

MEMBERS OF THE

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

SDES EASTERN CHAPTER NEWSLETTER

PO BOX 1512 SIOUX FALLS, SD 57101 | WWW.SDES.ORG


 NSPE-SD EASTERN CHAPTER
SOUTH DAKOTA
ENGINEERING SOCIETY
INSIDE THIS ISSUE

PRESIDENT'S COLUMN	1
TREASURER'S REPORT	2
UPCOMING EVENTS	3
MONTHLY MEETING	4
ANNUAL CONFERENCE	5
E-WEEK OUTREACH	6-7
MATHCOUNTS	8-9
BANQUET THANK YOU	10
SCHOLARSHIPS	11-12
AWARDS BANQUET	13-14
SDSU ALUM FOR ASCE	15
NEW MEMBER	16-17
WEBEX LOGIN	18
ADVERTISEMENTS	19-20
AWARD WINNING NOMINATIONS	21-34

WebEx: In addition to our monthly in-person presentation, the meetings will also be broadcast on WebEx. See pages 4 and 12 of this newsletter for the WebEx log-in information.

WebEx Information will now remain the same from November to May.

PRESIDENT'S COLUMN

BY GABE LABER, PE

Wow, what a busy February we had as an Engineering Society. Thank you to the many volunteers we had to help organize and participate in the Mini-Golf Challenge, MathCounts, serving at the Banquet and the Award Banquet. Congrats to the Mini-Golf Challenge winners and the Awards Banquet winners. I thought the Falls Improv was a nice change of pace for entertainment. They probably got a good laugh out of all the engineering lingo we threw at them for their skits.

I was able to take part in serving at the Banquet. I feel like we are all fortunate to have the jobs and careers that we have and I think it's great to be able to give back to the community. I know it was cold the morning that we served because I had to quickly shuffled from my car to the back door. As I saw all the guests come in, it just made me appreciate the life I have and how fortunate my family is not having to sit out in the cold like that. As Renee was talking about how they need more people to serve, it made me think that I could do more and maybe have my family help serve some morning so they can get another perspective about life. Perhaps our Chapter could serve more than once a year.

Thanks to Brad Ludens and Jared Pfaff for presenting last month on the City of Sioux Falls CIP and the SD DOT STIP projects. I think everyone enjoys this presentation each year and it's interesting to see how the Sioux Falls area continues to grow.

Please join us next week for our March meeting. Adam Roark with Gage Brothers will be presenting on Architectural Precast.

One last note, the Annual Conference is being hosted by the Eastern Chapter on April 6-7 in Sioux Falls. Please consider attending. Online registration opened today on sdes.org.

Hope to see you at next week's membership meeting.



TREASURER'S REPORT

BY SCOTT LAVOY, PE

Previous General Fund Balance	2/2/2022	\$ 20,994.40
<u>Deposits:</u>		
	None	\$ -
Total Deposits:		\$ -
<u>Expenses:</u>		
	E-week Golf Event Expenses	\$ (104.22)
Total Expenses:		\$ (104.22)
Total General Fund Balance:		\$ 20,890.18

Previous Scholarship Fund Balance	2/2/2022	\$ 7,114.73
<u>Deposits:</u>		
	None	\$ -
Total Deposits:		\$ -
<u>Expenses:</u>		
	Scholarship Committee Expenses	\$ (109.34)
Total Expenses:		\$ (109.34)
Total Scholarship Fund Balance:		\$ 7,005.39
Total Account Balance	2/28/2022	\$ 27,895.57

UPCOMING EVENTS

- Tuesday, March 8th— March Monthly Meeting with Adam Roark from Gage Brothers discussing Architectural Precast
- SDES Annual Conference, April 5-7 in Sioux Falls—Registration available online at sdes.org
- Tuesday, May 10th—May Monthly Meeting

March 2022

Sun Mon Tue Wed Thu Fri Sat

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April 2022

Sun Mon Tue Wed Thu Fri Sat

					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MONTHLY MEETING

Please join us **in-person** for the monthly Eastern Chapter SDES Meeting at the Pizza Ranch Meeting Room on 41st Street.

Tuesday, March 8th

Lunch starts at 11:30 am and the meeting begins at noon

Adam Roark with Gage Brothers will be presenting on Architectural Precast

We look forward to seeing you in person, but if you'd like to join us virtually via WebEx, please see the information below.

We have set up a recurring meeting for the rest of the year, so the meeting information will stay the same until the end of the year (May 2022). Members can also find the link if they log in to the website and click on Membership Meeting Information under the Members Only item in the left hand menu.

Join from the meeting link: [Click Here](#)

Join by meeting number:

Meeting number (access code): 2464 774 4807

Meeting password: ERt323BNuYv

Tap to join from a mobile device (attendees only)

+1-650-479-3208,,24647744807## Call-in toll number (US/Canada)

Join by phone

1-650-479-3208 Call-in toll number (US/Canada)

ANNUAL CONFERENCE KRISTA MAY, PE

SDES 61st ANNUAL CONFERENCE SCHEDULE

All times are stated in Central Time.

All events, unless otherwise noted, will be at the Holiday Inn City Centre in Downtown Sioux Falls.

Schedule subject to change.

Tuesday, April 5, 2022

- 10:00a – 2:00p **ACEC Quarterly Membership Meeting** (TBD)
- 3:00p – 5:00p **SDES BOARD MEETING**
- 5:00p – 6:00p **Registration Open**
- 5:30p – 9:30p **HOSPITALITY ROOM:** Sponsored by the Dakota Concrete Pipe Association

Wednesday, April 6, 2022

- 7:00a – 5:00p **Registration Open**
 - 7:15a – 8:00a **BREAKFAST**
 - 8:00a – 8:10a **Welcome:** Mayor Paul TenHaken
 - 8:10a – 9:00a **Larry Young, Boiling Frog Development:** Walking Farther Than You Have Before
 - 9:10a – 10:05a **Concurrent Technical Sessions**
 - 10:05a – 10:25a **BREAK & OPENING OF EXHIBIT HALL**
 - 10:30a – 12:20p **Concurrent Technical Sessions**
 - 12:20p – 1:55p **LUNCH & AWARDS**
 - **Keynote Address:** NSPE President Rick Guerra, PE
 - **New Officer Installation:** NSPE President Rick Guerra, PE
- Awards:** Brad Ludens, PE, SDAS Awards Chair
- 2:00p – 4:00p **Concurrent Technical Sessions**
 - 4:00p – 4:25p **BREAK in EXHIBIT HALL**
 - 4:30p – 4:55p **Concurrent Technical Sessions**
 - 5:00p – 5:30p **SDAS ANNUAL MEMBERSHIP MEETING**
 - 6:00p – ???p **SOCIAL:** Remedy Brewing Company

**Registration,
sponsorship and vendor
opportunities are
available online at
www.sdes.org/page-1564545**

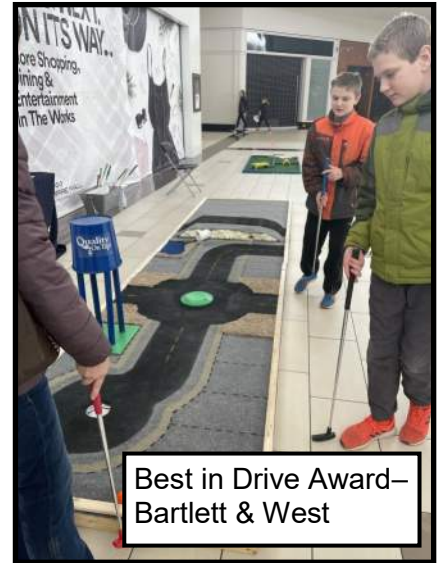
Thursday, April 7, 2022

- 7:15a – 7:55a **BREAKFAST in EXHIBIT HALL**
- 8:00a – 9:30a **Concurrent Technical Sessions**
- 9:30a – 10:00a **BREAK in EXHIBIT HALL**
- 10:00a – 12:00p **Concurrent Technical Sessions**
- 12:00p – 1:00p **PAST PRESIDENTS' LUNCHEON:** All Past Presidents are invited to attend.

REIMAGINING THE POSSIBLE: E-WEEK OUTREACH EVENT 2022

ERIN STEEVER, PE

Thanks for coming out to the Empire Mall on Saturday, February 19th for our first annual Mini-Golf Challenge! Four engineering firms constructed engineering themed mini-golf holes for mall visitors to play. A huge round of applause to VAA, IDG, Banner and Bartlett & West for taking a chance on this new event and *Reimagining the Possible* by tying civil engineering into mini-golf. Another big cheer to Southeast Tech for assembling and running the hands-on activity, and South Dakota State University (SDSU) Baja vehicle and Robotics Club to round out the event with a mechanical engineering flare, and DGR for printing our event posters.



