Zachow, WI • Cowboy Line Culverts • Des Moines River Bridge Demolition

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NORTH WESTERN LINES

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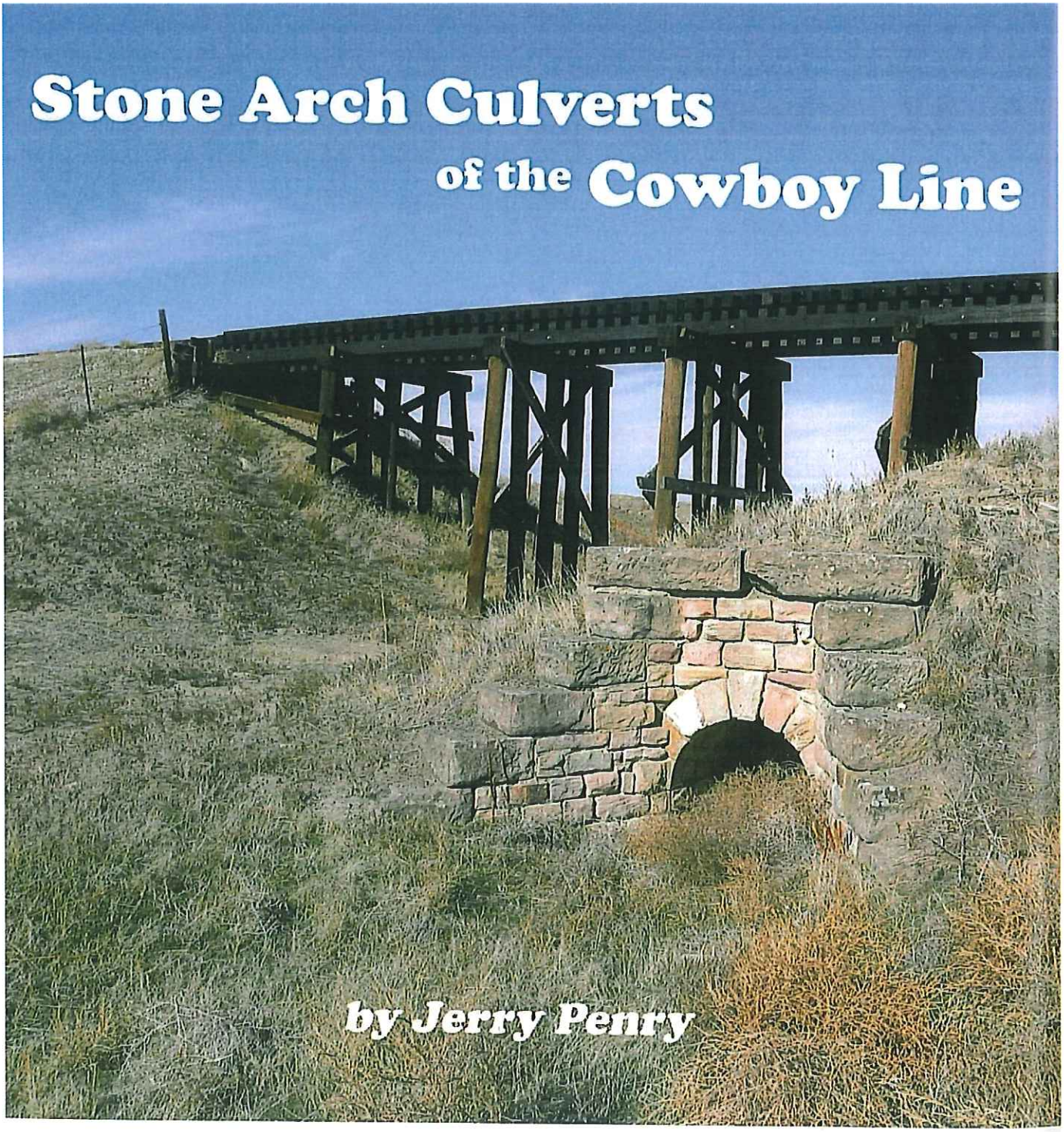
Stone Arch Culverts of the Cowboy Line



by Jerry Penry

While growing up along the Cowboy Line in north central Nebraska during its final years, I became familiar with drainage structures along parts of the line. On Highway 20 west of Atkinson near milepost 176, one particular stone culvert always caught my attention. It was noticeably different than the typical stone box or iron pipe culverts used as small drainage structures along the line. The buff and pink-colored, finely cut and shaped sandstones of this stone arch culvert were significantly different from the rough limestone blocks used for the other culverts. As far as I knew, there was not another one like it in the area.

