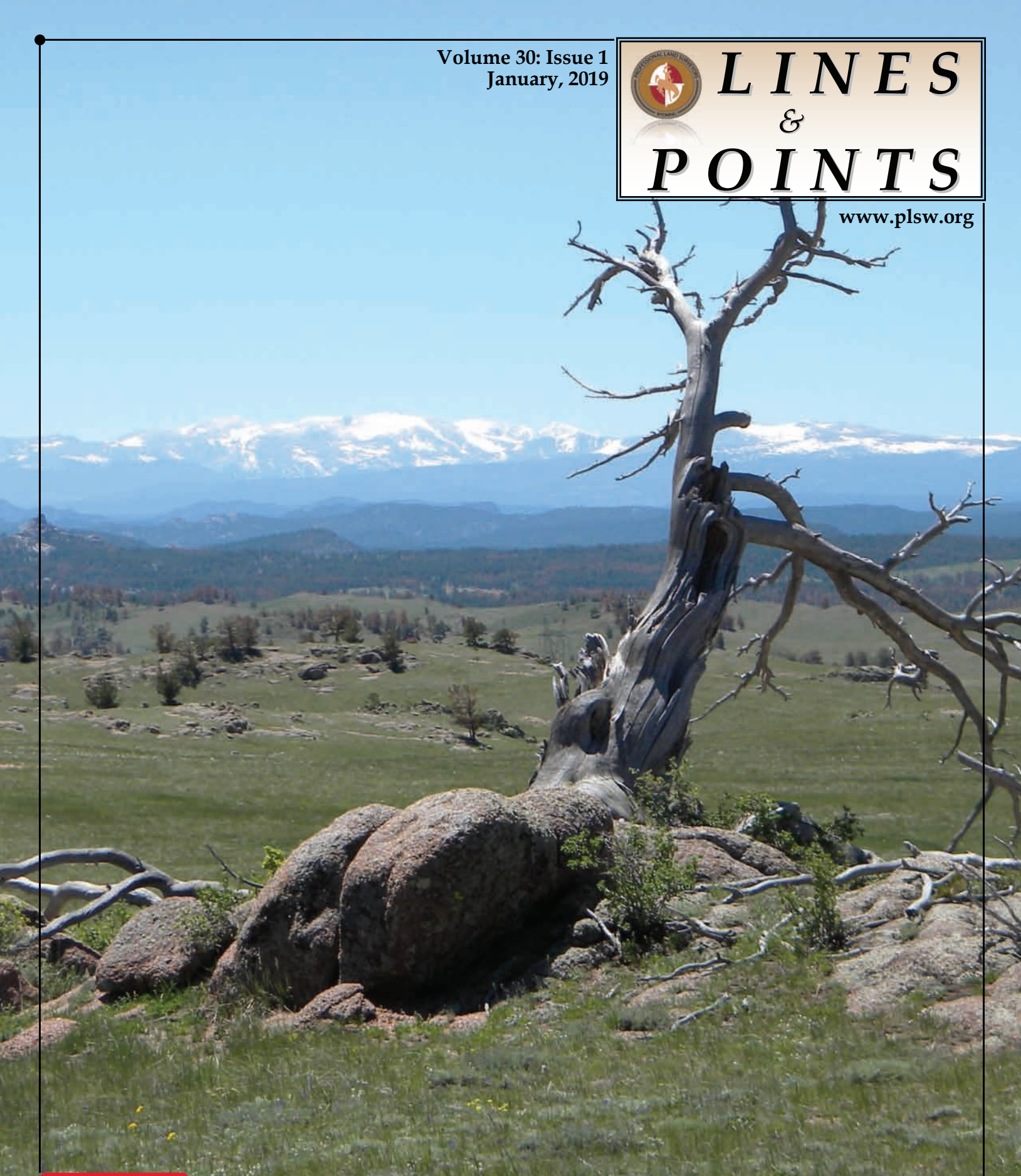
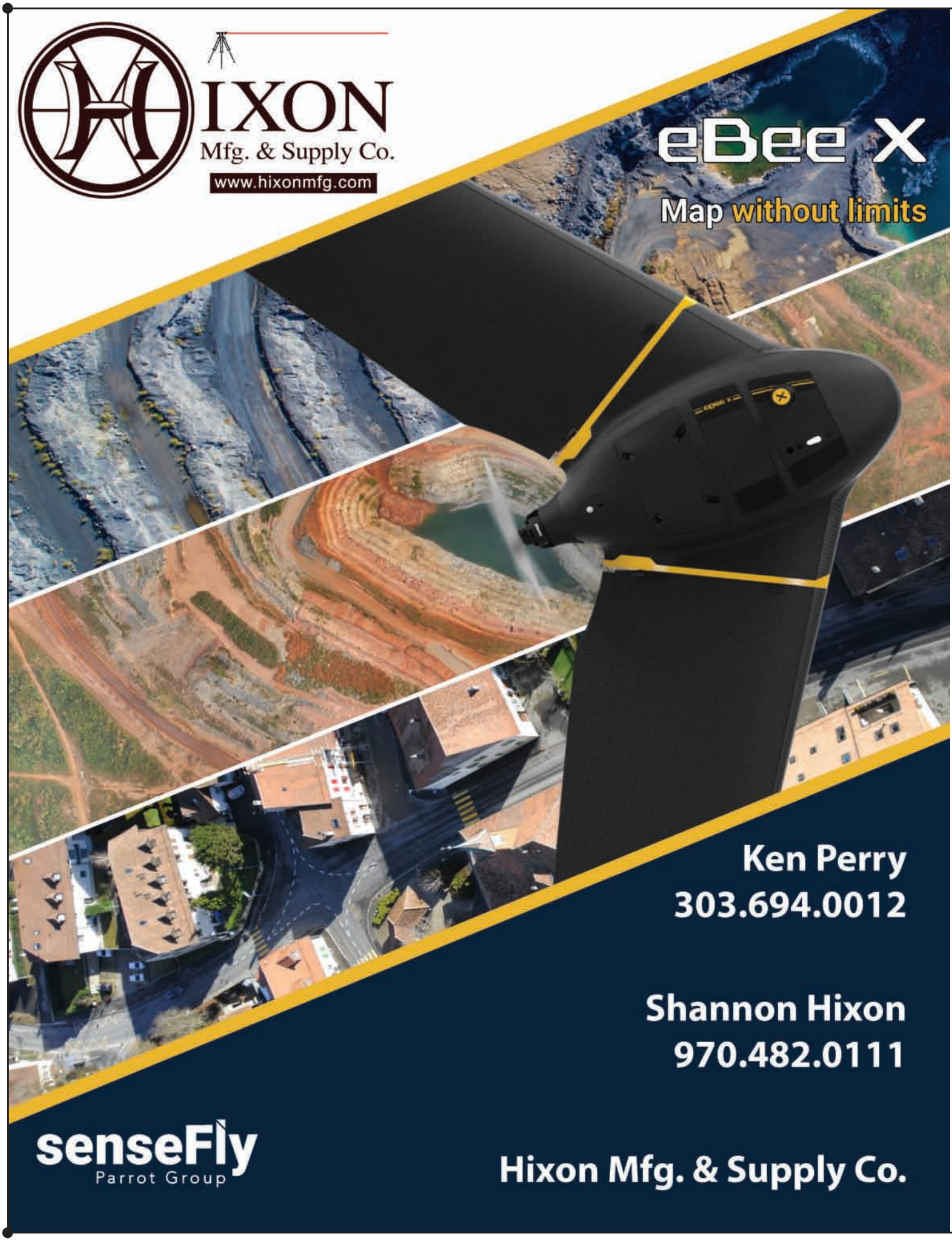
Volume 30: Issue 1
January, 2019

