



# FACE-OFF!

Arizona surveying firm's strong business practices earn it sitework contract for the fastest built stadium in the United States.

by Lieca N. Brown

As if it isn't strange enough that desert state Arizona has a hockey team, it is stranger that they originally played in an arena designed for a basketball team. The Coyotes, Phoenix's Wayne Gretzky-managed NHL team since 2001, needed its own stadium to be sure. The team had been sharing the America West Arena in downtown Phoenix with the Suns, Phoenix's NBA team. That arena was built for basketball—not hockey—so when the ice rink was set up inside, about 20 percent of the seating had a limited view. The arena wasn't very profitable for the Coyotes either, since the Suns got to keep the majority of non-gate receipts. A reported loss of \$30 million to \$35 million last season, along with limited revenue options while at America West Arena, led the Coyotes management team to look elsewhere for a new home.

Although an arena fit for the Coyotes was obvious, a location for it was not. At one point, the Coyotes were planning to move to Portland, Ore., but real estate developer Steve Ellman bought the team, recruited former hockey great Gretzky,

gained financial assistance from new co-owner Jerry Moyes, and worked toward building a new home for the hockey team.

After other site options fell through, including nearby Scottsdale, the city of Glendale was chosen as the home for the new arena. Glendale, a city referred to as the West Valley of the Phoenix Metro area, had several advantages—it's main one being the city's desire for development; Glendale was in need of some revitalizing. The Coyotes' arena will meet that need, along with a new development called Westgate planned to hinge around the arena that will include 6,000,000 sq ft of mixed-use development including retail, entertainment, office, hotel and residential use. What's more, Glendale's future new football stadium, currently under construction and scheduled for completion by 2006, will host the NFL Super Bowl in 2008.

After a record pace development in Glendale, the Coyotes now have a place to call home—a lush, open 600,000-sq ft facility holding more than 17,500 spectators—all of whom will have an unrestricted

view of the ice. Season ticket sales were already up 20 percent from 2002 even before the stadium opened.

The arena construction needed a hard-working and fast-acting yet efficient team—the same requisites put upon any NHL team. In January of 2002, Perini Building Company of Phoenix announced that it had been chosen to provide pre-construction and construction management services for the arena project. Upon acceptance of the job, Perini administrators knew they had some work to do: selecting subcontractors and creating a workable but rapid schedule. The work of each group for each phase was highly important, from the survey and staking work, to the excavation, to the utility layout, concrete and paving, to the final landscaping. Every phase was on a critical timeline.

### Break Out: A Plan of Attack

Perini was faced with challenges that seemed staggering. But, having the construction of several high-profile sporting arenas already on its resume, like the Bank One Ballpark in Phoenix and the Palace of Auburn Hills in Auburn Hills, Mich., Perini was prepared to tackle demanding elements of the project. Such tasks included excavating more than 125,000 cubic yards of dirt (the first completed construction milestone of the project); pouring 35,000 cubic yards of concrete (not including the 10,000 cubic yards of concrete needed for the 223 acres of sitework surrounding the arena); installing more than four miles of waterlines and seven miles of storm sewer; and putting in seven miles of sidewalk, 20 acres of paving and 320 large palm trees.

All of this was to be completed in a time frame of about a year and a half, sometimes in scorching temperatures approaching 115 degrees (in the shade!). The *Business Journal of Phoenix* reported that, according to industry experts, the new (currently named) Glendale Arena was to be the fastest-built arena ever constructed in the United States. The official groundbreaking ceremony for Glendale Arena was held April 3, 2002, with excavation beginning in June. Dry utility installation as well as final grading and paving for the 223-acre site got underway in late spring of 2003. The last stretch of concrete in the seven miles of onsite sidewalk was ready for a Dec. 27, 2003 Grand Opening, making the total project time 18 months from start of design to end of construction. Industry experts say that no other arena of this magnitude built in the United States has been completed in less than 20 months.