Best in Drive Award—
Bartlett & West



Most Popular Award— VAA

Here's the mini-golf recap. Hole 1 was presented by VAA. They constructed a Plink-o style obstacle out of mega-bolts and a structure that players could either go around or putt through the open door. Surprisingly, two visitors achieved a hole-in-one on this sturdy hole. Hole 2, presented by IDG, was 100% recycled and took players on a tour of South Dakota. The first stop was the newly reconstructed 8th Street bridge in downtown Sioux Falls, the second stop was the Oahe Dam in Pierre, and the third stop was Mount Rushmore in the Black Hills. This one proved to be the most difficult hole for some with the hole atop a hill. Features of Hole 3, presented by Banner, included material samples of an underground drainage system for a tunnel challenge and a solid fiberglass surfacing resembling a simple bridge supported with I-beams. Hole 4, presented by Bartlett & West, may have been most drive-worthy and started with an option to

putt through a drainage culvert or a lengthy multi-use trail tunnel. In true pedestrian fashion some of the players chose to bypass these and cross the road instead. The second obstacle was a roundabout. You may find it interesting that there wasn't a single grumble or complaint heard in relation to the roundabouts. I'd say drivers have finally figured them out!



Quickest Build Award –
Banner Associates



Best in Recycling Award— IDG

REIMAGINING THE POSSIBLE: E-WEEK OUTREACH EVENT 2022

ERIN STEEVER, PE

Southeast Tech brought some nostalgia to this new event with a gumdrop-toothpick geodesic dome build activity. To make this a more pandemic-inclusive hands-on event, this year's activity was individually bagged, and visitors had the option to either construct it on-site under supervision and guidance from Beth Kassing and her students or to take one home to complete later. Each bag included detailed instructions for assembly.

SDSU students from the Mechanical Engineering program rounded out our event with a Baja vehicle and a remote-control robot that shot a basketball out to volunteers and even a few brave mall visitors. Some of the lucky mall visitors were able to climb into the Baja vehicle and try out the helmet and 5-point harness seatbelt. The robot was from the 2019 competition. Robotics Club students were also promoting a Battle Rabbits program. Battle Rabbits, is the club's newest outreach project, is a BattleBots® style competition for high school teams. The high school students program the self-driving robots and send them back to the Robotics Club for the competition. Teams will compete against each other in destructive winner-takes-all matches. The teams will be guided and taught by members of the Robotics Club.

The competition will be held live on YouTube for anyone to enjoy! Email the team at sdstaterobotics@gmail.com or find them on social media for more information (Facebook: SDSU Robotics Club, Twitter: @sdsrobotics, Instagram: @sdstaterobotics, Snapchat: sdrobotics2009, YouTube: SDState Robotics Club).

On a final note, we also added a charity donation to our event this year. Donations were being accepted for the Habitat for Humanity of Greater Sioux Falls. If you missed it and would still like to contribute, donations are always being accepted at <https://siouxfallshabitat.org/>. Our event collected \$818.63.



MATHCOUNTS KRISTA MAY, PE



On behalf of the South Dakota Engineering Society, I want to thank all those that volunteered for this year’s program. This year’s bonus in-person competition was held on February 24, 2022 at Southeast Technical Institute in Sioux Falls.

The first-place team was Patrick Henry Middle School from Sioux Falls and the second-place team was Yankton Middle School. The top 4 competitors from the official online competition and the top 10 competitors from the bonus in-person competition advance to the state competition in Pierre on March 12th. There they will compete against the top students from 2 other chapters in the state. The top four individuals from the State Competition will represent South Dakota at the 2022 Raytheon MATHCOUNTS National Competition May 7th - 10th.

Thank you to the following volunteers for helping with this year’s competition:

Brad Ludens

Kari Johnson

Karin Lang

Jonathon Wiegand

Michele Nielson

Siana Murphy

Beth Kassing & 2 students

Thank you again for supporting the MATHCOUNTS program in South Dakota. Your help is greatly appreciated!



<— 1st Place Team from Patrick Henry Middle School

2nd Place Team from Yankton Middle School —>



MATHCOUNTS KRISTA MAY, PE



<— Brianna Eckert (Yankton MS)

1st Place Online Competition

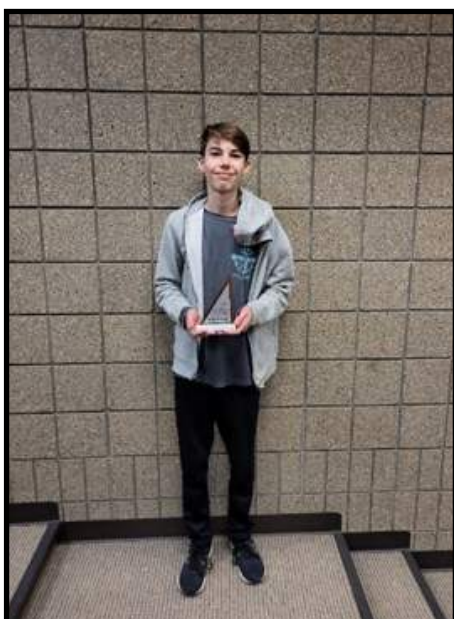
3rd Place Bonus In-person Competition



Brady Wheeler (Patrick Henry MS) —>

2nd Place Online Competition

2nd Place Bonus In-person Competition



<— Elijah Sumey (Patrick Henry MS)

1st Place Bonus In-person Competition

SERVING BREAKFAST AT THE BANQUET



Thank you to those that prepared and served breakfast at the Banquet during Engineers Week. Our chapter also provided the funds to pay for the breakfast that morning. We had a great turn out!

2/26/2022

Good Morning,

Thank you for serving at The Banquet during the month of February. We appreciate your commitment to our guests.

Please share with your congregation, co-workers, family, friends and neighbors that we welcome individuals and groups of any size to serve at The Banquet. The ability to serve is not contingent on the ability to sponsor a meal. All are welcome from one volunteer to 30 volunteers!

Brian A Majerus

Community Partnership Coordinator

The Banquet

900 E 8th St, Sioux Falls, SD 57103

volunteer@thebanquetsf.org

(605) 335-7066

Love has to be put into action, and that action is service.

ENGINEERING AWARDS BANQUET—SCHOLARSHIP WINNERS

LANCE MAYER, PE

As part of the 2021-2022 scholarship program, the SDES-Eastern Chapter awarded three \$2000 Engineering Scholarships out of 39 applicants to the following high school seniors:

Kaylee Updegraff from Sioux Falls, SD is ranked 1st in her class at Roosevelt High School and participates in several extracurricular activities including golf, tennis, Cancer Awareness Club, Spanish Club, National Honors Society, and volunteering in her church. Kaylee's most satisfying achievement is becoming team captain of her high school tennis team after coming in as a shy girl looking for a hobby and ending up a team leader in a sport that she has learned to love. Kaylee is fascinated with math and physics and enjoys boring her parents with daily physics rants. One example is after hearing about the divergent diamond project in Sioux Falls, she decided to do some research to learn more about them. While they were on a road trip, Kaylee noticed they were approaching a divergent diamond and got super excited letting her parents know that we were getting one of these in Sioux Falls. Kaylee plans on attending South Dakota State University to study Civil Engineering.



Lauren Fick, from Garretson, SD, attends Garretson High School where she is ranked number 1 in her class while participating in several activities, including golf, marching band, concert band, quiz bowl, Girl's State, youth group, and is student body president. Lauren's most satisfying achievement that gives her the most satisfaction is accomplishing her goal of receiving straight A's. She's always felt that the area of her life that she would have the most control is how she performed in school. In her pursuit to earn all A's, Lauren learned that self-discipline, time management, and learning to fully understand her subjects gave her a greater appreciation for school. Being from a family of engineers, and sick of being compared to her siblings in school, she would carve out her own path when searching for her career. However, despite Lauren's efforts, every career quiz she took, article read, and counselor she spoke with pointed her to engineering which helped her realize it fit her personality perfectly, from her attention to detail to her constant desire to improve, design and problem solve. Lauren plans on attending South Dakota State University to study Electrical Engineering.

