

American Icon

The Short Brilliant Life of Butler Ives

By Paul S. Pace, PLS

Part II of a two-part series

In the summer of 1864, the G.L.O. again reorganized Public Land surveys in Nevada, attaching it and Idaho to the Colorado surveying district and making Montana part of the Dakota surveying district. But this proved unworkable, as Colorado was simply too far away to be practical. Township plats submitted from Nevada were then sent to Lauren Upson, the California Surveyor General in San Francisco until 1866.¹ In the Spring of 1865, the Confederate capitol at Richmond fell to Union forces and a few days later on April 9th, General R. E. Lee surrendered the Army of Northern Virginia, effectively ending a war that killed over 600,000 Americans. Five days after that President Lincoln was assassinated, ushering in the disastrous presidency of Andrew Johnson and the grim realities of Reconstruction.

In early 1866 the direction of Butler Ives's life changed dramatically, fueled perhaps by frustration over the loss of the County Surveyor's position in Carson City. He left Nevada and signed on with the Central Pacific Railroad, as an Assistant Engineer. He was about to begin a series of reconnaissance surveys across Nevada, from the base of the Sierra eastward toward Salt Lake City. He wrote his brother William in April, this time from San Francisco,

*"I am down here preparing an outfit for making a reconnaissance for a rail road route from the Sierra Nevada Mountains to Salt Lake, across the Great Basin, for the Central Pacific Railroad Co. My explorations will embrace an extent of country about 450 miles in Length by 100 miles to 150 miles in width. Shall be followed by four or five transit and level parties for making detailed surveys soon as I have determined the most feasible route. I start for the field in a few days and expect to reach the city of the Saints in about two months. Shall have a party of eight men, all mounted and armed with Spencer rifles...The country is very dry, barren and mountainous...sort of purgatory on the outer rim of the happy land of Mormondom."*²

Butler continued, referring to his preferred reconnaissance instrument, the solar compass,

"Shall make the survey for topography, etc by triangulation with a solar compass, and the levels, or altitudes, with a cistern barometer. I expect to be in the field till snow flies again, and it will probably be a year before I get my report and maps all made out. They have about 5 000 men at work on the Pacific Railroad on this end and expect to get the road across the Sierras into the Great Basin during the next year, 1867, and I think if nothing happens I may be able to come and see you all the way by railroad yet. Dr. Whitney, whom you knew in Lake Superior, is the State Geologist of California, and is assisting me with my outfit."

Ives' hopeful prediction of getting the road over Donner Summit by 1867 failed to materialize. The hard granite and even harder

winters of the Range of Light would slow progress to a crawl, costing many lives, vast sums of money and forcing the Central Pacific to the wall financially. The Central Pacific's tireless Chinese blasted their way around and through the Sierra and down the canyon of the Truckee River, finally arriving in the Truckee Meadows in May of 1868. As for Professor Whitney, for whom the highest peak in the contiguous United States is named, one can only wonder if he made a connection between Butler, his brother William and the former Army surveyor, Lieutenant Joseph Christmas Ives.



Donner Summit and the railroad in snow sheds. Author's photo 2010

While the Chinese construction crews blasted out the CP's transmontane alignment, Butler was directed to find a "central route" from the Great Bend of the Truckee River, near present day Wadsworth, through Austin, Nevada and on to the Great Salt Lake. He would generally follow the route across Nevada taken by the Army surveyor, Captain James H. Simpson, in 1859. He undertook this mission with his usual vigor, covering large distances across the vast, unyielding wilderness, building a triangulation network with his solar compass as he went. His use of cistern barometers is interesting in that these instruments are large, cumbersome and easily broken. But they do provide accurate results and he was thus able to profile the reconnaissance routes through his network at the same time, and with some certainty, something the engineers back in San Francisco would appreciate.

