

PLAINS TALK

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Friday Night Lights: Sundance High School Football Field Lighting

Strategic Direction Report: Sports Lighting

Setting the Pace (and Maintaining It): SDSU Stanley J. Marshall Center

Room for Rodeo: James Kjerstad Event Center Lighting & Expansion

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NEXT ISSUE

The popularity of microbreweries locally producing craft beers has more than doubled in the United States in the past decade. Whether it's a brand new building, or a creative renovation of an old structure – check out the systems that support the process from fermentation to frothy pints.

MECHANICAL ELECTRICAL PLUMBING POWER

AN ENGINEERING SOLUTION CENTER

IN THIS EDITION...

Seems like this time of year is buzzing with exciting competition. A new (sort of) Super Bowl champion has been crowned, March Madness is upon us and MLB players have reported to their summer digs down south. Closer to home, most of us are seeing the light at the end of the wintry tunnel and gearing up for spring sports.

From golf to soccer, baseball, basketball, football and about a dozen others – there is certainly no lack of options for athletes. And in recent years, there’s been a lot of exciting activity around sports venues in our area. We’re seeing innovative new construction and upgrades on landmark facilities as clients invest in keeping arenas, fields, courts, courses and complexes in shape.

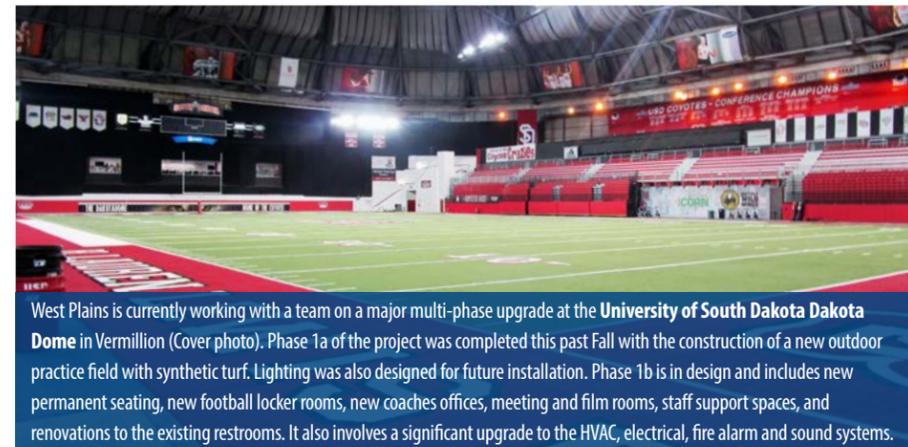
What shape that takes is another story. Nearly every sport has a different facility, and not surprisingly, the design considerations for each are as varied as the games they host. In this issue of Plains Talk, we’ll discuss possibly one of the most important (and often underestimated) elements of sports design – lighting. We’ll also share a few of the exciting projects we’ve either completed recently, or are working on now.

Exciting Projects In the Works



Rendering courtesy of JLGArchitects

Construction is officially underway on the new 54,000 square foot Great Shots golf entertainment facility at the Sanford Sports Complex in Sioux Falls. The \$12 million venue includes three floors of high-tech, interactive golf similar to the popular Topgolf program seen in other areas of the country. The space also includes a restaurant and the Sanford POWER Golf



West Plains is currently working with a team on a major multi-phase upgrade at the **University of South Dakota Dakota Dome** in Vermillion (Cover photo). Phase 1a of the project was completed this past Fall with the construction of a new outdoor practice field with synthetic turf. Lighting was also designed for future installation. Phase 1b is in design and includes new permanent seating, new football locker rooms, new coaches offices, meeting and film rooms, staff support spaces, and renovations to the existing restrooms. It also involves a significant upgrade to the HVAC, electrical, fire alarm and sound systems.

West Plains Announces Leadership Changes

This past January, we were pleased to announce two leadership changes in our firm. Marty Christensen, P.E. assumed the role of Building Services Division Manager for the company; while Mike Fisher, P.E. has been promoted to Office Manager in Sioux Falls.

Christensen stepped into his new role with 24 years of experience at West Plains. He joined our firm as a Mechanical Designer in 1994, and has grown into leadership roles as a Principal, Sioux Falls Office Manager and Board Member. Under his guidance, the Sioux Falls office has thrived, and we look forward to his continued leadership overseeing and developing client relationships and business operations across our five regional offices.