ENGINEERING AWARDS BANQUET—SCHOLARSHIP WINNERS

LANCE MAYER, PE



Caeden Ekroth, from Yankton, SD, has excelled academically as a senior at Yankton High School and is 1st in his class. He has been involved in golf, trapshooting, marching band, concert band, jazz band, science Olympiad, Mathcounts, boys state and runs a small lawn mowing business in the summer. Caeden's most satisfying achievement has his National History Day project. His exhibit won the regional contest, finished second in the state competition, and qualifying for Nationals which represented the top 3,000 of over 500,000 projects that participated. Caeden's interest in engineering stems from his fascination with planes and the technology used in space travel. He strives to understand the complexities of their moving parts and how to make them more effective and safer which makes engineering a perfect fit for his interests. Caeden plans to pursue a degree in Mechanical Engineering and a minor in Aerospace Engineering at the South Dakota School State University.

Also, in 2021, the Eastern Chapter sponsored a \$400 Engineering Scholarship which was made available through a permanent endowed fund held within the South Dakota Community Foundation. **Jonah Bebensee** was the recipient selected by the Scholarship Committee and he presently attends South Dakota School of Mines and Technology planning to major in Electrical Engineering.

Congratulations to all of this year's SDES - Eastern Chapter Scholarship Recipients!



ENGINEERING AWARDS BANQUET—AWARD WINNERS

WES PHILIPS, PE

The Young Engineer of the Year award was presented to **Kent Ode, PE**. Kent is a Transportation Engineer at HDR. He graduated from South Dakota State in 2015. Kent is a SDES Eastern Chapter Director and Events Coordinator, which includes planning the chapter's Golf Outing. He is also involved in HDR's Young Professionals group, which involves planning and executing a variety of community outreach programs and projects. Key projects Kent has worked on include the 49th Street/ Basin 104 Drainage & Roadway Improvements project and the upcoming Minnesota Avenue project from Russell Street to 2nd Street. Kent is known for his dedication, resourcefulness and teamwork.



The Engineer of the Year award was presented to **Trent Bruce, PE**. Trent is a Vice President and Sioux Falls Office Department Head at DGR Engineering. Trent graduated from South Dakota State in 2000. Trent's role is to lead a team of project managers and act as Client Manager and/or City Engineer for multiple communities in South Dakota, Iowa and Minnesota. Trent was a 24-year member of the South Dakota Army National Guard, recently retiring at the rank of Lieutenant Colonel. Trent was mobilized for three separate deployments, serving in Kuwait, Iraq, Syria, and Afghanistan. He served in various leadership positions to include Commander of the 211th Engineering Company and 153rd Engineer Battalion during his deployments. Trent also served as the Director of Public Works for the Kabul Base Cluster during a deployment in Afghanistan where he was responsible for all US military construction at three different bases. During this time, he facilitated the master plan of multiple military bases and participated in several design charrettes associated with the master planning process and future facilities. Trent is a former volunteer firefighter, has been involved in several community and professional organizations, and is very active in his children's activities.



ENGINEERING AWARDS BANQUET—AWARD WINNERS

WES PHILIPS, PE

The Outstanding Engineering Achievement Awards were presented to Infrastructure Design Group for the 8th Street Bridge and Greenway Improvements Project and HR Green for the Main Pump Station Project.

8th Street Bridge and Greenway Improvements project team members included: Chad Hanisch, PE, Tanner Odegaard, PE, Jasmin Rosa; Vanessa Victor, PE, Confluence: Jon Jacobson, PLA, ASLA, Jessica Williams, PLA, CIP, ASLA, Chad Kucker, PLA, CID, LEED AP, ASLA, Lightworks, Inc.: Kathi Vandel, PE, Allyson Evans, City of Sioux Falls: Joshua Peterson, P.E., Dena Knutson and Geotek Engineering & Testing: Shane Lindner. The rehabilitation of this 100 year-old historic bridge will allow for continued movement of vehicles and pedestrians across the Big Sioux River in Downtown Sioux Falls, while providing visual interest and supporting downtown reinvestment. Additional information on this project can be found in the attached project nomination at the end of the newsletter.



Main Pump Station Project team members included: Dawn Zahn, P.E., Sam Cotter, P.E., Mark Hardie, P.E., Mo Brua, P.E., Jed Reimnitz, P.E., Jason Van Liere, Terry Van Dyke, Terry Schlotterback, Keith Caruthers. Other firms that assisted included SEH (structural and architectural): Mike Hemstead P.E., Al Bush P.E., Tom Schuette, Scott Blank A.I.A, American Engineering Testing (geotechnical testing): Bruce Card P.E., Scott Kelly P.E., Scott Dumdei, Banner Associates (NACE Inspections): Adam Hanson, P.E., City of Sioux Falls: Mark Perry, P.E., Paul Faris, Dustin Posten, P.E., Kari Johnson, P.E., Josh VandenBos, P.E., Mike Finken, P.E., Raed Yousef, P.E., and Midwest Land Surveying. The Main Pump Station pumps 90% of Sioux Falls wastewater to the Water Reclamation Facility.

It has a current capacity of 65 mgd and the capability to expand to increase flow to 90 mgd. Construction of the pump station took nearly 2 ½ years and encountered multiple challenges, such as site flooding, pandemic-related labor delays and supply chain issues. Additional information on this project can be found in the attached project nomination at the end of the newsletter.

SDSU CE ALUM FOR ASCE PRESIDENT

December 10, 2021

To: ASCE Voting Members

From: Charles A. Tiltrum
101 Truman Drive
Aurora, SD 57002-2017
605-693-3400 (Home)
605-695-1757 (Cell)



REF: Support for nomination of Marsia Geldert-Murphey for President Elect of the American Society of Civil Engineers

I am writing to ask you to help support Marsia Geldert-Murphey in her quest to be elected President Elect of ASCE. I have known Ms. Geldert-Murphey since she was a student in the Civil and Environmental Engineering Department at South Dakota State University over 30 years ago. She took my classes, she helped me as a lab assistant in my surveying classes, and she was very active in the ASCE Student Chapter. I was the student chapter faculty advisor for 24 years.

Since her graduation from SDSU in 1992, I know Ms. Geldert-Murphey has been a very active member, officer, committee member, and leader in the ASCE St. Louis Section. Marsia has served on national committees and has been a Governor and Region 7 Director. I know she has always served with the best interest of the ASCE members and the organization as her objective. I feel she can serve the three-year commitment in the presidential offices and serve ASCE very well.

Ms. Geldert-Murphey has maintained a strong contact with SDSU after graduation. She has served on our CEE Department Advisory Council for many years, and she has also returned to SDSU to speak at ASCE student chapter meetings and other campus activities. In addition, Marsia serves as a mentor to CE students via video conferencing.

My involvement with ASCE over the past 47 years has enabled me to establish a strong opinion of Ms. Geldert-Murphey's ability to continue to serve ASCE in a very positive manner. I served on various education committees, was involved with the District 16 Council and Region 7 Governance Committee, held many offices in the local branch and South Dakota Section, attended ASCE "brainstorming sessions," and served on the ASCE Board of Direction 2001-2004.

I highly encourage your help supporting Marsia Geldert-Murphey in her efforts to be nominated and elected to the office of ASCE President Elect. Thank you for your time reading my letter, and hopefully thank you for your support for Marsia's nomination and election. Please contact me if you have any questions or comments.

Sincerely,



Read more here: [Two recent directors named official nominees for ASCE 2023 president-elect | ASCE](#)

Alysa Patterson

HDR

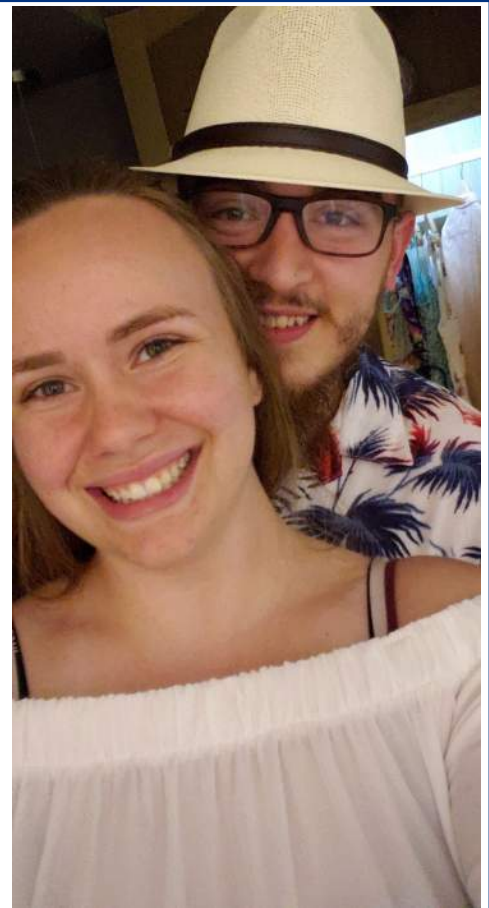
Transportation Coordinator
 Alyssa.Patterson@hdrinc.com

College and Major:

Texas A&M University
 at Kingsville



Civil Engineering



I was born in Amarillo, Texas, though I grew up mostly in Atlanta, Indiana and the Austin area of Texas. I graduated from Bastrop HS, so I claim Bastrop as my hometown. I started college at Abilene Christian University in General Engineering, in the mechanical track, before transferring after 3 semesters to TAMUK, where I graduated May 2020. While there, I was involved in Chi Alpha student ministries and the Tau Beta Pi engineering honor society. I have a small family: just my mom, my two brothers, my papa (grandfather), and 3 nieces, but my husband’s family is enormous, and they’ve treated me as one of their own since we began dating in 2013.