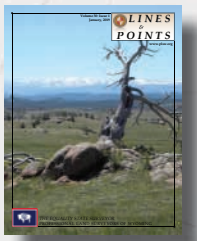
LINES & POINTS

www.plsw.org



THE EQUALITY STATE SURVEYOR
PROFESSIONAL LAND SURVEYORS OF WYOMING


HIXON
Mfg. & Supply Co.
www.hixonmfg.com
eBee X
Map without limits
Ken Perry
303.694.0012
Shannon Hixon
970.482.0111
senseFly
Parrot Group
Hixon Mfg. & Supply Co.



On The Cover

Retracing the Third Standard
photo by Dave Hammond

Contents

2019 PLSW Sustaining Members

- Jenn Heinrich - Frontier Precision Inc.
- John Baffert - Surv-KAP, LLC
- Chris Farnsworth - RDO Integrated Controls
- Kelly Goff - Underground Consulting Solutions
- Susan Hall - Trimble
- Tim Klaben - Berntsen International Inc.
- Troy Langston - Monsen Engineering

PLSW (Professional Land Surveyors of Wyoming; PO Box 8, Cheyenne, WY 82003) is a statewide organization of Land Surveyors registered to practice in the Equality State of Wyoming. PLSW is dedicated to improving the technical, legal, and business aspects of surveying in the State of Wyoming. PLSW is affiliated with the National Society of Professional Surveyors (NSPS) and the Western Federation of Professional Land Surveyors (WestFed).

Lines and Points is published by the Professional Land Surveyors of Wyoming. Lines and Points is not copyrighted and permission is hereby granted to reprint articles with appropriate credit. The Professional Land Surveyors of Wyoming assume no responsibility for statements made or opinions expressed in this publication. The articles and opinions as put forth in this journal are not necessarily those of PLSW or the Editorial staff of this journal.

PRESIDENT'S MESSAGE

Technology is an amazing thing. In my short career as a land surveyor I have witnessed many changes and technological advancements that have changed the way in which field and office personnel operate. My desire to learn how to draft came at an early age and grew when I received a copy of the DOS based version TurboCad in the early 90's. At 10 years old I would sit at my computer with the technical manual and teach myself how to use the software. I remember being especially proud of "copying" house facades, by eye, that I would see in magazines. My first exposure to AutoDesk products came with Release 12 in 1992; so, my history with tech has been fairly long considering my young age. Exposure to such technologies is almost a requirement for employment, but I don't consider it a complete advantage.

While this technology has made our work quicker and easier in the office and the field, what does not necessarily transfer are the mathematical computations that happen with a push of a button. Many people new to our profession have a risk of becoming a button pusher without ever being exposed to the beauty of the mathematical processes needed to calculate and compute what software can due in a matter of clicks. Gone are the days of cranking out calculations to layout curves from the PC with a theodolite and chain; and I doubt many surveyors miss it. But what was also lost is understanding the curve geometry. I believe that the struggle it takes to fully understand the equations and relationships between interior angles, arc lengths, cord definitions, degrees of curvature, etc. strengthens the ability of these young surveyors to become better licensees.

Other aspects of technology allow land surveyors to make measurements that are highly accurate and repeatable, beyond the accuracies that could have been dreamed of when the Public Lands Survey System was devised. Because of my age, a large majority of the surveying I have done has been with electronic equipment; the exception being some residential house layout where it is fun to breakout the T-16 and chain. While it is fun to use the older equipment, I do not think that the use of electronic total stations or GPS make our surveys any better or more accurate; often I see young surveyors using these "accuracies" to the detriment of the profession.

One of my pet peeves is the rewriting or "correcting" of a deed description of land, a trend that seemed to have gained popularity when GPS equipment became financially viable. What I am talking about is the record/deed bearing and distance vs. measured bearing and distance that can be found in some recorded deeds and on recorded plats. Along with these documents, it is not rare to find pin cushioned property corners. This "I can measure exactly 500.00' better than you" contest also seems to be common with young surveyors. I have found that they become so fixated with the coordinate display and the fact that it reads to the hundredth of a foot or better, that they base the acceptance/rejection of existing

corners solely on this single parameter. Does this supposed precision in measurement make for a better survey and make you a better surveyor? I would beg to differ, and find myself often taking the time to discuss my opinion about this with new employees and young surveyors. Besides clouding the chain of title and creating confusion in the field, my biggest issue is that I feel it does a disservice to the public and does not protect the, often long existing, property boundaries.

