Baseball — it’s America’s national pastime. An outing to the ballpark is steeped in traditions encompassing everything from food and drink — peanuts and Crackerjack, hot dogs, and of course beer — to singing “Take Me Out to the Ball Game” during the 7th Inning Stretch. The game can conjure up memories of simpler times or just provide a fun way to pass a few hours on a warm summer night.

Annual baseball operations run from approximately March through November, but the stadium also hosts other events. For example, in early 2016 the field was covered for a while by a skating rink to host outdoor college and professional hockey games.

Although attending a baseball game may teleport you back to simpler times, many aspects of stadiums’ physical structures have advanced significantly in recent years — often hidden behind the scenes, and even underground.

The Facility
Take Coors Field in Denver, Colorado. The stadium began operations in March 1995 after two-and-a-half years of construction, and is home to the Colorado Rockies MLB franchise. Built in the “retro-classic” architectural style popular at the time, the red brick and green painted exposed steel of Coors Field engender a feeling of the “good old days” of baseball. The structure was designed to blend in seamlessly with other buildings in the area, many of which are historic red brick industrial structures that have been renovated and turned into lofts, shops and restaurants. The field itself was burrowed in 21-feet below street level, allowing the stadium’s façade to be kept at a low-profile so not to overwhelm the surrounding buildings.

The generally nostalgic feeling of the structure belies the fact that it was constructed with some of the most progressive technology available at the time. In fact, until recently Coors Field was considered one of the most technically advanced ballparks in the country. For example, it was the first ballpark to feature a heated field. When Denver is experiencing one of its famous temperature swings, the field is kept warm by 45 miles of heating cables installed at the root zone of the turf. The technology is now common for ballparks in cities with variable weather, but Coors Field was the first to be climate-controlled.

Another innovative feature of the ballpark is its drainage system. The infrastructure was created to handle a 100-year-flood because of the field’s close proximity to the South Platte River. Potential flooding aside, operations at Coors Field require massive amounts of water.
Regardless of the type of entertainment, after each event the entire stadium is washed down using large, high-powered hoses and up to 200,000 gallons of water. Crews first walk the stands picking up most of the large trash, but inevitably some things are missed or may just fall into the drains during a game — peanut shells, straws, cups, and other trash.

In addition to water used for cleaning, the system collects runoff from the field during watering and whatever flows off the stands and field during wet weather. And that can be a lot.

“The only dirt that’s on the field is what’s on the sod,” explained Mark Young, an HVAC technician in the Engineering Department at Coors Field. That’s just 2- to 3-inches of dirt. Underneath this shallow layer of dirt is a specially constructed layer of sand and gravel designed to drain the field of as much as 4- to 5-inches of water an hour. This allows the field to be ready for play quickly in the event of bad weather, but because there’s so little dirt to hold in moisture, the field has to be watered daily.

Whatever the source, all that water has to go somewhere, and at Coors Field it’s collected in a huge vault under the parking lot at the rear of the stadium. It’s estimated the vault could hold up to 1 million gallons.

In part because of its location, Coors Field was designed and constructed under the direction of a statutory Special District and so is subject to the Phase II rules of the National Pollutant Discharge Elimination System — part of the Clean Water Act. These rules require Coors Field to obtain and adhere to a General Municipal Separate Storm Sewer System (MS4) Discharge Permit that is administered by the Colorado Department of Public Health and Environment.

An integral part this MS4 permit is the site’s Storm Water Management Plan (SWMP). The SWMP formalizes the many steps and procedures the facility implements to protect state waters from adverse effects related to pollution that could be picked up by stormwater generated on and around Coors Field.

The fundamental objectives of the SWMP are to:
- Provide for the effective management of stormwater runoff;
- Minimize the potential for pollutants to enter stormwater runoff; and
- Comply with and be protective of the water quality standards for the South Platte River.
The Challenge

During baseball season, the water and any trash and debris collected with it is pumped up and out of the vault and into the storm sewer system. In the off season, a much smaller amount of collected water is pumped out and diverted to any of several small detention ponds to evaporate.

The pumps that do the heavy lifting of moving all the collected water out of the vault were replaced in May 2015. The original pumps were chopper pumps installed in 1998. Although they were showing signs of wear — moisture was getting in the motors — they weren’t replaced.

When it became evident that the old pumps needed to be replaced, Young and James Leflar, an engineer and member of the HVAC team at Coors Field, reached out to Phoenix Sullivan, their contact at Denver Industrial Pumps.

The Solution

Sullivan recommended the old chopper pumps be replaced with two BJM SK55C Shredder Pumps and the associated electric submersible sump pump package. An integral part of the new solution was a variable frequency drive (VFD) control panel that was customized by BJM to be compatible with Coors Field’s existing alarm panels in the security room.