A rail route eastward through central Nevada appeared hopeless, blocked by seemingly endless north-south mountain ranges. But Ives accepted the challenge, hoping to find a way. They crossed the rocky ribs of the Great Basin in turn: the Clan Alpine, Desatoya, Shoshone, Toyabe, Toquima, Monitor, Diamond, Egan, White Pine, Shell Creek and the Snake Ranges. In the endless solitude of central Nevada, Butler Ives and his men searched in vain for a passage through, to no avail. In the end, they were forced to look elsewhere for the way east. Pushed to the north, along the Humboldt River, the final route added perhaps another 100 miles to the Central Pacific's burdens. And all the while Ives was searching for a route eastward, the Union Pacific's Irish navvies were methodically laying rails across the plains, striving to win majority control of the future transcontinental rail traffic with its lucrative revenues. In fact, they were hoping to meet the struggling Central Pacific at the Sierras.

In that light, Ives was informed by the CP management in

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August of 1866,

"If in your opinion you can safely undertake the trip at this season of the year, you will, as soon as you can refit your party, return to the Humboldt Wells (at the north end of the East Humboldt Mountains, near present day and aptly named Wells, Nevada) via the south end of the Great Salt Lake, south end of Pilot Peak, and Humboldt Pass, or any other practicable route you may find in the vicinity of the one indicated, making all necessary surveys to determine the practicability of the route for the construction of a railroad."³

In September of that year he received further instructions,

"After completing your reconnaissance and surveys of line from Great Salt Lake, via Pilot Peak to Humboldt Wells, you will at once proceed to make a reconnaissance of the country between the head waters of the Humboldt River (Humboldt Wells) and the north end of Salt Lake; extending your examination as far north as Thousand Spring Valley, Goose Creek Valley and Mts., and City of Rocks (66 miles northeast of present-day Montello, Nevada, just over the Nevada-Idaho line), and if possible as far south as Pilot Peak (25 miles south of Montello)...It is desirable if possible to avoid the long detour via the old Emigrant route, and I trust that your examinations may result in the discovery of a more direct line from Humboldt Wells to the northern extremity of Salt Lake. I have directed Mr. Epler (William Epler and S. M. Buck were the CPRR's two other route surveyors) to report to you, and desire that you take general charge of the survey..."⁴

The winter months that year were too cold to continue the survey, but with the coming of spring Ives and his men were back in the field, this time to begin preliminary surveys over the most favored reconnaissance corridors. During the hectic Summer of 1867, Butler wrote to his brother from Star City, Nevada, a lively little mining camp north of Unionville, on the eastern slope of the Humboldt Mountains,

"I am on my way up the Humboldt River, with a party of sixteen men to run a preliminary RR Line from the head of the Humboldt to the Wasatch Mts, east of Salt Lake, on one of the lines I explored last summer, around the north end of the Great Salt Lake. It is a new route never explored before, and the best through that desert country. I have a full transit and level party, besides enough for a scouting party for exploring with the old solar compass and barometer. I expect to reach Salt Lake about the first of September, which will be my first point of reaching civilized settlements after leaving this place. I have been engaged all winter on maps of my last season's surveys and have not completed them yet, and expect to add this season's surveys to it next winter."

The surveyors traversed the 300 dusty miles to the north end of the Great Salt Lake and then worked their way south along the eastern shore. They arrived in Salt Lake City in August and were quickly sent back out to do still more reconnaissance. They returned to Salt Lake City in early November. Butler informed his brother,

"I arrived here with my party last night, having finished work for the season...and take the stage myself for Sacramento tomorrow, where I borrough for the winter...Traveled 500 miles via the valley of the Humboldt River to its head, when we commence work about the first of July, and run 250 miles of preliminary R.R. line on one of the routes I explored last year...For 150 miles of the distance we had "dry camps" or for every camp in that distance we had to haul water with mule teams from 10 to 15 miles, for

cooking and drinking purposes, and some of that was brackish...I found it a good place to take the romance out of some enthusiastic young engineers I had in my party. On arriving here I received orders to make surveys of all the practicable routes, and a general exploration of the country between Salt Lake and Green River, the north fork of the Rio Colorado. I have been engaged for the last three months in that service."⁵