### Power Play: Selecting the Surveying Team

The Glendale Arena project required more than one million work hours

and, at its peak, more than 500 people working at one time in order to complete the job on schedule. Most of these were subcontractors—subcontractors who needed surveyor's stakes placed in the ground on a daily basis. Whether it was landscaping, paving, curb, electrical or retentions, Perini's expectation was that the surveying firm they chose would do whatever was necessary to stay ahead of the other trades.

The strict time constraints placed on the project, in combination with the magnitude of sitework that needed to be done, required Perini to be very selective in choosing a surveying company. The arena's construction manager needed a firm that would be able to keep up with the everyday challenges of working on a project of this size and deliver a quality end product—all within good time. With such a tight window in which to complete the sitework for this high-profile project, Perini needed to contract a surveying firm with a reputation for reliability. Without a reliable team of surveyors, none of the nearly 60,000 linear feet of curb, more than 20 acres of asphalt, or more than 300 large palm trees could have gone in correctly and on schedule.

Ken Schacherbauer, senior project director for Perini Building Company, remembered a surveying firm that had given a presentation in hopes of receiving the Glendale Arena contract more than a year earlier. In its presentation, Arizona Surveying and Mapping (ASAM) of Phoenix highlighted its company vision statement: "To be recognized as the best survey company in the [Phoenix Metropolitan] Valley while growing at 25 percent annually."

The aggressive vision caught Schacherbauer's attention. He selected ASAM for the construction staking of the sitework phase of the Phoenix Coyotes' Glendale Arena. When he called, he said, "If you're going to reach your goal of growing at 25 percent a year, you're going to need more work."



ASAM surveyors used the Leica SR530 GPS receivers and many TPS 1100 and 1103+ Professional Series robotic total stations from their inventory for the critical staking needed to complete the project.

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### A Deep Bench: "Engineering Integrators"

Many surveyors work on the philosophy that the more known coordinates on the site, the more accurate the stakes will be. ASAM surveyors, who exclusively use Leica Geosystems (Atlanta, Ga.) equipment, put their Leica System 500 GPS receivers to work to set control on the arena project. ASAM has also standardized on Leica's robotic total stations. Using GPS and robotic technology on a worksite of this magnitude—one that encompassed 223 acres—was a huge boost to time-saving and efficiency.

ASAM surveyors used the Leica SR530 GPS receivers and many TPS 1100 and 1103 + Professional Series robotic total stations from their inventory for the critical staking needed to complete the project. "It is not only the level of precision and accuracy [of Leica's instruments], but that the instruments are rugged and reliable," says ASAM's Chief of Parties Michael Sullivan, LSIT. "We almost never have down time due to equipment malfunction. And by being exclusively a

Leica operation, if one instrument is in for regular maintenance, any one of my party chiefs can easily utilize one of the back-up systems without a problem."

Flexibility and smooth operations were key for ASAM on the Glendale Arena project. ASAM had to be accommodating with the number of crews it sent to the site each day, which ranged from three on an average day to six on a busy day, and all crews had to be ready, willing and able to respond to each subcontractor's dynamic needs in the field. ASAM's customer service driven slogan, "Want to get it right?... Ask a Customer" (engraved on a brass plaque on the CEO's desk) provided the foundation for the company's team and individual determination to ensure the success of the surveying work of the project.

Ultimately, it was the design-build method of operation that made the arena's 18-month record pace of construction possible. However, it was also the design-build's ongoing submission of new plans from multiple engineering firms, each working on different elements of the \$220 million project, that created the greatest challenge for ASAM. But with the challenge came an opportunity for ASAM to enhance the level of surveying services it could provide. "It was in a role as 'engineering integrator' that we were able to provide a significant value-added service," says Eddie Lange, ASAM's vice president of business development.

