extractor can pull a 12-inch diameter casing out of the ground with one draw!

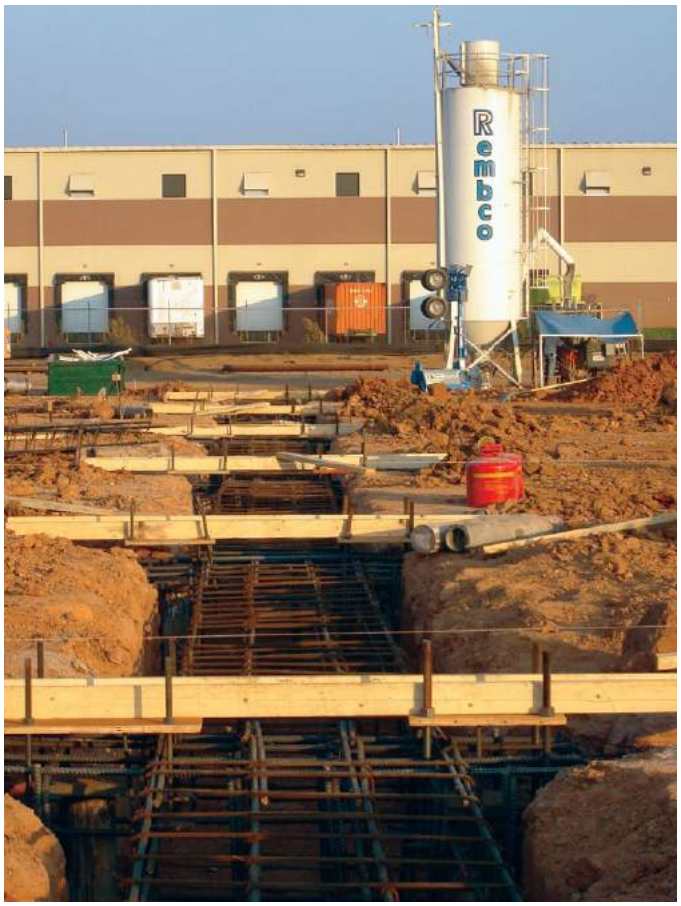


When it comes to soil stabilization, Rembco does it all: building foundations, rockslide and soil stabilizing, sinkhole remediation, controlling underground liquid migration and much more. And now with the new Soilmec®, they're doing it faster and cheaper than ever.

For evaluation of your next project, call our lead estimator, Mike Bivens at 865-363-4708, or email mike.bivens@rembco.com.

What's This Going to Cost?

Good question! If you have already selected a pricing method, the answer is very straightforward. If you haven't, here's a quick "take home point". You can learn a lot about any geotechnical service provider by how well they help you to choose a pricing method for your project.



Pricing Methodology and Risk

Estimating any type of construction involves uncertainty, but most geotechnical construction occurs under tons of earth where it is difficult to know the conditions. Estimating these costs presents an added degree of uncertainty. How deep to competent rock? What types of soil will we encounter? Are there underground structures? Will we encounter materials such as trees or construction debris? What drilling method will work best? The answers to these questions will determine what construction methods and what equipment to use…how many crew members will be required…and for how long. So it becomes clear. Uncertainty in these areas equals risk, and risk affects pricing. In fact, risk…how much there is and who will assume it… is the basis of the pricing methods that we will consider here.

The three types of risk in geotechnical work are:

1. **Technical –** the risk related to choosing a solution that will perform to specifications.
2. **Quantity –** the risk related to accurately estimating the scope of work.
3. **Duration –** the risk of predicting the time it will take to complete the work.

Mike Bivens, Engineer and Lead Estimator at Rembco, explains, "There are three common methods for pricing geotechnical services - lump sum, unit pricing, and time and materials. Each uses a different approach for assigning risk" says Bivens, "and the level of risk that the contractor accepts is reflected directly in the pricing."

Lump Sum Pricing

Charging a flat rate for a job means that the construction contractor assumes all the risk – technical, quantity and duration. This method is frequently used when the client needs a firm price and can not allow the price to creep if adverse conditions are encountered. Soil nailing is a good example because it usually has well defined scope and a very predictable quantity. Lump Sum is cost effective for projects with limited risk, but projects with elevated risk will be expensive.

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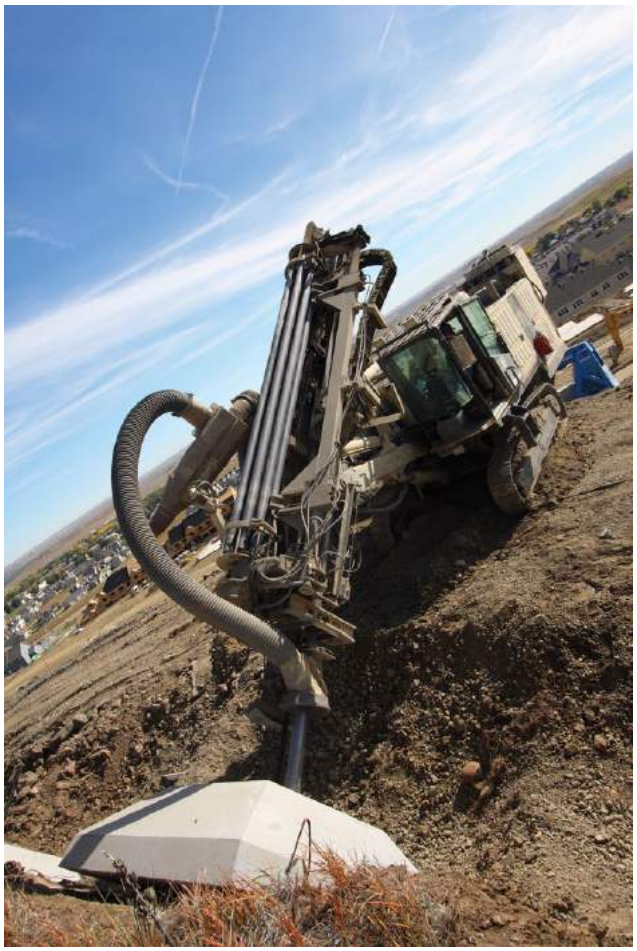
Stabilizing a Moving Hillside