Years later, after obtaining employment with a civil engineering firm, the drainage structures of the Cowboy Line came to have greater significance to me, especially after the abandonment of the line in 1992. Historical research into the steel trestles at Long Pine and Valentine eventually led me to a substantial stone arch culvert west of Johnstown near milepost 236. It is hidden from view when traveling on Highway 20, so few people know of its existence. With an opening 32 feet wide and 232 feet long, it rests at the bottom of a high fill where the small Plum Creek flows through. It is truly impressive. Constructed in 1903 to replace an aging wooden trestle that was built in 1882, the Plum Creek culvert is an engineering marvel for this era of the railroad in Nebraska. With massive sandstone blocks throughout its construction, it is complete with a stone floor and a small waterfall on the north end. The keystone on the north side is

Above: Culvert 654 is located 2.5 miles east of Chadron. The 48-inch opening was later determined to be insufficient, so a six-span pile bridge was built adjacent to it. *—Jerry Penry photo*

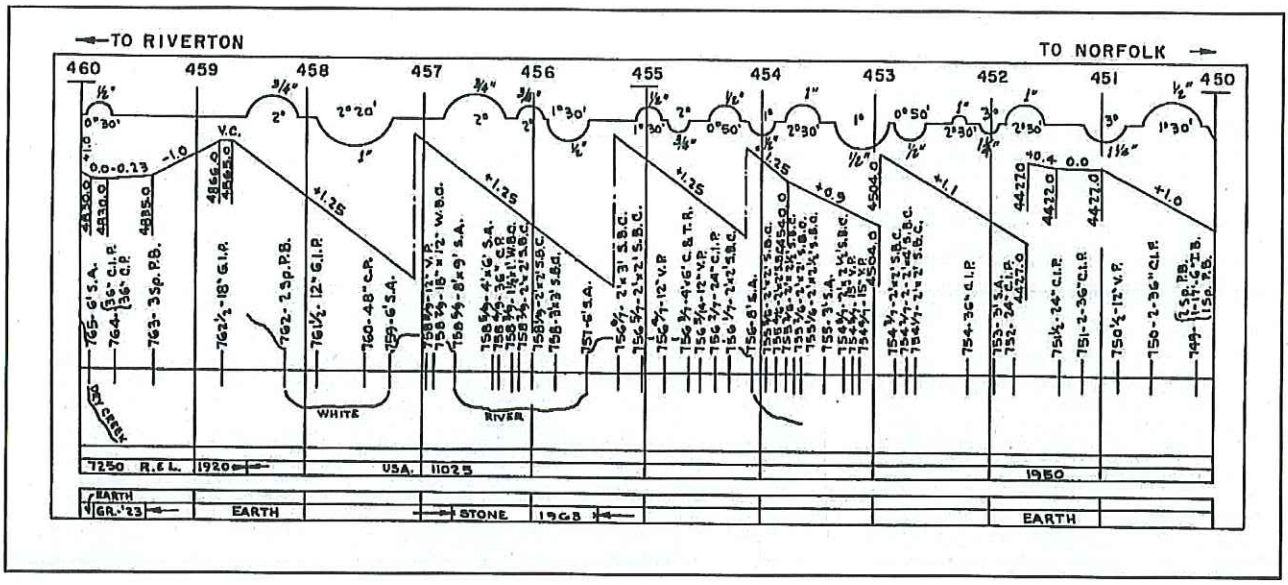
Above: Culvert 753 has a 36-inch opening and was built in 1896. It is located at milepost 452 just west of the former station of Andrews. *—Jerry Penry photo*