As technology continues to change the ways that we measure, some companies flirt the line between general measurement and the practice of land surveying. Some companies grossly misrepresent their technologies and their applications, specifically property boundary applications. It is up to us as individuals and as members of PLSW to address these issues as they arise. We need to take the time to educate young surveyors, clients, and the public the appropriate application for these technologies and that measurement is just one of the many tools that surveyors keep in their tool box.

Geno Ferrero, PLS

President, Professional Land Surveyors of Wyoming

ANNOUNCEMENTS

Immediate Job Openings for WWC Engineering

Title: Surveyor

Location: Sheridan, WY

Job Description and Responsibilities: WWC Engineering is accepting applications for a surveyor in our Sheridan, WY office. The candidate must either possess an active Wyoming PLS license or be able to obtain Wyoming licensure within 2 years. The surveyor will work under the direct supervision of licensed engineers and surveyors. Typical duties entail overseeing and performing boundary surveys, ROW surveys, staking oil & gas well locations, and plat preparation. The successful candidate must be proficient with Trimble survey equipment and Trimble Business Center; possess strong communication and problem solving skills; exhibit a high attention to detail; and work efficiently in a team environment. Special consideration will be given for experience with AutoCAD Carlson and/or Civil 3D platforms. The candidate will be responsible for oversight and coordination of multiple survey technicians as well as performing independent surveying activities. Travel is required, and the candidate must have a valid driver's license.

Wage Range: Depending on experience.

Job Closing Date: Until filled.

Contact: Chad Reed at (307) 672-0761 or email at creed@wwcengineering.com

What You Need to Provide: Cover Letter, Resume, and References.

Title: Surveying Technician

Location: Casper, WY

Job Description and Responsibilities: WWC Engineering is accepting applications for a surveying Technician in our Casper, WY office. The candidate would work under the direct supervision of licensed engineers, surveyors, and current survey crews. Typical duties entail assisting in performing boundary surveys, ROW surveys, staking oil & gas well locations, well plat preparation, topographic surveys, and construction staking. The ideal candidate would possess previous experience in the field of surveying or related engineering background and be proficient with Trimble survey equipment and Trimble Business Center software; possess strong communication and problem-solving skills; exhibit a high attention to detail; and work efficiently in a team environment. Special consideration will be given for experience with AutoCAD Civil 3D software. Travel is required, and the candidate must have a valid driver's license.

Wage Range: Depending on experience.

Job Closing Date: Until filled.

Contact: Darrin Tromble at (307) 473-2707 or email at dtromble@wwcengineering.com

What You Need to Provide: Cover Letter, Resume, and References.

Company Information: WWC Engineering is a mid-size, multi-disciplinary, employee-owned engineering firm that has been serving the Rocky Mountain region since 1980. Our culture is one of unity, collaboration, and respect, which affords a great work atmosphere and healthy work-life balance. WWC's major service sectors include Civil/Site, Environmental, Land Development, Municipal, Mining, Energy Development, Oil & Gas, Planning, Roads/Bridges, Surveying, Water/Wastewater, and Water Resources. As a preferred employer, WWC offers one of the most competitive salary and benefit packages available in a fun and rewarding work environment. Located just east of the Bighorn Mountains, Sheridan, WY abounds in recreation opportunities during all seasons, including world-class hunting, fishing, snowmobiling, and cross country and downhill skiing. The community offers many modern amenities such as award-winning schools and commercial air service, while maintaining its western culture and hospitality.

Our personnel receive a competitive salary that also includes paid overtime. Benefits include health, dental and vision insurance, with the option for dependent coverage. We also provide life and disability insurance. The company provides a 401k profit sharing plan, with a company match of 50% of the employee's contribution up to a 5% maximum. We also offer paid holidays, vacation, sick leave, relocation expenses, and continuing education opportunities.

99th Annual Convention
Little America - Cheyenne
Wednesday, Feb. 6 through Friday, Feb. 8, 2019

WES 2019 Land Surveying Sessions

Wednesday, February 6 - 2:45 p.m. to 3:45 p.m.
Speaker: Jack Studley, PLS, Cheyenne City Surveyor
Topic - "Original Surveys of Cheyenne"

4:00 p.m. to 5:00 p.m.
Speaker: Pam Fromhertz, Rocky Mountain Regional Advisor, NGS/NOAA
Topic - "NGS 2022 Program Adjustment"

Thursday, February 7 - 8:00 a.m. to 10:00 a.m.
PLSW Annual Business Meeting

10:30 a.m. to 11:30 a.m.
PLSW Board of Directors Meeting

1:15 p.m. to 2:15 p.m.
Speaker: Dr. Herb Stoughton, PEPLS
Topic - "Surveying Education, Training, and Professional Development"

2:45 p.m. to 3:45 p.m.
Speaker: Jeremy Davis, BLM Surveyor
Topic - "Closing Corners according to the 2009 Survey Manual"

4:00 p.m. to 5:00 p.m.
Speaker: Shannon Hixon, Hixon Mfg. & Supply
Topic - ""Drones & SmartNet"

Go To www.plsw.org and click the WES Regisration Link

Geodetic Surveying: Part XV

Alexander Dallas Bache and the Coast Survey: Part 4

Herbert W. Stoughton, PhD, PELS, CP

The primary purpose and charge of the Coast Survey was to collect, reduce, analyze, and disseminate (publish) usable information pertaining to navigation along the U.S. coasts. The amount of data collected directly reflected the number of assistants employed. In 1841, Hassler had ten field assistants. One decade later, Bache had 26 assistants. On the eve of the American Civil War, the Coast Survey employed 76 assistants and sub-assistants. It was originally thought that the Coast Survey would produce only nautical charts. This was expanded to process and distribute geographic, geophysical, oceanographic, technical and commercial information in the data collection process.

The office component of the Coast Survey contained 12 assistants under Hassler (1841) and 50 assistants under Bache in 1850. In 1860, the office had 120 assistants and sub-assistants. Also, there were 19 additional individuals engaged in contract drafting and engraving. Until the American Civil War, the Assistant-in-Charge of the office was held by an Army officer. The first appointment was held by Captain Andrew Atkins Humphreys. The second appointment was Brevet Major Isaac Ingalls Stevens. Stevens graduated at the head of his class at West Point (1839).