“The customer needed a pump that could handle debris getting into the vault/sump and not clogging the pump,” Sullivan said. “The BJM shredder pump has a cutting tool that cuts and shreds the debris . . . allowing it to pass without clogging the pump.”

In addition to their ability to handle debris, other technological improvements also made the BJM shredder pumps a good solution. For one thing, the original pumps operated on a highly specialized and outdated air bubbler system, whereas the SK55C pumps use a simple float system to turn them on and off.

The BJM pumps operate on a lead–lag setup, Sullivan explained. The floats prompt the first pump to turn on, and if needed, also prompt the second pump to turn on. Likewise, the floats shut the pumps off when the water level is sufficiently lowered. For this installation, the target flow for each pump is approximately 350 gpm at 32 feet of total dynamic head. Generally, the BJM SK55C can handle a maximum flow of 570 gpm, with a maximum head of 59 feet.
The two pumps sit in a sump that's approximately 16 feet deep. In addition to the two 7.5 HP pumps, this BJM sump package included two cast-iron slide rail assemblies, four stainless steel intermediate guide rail brackets, and 100 feet of 1.5 inch stainless steel pipe rails.

The newer pumps' also take full advantage of advances in metallurgy and materials that allow all of the pump's parts and components to be self-contained, Sullivan said. The only parts that may experience wear are the cutting bars, bearings, and seals. Those components aside, it would be realistic to expect these pumps to last 20 years.

“They've made a better product that lasts longer,” Sullivan said.

BJM’s shredder pumps leave solids slightly larger than if passed through a grinder pump. The shredding action is caused by using a cutting impeller with a Tungsten Carbide Tip, against a "spiral" shaped diffuser plate.

Additional technical features of the BJMs Shredder pumps include:

- Longer Power Cord — A 33-foot power cord is standard.
- 304SS Motor Housing — The stainless steel motor housing provides superior abrasion resistance and will not wear out like aluminum motor housings when pumping sandy water.
- Three Seal Motor Protection — The motor is protected by double mechanical seals. The lower seal is made of silicon carbide/silicon carbide, and the upper seal is made of carbon/ceramic. An additional lip seal has been installed above the impeller to help prevent abrasives such as dirt, silt or sand from entering into the seal chamber.
- More Motor Protection — Winding protection and (NEMA) Class F motor insulation allows the motor temperature to rise to 230°F, superior to pumps with Class A and B insulation. An automatic switch turns the pump motor off if the temperature and/or amp draw gets too high. When the motor cools the switch will automatically reset and the pump will turn back on.
- Tough Pump Construction — Hardened cast iron stands up to rough handling and pumping sandy water unlike pumps with soft resin impellers or plastic exterior components.

The pumps are also available in 316 cast stainless steel, and a new explosion proof shredder pump is also now available.

Another Advantage
BJM was also willing to go the extra mile to create a custom control panel so the ballpark could tie into its existing alarms in the security room. The Custom Duplex Control Panel BJM fabricated has auxiliary contacts allowing communication with the existing system that includes
The pumps include a twist in the traditional pump design: seal minders, elapsed time meters, and dedicated auxiliary contacts for seal fail 1, seal fail 2, overload 1, overload 2, and high level.

**The Outcome**

As a new baseball season draws near, the HVAC team at Coors Field feels confident that with the newly installed pumps they'll be ready to handle any curveballs that may come at them.

“It does exactly what it’s supposed to do. It was a good install and we haven’t had any issues with them,” said Leflar. “They’ve done what we asked them to do and they met our criteria.”

**About the Author**

Mike Bjorkman is Vice President of BJM Corp. and has more than 30 years of experience in the pump industry. He serves as Director of Marketing and IT for BJM Pumps, LLC and All Test Pro, LLC. Both companies are subsidiaries of BJM Corp. Mike can be reached at 1-860-399-5937.

**About BJM Pumps**

BJM Pumps, established in 1983, supplies electrical submersible pumps to industrial and municipal markets throughout the United States, Canada and South America. BJM Corp. is headquartered in Old Saybrook, Conn. For more information, visit [www.bjmpumps.com](http://www.bjmpumps.com).

**About Denver Industrial Pumps**

Denver Industrial Pumps offers a complete line of products by various manufacturers, including pumps, mixers, motors, drives, controls, engineered packaged systems, filtration and seals. Products and services cover all major markets. Services include local inventory, repair center, fabrication services, onsite services, factory trained sales staff, application engineering, packaged systems and training. For more information, visit [www.denverpumps.com](http://www.denverpumps.com).