Rembco Puts Down Anchors in Colorado

Colorado Springs, Colorado - In June of 2008, the developer of an Army housing complex at Ft. Carson Army Base made a rather startling discovery: excavation for the recently completed housing project had somehow started the nearby 1,200-foot wide hillside moving toward the homes. Worse yet, two water tanks holding 5 million gallons of water were located just above the destabilized hillside. The developer, Balfour Beatty Construction, called in the Stabilizing Force: Rembco.



The Investigation

"The first thing we did was conduct a geotechnical investigation of the area," says Rembco Estimator/Engineer Mike Bivens. "We quickly learned that the unstable soil making up the hillside was colluvium—deposits of sediment at the bottom of a low-grade slope that had been transported by gravity. We realized we were actually looking at the rubble left behind by a prehistoric landslide. To add to the problem," Bivens goes on to say, "high ground water levels in some areas of the site were causing further instability." Armed with this knowledge, the Rembco team was able to design and build a stabilization system for the prehistoric monster that was edging toward the homes.

The System

"The system we constructed included approximately 225 rock anchors drilled through the unstable soil to competent bedrock," says Bivens. Each anchor was attached to a pre-cast, reinforced concrete reaction block approximately eight feet square and more than two feet thick. Following installation, each anchor was pull-tested and locked off under a working load of 240,000 pounds (120 tons). "To combat the high groundwater levels," says Bivens, "we drilled approximately 60 horizontal drains into the toe of the slope to provide drainage for saturated areas. We completed the job by re-grading the slope to cover the anchors and re-vegetating the area." The time required for the entire job: ten weeks.

The Results

Through the strategic deployment of anchors and drains, the Rembco team was able to permanently halt the advancing hillside, and also stabilize the water tanks. "Rembco did everything they said they would do," says Steve Miller of Balfour Beatty Construction, "and they completed the job ahead of schedule. If I had to describe Rembco's performance in one word, that word would be 'flawless'."

Whether your instability problems date back to last week or the last ice age, you'll get the professional services you need from Rembco—the Stabilizing Force for building foundations, rock slide and soil stabilizing, sinkhole remediation or controlling underground liquid migration. We can be reached at 865-671-2925, or visit our website at **www.rembco.com**.

Saving Face in the Great Smoky Mountains

(continued from page 1)

The Challenges

To begin with, Indian Head Rock is a notable landmark. Like a facelift operation for an aging movie star, the face had to be stabilized while maintaining its "natural look." In addition, there had been recent rockfall events, leaving the current stability highly in question. Other challenges included performing overhead drilling at heights up to 100 feet above the road and working 24-hours a day. Furthermore, the project was schedule sensitive; Rembco would have to work around the park traffic that flowed under the landmark, with only a short window when the road could be closed entirely.

The Job

"We recommended a stabilization system that included three separate products," says Rembco project manager James Grubbs. We used small rock bolts and polyurethane injections to glue the rock face back together. We also employed large rock bolts—top to bottom—to anchor the rock," says Grubbs. "Those bolts, set as deep as 45 feet into the mountain, stabilized the face and slope below the rock. To complete the job," Grubbs went on to say, "we sculpted and stained the more visible sections to match the natural contours and color of the rock."

The Results

"Indian Head Rock has been stabilized—nose and all," says James Grubbs, "and Little River Road is once again safe for travel. What's more, we were able to complete the job with only one week of road closure, which was very important to our client."

When it comes to soil stabilization, Rembco does it all: building foundations, rockslide and soil stabilizing, sinkhole remediation, controlling underground liquid migration—and even an occasional facelift. For evaluation of your project, call Mike Bivens. 865-363-4708, or email **mike@rembco.com**.

What's This Going to Cost?

(continued from page 3)

Lump Sum Pricing

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Unit Pricing

When geotechnical work is charged by linear feet drilled or by volume of grout pumped, all of the quantity risk is shifted to the client. Unit pricing is generally used on projects where the quantities are unpredictable. For instance, micropiles are frequently unit priced when the depth to rock is uncertain. Likewise, sinkhole remediation is commonly unit priced because of the unpredictable variations in depth and subsurface conditions. Unit pricing allows the client to pay only for the exact amount of drilling performed and grout pumped.

Time and Materials Pricing

Time and materials pricing, commonly used where the quantities are unknown and the speed of the work is affected by factors outside the contractor's control, places the risk for quantity and duration on the client, while the risk of technical performance remains with the contractor. This method is commonly used on projects where the scope is difficult to define or very difficult to control. For instance, time and materials would be a preferred method for pricing a project where there was very little geotechnical information about the jobsite, or where other, higher priority activities on the site might suspend the contractor's work suddenly, frequently and for unpredictable amounts of time.

"Rembco makes it a priority to understand each client's situation and to recommend the best solution," says Bivens. "We provide complete, design-build solutions, suggest the best pricing strategy and recommend the most cost effective solution." "Sometimes that might mean a reduction in the scope of the job," says Bivens. "If we discover conditions that reduce the scope and cost of the project, we're happy to pass those savings along to our client. We view each project as a partnership, and we want our clients to succeed."