Superintendent Bache, after the initial personnel problems encountered during the transition from Hassler's tenure apparently had only minor problems. There was a brief episode when the Coast Survey initiated operations on the west coast, which was compounded the 1849 gold rush. Bache quickly addressed the matter by assigning George B. Davidson. By 1860, the Coast Survey mission on the west coast was at the same "level of completion" as on the east and Gulf coasts.

The presidential election of 1860 and the deep seated socio-political differences, which had been festering since the second decade of the nineteenth century came to a head. South Carolina seceded from the Union on 20 December 1860. That state seized the Coast Survey vessels Fire Fly and Petrel . Neither vessel survived the War. Ferdinand H. Gerdes was working along the Gulf Coast, and was able to send the vessels James Hall and Gerdes to New York. The Peirce and Torrey terminated charting efforts in late January 1861, and departed the Florida waters in February. The vessel Twilight was working in Texas and was seized by the rebels.

Land-based Coast Survey personnel were not exempt. In several instances local residents seized the instruments and equipment. Most of the items were never recovered. However, in one instance Coast Survey topographers accompanying General William T. Sherman across Georgia recovered (in an armory) the instruments a field party had used in North Carolina at the start of the War. Although many Coast Survey assistants supported the Northern cause, there were several resignations. In one instance, Bache displayed his anger when he fired Aid George U. Mayo for authoring a "treasonable letter addressed by you to your Uncle calls for your immediate dismissal with disgrace from the Coast Survey . . .".

Within six weeks of hostilities, Bach had formulated the concepts of a plan that assured continuation of the Coast Survey throughout the War. Rear Admiral Charles H. Davis (Navy Bureau of Detail); Captain Samuel Du Pont; Major John G. Barnard (Army Corps of Engineers) ; and Bache formed the "Conference on Commission" (unofficially called the "Blockade Strategy Board"). It was Bache's proposal that the Coast Survey provide/furnish the requisite information of a hydrological and topographical nature.

The Blockade Strategy Board wrote five memoirs addressing the naval blockade of over 3,500 miles enemy shores from the Potomac River - Chesapeake Bay to the Mexican border. Memoir I (16 July 1861) presented the general broad goal of the blockade. In this document it was indicated that "The Archives of the Coast Survey will furnish the best information concerning the region of the coast." Memoir II (13 July 1861) proposed capturing one or more of three sites on the South Carolina coast for a naval base, harbor of refuge, and coaling station. Memoir III (26 July 1861) addressed the coast of Georgia and Florida. It also revisited points contained in Memoir II. Memoir IV (9 August 1861) addressed the problems of blockading New Orleans and Mobile, and establishing a naval base. Memoir V (3 September 1861) recommended that a Coast Survey vessel be assigned to each principal blockading squadron "to complete . . . the examination of such parts of the coast not yet surveyed in detail . . .".

Prior to the American Civil War, approximately 400 naval officers had been assigned to the Coast Survey. These individuals gained invaluable command experience earlier in their career than those officers normally received during line duty. Four officers were admirals; two were commodores; four were captains; five were commanders; and four were lieutenant commanders. Eight additional naval officers served with distinction in the Confederate Navy. Less than 60 Army officers served at the Coast Survey. Eighteen earned ranks of general in the Northern army and three additional individuals held ranks of general in the Confederate army.

The civilians of the Coast Survey did not remain on the sidelines. Charles O. Boutelle was assigned to Admiral Du Pont's command. The expedition was to capture Port Royal, South Carolina. Mr. Boutelle commanded the Vixen , and escorted the U.S.S. Ottawa and Seneca , relocated the navigation channel, and set bouys and navigation aids permitting 17 ships to enter the bay and bombarded the forts into submission. This captured site provided a much desired facility for the blockading fleet.

The capture of New Orleans utilized the services of several Coast Survey civilians. These included Ferdinand H. Gerdes; Joseph Harris; John G. Oltmanns, Richard E. Halter; and Thomas C. Bowie. Harris had been a Sub-Assistant in the Coast Survey, then surveyor with the U.S. Boundary Commission, and had volunteered for War Service with the Coast Survey. On 13 April 1862, Assistant Ferdinad H. Gerdes moved the Coast Survey vessel Sachem , and led a group of Adm. Farragut's fleet (10 ships) up the Mississippi River. Gerdes wrote, ". . . the steamer Sachem had an escort as never a Coast Survey vessel experienced before . . ." (letter to Bache, 22 March 1862). After Adm. Farragut's capture of New Orleans, Messrs. Oltmanns, Harris, and Halter reconnoitered a route through the Mississippi River bayous and swamps to the rear of the Confederate Fort St. Philip. Commander Porter wrote a letter to Mr. Bache on 29 April 1862, detailing the efforts of the Coast Survey personnel in the capture of New Orleans and Forts Jackson and St. Philip. On 13 May 1862, the Sachem was on the Pearl River when Assistant Oltmanns was severally wounded. Although Gerdes feared for Oltmanns' life, he survived and continued surveying for Union forces in Louisiana, Texas, and Virginia.

(Continued on Page 14)

Retracement of the Third Standard Parallel

by: Dave Hammond, PLS 2337

HISTORY OF THE SURVEYS
- 1870 GLO SURVEY OF 3RD STANDARD PARALLEL T. 13 N., R. 72 W.
- 1873 GLO SURVEY OF T. 13 N., R. 72 W.
- 1874 GLO SURVEY OF T. 12 N., R. 72 W.
- 1882 TIE SIDING AND VIRGINIA DALE COUNTY ROAD SURVEY
- 1953 WYOMING STATE HIGHWAY DEPARTMENT (WSHD) AS-CONSTRUCTED PLANS
- 1983 WSHD AS-CONSTRUCTED PLANS

I have had several occasions to retrace Standard Parallels. It seems that they always have a little twist that makes them more interesting or problematic. The one I am going to talk about now is the Third Standard Parallel crossing U.S. Highway 287 South of Laramie. I started retracing PLSS monuments in T. 12N., R.72W. near the Wyoming – Colorado State Line, recovering PLSS monuments and tying them into a control network. I am always amazed at some of the original distances noted in the GLO records compared to the present day measurements. They are so close that I have developed a great respect for the original surveyors and their conscientious and dedicated work.