Fisher joined the Sioux Falls office in 2013 as the Electrical Department Head and has



Marty Christensen, P.E.
Building Services
Division Manager



Mike Fisher, P.E.
Office Manager
Sioux Falls

nearly 30 years of experience as a consulting engineer. Over the past five years, he has been a leader in project management and business development in Sioux Falls, and we are excited to support him in this next phase of his career at West Plains Engineering.

Congrats Marty & Mike!!!

Welcome New Team Members



Rick Ames
Mechanical Designer
Sioux Falls



PROJECT PROFILE

NEW CONSTRUCTION

Sundance High School
Football Field Lighting
Sundance, WY

Friday Night Lights

Anyone who has watched high school football knows that “Friday Night Lights” isn’t just a clever Hollywood name. The atmosphere of a high school stadium under the lights on a cool Friday evening is remarkable, especially in rural Wyoming.

In 2016, the Sundance/Upton Patriots wrapped up construction on a new home field. The program is a co-op between Sundance High School and nearby Upton, playing in the highly competitive Division 1-A. With a new home, all they needed to create that true Friday night feeling...were the lights.

The field itself had been built under a contract between the Crook County School District and a landscape architect/civil engineering team. The District then raised additional funds for the lighting under a separate project.

West Plains Engineering was contacted to evaluate options of either using existing poles and fixtures from nearby Natrona County School District, or installing a completely new system. Ultimately, a new system from



Matt VonHaden, P.E. is an Electrical Engineer with more than a decade of experience in our Rapid City office. He has been involved in the design of sports lighting projects for high school and collegiate venues across South Dakota and eastern Wyoming.
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Musco Sports lighting, with a 20-year warranty, was selected because it was only slightly more expensive than the used equipment and would require significantly less maintenance.

The sports lighting system uses four 70 foot poles each with seven 1500 watt metal halide light fixtures. The combined poles and fixtures produce an even, average illumination on the field of more than 35 foot-candles.

Our electrical team was also tasked with getting power to the field from the existing Old Elementary School in Sundance. From the new service point, power was also provided to several items from the previous field project, such as the score table, scoreboard, start and finish lines for the track, and miscellaneous receptacles.

A FIXTURE IN PLAYABILITY

In nearly all sports, the ability to see well – both for players and fans – is critical.

After all – everyone has seen the highlight reels replaying the gut-wrenching moment an athlete squandered the winning play because he/she “lost it in the lights”. Over the years it’s happened so frequently it’s almost become a sports culture joke. But our electrical engineers know, it’s a very real issue. So real, in fact, that the Illuminating Engineering Society (IES) has created standards and recommendations for sports venue lighting specifically to address playability (i.e. not being impeded by lighting). But beyond playability, the design team must also consider the fan experience. Spectators invest their hard-earned time and money into attending sporting events, and the wrong light fixture placement or lighting levels can greatly change their view. While there is no one-size-fits-all approach to sports lighting design, in this article we’ll discuss several consistent themes that must be considered to some degree in all venues.

Light Levels | One of the main considerations for sports is exactly how much light is needed. Lighting levels will vary based on several factors, including the type of sport being played, indoor or outdoor venues, level of play (little league, high school, college or professional) and if the sporting events will be televised. As mentioned previously, lighting levels are designed based on recommendations provided by the Illuminating Engineering Society (IES), but the engineer(s) must also factor in requirements of the organization or sports club.

Fixture Location | The location of the sports lights on any type of venue is also important and has a significant impact on lighting uniformity and playability. For outdoor venues, it’s based on the number of poles and pole placement, while indoor venues focus on the location of the light fixtures in coordination with the structure. The elevation of the lights will have impact on playability, not only because they can cause glare, but also impede the flight of a ball. The location of the lights can also impact spectator viewing.

Aiming Angles | The aiming of the light trajectory is also crucial to the playability on outdoor fields, as well as spectator viewing. The lower elevation of the sports lighting fixture can cause a player to be looking into the lights as they are trying to make a play, causing those “lost it in the lights” blinding conditions. This is similar to driving and the oncoming car has their high beams on, causing you to not be able to see the road in front of you. To alleviate this, outdoor sports lighting fixtures must be mounted so that the aiming angle is at a minimum of 25 degrees.