In middle school, I took a class where we learned drafting (as in, drawing board, true edge, triangles, pencils, etc) and it began my interest in engineering. I sought out a mentor through my grandparents’ church, and ended up good friends with Max Proctor, who helped me get an internship with the Design Division at TxDoT my first summer after high school. I continued working with Max during the summers, even when he moved to a private company during my junior year, and ended up with a full time offer at Alliance Transportation after college. I was let go due to Covid, and moved to South Dakota on a bit of an impulse in December 2020. My husband and I love the community we’ve found here and plan to stick around for a good while, even though we’re not at all used to actual winters.

Family: Husband, Luke Patterson

Hometown: Bastrop

Job Title and Years With Firm: Transportation Coordinator; 0.5

Favorite Room in My House and Why: The living room; that’s where board games are played, shows are watched, and quality time is spent with the one I love.

My Normal Breakfast: I don’t eat breakfast at breakfast time, but I love bacon, eggs, and pancakes for supper!

Hobbies: crochet, baking, and lately playing Dungeons & Dragons

What do you collect? Yarn, kitchen equipment, dice

My Best Personality Trait: Empathetic

Pets: 2 dogs, Goose and Kenai

Pet peeves: loud chewing, acting foolish when you’re not, and judging the things that make others happy

Favorite beverage: black tea with honey, or a Mexican mule

Favorite TV Show: Avatar: the Last Airbender

Favorite Season: Fall (now that I’ve seen it)

People may not know about me... I currently have one tattoo, but have plans for at least one full sleeve

Alysa Patterson

HDR

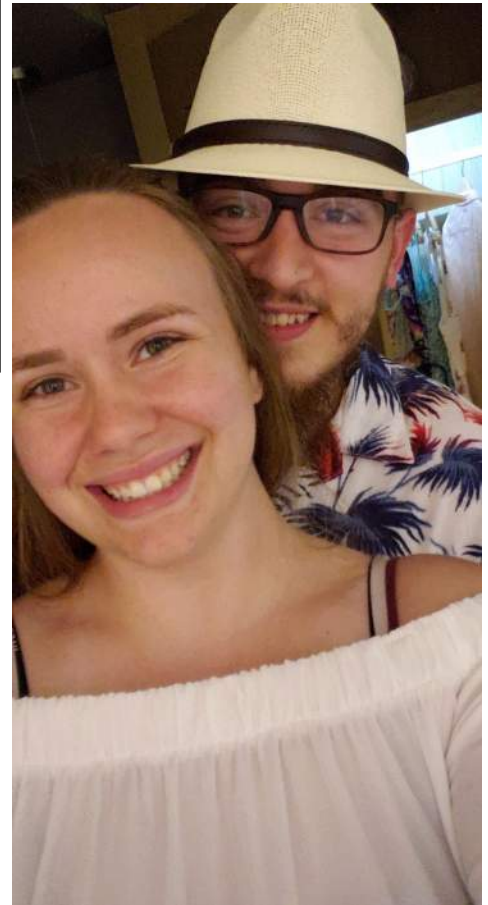
Transportation Coordinator
 Alyssa.Patterson@hdrinc.com

College and Major:

Texas A&M University
 at Kingsville



Civil Engineering



Continued...

Favorite Quote: “It’s the questions we can’t answer that teach us the most. They teach us how to think. If you give a man an answer, all he gains is a little fact. But give him a question and he’ll look for his own answers.” Patrick Rothfuss

What made you want to be an engineer? Encouragement from a teacher and a mentor; I like to solve problems, and they pushed me toward a career that will stretch me.

What do you like best about being an engineer? The thought that we get to improve life for people around us (even if they hate the process of getting there, it’s better in the end than when we began)

Describe a significant event in your career. I was let go in October 2020 and struggled with self-doubt and questioning if I had chosen the right path. Moving 1000 miles north and the resulting change in scenery, people, and climate helped clear my head and see that this is where I need to be.

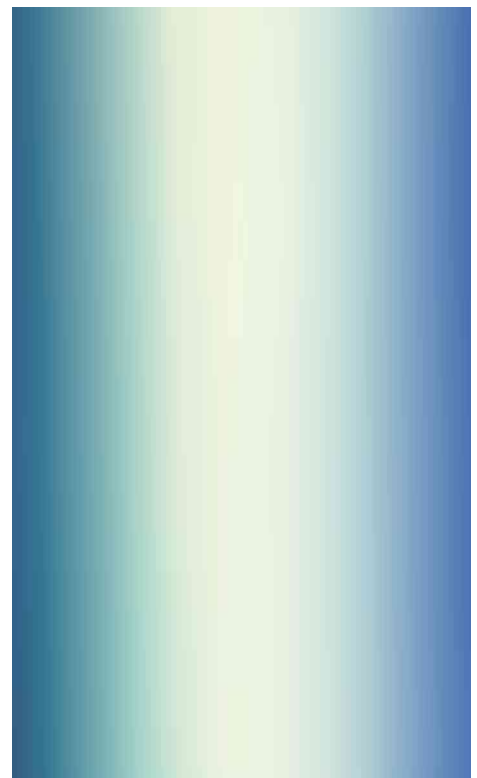
Describe a significant event in your personal life. In 2012, I met Luke at my grandparents’ church. Through that, I came to know Jesus and also gained a family unlike anything I had ever experienced; one moment where a cute boy smiled at me ended up shaping my future in ways I could never have predicted. We’ve been dating since 2013, and got married in 2019.

Describe an achievement from the past year you are proud of. I moved to a new state where I knew exactly 0 people, learned several new engineering programs, and never faltered.

What are you looking forward to in the next year? Hopefully buying our first home and starting a garden! Professionally, passing the FE and moving towards licensure.

I hate it when... people use ketchup close to me. That stuff is vile.

Favorite Place to Visit and Why: Texas! I miss the food, friends, and my in-laws, so we like to visit whenever we get the chance. South Dakota is great, but nothing here compares to Torchy’s Tacos.



2021-2022 OFFICERS AND CHAIRPERSONS

Officers

President	Gabe Laber, PE
President Elect	Josh Peterson, PE
Vice President	Devin Clay, PE
Secretary/Treasurer	Scott LaVoy, PE
Chapter Director(1st term)	Kent Ode, PE
Chapter Director(2nd term)	Kari Johnson PE
State Director	Riley Rinehart, PE
Past President	Ben Scholtz, PE

Committees

Nominating Committee	Lee Kaffar, BA
Mathcounts	Krista May, PE
Scholarship	Lance Mayer, PE
Events Coordinators	
E-Week	Erin Steever, PE
Winter Social	Kent Ode, PE
Golf Outing	Kent Ode, PE
Awards Banquet	Jedidiah Reimnitz, PE
Awards	Wes Philips, PE
Audio/Visual IT	Chad Stensland, PE
Newsletter	Abby Nelson, PE
Membership List	Myron Adam, PE

Eastern Chapter of SDES Goals

- To promote the licensed practice of engineering and to provide learning opportunities that enable licensed engineers to maintain practice competency;*
- To maintain high ethical standards for the practice of engineering and lead the profession in adhering to these principles:*
- To protect the public health, safety, and welfare; while being good stewards of the environment;*
- To incorporate engineering principles and perspectives in government decisions that protect the public; and*
- To consider community service a professional obligation.*

SDES Mission Statement

SDES is the state society of engineers from all disciplines that promotes the ethical and competent practice of engineering, advocates licensure, enhances the image of its members, and advocates legislation and public policy for the betterment of human welfare and the profession.