I was finding original PLSS monuments using ties from the 1953 WSHD as-constructed plans. My survey was proceeding in a timely fashion and I was enjoying the work and finding monuments easily.

When I got to the SC 33-34, T.13N., R.72W., I found a pipe monument set by Coffey Engineering (point 812). Coffey's corner record stated that they had found a stone marked correctly and set the pipe monument to perpetuate the location. I did find the stone with marks in a pile of stones around the pipe monument. I then compared the found pipe's position to the one I had calculated from the tie on the 1953 WSHD as-constructed plans and they were very close to the same.

I then calculated coordinates for the same standard corner using the 1983 WSHD as-constructed plans and again compared them to the pipe's position. To my surprised they did not match. My calculated coordinate based on the 1983 WSHD as-constructed plans would put me farther North and West of the pipe monument. What monument did the Highway Department tie to for the standard corner in 1983?

I then proceeded northerly to the calculated position from the 1983 WSHD as-constructed plans to find out. To my surprise, I found a well set stone with "SC" on the north face and 3 notches on

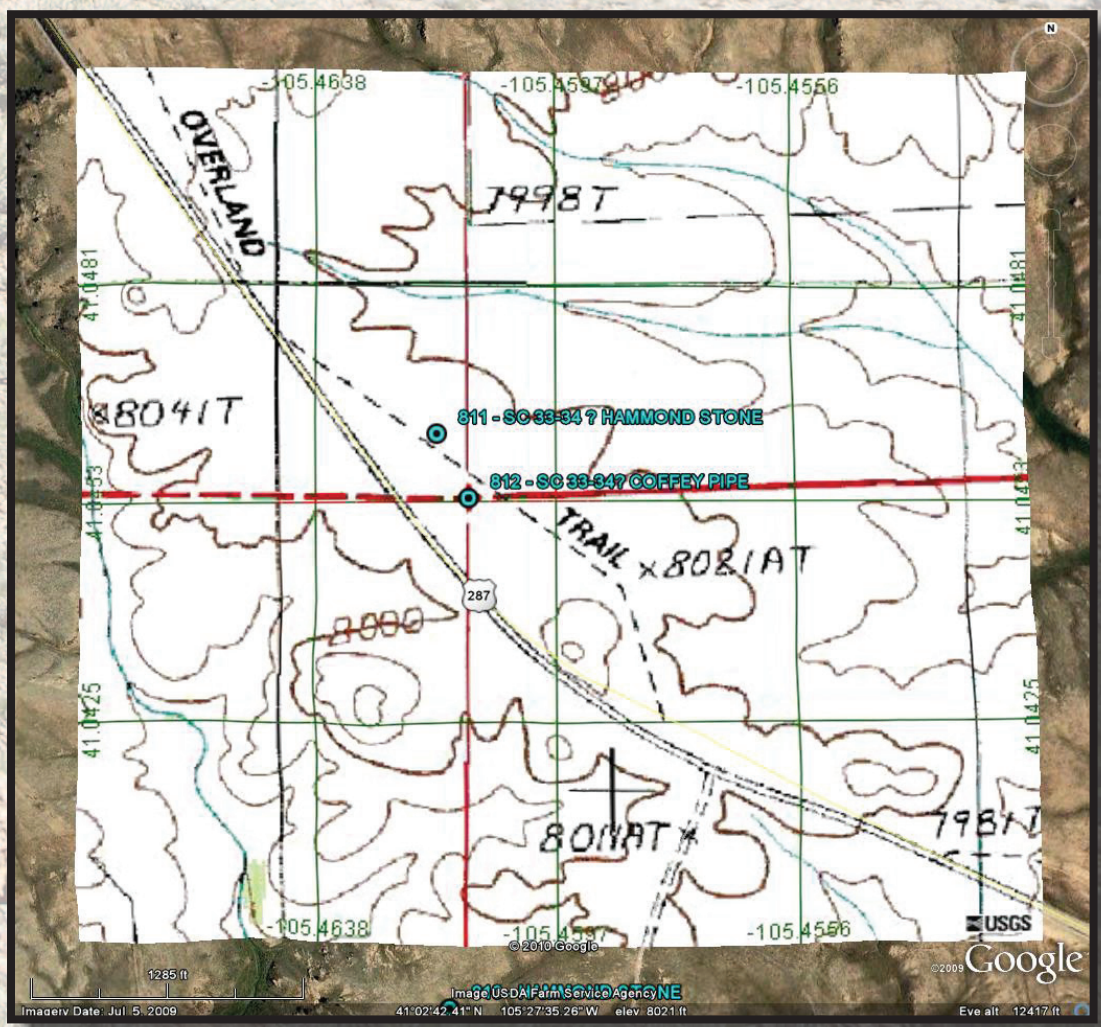
which monument I will be accepting as the standard corner for my survey.

I searched east and west for a mile for other PLSS monuments and found nothing. I then decided to go further east of the highway along the 3rd Standard Parallel. I knew where the northeast corner of Section 1, T.12N., R.72W. from a previous survey. The stone I had recovered in the earlier survey had been replaced with a pipe monument set by Coffey Engineering. The stone, well marked, was in the mound of stone at the corner.

the west and east sides (point 811). I also found remnants of an old county road in this area, so I got copies of the county road notes and found that the county surveyor had indeed tied to the SC 33-34 T.13N., R.72W. as part of his survey. I then searched for the CR stone and found it at the correct distance within a few tenths of a foot of point 811. That would confirm that the stone with the "SC" on it was in the same location since 1882. See drawing showing the location of the points

Now the head scratching started! I have found two monuments purporting to be the SC 33-34, T.13N., R.72W. and the stone with "SC" (point 811) is 300'± North and 150"± West of the Coffey Pipe monument (point 812). It appears as though my work had just begun. I desperately needed more information in order to determine

Since I was now three miles from the highway, my GPS didn't have the reception from the base due to the terrain and radio limitations. I asked Alan Cormier from Casper to bring his GPS



unit down because it was capable of using more satellites and had better range with an external radio. I also thought that two heads are better than one. After Alan arrived we headed west on a line from the northeast corner of Section 1 to the stone with the "SC" and found a pipe monument by Coffey Engineering for the North ¼ corner for sec. 1. Continuing west two miles, we didn't find any other monuments.