Uniformity | Lighting uniformity refers to the ratio between the brightest spot (max) on the field/court to the darkest spot (min). The target ratio during design varies by level of play and sport, for example, between 2.1 and 4.0 in some cases. The main objective however, is to strive for the lowest uniformity ratio we can achieve while meeting the average lighting level across the field of play to account for the human eye. As it goes into and out of areas on the field/court that are dark in some

areas and light in other areas, the change can dilate the iris causing the eye to refocus. As this happens, the player might lose playability.

Cutoff, Spill Control or Glare | Cutoffs, spill control and glare all reference the concern for light spilling onto neighboring properties or into the spectator viewing spaces. Particularly for the fans, the inability to see the action on the field because of lighting is a very big dissatisfier. Having cutoff visors on the fixtures is traditionally a very effective way to keep the illumination to the field. Today’s LED fixture provide even better light control.

Maintained Levels | When lighting systems are first installed, they naturally perform better than after having been operated for several hundred hours. There are losses that happen based on lamp life and environmental conditions. Because of this, lighting systems are designed to provide a “Maintained Light Level”, or the performance of the lighting system just prior to when maintenance occurs. Losses are taken into account during design to ensure the lighting system will perform to the required light level throughout its life prior to normal maintenance so even as the losses occur, an acceptable amount of light remains.

Commissioning | Verifying all the design criteria has been met with the installation of the sports lighting system is an important final step in the process. Commissioning requires the contractor and manufacturer to physically measure the light levels on the field to be able to determine if the install does in fact meet the design. If the measured light levels do not match the design light levels and the other criteria, the contractor and manufacturer work together to make the proper corrections to ensure the sports lighting system meets all the criteria set forth within the design.

Download Additional Strategic Direction Reports

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Strategic Direction Report



SPORTS LIGHTING



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Brian Hall is an Electrical Designer in our Cedar Rapids office with a special focus on athletic lighting projects. His extensive experience with high school and collegiate facilities has made him a valuable member of the Sioux Falls-based design team for the USD Dakota Dome renovation. brian.hall@westplainsengineering.com

Team Spotlight

WADE MYRABO



Title: Sioux Falls Mechanical Department Head
Years with WPE: 6 Years
Home Team: Wife-Shonette; Son-Luke & Daughter-in-Law Mariah; Grandson-Gavin (1); Pups-Trixie (17) & Hazel (4)

If you've been to a major athletic venue in Eastern South Dakota in the past decade, chances are Wade Myrabo had something to do with it. The 30-year Mechanical Engineer has stamped plans for some of the landmark sports facilities in the region, including the Sanford Pentagon, Sanford Fieldhouse and SDSU Stanley J. Marshall Center. The spaces are all unique, but Wade sees the goal as the same – providing a comfortable environment so people can simply enjoy the show. After all, as a former athlete and avid sports fan (he's a big SDSU Wrestling follower), he knows the best part about these buildings is making it possible for athletes to compete and fans to experience.

In his own life, Wade's experiences focus on family and the outdoors. He and wife Shonette, an art teacher at Washington High School in Sioux Falls, like golfing, biking and hiking in the State Parks. But their newest adventure is being grandparents to one-year-old Gavin. The little guy is already showing some major athletic skills – as Wade says "sliding down stairs and going through every piece of the house in a split second." Sounds like the Myrabo house might have become a sports venue all it's own – but what a great show!



PROJECT PROFILE

ADDITION/RENOVATION

Stanley J. Marshall Center- Phase 1
Brookings, SD

Team
EAPC Architects & Engineers

SETTING THE PACE (AND MAINTAINING IT)

Athletics are big time in Brookings, SD. Home to the Division I South Dakota State University Jackrabbits, this small town of just under 24,000 is making a splash in collegiate sports. In the past decade, the Jacks have made postseason runs in baseball, football, men's basketball, women's basketball, volleyball and women's soccer. They've also registered individual national qualifiers in track and field, cross country and wrestling.

Not surprisingly, the excitement of these winning programs has caught on quickly. Since the 2009-10 season, the Athletic Department has quadrupled ticket sales, and enjoyed significant increases in fundraising and sponsorship dollars.

Naturally, the university wants its facilities to keep pace with this success, not only for student-athletes, but for donors and fans too. Multiple athletic facilities on campus have undergone expansion or upgrade in recent years and in 2015, the SD Board of Regents continued that trend, approving nearly \$20 million in renovations and additions to the Stanley J. Marshall Center. The complex is home to the men's and women's basketball, wrestling and volleyball teams, and space was beginning to get tight.

