By: Doug Sherman, Winner Area Engineer

Last summer, Winner Area was tested with a drilled shaft that pretty much had everything imaginable go wrong with it that could go wrong. As such, I decided I would tell the story of that problematic drilled shaft for my yearly article for the newsletter.

The story began on the morning of July 3, 2018, when I woke up at around 1 a.m. knowing full well I had a very long day ahead of me. I met up with Brad Norrid, Tom Strubel, and Kevin Griese on site, and by 2 a.m. or so, drilling of the nearly 80-foot deep, 8-foot diameter shaft was underway.

Things were progressing until around 4 a.m. when we had a large chunk of shale come loose off the side of the shaft just below our steel casing which then started water to gush in from the side. We did what we had to do to protect the integrity of the shaft when that happened. In that, we ordered the contractor to flood the shaft with water. In doing this the weight of the water has enough pressure that it holds the sides of the shaft together and prevents further breakdown. The addition of the water worked out great and stopped further degradation of the shale so we resumed drilling around 5 a.m. It was at that time that our real problems began……..

The auger bit the contractor was using wasn’t working at all due to all the water we had added so the contractor decided to try a different auger bit. After putting on a different auger bit that was better equipped for drilling in water, the first couple passes made by the contractor seemed to be once again working so I remember thinking to myself, “thank goodness we are back in business”. As it turned out, we were not in business very long. <heavy sigh here> The contractor had a worried look as they lifted out the auger bit, only to find the auger bit was no longer attached to the drill. It had broken off at the bottom of the hole and was some 50 feet below the surface buried under water inside what we had previously drilled out. The contractor spent the next several hours trying to get the broken bit out of the shaft but every attempt failed. Soon those hours turned into days as attempt after attempt failed.

After several days of numerous failed attempts to retrieve the bit, the contractor tried a new approach. They welded an extension onto the casing with the intention of drilling it further into the ground in hopes they could cover over the original spot where the large chunk of shale broke loose and seal that area off. If it had worked, they were then going to then pump out all the water so they could see the auger bit and have a better chance of getting it out. Note that I said, if it had worked, as things did not go according to plan.
The vibration used to place the casing further into the ground, also vibrated the land adjacent to the shaft and - with no warning at all - a huge sinkhole appeared! Material from all around the shaft had shifted and fell into the shaft itself. At this point in time, the contractor again flooded the hole with water to ensure noting else was going to break free. We knew it was time to start worrying.

After many meetings and much discussion, it was decided to fill the remaining portion of the hole with flowable fill to protect the integrity of what we had previously drilled out. Flowable fill is a cement/sand/water mixture that after hardening, has the approximate strength of well compacted dirt. The flowable fill was placed with a tremie* tube to ensure we could insert the material at the bottom of the shaft and little by little replace all the water with flowable fill. Once this was done we also placed flowable fill inside the sink hole that had developed to repair it as well. After the flowable fill had attained enough strength, the contractor again attempted to drill the casing further into the ground to seal off the original area that had caused all the problems weeks before.

This time on Aug. 7, 2018, over a month after we had first begun this drilled shaft, we finally caught a break and the drilling down of the casing worked. Once this was done we again went to the business of drilling out all the material from inside the shaft including the now hardened flowable fill material we had pumped in. At approximately 5:30 that afternoon, we got back to the point where the broken auger bit was at. That alone was a major milestone, but we still needed to get that thing out to finally get back in the business of building a bridge. Now, because the flowable fill placement and the lowering of the casing had worked to seal off the leak, we also had a dry hole where, with a good light, the contractor could physically see the broken auger bit. This finally gave us hope. The contractor put a very small drill bit onto their drill and lowered it into the shaft. Because this bit was so much smaller than the actual hole itself, they had enough room to move and maneuver it in such a way they were able to hook it onto the broken auger bit and lift it from its former grave, some 52-feet below the ground. At approximately 6:30 p.m. on Aug. 7, the broken auger bit was finally extracted.

I saw a lot of smiling and heard a few shouts that said, “we got it!!” as I saw it lifted from the ground and set beside the hole. In my now 31 years with DOT, I have never felt more relief on any project anywhere than I did that night as I snapped the above photo. I knew we were finally back in business and it felt so good.

*A tremie is a watertight pipe, usually of about 250mm inside diameter (150 to 300 mm), with a conical hopper at its upper end above the water level. It may have a loose plug or a valve at the bottom end. A tremie is used to pour concrete underwater in a way that avoids washout of cement from the mix due to turbulent water contact with the concrete while it is flowing. This produces a more reliable strength of the product. Source: Wikipedia

Pictured above is the completed pier from the drill work.