Webex Login Instructions

SDES March Monthly Meeting
Meeting available on Webex on
Tuesday, March 8th at Noon (CST)

Meeting number (access code):
 2464 774 4807
 Meeting password:
 ERt323BNuYv

Join from the meeting link:

[Click Here](#)

For any and all newsletter articles, additions, edits, corrections, and important dates contact:

Abby Nelson, PE
 HDR
 101 S. Phillips Avenue, Suite 401
 Sioux Falls, SD 57104
 605-977-7753
 Abby.Nelson@hdrinc.com

For all *State Society* membership information and other business, contact:

Nancy Hoines
 SDES Executive Director
 PO Box 1076
 Pierre, SD 57501
 605-951-1004
 sdengineeringsociety@gmail.com

Ideas transform communities



Sioux Falls 605.977.7740
 Rapid City 605.791.6100
hdrinc.com

infrastructure
 design group inc.

Sioux Falls | Watertown | Mitchell
605-271-5527
InfrastructureDG.com



Structural Engineering | Municipal Engineering
 Transportation Engineering/Planning | Water Resources | Site Development
 Land Surveying | Construction Observation | Parks & Recreation

JSA ENGINEERS AND LAND SURVEYORS
Land Development • Municipal • Streets • Water • Sewer • GPS • Construction Staking

6810 S. Lyncrest Avenue • Suite 101
 Sioux Falls, South Dakota 57108-2515
 605-367-1036 • Fax 605-367-1002



Designing Solutions
 for community growth

As a national leader with long-time relationships in water-focused services, Bartlett & West is your ally for success.

Bartlett & West

2921 E. 57th Street Sioux Falls, SD www.bartlettwest.com



WE ARE ULTEIG

Delivering engineering and technical services to Lifeline Sectors® vital to everyday life.

5701 S Corporate Place, Suite 1
 Sioux Falls, SD 57108
 605.323.2306

Ulteig

www.ulteig.com

We listen. We solve.™

Sayre Associates

Vibration Monitoring,
 Construction Administration,
 Civil Engineering & Land Surveying

Call us to discuss your project needs!

www.sayreassociates.com • Phone: (605) 332-7211

www.bannerassociates.com

Brookings
 Sioux Falls
 Vermillion
 Milbank
 Rapid City

Toll Free
 1.855.323.6342

Civil/Transportation
 Municipal Engineering
 Land/Site Development
 Water Treatment, Storage & Distribution
 Wastewater Collection & Treatment
 Hydraulics/Hydrology
 Environmental
 Surveying

BANNER
 engineering a better community

Thank you for your support of SDSES! Advertisement Sponsorships are available in our monthly newsletter. The newsletter is distributed to over 200 members of the chapter and posted on the SDSES website. If you are interested in having your advertisement here, please contact Nancy Hoines via phone: 605-951-1004 or email: sdengineeringsociety@gmail.com.

The Leading Distributor of Water, Sewer & Storm Drain Products & Services



CORE & MAIN
South Dakota

WE'RE ALL ABOUT
South Dakota

Rapid City
2808 E. Hwy. 44
(605) 716-9427

Sioux Falls
2101 E. 54th St. North
(605) 339-2814



coreandmain.com

Local Knowledge | Local Experience | Local Service, Nationwide®

ESS BROTHERS & SONS, INC. 

PREVENT INFLOW/INFILTRATION



Infi-Shield **Gator Wrap** **Flex-Seal**

9350 County Road 19 Phone: 763-478-2027 Fax: 763-478-8868
Loretto, MN 55357 website: www.essbrothers.com

WPE WEST PLAINS ENGINEERING, INC.

AN ENGINEERING SOLUTION CENTER

MECHANICAL ELECTRICAL PLUMBING POWER

SIoux FALLS, SD ■ RAPID CITY, SD ■ BISMARCK, ND
CASPER, WY ■ CEDAR RAPIDS, IA

westplainsengineering.com

 **SDRMCA**
South Dakota Ready Mix Concrete Association

Jody Titze, PE
Executive Director

5024 S. Bur Oak Place, Ste. 113A, Sioux Falls, SD 57108
office (605) 274-0145 | cell (605) 366-9585
jtitze@sdrmca.org | www.sdrmca.org

 **FELSBURG HOLT & ULLEVIG**
connecting & enhancing communities

Civil Design
Construction Management
Data Science
Environmental
ITS/Traffic Engineering
Planning
Structures
Transportation Operations/Safety
Water Resources



ENGINEERS SCIENTISTS PLANNERS

SIoux FALLS, SD

Jennica Wilcox, PE | 605.777.1973 WWW.FHUENG.COM

 **HRGreen** [▶ HRGREEN.COM](http://HRGREEN.COM)

Since 1913, HR Green has provided solutions that build communities and improve lives.

▶ 431 N. Phillips Avenue | Suite 400 | Sioux Falls, SD 57104
▶ Phone 605.334.4499

TRANSPORTATION + WATER + GOVERNMENTAL SERVICES
LAND DEVELOPMENT + ENVIRONMENTAL + CONSTRUCTION

Rethink what's possible with a local, full-service AEC team.

See how our Sioux Falls office can help at burnsmcd.com/InformerAEC.

BURNS & McDONNELL
CREATE AMAZING.

DGR **ENGINEERING**

Streets • Sewer • Drainage
Water • Airports • GIS
Electrical Power

Trusted. Professional. Solutions.

Four locations including
Sioux Falls, SD
605-339-4157

dgr.com email: dgr@dgr.com



4. Project Team

Owner:

City of Sioux Falls
Engineering Department
Joshua Peterson, P.E.
231 N. Dakota Avenue
Sioux Falls, SD 57104



Engineering Team:

Lead Consultant

Infrastructure Design Group, Inc.
Chad Hanisch, P.E.
3241 E. Bison Trail
Sioux Falls, SD 57108



Lighting

Lightworks, Inc.
Kathi Vandel, P.E.
361B Main Street
Weston, MO 64098



Landscape Architecture

Confluence
Jon Jacobson, PLA, ASLA
524 N. Main Avenue
Sioux Falls, SD 57104



Material Testing

Geotek Engineering & Testing
Shane Lindner
909 E 50th Street North
Sioux Falls, SD 57104



5. Project Description

Summary:

The 8th Street concrete arch bridge is approximately 241 feet long and 66 feet wide. Prior to rehabilitation, it consisted of three traffic lanes along with parallel parking and sidewalks on both sides. The width of the existing structure was wider than most structures constructed in the early 1900's. No one can pinpoint why it was constructed wider than normal, but the width has served the structure well to date and is anticipated to fit the needs for the Big Sioux River crossing well into the future. The structure consists of three reinforced arches with each arch spanning approximately 80 feet. The spandrel walls had simple incised fenestrations outlining each span. Each pier has decorative conical nosings with the upstream side being armored for protection from ice and debris.

Beyond some typical maintenance, the only significant rehabilitation was completed in 1977 which consisted of replacing the bridge infill, new surfacing, replacing the decorative railing, and installing new roadway lighting.

In 2017, the City of Sioux Falls contracted with InfrastructureDG to determine the viability of rehabilitating the bridge. Through this study, rehabilitation was deemed viable and the least expensive long-term investment. Construction began in March of 2020 and concluded in August of 2021. Final project elements included greenway improvements on both sides of the river, an interpretive wall display along the west trail under the bridge, hydro-demolition and traditional concrete removal, surfacing and bridge fill removal, water proofing of the arches, hand stamping of shotcrete repairs, resurfacing of the spandrel

walls, pier nosing reconstruction, new bridge drainage system, precast balustrade railings, historic street lighting, balustrade railing lighting, up-lighting of all arches, river greenway walls, water main and utility installation, and final concrete surfacing.



Application of Engineering Principles:

Engineering principles were prevalent throughout project design and construction.

Historical:

Historical Research was conducted on the 8th Street Bridge. The bridge was listed on the National Register of Historic Places in 1993. At least two other structures were previously constructed in the location of the 8th Street Bridge to allow passage over the Big Sioux River. A plaque on the original bridge notes this was the first bridge to cross the Big Sioux River in Sioux Falls. Construction bids were solicited in 1911 to build the current structure, one publication referred to the project as “the greatest and most costly concrete bridge in South Dakota.” Results of the historical research included recommendations on aesthetic design and preservation of the structure.

Land Surveying:

The overall survey services provided on the project included right-of-way (ROW) research, title search and boundary survey along with a full topographic survey and base mapping. Construction surveying was also completed during the project. 3D scanning was completed before and after removals were completed underneath each arch. The data was utilized to quantify hydrodemolition removal quantities.

Project Management:

With multiple stakeholders, subconsultants, numerous project design elements, and eyes on the downtown area, project management played a key role in the success of the project. Project management accounted for coordination between all entities, scheduling, budgeting, and proper communication

throughout the project design and construction. Constant communication with private utilities during design and construction was vital to the projects success.