We then went west of the highway on the same line mentioned above for 1/1/2 miles and didn't find any monuments. Since the distance difference from the stone with the "SC" and Coffey's pipe monument was about 300 ft., I decided to walk south about 300 hundred feet and found a reddish-black set stone sitting alone on a hill. We didn't see any marks on the stone, but tied it into the survey. We then determined a line from the northeast corner of Section 1 and the newly found stone and headed further west.

We found three stones representing: the northeast corner of sec. 6, a stone with faint marks and a SC with an aluminum cap set by Jim Greer by the side of the stone: the north ¼ of sec. 6, a stone lying loose on the ground: and the northwest corner of sec. 6, a stone in the wire fence line with an aluminum cap set by Jim Greer near it. We tied these monuments into the survey.

With this new found information. We determined a new approach to the correct line of the Standard Parallel. We then went back to the east side of US 287 and started looking for the monuments on the new line starting with the northwest corner of sec. 1. We did not find the northwest of sec. 1. We found a stone lying on the ground loose in the area of the North ¼ corner with no marks visible. The northwest of sec. 2 and the north ¼ corner of sec 3 were not found after an extensive search.

After reviewing the topo calls on the line. It was decided that the northwest corner of sec. 2 would be a likely candidate to be found because of the reference to the very detailed topo calls on the corner. After some calculations with reference to the topo calls, I went to the area which was in a swale with a grassy meadow. Grass was about waist high and very thick. After walking around the area, I saw a rock just barely above the ground in the wet meadow. It was only exposed an inch or so. At this time, I called Alan again and had him come back down from Casper to help me expose this rock. I wanted another set of eyes on the recovery of this stone in case it ever came into question. It took a considerable amount of effort to dig this rock out of the ground. The picture shows it is a very large stone. The marks and size of the stone fit the notes of the original notes from 1870. GLO notes stated a Granite Stone 20"x14"x16". Stone found was a well set Granite Stone 18"x14"x16". 2 notches on east face. 3 notches on

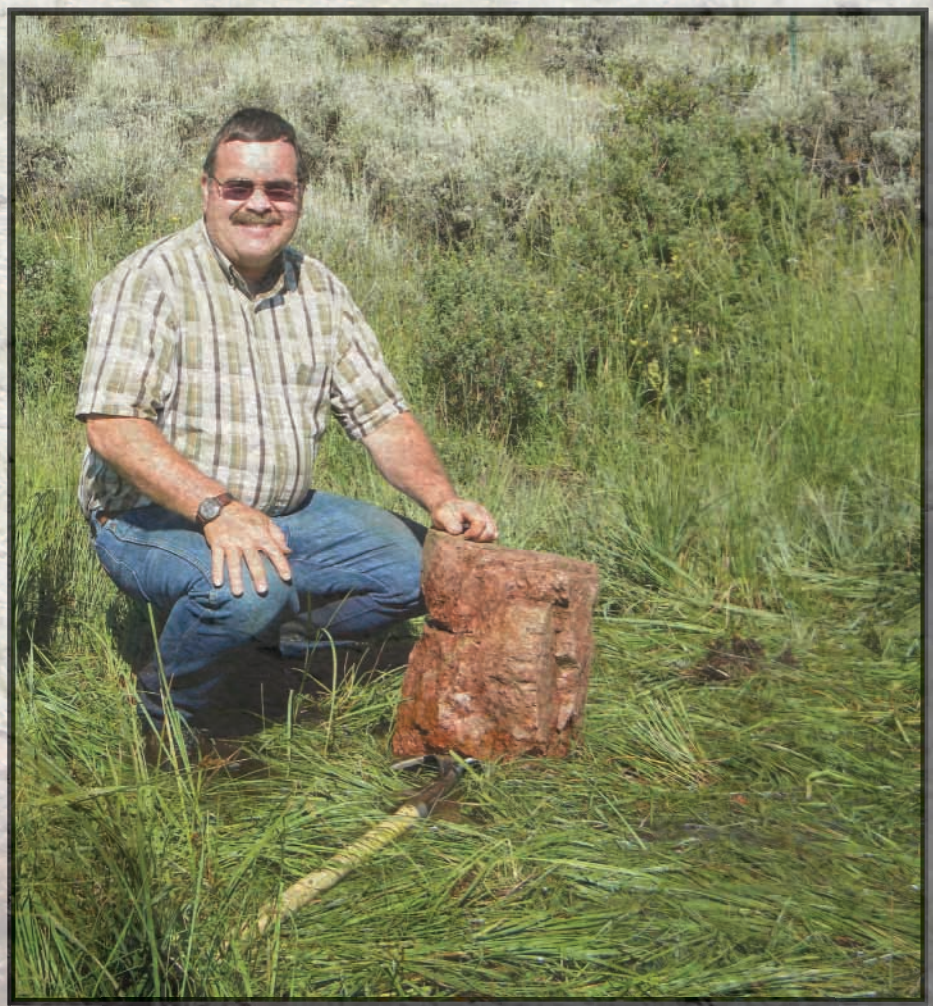
west face. The original stone set in 1870 for sure!

After tying the stone in to the survey, the stone was set in its original orientation with a Deep Clear Magnet underneath and two reference monuments consisting of 2-1/2" caps on 5/8"rebars set to the southwest and northeast.

So this recovered stone confirmed the location of the retraced line from the northeast corner of sec. 1. It also verified the stone that Coffey Engineering replaced at the northwest corner of sec. 3 was the original stone set on the standard parallel.

This stone now brings into question what the stone with the "SC" represented.

Further surveying to the south and west of the standard parallel and west of the highway showed the distances from the ¼ corners south of the standard parallel were all similar in length of about 2400-2500 feet. This confirms the location of the Coffey monument (812). So, it is apparent that the corner with the "SC" was maybe set at a normal distance of 2640 feet for a normal section. It could represent the CC for the section to the south but not set as a SC for the standard parallel. Why the surveyor didn't see the monument number 812 about 150 east and kept going past it to the north is not known.