In the same letter, Ives again stated his preference for the solar compass and cistern barometers for reconnaissance work. The solar compass was an accurate tool in his hands and with it he made rapid and relatively inexpensive explorations across Nevada and Utah. He used triangulation where it was possible, traverse methods otherwise, and in this way managed from 10 to 30 miles a day, including a continuous barometric profile with the ungainly cisterns. Ives and his party located preliminary center line across the barren alkali wastes west and north of the Great Salt Lake and several routes through the Promontory Mountains. He was ever mindful of the costs, but his principle route required three miles of heavy rock work down the eastern slope and an eight hundred foot long tunnel.⁶ Meanwhile, all the rail, spikes, switches, plates, locomotives, anything that the Central Pacific needed that could not be built in California, had to be shipped around Cape Horn, up the coast to San Francisco, then hauled overland to the hard working Chinese construction crews. The costs in time and treasure were enormous.

In May of 1868, Ives entered Palisades Canyon, a rugged twelve mile long defile of vertical basalt cut by the Humboldt River, just west of what is now Carlin, Nevada. It was hard going, requiring several large bridges and the heaviest grading since the Sierra crossing. In this stretch Ives did the preliminary as well as the final location staking for the railroad. Writing to William that summer from Fort Halleck, east of Elko, Nevada, he summed up the arc of his life for the last several years,

"They keep me out in these infernal regions of salt and desolation because I am familiar with the country and I am not afraid of the Indians. I am a sort of vagabond pioneer of the R.R. Co. singled out for difficult jobs and with a carte blanche to do pretty much as I please."⁷

The reconnaissance and preliminary surveys across the wilderness that had occupied Ives for years were coming to a close. Ives would soon be engaged in surveying final centerline across Nevada. With him he had a party of twelve men, a mule team, several saddle horses and four months' provisions.⁸ Chief Engineer Sam Montague, mindful of the fierce competition with the Union Pacific, reminded Ives in every letter he sent to him that summer,

"... the necessity for pushing ahead will compel us to sacrifice good alignment & easy grades for the sake of getting light work. Make temporary location by using sharp curves and heavy grades wherever you can make any material saving on the work. The line we went now is the one we can build the soonest, even if we rebuild immediately. Keep this in mind."⁹

The Union Pacific's surveyors pushed their initial surveys westward into the Promontory Range before the Central Pacific's surveyors could return for the final location work. They found Butler Ives' preliminary survey stakes through Promontory Pass, and while giving him credit for finding it, used his stakes for their own centerline. Both roads made numerous surveys and realignments near Promontory, including the CP's

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elimination of Ives' tunnel and opting instead for a large fill on another nearby route. Amidst confusion as to where the rails might join, a decision was finally made and the surveyors from the two railroads tied their centerlines together at Promontory, discarding the great many miles of line each had surveyed and graded in opposite directions, past that point.

At the conclusion of the surveying effort, Ives was made a Division Engineer and then charged with the actual construction of a portion of the rail line west of Ogden City, Utah Territory. He had three construction parties working for him and he was pressed to keep ahead of the work. From Ogden, he wrote to his brother in February of 1869,

*"I have been very busy for the last year; we are building railroads with a rush out here and engineers have their hands full...I am a division engineer, and have charge of 46 miles of construction from this point westward. Have three construction parties under me, and it keeps me very busy. Both R.R. Companies are building in this section, striving for the Government subsidies, with much regard to the value of the road. Our line has built over 400 miles of road within the last year, and we have about 140 more graded and nearly ready for the track...We expect the two roads will meet by the first of May next. I have been living in tents all winter, which is not very pleasant where wood is scarce as it is out here, though we have stove and plenty (of) grub and good cooks."*¹⁰

As the competition between the two railroads was fierce, attention was paid to the condition of the opposing force, particularly as grading parties from the CP and UP passed each other in Utah, heading in opposite directions. In March of 1869, Sam Montague wrote, perhaps gleefully, to Butler Ives,

"The Union Pacific is nearly out of powder".