Traffic:

The turn lane over the bridge was eliminated to create wider pedestrian paths on both sides of the bridge. Traffic calming “bumpouts” were constructed at pedestrian crossings over the bridge and in nearby areas. This is a common theme of the downtown area to enhance pedestrian connectivity throughout downtown.

Soil Borings and SUE Exploration:

The design team coordinated with Geotek Engineering & Testing for soil boring locations and recommendations. SUE’s were also completed to identify potential utility conflicts and better coordinate design improvement needs. SUE’s identified 14 separate CenturyLink conduit running through the bridge which were temporarily relocated during construction.

Material Testing:

Material testing was completed on the existing structure to identify existing concrete strengths and rebar configuration. Testing was also completed during construction on shotcrete, concrete, base course, bridge fill material, and the riverwall rebar to ensure proper bond strength to the bedrock.

Signage and Pavement Markings:

Signage and pavement marking design was completed based on City and MUTCD requirements.

Traffic and Pedestrian Control:

Traffic control included closing of the bridge, detour routes, and a phased approach to concrete repairs east of the bridge. Pedestrian control included pedestrian and bike trail closures and detours.

Erosion Control:

Erosion control design and monitoring was completed on the project. A temporary causeway required silt curtain to be installed and moved around as different spans of the bridge were completed. Hydrodemolition required two pH controlled weir tanks to treat the effluent before it could be discharged.

Lighting:

Lighting design consisted of roadway lighting as well as lights within retaining walls, seat walls, the interpretive wall, bridge balustrade railing, and bridge arch lighting.

Structural:

Structural design and evaluation were completed for bridge rehabilitation viability. Other structural components included coping beam, railing, pier nosing, and retaining walls. Concrete delamination identification was critical during construction of the project.

Landscape Architecture:

Project elements include the riverwall, seatwall, interpretive wall, grouted boulder wall, Greenway signage and monuments, planter areas, and trees.

Originality and Innovation:

In 2016 the 8th Street Bridge had no original design plans on file and a sufficiency rating of 46.3. With no load rating and over 100 years old, the bridge was identified within the City of Sioux Falls Capital Improvement Plan (CIP) for replacement at a cost upward of \$15M. Prior to committing to replacement, the City wanted to verify whether rehabilitation would be a feasible alternative. January of 2017, the City hired Infrastructure Design Group, Inc. (InfrastructureDG), headquartered in Sioux Falls, to determine the viability of rehabilitation. InfrastructureDG put together several teaming partners and a phased approach to analyze and thoroughly investigate the viability.

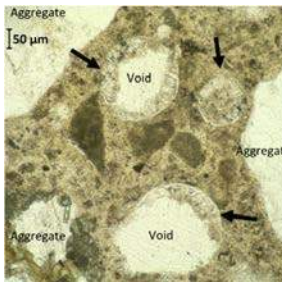
Team members included:

- Confluence: landscape architects involved in the design of the river greenway improvements surrounding the existing structure
- Geotek Engineering and Testing Services, Inc.: completed multiple cores of the structure and utilized Braun Intertec for petrographic analysis
- Kogel Archaeological Consulting Services, LLC.: completed the historical research for the structure

Initial phases of the project consisted of an in-depth inspection of the structure to quantify areas of deterioration, re-create existing plans of the structure for load rating analysis, analyze existing concrete characteristics through coring and petrographic analysis, conduct historical research, and provide a summary of findings with recommendations. At over 100 years old, deterioration was prevalent throughout the structure. The most significant amounts of deterioration were located on the underside of the arches within the outer ten feet on the north and south edges of the bridge. This area is directly below the gutter line of the roadway and supported the sidewalk areas. Reinforcement was exposed and showed 70% section loss. The bridge had experienced some significant deterioration in the past fifteen years.



Important findings from core testing and petrographic analysis indicated average concrete compressive strengths of 4,280 psi and low chloride limits. Steel reinforcement obtained from the core samples also showed very little corrosion. The positive results of these tests were key to moving into the alternative analysis and rehabilitation recommendations. Alternative reviews included a life cycle cost analysis comparing a new structure and two rehabilitation alternatives. The base cost of the new structure was estimated at \$12.5M assuming a 3-span prestressed girder bridge and simulated concrete arch panels. Alternative 1 rehabilitation included fiber reinforced polymer (FRP) wrap of the underside along with traditional removal and repair methods. Alternative 1 costs were estimated at \$4.1M. Alternative 2 rehabilitation utilized hydro demolition and hand-chipping for removals along with gunite or shotcrete for final patching. Alternative 2 costs were estimated at \$3.2M. Service life for all options assumed a minimum of 30-year service life and design life estimated at over 75 years. The life cycle cost analysis indicated Alternative 2 was the most efficient and least expensive long-term investment.





The project began in early March of 2020 with construction of the temporary causeways providing access to the underside of the arches. The causeway was rearranged three different times for access to each span. Due to existing buildings within proximity to the bridge, the only construction access was from the southwest corner of the structure.

Surfacing removals on top of the bridge began immediately to allow time for CenturyLink and Terra Technologies to complete concrete encasement removal, consolidation of fiber lines, and construction of the cable-stay support system. The CenturyLink work was completed in approximately four weeks allowing SFC Civil Constructors full access to the site.



Prior to construction, the east span of the bridge consisted solely of riprap and pavement for the bike trail. The east span was activated by removing all riprap, installing a riverwall along the bike trail with decorative quartzite caps, and widening the pavement to create an area for activities or a shady spot to rest on the arc shaped seatwall. A grouted quartzite boulder wall was also installed on the east side, north of the bridge, to tie the riverwall to the existing greenway open green area. This allowed for elimination of the existing gabion baskets which were sluffing away from the turf and creating an eye sore.

Complexity:

One of the major elements of the project was stakeholder and agency coordination. Private utility coordination began at the onset of the project but it was not until the final alternative was selected that the details of utility coordination became a major focus. Private and public utilities crossing the bridge included gas, electric, water, and multiple different communication lines.

One of the more significant utilities present within the bridge fill included a series of fourteen conduits sandwiched between the top of the arches and the pavement surface. All fourteen of these conduits were operated by CenturyLink with many of them concrete encased, full of major fiber lines, and feeding much of eastern Sioux Falls and beyond. An option of reconstructing their facilities at a different location would cost the utility company millions and require years of planning, design, and construction. CenturyLink hired Terra Technologies, LLC to coordinate viable options of supporting their lines while allowing access for rehabilitation crews. After more than a year of coordination between InfrastructureDG and Terra Technologies,



an appropriate support system was selected. The support system included 31' tall steel towers with large concrete deadmen on each end of the bridge and a suspension system between the towers to elevate the CenturyLink lines plus a Verizon fiber line. The lines were supported high enough to allow rehabilitation crews access to all portions of the structure. All other utilities were able to be relocated or removed within the construction limits while bridge work was accomplished. New concrete duct banks were installed, allowing easy installation of the existing utilities and future utility expansion needs.

As seen in the photo above, small machinery consisting of boxer skid steers, mini excavators, and conveyors were used to remove and replace bridge fill material. The small machinery, along with unloading and loading the bridge fill material in lifts across the entire structure, helped protect the bridge from experiencing heavy point loads. A waterproofing membrane and new drainage system was installed on the bridge before placing the new fill material.



Access to complete the work underneath the bridge was difficult with river walls residing on both sides of the river. The only viable access was to build a causeway over the riverwall. The causeway consisted of riprap overlaid by gravel to create a roadway. The causeway was shifted multiple times to provide access to each span of the bridge.

The existing 10" ductile iron watermain through the bridge was

replaced with a new 12" PVC watermain. Due to the watermain having minimal cover by being sandwiched between the concrete arches and the bridge deck, and the brutally cold South Dakota winters, special consideration was given to the watermain to ensure it never freezes. The watermain installed was fusible PVC wrapped in an insulation jacket and included a heat trace system which maintains the temperature of the watermain above freezing. A light visible from the roadway turns red if the system ever shuts off or needs maintenance.

Lighting was creatively implemented into many aspects of the project. Project lights include bridge uplighting and historical roadway lighting as well as lights within the retaining walls, seat walls, monument signage, and the bridge balustrade railing.



Social Significance:

With this location being the first crossing of the Big Sioux River in Sioux Falls, the 8th Street Bridge has played a significant role in the vehicle and pedestrian connectivity of downtown for over 100 years. Rehabilitation will allow the historical structure to continue this role well into the future.

River greenway work was completed concurrently with the bridge work, finalizing the gap between phases 1 and 2 of the river greenway projects and creating a unique ¼ mile stretch of riverside trail through downtown. Within this stretch, one will find the arch lights of the 8th Street bridge, the riverside amphitheater, a sandy canoe landing, and the Arc of Dreams along with a viewing area for the Arc. The timing of the project fit perfectly with the current overall revitalization of downtown.