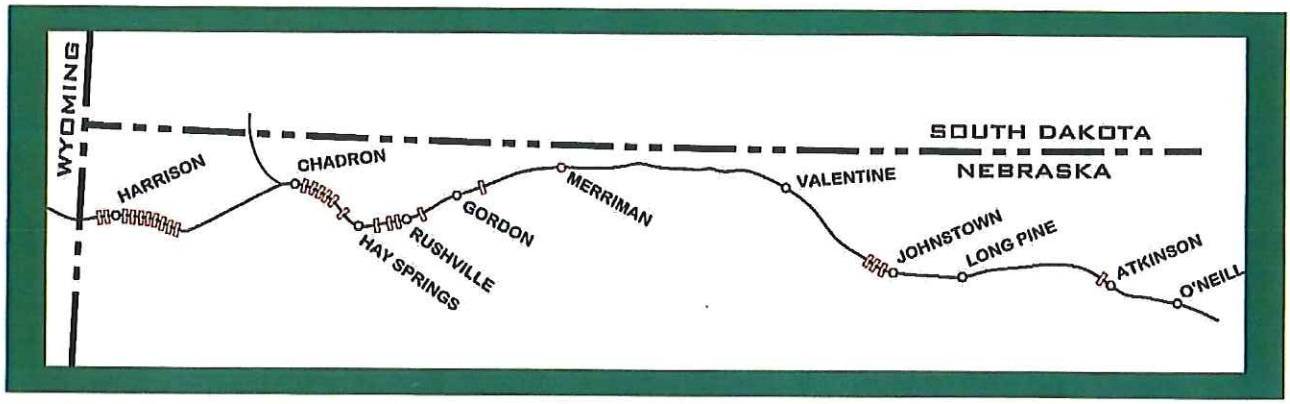
engraved with the date of its construction. Standing inside this structure with the clear water of the shallow trout stream flowing by is a surreal experience.

With my interest piqued, I began examining the track charts for additional stone arch culverts along the Cowboy Line. Drainage structures, as well as mileposts, were consecutively numbered on the line beginning at Fremont, Nebraska, increasing going west. Intermediate structures, between those with whole numbers, were given fractions such as 97 1/2 or 220 2/6. This numbering system for the Cowboy Line was updated as new drainage structures were added or removed. In some instances, a structure with a whole number is missing, but there is another structure assigned a fraction past that missing number. In other instances, it appears the designation for intermediate structures might have correlated with a fractional distance between the structures. The lone stone arch culvert between structures 337 and 338 west of Atkinson is numbered 337 2/5, but there are no other structures or possible waterways between the structures with the whole numbers. Stone arch culverts are easily identified on the track charts since they are designated with the initials "SA."

The first notation of a stone arch culvert west of Fremont is just east of Stanton near milepost 68.5. This portion of the line was abandoned in 1985. Today, there are no structures of any type where the grade crosses Indian Creek.

The next stone arch culvert, the one previously mentioned west of Atkinson, is 108 miles farther west. The large culvert at Plum Creek is 60 miles farther west. Just west of this location,





Above: Culvert 316 near Emmet is a 3-foot x 3-foot stone box which represents the simpler and more widespread method of making a culvert by a crew not skilled in the fine art of making a stone arch. *—Jerry Penry photo*

Top and above: The railroad track chart between mileposts 450 and 460 shows the locations of eight stone arch culverts designated by "S.A." This location is between Andrews and Harrison. Above, 25 stone arch culverts are marked on this Cowboy Line map between O'Neill and Harrison. *—Top, Jerry Penry collection; above, Jerry Penry illustration*

there are two separate 10-foot stone arch culverts for Little Cedar and Evergreen creeks, between mileposts 238 and 239. The keystones on each of these culverts were engraved with "1901 C.A.B." providing not only the year of their construction, but also the initials of the person responsible for designing them.

The next stone arch culvert, approximately five miles east of Gordon, is 115 miles west near milepost 355. This culvert, designated 552, has a keystone marked "1900 C.A. BERG." This important piece of additional information provides the last name of the stone mason responsible for building these elaborate structures.

Continuing west toward Chadron, the stone arch culverts begin to steadily increase in number.