Montague also ordered Ives to,

*"...keep Governor Stanford informed of Union Pacific demonstrations at the point where they cross us east (sic) of Blue Creek. They have not cut our line yet."*¹¹

In April Ives wrote to a friend in San Francisco that he was told to stop all work on grading and structures east of Blue Creek in the Promontory Mountains. Promontory itself was originally known as Ives Pass, in deference to Butler's location of the line through there; the name was later changed. Another Ives Pass survives, west of Montello, Nevada, at the head of Immigrant Canyon, through which the railroad perhaps could have passed, saving the present route out and around Mount Murdock. In the end, much of Ives' original alignment was rebuilt in more suitable locations and to accommodate the larger and faster locomotives that soon came into use.

Butler's prediction that the rails would join in May proved to be true, largely through the efforts of the Chinese crews. So fierce was the competition between the roads, that on April 28, Central Pacific's track gangs laid 10 miles and 56 feet of rails in just under 12 hours, a record that may still be unbroken. The Golden Spike ceremony was held at Promontory Summit, Utah on the 10th of May, 1869. Butler returned to California and continued on with the Central Pacific Railroad Company, settling into a comfortable life in the Golden State. But while the Central Pacific and Union Pacific comprised what is generally thought of as the Transcontinental Railroad, the fact is that the CPRR terminated in Sacramento, not San Francisco.



The railroad is complete. National Park Service photo.

To get from the Capitol to the City by the Bay, one could take a pleasant, but slow ride down the Sacramento River on a river boat, or take the faster standard gauge short line called the California-Pacific Railroad, and after a relatively short rail journey and two ferry crossings, one across the Carquinez Straights and another across the San Francisco Bay, arrive at San Francisco. The California-Pacific, a small independent road, quickly became an acquisition target for the insatiable Central Pacific.

The CPRR wanted a monopoly on rail traffic in the area and waged several legal battles with the California-Pacific in the courts to that end. By August of 1871 the CPRR held controlling interest, though not outright ownership, of the smaller road. However, in December of 1871 devastating floods struck the central valley of California, wrecking havoc on rail lines and other infrastructure. The California-Pacific, now under CPRR control, was especially damaged and would not fully recover.

On Christmas Day of 1871, Butler boarded a northbound California-Pacific passenger train, headed for Napa County. He was very well dressed and wearing expensive jewelry, perhaps having attended church services or dining with friends earlier that day. He nevertheless carried his survey instruments with him in the passenger car. A few miles north of Vallejo, he stepped out onto the platform of the moving car, perhaps to have a smoke, get a better look at something, or perhaps for no reason at all. He was never seen alive again.

On December 27, 1871, the *Vallejo Evening Chronicle* featured this headline:

Dead body Found

On Tuesday evening information was brought to Vallejo that the body of a man had been found in the tules in the vicinity of Hallman's residence on Napa Creek or Bay. A young gentleman had been sent here with the request that Judge Riley should immediately come up and hold an inquest. On learning the facts of the case and the precise location, he became satisfied that the corpse had been found in Napa County, and telegraphed to the Coroner at Napa City to repair to the spot and hold an inquest.

The next day, a Thursday, December 28th, the *Vallejo Recorder*

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ran the following similar, if slightly contradictory, article:

Found Drown in the Tules

On Tuesday Judge Riley received information that a dead body had been found in the tules...on the California Pacific Railroad.... The body was brought to town and found to be by letters and papers in his possession that of Butler Ives, an assistant engineer in the field, attached to the staff of the Engineers of the Central Pacific Railroad. He appeared to be a man about thirty-five years of age, was well dressed in black cloth coat, with kid gloves, white shirt and jewelry and bears a deep cut on his forehead.

He had in his possession at the time surveying instruments showing evidently that he was on duty...and it appears since the damage to the railroad from the late rains he had been sent out to look after the repairs and in crossing the bridge perhaps stepped out of the car...to see its condition when he fell off the train... He probably met his death on Christmas or the day before...His diary shows he was in this country several years but we were unable to ascertain whether he was a married man or not. A brother resides in Michigan, from whom he had a letter in his possession. No inquest was held upon the body and he will be buried in the Cemetery today and the sad intelligence sent (to) his relatives.