Economic Impact:

SFC Civil Constructors was awarded the project, final construction dollars for the project were just under \$7.7 million.

Forward thinking from over 100 years ago to build a wide, resilient structure has continued to pay dividends over time. The investment was very significant at the time but has served the City well over the years. Construction costs would have been significantly higher if it weren't for rehabilitation. This not only saved on cost, but also reduced construction time and impacts to downtown businesses.

The greenway improvements downtown have spurred a large amount of growth and development. This in turn generates revenue for the City over time. Phase 1 and 2 alone have resulted in \$110 million in adjacent private redevelopment. This return on investment is a great example of the importance of quality of life initiatives within a City.



Summary *(Describe in layman's terms why this project is worthy of special recognition)*

The Main Pump Station (MPS) project consists of the design, bidding, and construction of a wastewater pump station that pumps 90% of Sioux Falls wastewater to the Water Reclamation Facility. The MPS is a critical infrastructure facility that increases the Sioux Falls wastewater collection system capacity in conjunction with improvements to the outfall sewer and Water Reclamation Facility. The MPS is the largest wastewater pump station in South Dakota, and provides additional sewer capacity to accommodate future development in Sioux Falls.



The Main Pump Station replaces the existing Brandon Road Pump Station, which is approximately 40 years old and is in need of updates to increase flow and improve maintenance access, functionality, standby power, and safety.

The MPS has a peak design capacity of 65 mgd, and the capability to add a pump to increase the flow to 90 mgd. Screening facilities include two mechanical screens, a bypass channel, and a channel for a future screen to be added to increase flow capacity. Four dry-pit pumps are located in the pump room, sized for an individual peak flow of 15,000 gpm at 128' TDH, and use 600 hp motors controlled by variable frequency drives. Space for a fifth pump is provided to increase flow in the future. The pump room includes maintenance provisions for servicing pumps, including a bridge crane and an open mezzanine to allow access to the piping header.

Preliminary design included site evaluation of the existing City property and adjacent sites for relocation of the pump station, considering constructability, staging area, flood plain, property cost, traffic impacts, and existing utilities. Final design included a surge analysis conducted to protect the piping system from high and low pressure conditions and evaluate surge tanks and surge relief valves. The design also included structural, architectural, mechanical, electrical, and instrumentation design.

The construction of the pump station took nearly 2.5 years and encountered multiple challenges, such as site flooding, pandemic-related labor delays, and supply chain issues.

The Main Pump Station project is submitted for the Outstanding Engineering Achievement for the following reasons:

- **Community impact:** The Main Pump Station serves 90% of Sioux Falls. Expansion of the facility will enable future development in Sioux Falls.
- **Innovation:** Innovative engineering approaches to wet well design, corrosion protection, and electrical switchgear control were incorporated in the design.
- **Capacity & Longevity:** The 65 mgd facility is the largest wastewater pump station in South Dakota. The capacity, ability for future expansion, and longevity of design choices will serve Sioux Falls for many years.



Application of Engineering Principles

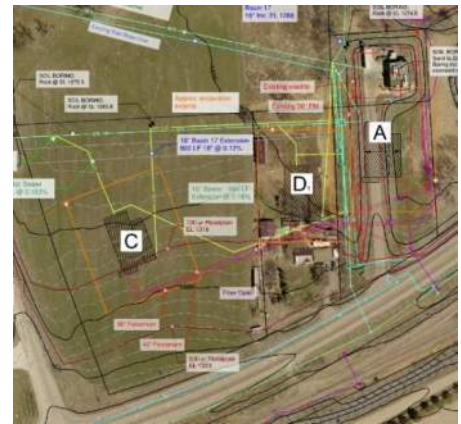
The Main Pump Station design applied engineering principles across engineering disciplines. Preliminary design included 13 technical memoranda evaluating alternatives for various components of the design. The design evaluated alternatives for site/civil improvements, electrical evaluations, process equipment considerations, and construction implementation.

Main Pump Station Tech Memos		
Site Plan & Floodplain Evaluation	Screening	Electrical & Instrumentation Basis of Design
Pump Selection & Station Layout	Wet Well Hydraulic Analysis	Arc Flash Hazard Analysis
Force Main Surge Analysis	Hydraulic Capacity Analysis	Standby Power Basis of Design
Demolition & Re-Use of Existing Structure	Future Odor Control Alternatives	Corrosion Protection System
Construction Sequencing		

A few selected examples of these engineering evaluations are summarized below:

Site selection

Preliminary design evaluated the existing pump station site and adjacent sites to compare the advantages of each site. An economic evaluation was conducted, but non-monetary factors (such as future expansion of Rice Street) were also considered. Considerations included existing and proposed utilities, floodplain, property cost, site access, construction access and excavation stabilization. The evaluation resulted in selection of a new greenfield site west of the existing pump station.



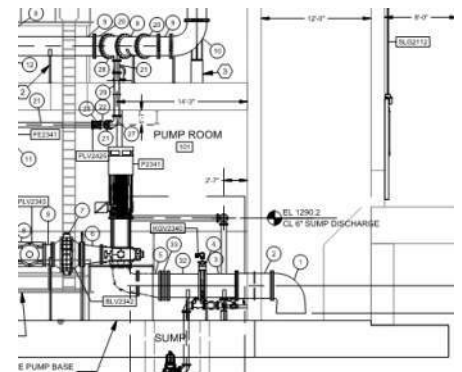
Screening

The screen equipment was evaluated for screen opening size, serviceability of the equipment, and efficiency for compacting the screenings. Multiple screen styles were evaluated, and a multi-rake bar screen was specified for the MPS. A 5/8-inch bar spacing was the base bid design, with an optional 1/4-inch bar spacing bid as an add-alternate. The washing compactor was evaluated to determine the anticipated rate and volume of screenings produced.



Pump Station Hydraulics

One of the design priorities of City staff was to design superlative pump station hydraulics. The design adheres to the guidelines established by the Hydraulic Institute standards, and consists of confined individual wet wells for each individual pump. This self-cleaning style of wet well provides improved hydraulic performance and a reduction in sludge buildup.

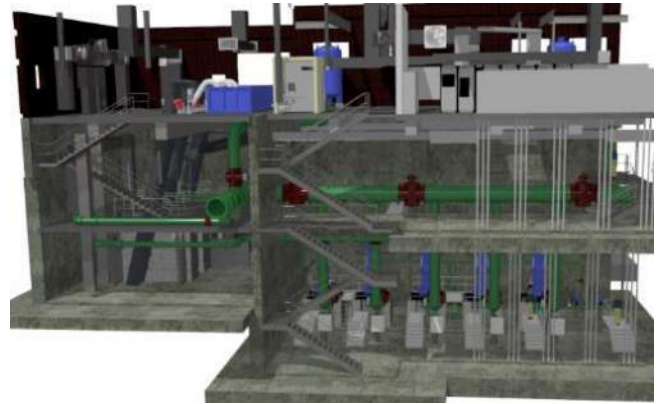


Originality and Innovation

The MPS design incorporated many unique and innovative approaches to the design and construction.

BIM / 3D Modeling

The project design was completed with 3D modeling and building information modeling (BIM) collaboration between project disciplines. 3D modeling of the station was critical for coordination with the structural & architectural design subconsultants.



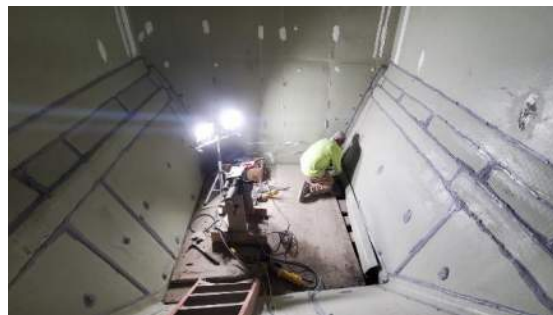
Surge tank system

An innovative approach to evaluating and resolving hydraulic transients (surge control) was part of the design process. Hydraulic modeling software (KY Pipe) was used to model the pumping system and the two force mains to predict the creation of hydraulic transients when pumps start and stop. The KY Pipe model identified the surge pressure and vacuum events, and surge mitigation techniques were modeled to keep the hydraulic transients within the allowable design pressures of the pipe. Ultimately, two surge tanks were incorporated into the pump station design, one surge tank for each force main. The surge tanks are 6-ft diameter, 13-ft tall, and contain air and water under pressure to control surges.