Other monuments were set according to calculations. So, I now feel that we can put this work on the 3rd Standard Parallel behind us. It was an interesting project and did entail a lot of extra work in the retracement. The use of topo calls and a diligent search solved the location of the true standard parallel. I would like to thank Alan Cormier, PLS 5632 for his assistance with his GPS, calculations, checking calculations, and the pictures in this article.

Two heads were truly better than one on this project.

(Continued from Page 8)

In November 1862, recently promoted Rear Admiral David Porter requested Assistant Ferdinand H. Gerdes report to the Mississippi River squadron at Cairo, Illinois. Gerdes was joined by Sub-Assistant Clarence Fendall, draughtsman Alexander Strausz, and Sub-Assistant R.E. Halter. Until the fall of Vicksburg (4 July 1863), the Coast Survey personnel were assigned mapping duties supporting the Union forces, sometimes while under fire from the enemy. After the victory, Admiral Porter wrote Bache an effusive letter of appreciation for the services of both Fendall and Strausz.

In late November 1863 and through early 1864, Clarence Fendall, Thomas C. Bowie, and Ferdinand H. Gerdes worked along the middle Mississippi River, Ohio River, and Red River. Gerdes and Bowie were frequently under enemy fire while working on the Mississippi River between Mound City and Cairo. Around 18 June 1864, Gerdes terminated mapping operations upon orders from Rear Admiral Porter, and proceeded to Casco Bay, Maine, to direct a hydrographic survey party.

In late October 1864, Gerdes returned to Mound City, Illinois, and completed surveys for a Navy yard. In December, Gerdes was appointed topographic engineer of the Western Navy Yard Commission. Later, Gerdes boarded the Curlew for a two week reconnaissance of the Tennessee River and completed a map of 180 miles which was checked by six astronomic stations (latitude and longitude).

While a relatively small group of the Coast Survey personnel were heavily involved along the Mississippi River, others were assigned to the Atlantic coast south of Cape Hatteras. They served as ship pilots, hydrographers, topographers, geodetic surveyors, scouts, messengers, and advisors. Coast Survey personnel accompanied naval expeditions. In late 1861 and 1862, Coast Survey personnel were assigned to support Brig. Gen. Burnside offensive campaign to Roanoke Island and other locations identified to tighten the nautical blockade.

In 1863, Assistant George Fairfield commanded the Coast Surveys schooner James Hall . Fairfield wrote that on 14 March he and his assistants were measuring a base line ". . . and even amid great perils we . . . calmly pursued our scientific investigations . . . It was a little difficult however, as the men would look off to see the shells burst." Sub-Assistants P.C.F. West and Cleveland Rockwell were assigned to serve with Maj. Gen. John G. Foster at New Berne. Rockwell accompanied Union forces on two reconnaissance missions. On the second mission he was with four companies of cavalry, when the commanding officer became aware of a Confederate unit in the area. Immediately, the reconnaissance became a pursuit followed with a calvary charge in which Rockwell participated. The charge produced 13 prisoners, 35 horses and all their gear, and two Confederates killed in action. In another incident, Coast Survey surveyors were assigned to a gunboat. Because there was a shortage of watch standing officers, the two Assistants volunteered to stand watch and command picket boats.

Another dangerous operation was to capture Fort Fisher. The plan was to navigate an expendable vessel containing 350 tons of black powder into the breaker just below the fort. Coast Survey Assistant John S. Bradford was charged to survey approaches and locate the best route to bring the ship below the fort's guns. The surveys were executed at night directly under the guns of what was considered one of the most impregnable forts in the world. Bradford was also assigned to reconnoiter the ship's final voyage. The project failed, but the valor of Bradford was recounted by Adm. A.C. Rind in 1890!

Assistant Charles O. Boutelle performed an amazing piloting feat when he took the sloop-of-war Dale up a creek to an anchorage. A senior officer attached to the expedition wrote, "I cannot finish without mentioning the obligations I am under to Captain Boutelle for the skill and untiring energy he displayed in piloting us through those inland waters, and I think the people must have been a little surprised at seeing vessels of war passing at full speed up narrow and not over-deep rivers . . .".

Along the Atlantic coast the Coast Survey's personnel and resources were continuously involved in the conflict. The coast Survey ship Bibb was used as a gunboat. Throughout the War, the personnel of the Coast Survey were everywhere along the Atlantic coast supporting naval and military actions. The civilian assistants served as civilians and had no military rank/ commission, except "honorary" titles. Although these individuals supported the Union, a number of them had spent a significant portion of their careers in the South, and had developed ties to their southern Americans. A number of Coast Survey individuals expressed concerns for their safety if captured by Confederate forces while

executing surveys.

The affiliation of Coast Survey civilian personnel with Naval operations, and thus joint Naval - Army operations, was understandable. The Naval requirements for accurate hydrographic charts of the Confederate coasts were necessary to enforce the blockade. The initial impetus for the survey of the coast was to protect commercial maritime activities. The Coast Survey's activities had been to generally chart the coast, chart the navigational channels to harbors, and identify/locate coastal hazards in/along coastal shipping corridors. The complex geography of the southern Atlantic coast line which was continuously changing due to seasonal storms, hindered Union forces' attempts to blockade the numerous "small ports" useable by smaller blockade runners.

Boutelle, Gerdes, and others had extensive experiences in geodetic, topographic, and hydrographic operations, which made them invaluable, and sought after by command officers of surveying and mapping operations. Although these Coast Survey personnel only had the status of "civilians", they did not hesitate to enter the "war zone" to perform their professional assignments.

In June 1861, General Winfield Scott realized there were inadequate maps for land operations, and that there was a desperate need for trained topographers. The Army Topographic Corps numbered less than fifty, and most officers were assigned to mapping the West (for military purposes) or on the Great Lakes. Others were already posted to senior staff positions of the standing military organizations.