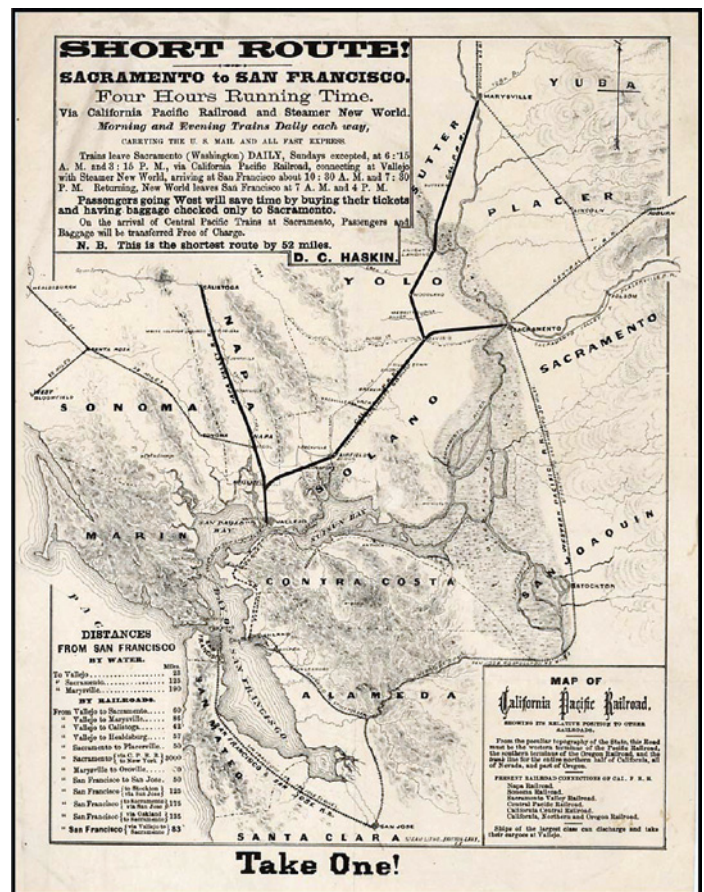
Butler had a number of letters in his possession at the time of his death, two work-related notes from his boss Sam Montague, still Chief Engineer for the CPRR, but also acting Chief Engineer for the California-Pacific RR, and another from his brother in Michigan.

The newspapers continued to release information as it became available. But the next day's *Chronicle* was particularly revealing. It stated, among other things,

...he was lying about 250 yards below the small railroad bridge over the little creek; that the man had evidently been knocked off of accidentally fell off the cars while they were passing over the bridge, and his body was then washed that distance down the creek by the freshet...Among his effects was a check on the Bank of California for \$1500; and about \$15 in coin; silver watch and gold chain; gold studs; gold collar button; one of his sleeve buttons was missing; diamond ring; he was very genteelly dressed in black and had one kid glove on. The deceased has an ugly scar or sore on his forehead just above the right eye. According to the evidence of General J. F. Houghton as taken at the inquest held today, he testifies that Ives told him he received the blow at the hands of an Irishman; he was playing cards with him on the 18th inst. and the Irishman insulted him; and he threw the cards in the Irishman's face, when he struck him with a club on the head.

Ives was still running route surveys for the railroad, rather than assessing storm damage as first surmised. Perhaps he was surveying the proposed North Pacific Coast Railroad, which was finally completed from Sausalito to the Russian River in 1873. The newspaper continued,

"Ives was in charge of a party engaged in surveying the proposed railroad from the Summit to Sausalito; had been in the employ of the Central Pacific Railroad for about 8 years; was a man who drank, but never to excess..."



California Pacific Railroad flier, Ruderman Antique Maps, Inc

An inquest was held and Butler's old friend and colleague J. F. Houghton testified. The paper summarized his testimony:

I was well acquainted with the deceased during his lifetime; knew him to be Butler Ives, Civil Engineer in the employ of the CPRR; knew of the deceased having had a difficulty and fight with some person on or about the 18th day of December, 1871; had a bruise on his forehead; saw him on that date; saw him again in Sacramento on the 20th of December; deceased said he received the bruise from an Irishman, and that it was done with a club; he came on the cars at Adelanto, Napa County.