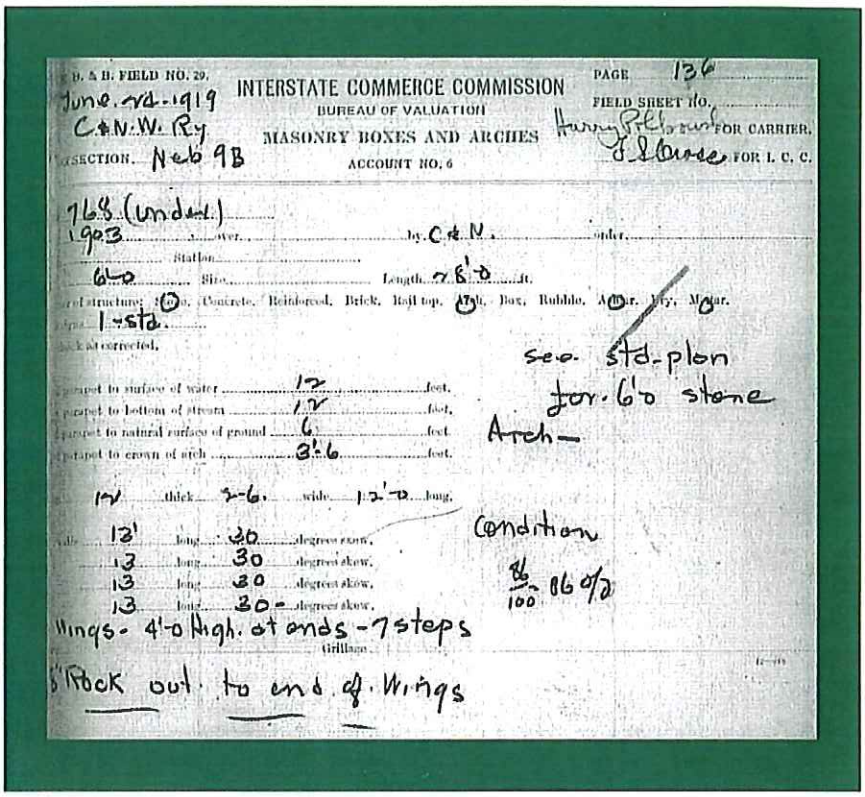
One surprise was finding a partial stone arch culvert (one mile west of Rushville) replaced with an adjacent pile bridge to facilitate additional drainage. This partial structure provides an informative side view of the arched roof and overall construction involved in building a stone arch culvert. Between Fremont and Chadron, a distance of 406 miles, there are only 16 documented stone arch culverts of an estimated 996 drainage structures. Two separate stone arch culverts, located west of Hay Springs and east of Chadron, have impressive twin 10-foot openings where only one culvert originally existed. A second opening was made by removing one of the wingwalls of the original structure and weaving in new stone blocks to create one twin structure at each site. Both keystones on the newer sides are marked with the date 1911.

West of Chadron, there are 10 stone arch culverts between the former station of Andrews near milepost 451 and the Wyoming state line near milepost 469. According to the track charts, there are 1,206 drainage structures on the Cowboy Line between Fremont and the Wyoming state line with the last structure number in Nebraska being 782 1/4. Only 26 of the 1,206 total are stone arch culverts, representing only two percent of all drainage structures. Additional stone arch culverts are located in Wyoming with the line continuing west toward Lander.

The increased frequency of the stone arch culverts on the western portion of the Cowboy Line in Nebraska as well as the scarcity on the eastern end seem to indicate that the railroad construction crew was based in Chadron. The source of the stones to build these structures was probably in eastern Wyoming or western South Dakota. Dates on other stone arch culverts and information obtained from the 1919 ICC Valuation reports indicate that most, if not all, were built between 1896 and 1911.

Two of the stone arch culverts between Andrews and Harrison have deteriorated. They were made from poor grade limestone blocks instead of hard sandstone. These culverts may be original, built in 1885 from stone taken from deep cuts made through the hills of the Pine Ridge region of that area. One particularly interesting culvert was built on a shallow angle with the railroad and on a curve to match the direction of the drainage flow instead of being built perpendicular to the tracks. This culvert, near milepost 457, measures 9 feet wide and 202 feet long with additional long stone wingwalls on the ends.

Not all of the stone arch culverts were built for drainage purposes. Several were built specifically as livestock underpasses. By their construction with tall sides and an arched roof, these structures must have provided confidence to the



B. & B. FIELD NO. 29. INTERSTATE COMMERCE COMMISSION PAGE 136
June 22-1919 BUREAU OF VALUATION FIELD SHEET NO.
C&N.W. Ry MASONRY BOXES AND ARCHES FOR CARRIER.
SECTION. Neb 9B ACCOUNT NO. 6 FOR I. C. C.