With Arizona's extreme summer temperatures and the multiple sources involved in necessary, ongoing changes, the design-build approach could simply not have been successful using the traditional field calculation approach. ASAM instead followed its standard method of operation, which is to have the CAD department electronically calculate staking points with MicroSurvey MSCAD2002 software (Westbank, British Columbia, Canada) in the office instead of in the field, a huge benefit when working in the heat of an Arizona summer. Point maps were then provided for the field crews, who used their Leica TPS 1103 + robotic total stations to systematically record the actual location of virtually every point staked; this provided a complete source of documentation for any potential questions. More importantly, this type of procedure allows ASAM's CAD operators to often identify design inconsistencies early on and to resolve the issues before any work is done in the field. And with the arena's design-build process involving rapid, ongoing changes and additions to plans, the integration of several designs prior to staking was challenging. Throughout the sitework phase, Senior CAD Operator Terry Shaffer meticulously overlaid the latest electronic plans from the various engineering sources in order to identify potential problems. Managing the data so closely allowed conflicts to be identified quickly and resolved before staking and construction, thereby avoiding costly field compromises. Sullivan became the single point of contact in the field to coordinate the latest plan revisions with Perini's staking needs, often on a real-time basis.

"Arizona Surveying and Mapping has the capability, the equipment and the manpower," says Roy Azinger, project civil superintendent for Perini Building Company. "They

### Glendale Arena Quick Facts

- Each concrete section of the floor required an uninterrupted stream of about 50 truckloads of concrete traveling to and from the jobsite in a time frame of a couple of hours or less.
- The combined amount of concrete needed for the arena and the sitework surrounding the arena was approximately 45,000 cubic yards. This equates to enough concrete to build 600 homes and fill 5,000 ready mix truckloads of cement.
- Perini Building Company installed 12 miles of underground pipe along 91st Avenue and newly-constructed Maryland Avenue.
- More than four miles of waterlines and seven miles of storm sewer, including 20,000 feet of 8' diameter pipe, were installed.
- In total, seven miles of sidewalk and 20 acres of paving were placed throughout the Westgate site.
- The 2.5-acre body of water, Lake Glendale, holds 4.5 million gallons of water.
- Rough grading of the entire 223-acre site involved moving one million yards of soil.
- At its peak, construction included more than 500 people on site at one time. Including fabricators and suppliers, more than 20,000 people were involved in the building process.
- With 2,400 tons of air conditioning, the arena can generate enough air to cool 800 homes.
- The roof includes 1,600 tons of structural steel and covers more than four acres.
- Building the arena required 5,000 tons of steel to reinforce the concrete structure and the installation of 30 miles of piping systems ranging in size from 2" to 20". More than 220 miles of wiring was installed.
- Glendale Arena will serve an average of 20,000 inches of hot dogs per game. If all of the hot dogs served in one year at Glendale Arena were lined up end to end, it would be about 20 miles long!
- The new arena will sell more than 100,000 gallons of soft drinks per year!

Source: Glendale Arena website, [www.glendalearenaaz.com/index.php](http://www.glendalearenaaz.com/index.php).

[ASAM workers] were always up to the task, regardless of the time frame we gave them.”

### Score! Project Is A Success

Thousands of field and office hours were required for the construction staking of the Phoenix Coyotes' Glendale Arena sitework. While the size and complexity of the project was impressive, the real opportunity for ASAM came with meeting and exceeding customers' expectations: providing service—not just surveying.

The construction services of Perini, ASAM and the other companies involved in creating Glendale Arena helped to unearth a home for the Phoenix Coyotes, its owners and supporters, and its fans—4,000 more fans, that is—to enjoy the performance of their hometown hockey team. The arena will also act as a venue for many other events including ice skating, bull riding and boxing events, and scheduled performances by Bette Midler and Britney Spears. And although the Coyotes debuted on Opening Night at Glendale Arena with a 3-1 loss against the Nashville Predators, their new home is definitely a win—a win that filled the slot for a new venue for many to enjoy and a new venue that is sure to be part of a renewed area of Arizona. 🌐

*Lieca N. Brown is editor of POB.*



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