William Hood, a colleague from the CPRR, also testified at the inquest. Hood was a Civil War veteran and worked on the railroad's engineering staff with Ives. He stated under oath that:

I was well acquainted with the deceased during his lifetime. I last saw him on the 20th of December; I have known him to walk and heard him talk in his sleep, and was more or less absent minded; believe that he walked off the cars of the Cal. Pacific Railroad whilst in that condition.

Other testimony was given, but certainly none that was satisfactory to Butler's family and friends, particularly in light of Hood's odd testimony. An investigation continued, seeking closure to his mysterious death, but at that point, the newspaper coverage ends and Butler's true fate, if it were ever known, seems lost to history.

The memory of Butler Ives survives in the West today, but not

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as legend. Rather, it is due in large measure to the quality of his work on the Public Lands in Nevada and Oregon. It remains as a tribute to his dedication and skill, his expertise and conscientious nature. Nevada B.L.M.'s Chief of Cadastral Surveys David Morlan, P.L.S. recently recalled Butler Ives as "an outstanding G.L.O. surveyor, if not the best. His accuracy both in distance and direction were remarkable and consistent. He is probably the only G.L.O. surveyor I have retraced that I would ever consider applying an 'index factor' to." Mr. Morlan's sentiments are shared by many other surveyors who have retraced Ives' work in western Nevada, including the late Tom Foote, P.L.S who told some remarkable tales of retracing Ives, and Steve Parrish, P.L.S, himself a former Chief of Cadastral Surveys, who noted that Ives was "the finest pre-1900 G.L.O. surveyor I have ever retraced". Butler's many letters reveal his strong commitment to the work on the Public Lands and the railroad, as well as a sense of humor and occasionally, an ease with life. Butler Ives' reputation remains a powerful presence to this day.

Many of the men who passed through Ives' life fared well, a few did not. John Kidder moved to California and later went to work for the Central Pacific Railroad. He dabbled in politics and in mining, where he eventually made a fortune. He kept a hand in railroad engineering and in 1874 he became the Chief Engineer for the Nevada County Narrow Gauge Railroad, surveying the short line's route from Nevada City to its junction with the Central Pacific RR at Colfax, California. Later, he became the railroad's General Superintendent. In 1884 he bought controlling interest in the line and became its President. When he died, at Nevada City in 1901, his wife famously assumed control of the railroad.¹²

James Houghton served three terms as California Surveyor General. He then returned to the world of business. In 1887 he became President of the San Francisco Dock Company and in 1889 Houghton was elected to the Board of Regents of the University of California. He died in 1903.

James North became a member of the Nevada Bar and began a private law practice while Surveyor General. He was appointed associate justice of the Nevada Territorial Supreme Court, where he was involved in a serious controversy over mining law with well-known attorney, and later U.S. Senator, William Stewart. He left Nevada and moved to Knoxville, Tennessee. Later he moved to California where he founded the city of Riverside. Unsuccessful in several business ventures, his marriage and an election for the California Supreme Court, North died in Fresno in 1890.¹³

Joseph Ives left the ruined Confederacy in 1865, searching for a new life. He traveled extensively, calling on old friends, but he was unable to find meaningful work. He eventually took a position at Columbia University's School of Mines. Broke and demoralized, Butler's distant cousin died from the effects meningitis and alcohol in 1868, at the age of 39.

Butler Ives' brother Caleb, to whom he had given power of attorney when he left Michigan in 1851, came west to collect his effects and perhaps accompany his brother's body back home. Wells Fargo & Company, as a favor to the Central Pacific Railroad and in tribute to "Mr. Ives' attainment as R. R. engineer and character as a gentleman" sent his body back to Michigan at no charge.¹⁴ Butler's last ride on the railroad he worked so hard to build, was eastbound across the Sierra and the Great Basin, and on to his grieving family and burial at Elmwood Cemetery

in Detroit, Michigan. Born in 1830, he was dead by the age of 41, after a brilliant though tragically short career as one of the most respected surveyors in the pioneer West.