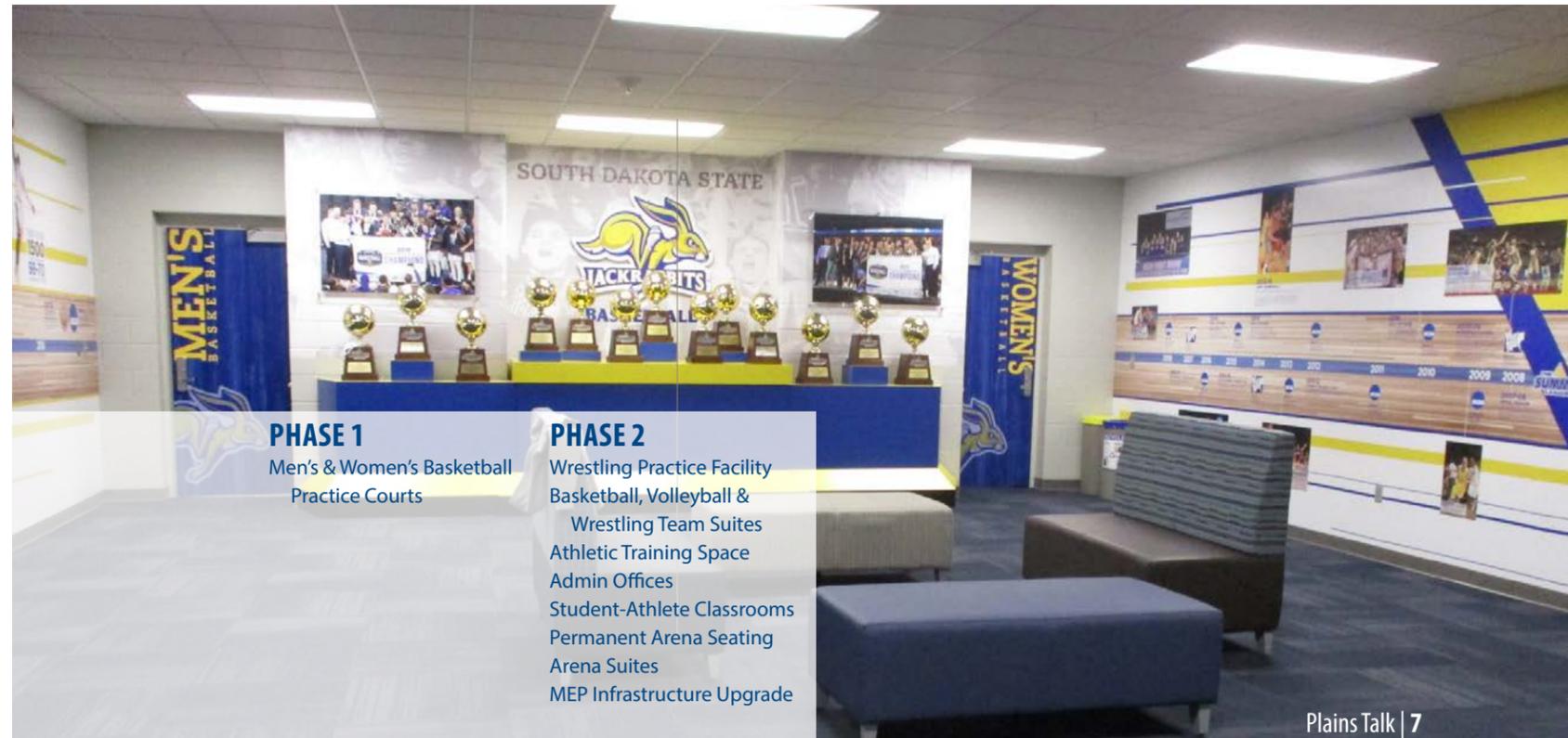
West Plains Engineering joined a team led by EAPC Architects & Engineers out of Sioux Falls to address the issue of not only adding space for team training, but also upgrading the facility to enhance the fan experience.

Initial programming determined a multi-phase approach to accommodate both operations and budget. Phase I was completed in 2018, and involved approximately 27,000 square feet of basketball practice space for the men's and women's programs,

Phase II will add a 15,000 square foot wrestling practice facility, and all four programs will get new, modern team suites, a state-of-the-art athletic training/treatment room and classrooms. Renovations will also involve reconfiguring Frost Arena to improve site lines for fans, add VIP box seating, club seating and an improved concourse to bolster the feeling of "home court advantage".