The completed bridge as of today.
Thank You

Longevity

<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
<th>Position</th>
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<tbody>
<tr>
<td>Michele Gabert</td>
<td>35 Yrs.</td>
<td>Accounting Assistant</td>
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<tr>
<td>Steve Rhoades</td>
<td>30 Yrs.</td>
<td>Equipment Shop Foreman</td>
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<tr>
<td>Dennis Maciejweski</td>
<td>30 Yrs.</td>
<td>Journey Transportation Tech</td>
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<td>Brad Horstman</td>
<td>30 Yrs.</td>
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<td>Jay Larson</td>
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<td>Andrew Hatch</td>
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<td>Tracy Fuerst</td>
<td>20 Yrs.</td>
<td>Secretary</td>
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<td>Christopher Vetter</td>
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<td>Project Technician</td>
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<tr>
<td>William Wieser</td>
<td>20 Yrs.</td>
<td>Transportation Analyst</td>
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Brad Horstman, right, receives his 30-year plaque from Brad Norrid.

John Villbrandt, left, presents Del Marshall, right, with a custom built sign for his retirement. Del dedicated 30+ years of work to the SDDOT. Thank you, Del!
Like many things in life, there comes new beginnings. For some within the South Dakota DOT, they celebrated a new beginning with the welcoming of a newborn child. Congratulations to the parents, and grandparents of these future SDDOT employees!

**Samson Liam Dammann**  
*Born: 03/11/2019 - 10.5 lbs., 22 In.*  
*Parents:* JoElle Dammann (Office of Bridge Design) and Travis Dammann.

**Carrie Marie Rattling Leaf**  
*Born: 04/17/2019 - 7.4 lbs. 20 In.*  
*Parents:* Megan Bennett (Finance) & Edwin Rattling Leaf Sr.  
*Granddaughter* of Merlin Bennett (Pierre Region Highway Maintenance)

**Autumn Elizabeth Mentele**  
*Born: 06/19/2019 - 6.15 lbs. 20.5 In.*  
*Granddaughter* of Karen Mentele (Central Finance Office) and Don Mentele (Pierre Region Seasonal Maintenance)
Roxanne Juliet
Born: 04/20/2019 – 8.13 lbs. 20.5 In.
Parents: Crystal (Sioux Falls Road Design) and Joe Stonesifer

Jaxon Douglas Sherman
Born: 06/22/2019 – 8.2 lbs. 20.5 In.
Grandson of Doug Sherman (Winner Area Engineer).
Across the pond

While on a recent trip “across the pond”, Karla Engle was visiting Italy and could not help but snap some pictures of their transportation signs, infrastructure and more! While on this trip, many of their transportation styles stood out. In Rome, their unique, old streets really stood out.

Karla wrote: “In Rome, there are many narrow and undulating cobblestone streets.” Unlike America where a majority of the roads are paved with a concrete or asphalt mix, a lot of brick work is done on the streets in Rome. On the other leg of her trip, she visited Florence, which had some very unique street signs being made by a local artist. She wrote: “In Florence, a street artist has been adding art to the Do Not Enter signs. Because of this, interest in his art has really taken off. Now you can purchase stickers of his artistic street sign additions.”

Karla provided several pictures showcasing Italy and their unique transportation ways.
The SDDOT community has lost two longtime employees who dedicated so much and so many years to the department. Although they may be gone now, their legacy within the SDDOT community and their respected hometowns will forever remember them.

On June 20, 2019, Charles “Chuck” Piper passed away. Charles dedicated 37 years of work to the South Dakota Department of Transportation. After leaving the Airforce in 1956, Charles obtained a job as an Area Engineer for department in Rapid City. After advancing to other positions within the department, he retired in March of 1993 as the Region Engineer. Through committing countless hours of valuable time to the department, Charles also played a major role in helping the community of Rapid City help recover after the devastating 1972 flood. From helping restore and redesign roads, to helping build the Jamie Johnson Memorial Field. In 1999, Charles was inducted into the South Dakota Transportation Hall of Honor.

On July 5, 2019, Mansour Karim passed away. Mansour was one-of-a-kind and had a very unique and wonderful story. Mansour who was born in Tehran, Iran, made the big decision to move to America in 1950, with little cash in his pocket and a dream of earning a college degree and getting a job. After earning an engineering degree from South Dakota State, Mansour briefly lived in Rapid City before moving to Pierre to work for the South Dakota Department of Transportation. Once in Pierre, he helped establish the first highway hydraulics office where he served for 36 years. During retirement, he continued to work with rental properties that he owned, along with giving back to the State of South Dakota and the community of Pierre. Mansour is the epitome of the American Dream, and showing everyone that anything is possible with heart and determination.