768 (und.)
1903 over by C & N. under
Station
6-0 Size Length 78'-0 ft.
Kind of structure: Stone, Concrete, Reinforced, Brick, Rail top, Arch, Box, Rubble, Ashlar, Dry, Mortar.
1-sta.
Skew corrected.
see std-plan for 6'0 stone Arch—
Parapet to surface of water 12' feet.
Parapet to bottom of stream 12' feet.
Parapet to natural surface of ground 6 feet.
Parapet to crown of arch 8'-6 feet.
12' thick 2-6 wide 12'-0 long.
Condition 86 0/2
13' long 30 degrees skew.
13 long 30 degrees skew.
13 long 30 degrees skew.
13 long 30- degrees skew.
Wings- 4'-0 high. at ends - 7 steps
Grillage
Rock out to end of Wings

Above: In 1919, every culvert was documented with a Valuation report of the ICC. Stone arch culvert No. 768 west of Harrison was determined to have been built in 1903 and at that time was deemed to be in 86 percent of its original condition. *—Jerry Penry collection*

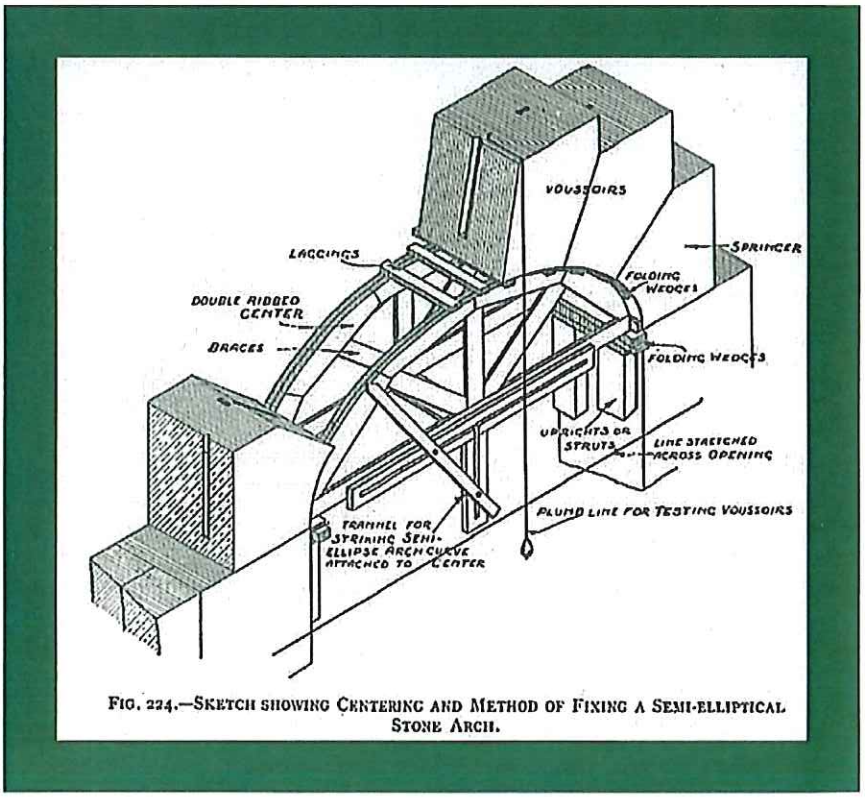
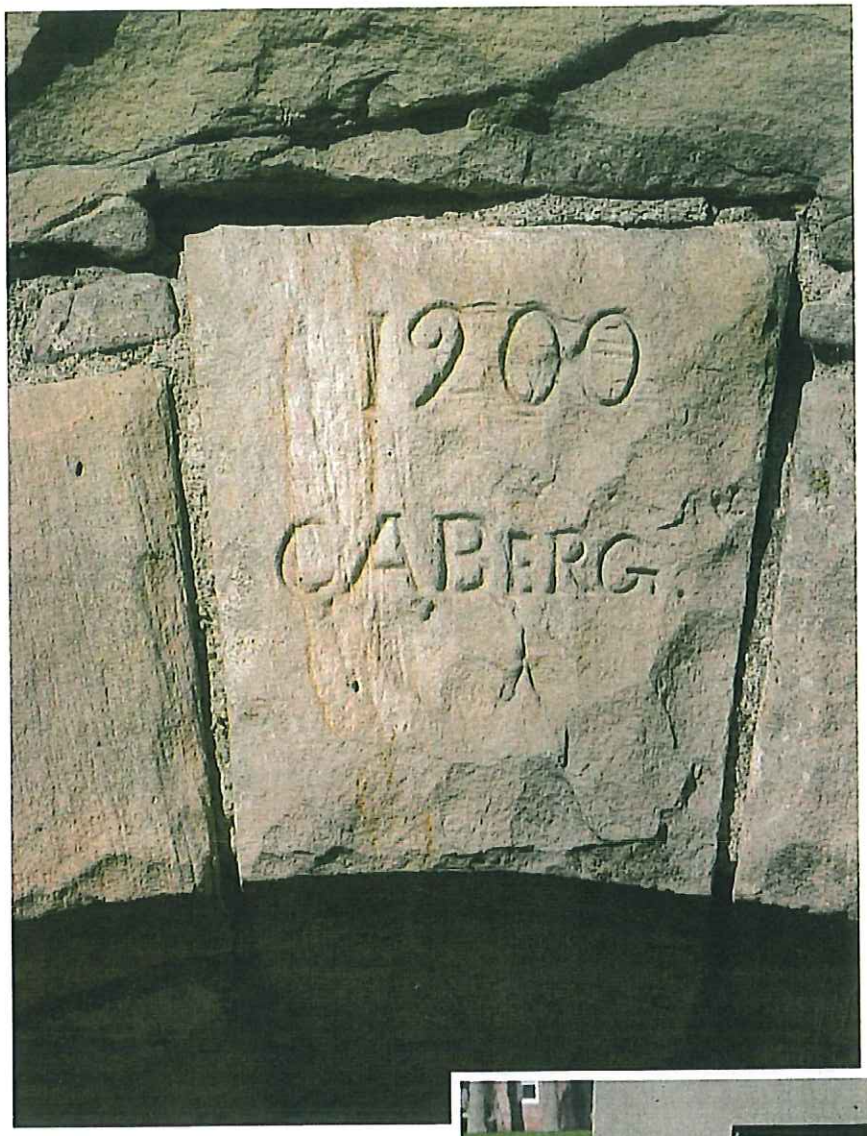
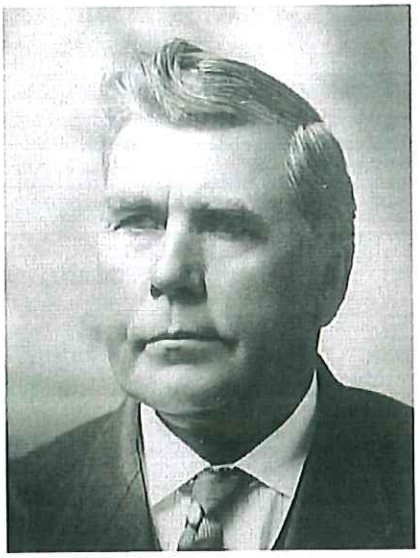