This phase will also tackle major upgrades to the mechanical, electrical and electrical infrastructure serving the facility. Planned changes include repairs to the plumbing system, addition of a fire suppression system, power upgrades and ventilation modifications. Mechanical and electrical construction for this phase alone is anticipated to reach roughly \$10.4 million.

Completion of Phase II is scheduled for 2020.



PHASE 1

Men's & Women's Basketball Practice Courts

PHASE 2

Wrestling Practice Facility
Basketball, Volleyball & Wrestling Team Suites
Athletic Training Space
Admin Offices
Student-Athlete Classrooms
Permanent Arena Seating
Arena Suites
MEP Infrastructure Upgrade

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PROJECT PROFILE

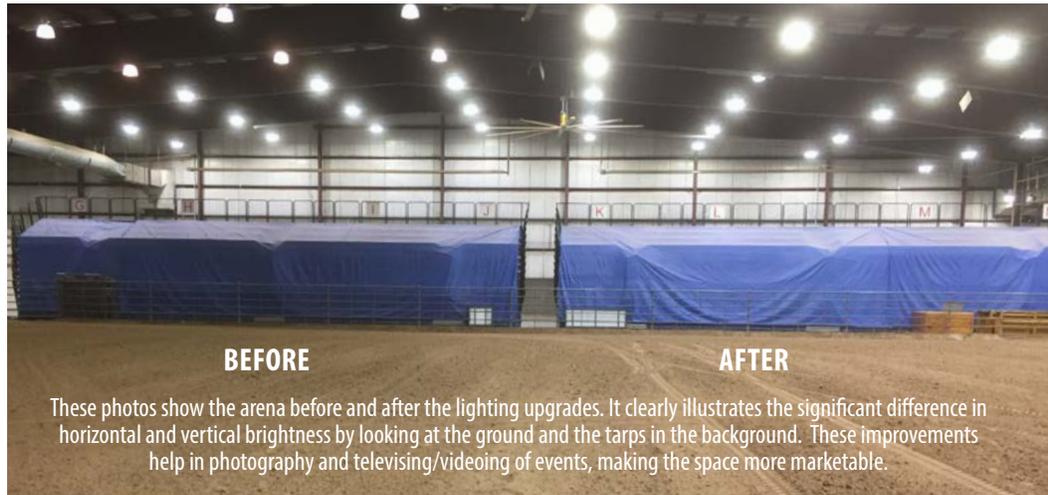
LIGHTING UPGRADE & EXPANSION

James Kjerstad Event Center
Rapid City, SD

Team
Geiger Architecture



Mike Sigman, P.E. is an Electrical Engineer and Rapid City office manager. He has been with West Plains more than 20 years, and in his spare time, is an active member of the SD Cutting Horse Association (SDCHA), the SD Quarter Horse Association (SDQHA) and is past President and current Vice President of the SD Reined Cow Horse Association (SDRCHA).



These photos show the arena before and after the lighting upgrades. It clearly illustrates the significant difference in horizontal and vertical brightness by looking at the ground and the tarps in the background. These improvements help in photography and televising/videoing of events, making the space more marketable.

ROOM FOR RODEO

The existing James Kjerstad Event Center (JKEC) opened in 2003 and is an 118,000 square foot multi-purpose facility located on the Pennington County Central States Fairgrounds. Located in a region that loves its rodeo roots, the facility specializes in agriculture/equestrian events with a 48,750 square foot dirt floor arena and stadium seating for almost 4,500.

High demand for the facility, existing limitations, and CSF's desire to further develop the facility as the "Horse Capital" venue led to a decision to expand. West Plains Engineering is currently part of the design-bid-build team for this expansion,

which will be approximately 250'x175' with a dirt floor that can accommodate livestock related events such as barrel races, team roping, cutting, and stalling.

Prior to this project, our team worked with CSF on a separate project to select energy efficient, high performance LED fixtures and a new controls system for the arena. The new system provides the controllability of the light output of a single light fixture based on an IP address of the fixture. This provides infinite possibilities in control and scene arrangement to accommodate the variety of arena users, and since it's installation, has reduced energy costs by nearly \$1,000 per month.