With approximately one-third of the oceanic coast under Confederate control, General Scott called upon Bache and the Coast Survey to provide experienced topographers, for the up-to-date maps of the country side between Washington (Union capital) to Richmond (Confederate capital). In June 1861, the Coast Survey detailed the dean of their topographers - Assistant Henry L. Whiting, as party chief, and Sub -Assistant F.W. Dorr and Aid Cleveland Rockwell each heading a field party. On 17 April 1862, Dorr was afield mapping through the York River to the Warwick River and thence to the James River. Usually Dorr would set up the plane table and within a few minutes, and had identified and plotted the sight lines to prominent features. One day, however, while "on station" his work was interrupted by a Corps of Topographic Engineers lieutenant. A Confederate battery approximately 1,000 yards distant opened fire. The initial shot struck the tripod and exploded. Three pickets who were at the site were killed outright. The lieutenant and one chainman were mortally wounded, dying two days later. Dorr received a slight scratch on his hand. Since the alidade and plane table had been destroyed, Dorr immediately continued his surveying using a compass and chain. Throughout April, May, and June 1862, Dorr and Donn served with the Army of the Potomac during the entire campaign.

Near the end of 1862, J.G. Oltmanns was sufficiently recovered from earlier wounds (at the battle of New Orleans), joined Coast Survey Aids Charles Hosmer and H.S. Lyman who were mapping the Mississippi River from New Orleans. Oltmanns and Lyman were surveying the Atchafalaya River when the gunboat Kinsman struck a snag and sank. Six men were lost in the incident. The two Coast Survey members saved the maps and surveys, but lost all the professional and personal equipment.

Oltmanns saw continuous action on the Mississippi River as Admiral Farragut attempted to capture Vicksburg and disarm other Confederate installations impeding Union navigation of the Mississippi River. At Port Hudson, Oltmanns horse was shot out from under him and killed. After Vicksburg was captured (4 July 1863) and Port Hudson surrendered five days later, the Mississippi River was opened to Union vessels. Oltmanns mapped the Vicksburg Confederate defenses and Union approaches. Oltmanns was then assigned to support the Sabine Pass expedition, and took part in the Red River campaign. In late August or early September, Oltmanns completed twenty-one months in continuously service with the army in the Department of the Gulf. Oltmanns joined Major General Phil Sheridan in the Shenandoah Valley, Virginia, in September 1863.

Charles Hosmer performed hydrographic and land surveying work supporting the occupation of Brownsville, Aranas Pass, and Pass Cavallo. His next assignment was to the north shore of Lake Pontchartrain. Hosmer returned to the Red River campaign conducting topographic surveys at several sites. He was detached from the Department of the Gulf in late June.

In the fall of 1863, the Chief Engineer of the Army of the Cumberland requested Assistant Preston C.F. West and others to report to Chattanooga. Bache immediately sent messages to West; Clarence Fendall; C.F. Dorr; J.W. Donn; and Cleveland Rockwell. The trips to Chattanooga by the surveyors were exhaustive and dangerous. The surveyors immediately initiated mapping

operations throughout the area which would relieve the Confederate siege of Chattanooga. Donn and Dorr split the area to be mapped. Donn surveyed the river and the western approaches, including Lookout Mtn., Racoon Mtn., and the valley of Lookout Creek. Dorr took charge of mapping the eastern approaches including Missionary Ridge. Both topographers were under Confederate rifle fire, because the enemy were well aware of the purpose of the "white-topped instrument" (plane table alidade). There was only one significant flaw in the mapping. Dorr and the Army topographers missed a steep valley separating a small hill from the north end of Missionary Ridge. Inspecting the terrain today, one wonders why more valleys were not omitted. This omission stymied Sherman's flanking attack.

When General Robert E. Lee invaded Maryland and Pennsylvania, the cities of Philadelphia and Baltimore as well as the surrounding countryside paniced. Bache wrote to the governor of Pennsylvania and the mayor of Philadelphia offering assistance. The mayor responded, "We have no engineer (to build defensive works), and your aid would be invaluable . . .". On 27 June 1863, Bache reported in person, and took over the direction of both reconnaissance and construction of fortifications. Thirteen Coast Survey topographers and draughtsmen joined him. Also, Bache enlisted the surveying and mapping staffs of several railroads and engineers from academic and private companies.

Since there was almost continuous military maneuvers in Virginia, Coast Survey Assistants, Aids, and Sub-Aids were deployed with every major Union command. In 1864, General William T. Sherman initiated his march to Atlanta, then Savannah, and northward through the Carolinas. Sherman employed a single base map. Since he and his commanders had the same map, the movement of troops, artillery, supplies, and other army components were accurately coordinated. Prior to Sherman's "March to the Sea", General Sherman's chief topographic engineer wrote to the Assistant-in-Charge of the Coast Survey Office, "I have just received yours of the 26 April, enclosing proof-sheet of Northern Alabama and Georgia. I am directed by General Sherman, . . . , to perform the very pleasant duty of thanking the Coast Survey for the promptness with which the map was gotten up, and its fine appearance. It will be the standard during the campaign upon which we have just entered." General Sherman's chief topographical engineer, Captain Orlandoe M. Poe, requested the Coast Survey topographers accompany the army north from Savannah. Captain Poe requested (by name) Sub-Assistants Cleveland Rockwell and F.W Dorr. They were accompanied by Aids W.W. Harding and Franklin Platt. The Coast Survey team accompanied Sherman's army until the surrender of General Johnston (14 April 1865). With this termination of hostilities, Frederick W. Dorr and Cleveland Rockwell proceeded to Washington. These two Coast Survey topographers were among the first Coast Survey personnel to take to the field in June 1861.

With the cessation of the hostilities, the Coast Survey personnel made their way back to Washington to pick up the previous assignments update the charting of the United States coasts.

LINES AND POINTS ARTICLE ROTATION SUBMISSION SCHEDULE BY CHAPTER

Responsible Chapter	First Call Date	Last Call Date	Publication Date
Laramie Valley Chapter	THANK YOU!! (SEE "RETRACEMENT OF THE THIRD STANDARD PARALLEL" IN THIS ISSUE)		
Upper Platte Chapter	March 1	March 15,	April 1, 2019
Southwest Chapter	June 1	June 15	July 1, 2019

LINES AND POINTS
P.O. BOX 8
CHEYENNE, WY 82003

Please Recycle