This article is dedicated to the memory of the Hon. James H. Thompson who passed away in February, 2011. Jim represented Nevada in the boundary litigation with California in the 1970's and 80's. He had an appreciation of the surveyor's contribution to society in the highest and broadest sense and was an unfailing friend to many of us.



End Notes Part I

¹*John Wesley North and the Reform Frontier*, Merlin Stonehouse, University of Minnesota Press 1965

²*ibid.*

³*Report of the Commissioner of the General Land Office* 1861, page 162, 163

⁴*Chaining Oregon*, Kay Atwood, 2008

⁵*ibid.*

⁶*ibid.*

⁷*ibid.*

⁸*Ancestry.com, Nevada County Biographies*, 2011

⁹*Chaining the Land*, second edition, F. D. Uzes, 2006, Appendix 20

¹⁰*The Organic Act for the Territory of Nevada, March 2, 1861*, defined the eastern boundary as the 39th degree of longitude from Washington. The U.S. Congress enacted legislation moving it to the 38th degree of longitude on July 14, 1862. On May 5, 1866 Congress again moved the line, this time to the 37th degree of longitude from Washington, where it remains today.

¹¹*Report of the Commissioner of the G.L.O.*, Nov. 30, 1861, pp 490-491

¹²Letter to William Whitney, September 6, 1861,

¹³*Biographical Register of the Officers and Graduates of the US Military Academy at West Point, since its establishment in 1802*, G.W. Cullum, 1890, Vol. II, p474

¹⁴*History of Nevada*, edited by Sam P. Davis, 1912, Vol. I, pp 208-209

¹⁵*A History of the Rectangular System*, White, 1991

¹⁶Letter to William Ives, May 3, 1862, Carson City, NT

¹⁷*History of Nevada*, Angel, Myron, "The Nye History, 1881", Thompson, 1881

¹⁸*A History of the Rectangular System*, White, 1991

¹⁹*California v. Nevada*, 447 U.S. 125, 1980

²⁰Letter to William Ives, August 11, 1862, Carson City, Nevada Territory

²¹Letter to William Ives, June 14, 1863, Carson City NT

²²*The Saga of Lake Tahoe*, Edward Scott, 1957

²³*Early Engineering Works Contributory to the Comstock*, Galloway, 1947, Mackay School of Mines

²⁴Boundary Survey Field Notes, on file with California State Lands, Sacramento, California

²⁵Letters by Ives, December, 1863, March, 1864, Carson City, Nevada Territory

²⁶*Annual Report of the Surveyor General of California for the Year 1863*

²⁷*ibid.*

²⁸Letter from John F. Kidder to George Davidson, USC&GS 1903, Bancroft Library, UC Berkeley

²⁹*Annual Report of the Surveyor General of California for the Year 1863*

³⁰*ibid.*

³¹*Chaining the Land*, second edition, F. D. Uzes, 2006

End Notes Part II

³²*A History of the Rectangular System*, White, 1991

³³Letter to William Ives, April 2, 1866,

³⁴*Testimony Taken by the United States Pacific Railroad Commission*, Vol. 6, 1887

³⁵*ibid.*

³⁶Letter to William Ives, November 2, 1867, Salt Lake City, Utah Territory

³⁷*Promontory Summit, May 10, 1869*, National Park Service, 2005

³⁸Letter to William Ives, July 19, 1869, Fort Halleck, Nevada Territory

³⁹*The Work of Giants*, Griswold, 1962, pp 247-8

⁴⁰*ibid.*

⁴¹Letter to William Ives, February 27, 1869, Ogden City, Utah Territory

⁴²*Central Pacific Railroad Photographic History Museum*, WWW.CPRR.org

⁴³*Chaining Oregon*, Kay Atwood, 2008

⁴⁴*A Tale of Two Cities and a Train*, Juanita K. Brown, 1987

⁴⁵*John Wesley North and the Reform Frontier*, Merlin Stonehouse, University of Minnesota Press 1965

⁴⁶*Chaining Oregon*, Kay Atwood, 2008