HDPE Liner

City staff worked with HR Green to determine a cast-in-place HDPE liner would increase the longevity of the pump station structure, knowing that diverting this level of flow for future wet well maintenance was an expensive option. There were several challenges encountered with the constructability, and the labor-intensive process was monitored closely by our staff. Temperatures impacted the liner (causing expansion/contraction), presenting challenges for the contractor. HR Green witnessed the HDPE welding and spark testing to verify the liner is water-tight to extend the life of this critical infrastructure.

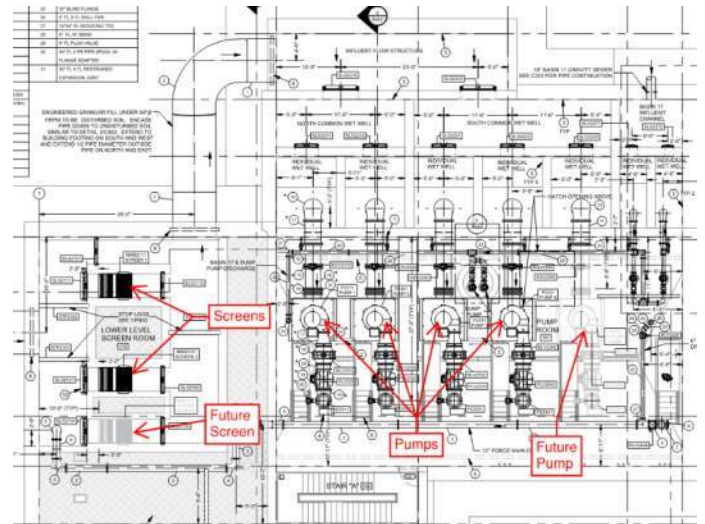
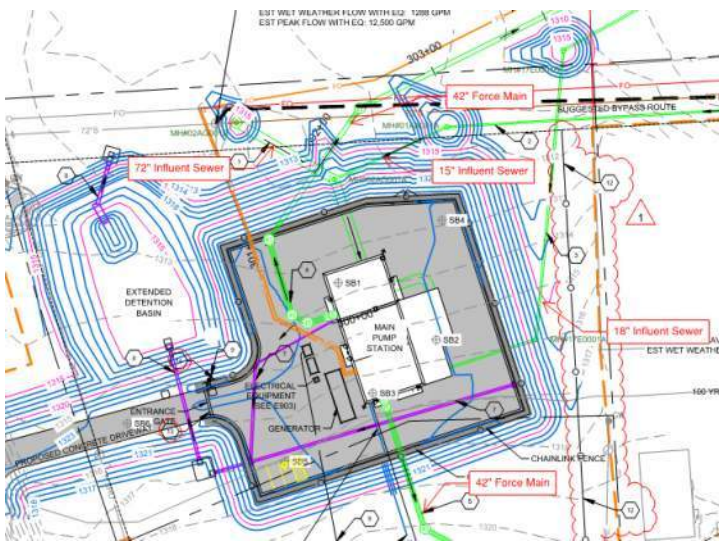


Project Complexity

Design Complexity

The project design included coordination between site/civil, architectural, structural, process, mechanical, electrical, and controls disciplines to meet the project deliverable deadlines. The project design included frequent input from operations staff, and focused on serviceability of equipment, maintenance access, contingency planning for flood protection and standby power. Environmental considerations were also incorporated in the design, such as removal of an existing buried diesel fuel tank and protection of wetlands adjacent to the existing pump station.

Site utilities include coordination of 72-inch, 18-inch, and 15-inch diameter sewers, two 42-inch diameter force mains, and utility service connections for water, gas, and electric service. Site grading design addresses flood plain concerns, raising the site above the 500-year floodplain elevation. The site design addressed flood plain concerns, storm drainage management, and site access. The site plan includes provisions for maintenance vehicles and trash haulers to dispose of screenings.



Construction Complexity

The construction administration and project management encountered

Disaster Coordination

A major challenge early in the construction came from flooding along the Big Sioux River in fall of 2019. Excessive rain caused river levels to flood the site that had been dewatered and excavated down 35 feet. This flood caused 2.5 months of delay, at no fault of the contractor, engineer, or owner. The construction team worked together to negotiate the cost impact, time delays, and to get the project moving and back on track.



Concrete Coordination – Hot / Cold Weather Concrete, Mass Concrete Considerations

The contractor placed concrete in single-digit temperatures and during 90 degree weather over the course of this project. The project required monitoring concrete with ice added on hot days and hot water added on cold days to ensure concrete arrived at the appropriate temperature. The project involved discussions with the concrete supplier and the contractor regarding both hot and cold weather placement. The project team also discussed mass concrete and monitoring temperature of heat of hydration of cement. The specified concrete strength of 6,000 psi required additional cement, increasing the heat production. Staff coordinated closely with AET for temperature monitoring, checked heat and temperature on rebar during cold weather placing. Concrete waterproofing products were also part of these discussions, both exterior-face waterproofing (spray-on cementitious) as well as admixture waterproofing products.



Electrical Coordination & Switchgear Integration

The project design and construction required extensive coordination during submittal review and later on-site between Rockwell, Schneider, and American Electric for the Main-Tie-Main switchgear that was designed. Coordination included factory assurance testing for the switchgear control panel. Rockwell was on-site for 2 weeks to start up the switchgear controls. City staff and the engineering team provided guidance to these subcontractors and suppliers to communicate the design intent of the specifications. The project team later participated in training of this equipment to review the operation and confirm the design intent had been met.



Construction coordination of the electrical equipment also included with the contractor and subcontractors to verify elevations for the cable bus entrances for the utility and generator power feeds to the building. This involved consulting multiple supplier shop drawings to coordinate dimensions of the standby generator, main breaker equipment, and building openings.

Social Significance

The Main Pump Station creates a lasting legacy that will serve the sanitary sewer system for over 90% of Sioux Falls for years to come. While wastewater infrastructure is not typically visible above-ground, this facility provides a valuable service to the community that few residents are aware of.



Architectural selections were made with the longevity and aesthetics in mind for this critical infrastructure. Windows allow natural light into the space, and skylights serve a dual purpose for lighting and future equipment removal. Masonry construction was used for the above-grade structure for longevity and to match other buildings maintained by Sioux Falls Water Reclamation. Below-grade construction is cast-in-place concrete with HDPE liner in the wet wells for longevity. The site improvements were raised above the 500-year floodplain elevation to ensure the facility will continue to operate in emergency conditions. The longevity of the design choices will serve Sioux Falls for many years.

The City described the social significance of the Main Pump Station project:

“The Main Pump Station is the last of four significant sanitary sewer improvement projects that connect the City’s collection system its Water Reclamation Facility. The four projects include a 20 million gallon earthen equalization basin, roughly two miles of 72 inch gravity sewer, a 65 mgd pump station (expandable to 90 mgd), and a two and a half mile 42 inch diameter force main. The Main Pump Station and these related projects will serve the City of Sioux Falls for the next 50 years and beyond. The HR Green design team, General Contractor John T. Jones, several City Staff, and many others worked through many challenges to see this incredibly important project through to completion. The dedication, vision and support of all involved should be commemorated and congratulated for this achievement.”

-- Ryan Johnson
 Utility Administrator
 City of Sioux Falls

Economic Impact

The MPS increases the capacity of the wastewater infrastructure that serves the majority of Sioux Falls. As Sioux Falls grows and develops, the MPS facility will have capacity to accept additional sewer services. This will meet the increasing demands of a rapidly growing City, encouraging future development.

The project was funded with State Revolving Fund (SRF) financing, at a low loan interest rate of 2.25%. City staff coordinated to minimize the impact this construction project will have on the rate payers of Sioux Falls.

When a large project uses SRF financing, City hires a consultant to design and bid a large project, and has requested funding from SRF, the engineer’s opinion of probable cost (EOPC) is critical. We were proud that the EOPC fell within the range of bids and that the low bidder was less than the project EOPC. This is a result of detailed plans, QA/QC review, and thorough design coordination.

Changes during construction can cost communities millions. Total project change orders were limited to 1.6% of the awarded contract for the MPS, even despite unforeseen costs due to flooding and supply chain delays. This is a good percentage for our industry and we are proud of the details that were included within the plans to help keep the change orders during construction at a minimum. The final contract amount to date is also within 1% of the engineer’s estimate at time of bid.

Main Pump Station – Construction Contract	
Engineer’s Estimate	\$22,477,000
Awarded Contract	\$21,996,800
Final Contract	\$22,358,319
Change Orders	1.6% of awarded contract

Acknowledgements:

HR Green Design Team
 S.E.H. Design Team
 City of Sioux Falls staff
 John T. Jones Construction Co.