FIG. 224.—SKETCH SHOWING CENTERING AND METHOD OF FIXING A SEMI-ELLIPTICAL STONE ARCH.

Right: This diagram from Modern Practical Masonry (Edmund George Warland) illustrates the inner wooden framework and how each stone had to be individually shaped as a piece of the puzzle for building a stone arch culvert. *—Courtesy Jerry Penry*



Above: Charles A. Berg occasionally left the date and his initials or name on the keystones of the stone arch culverts he built. This culvert, No. 552, is located five miles east of Gordon. *—Jerry Penry photo*



Above, below, and opposite page below: Charles A. Berg was the mastermind behind the construction of the stone arch culverts on the Cowboy Line. The Berg tombstone is pictured below and on the opposite page. It is likely that Berg made his own tombstone in the Greenwood Cemetery in Chadron when his first wife, Martha, died. The dates of Berg's birth and death were never added. *—Above, courtesy Mike and Terri Shelby; below and opposite page, Jerry Penry photos*

livestock that used them, whereas another type of culvert may have made them wary to enter.

The Berg Family

Additional research eventually led to discovering descendents of Charles A. Berg and to more information about him.

Berg was born in Nasby, Darlarne, Sweden, on March 27, 1858. As a young adult, he immigrated to America and settled near Marshalltown, Iowa, where he married Martha Newblom in March of 1885. That same year the couple moved to western Nebraska where they obtained a homestead near Hay Springs.

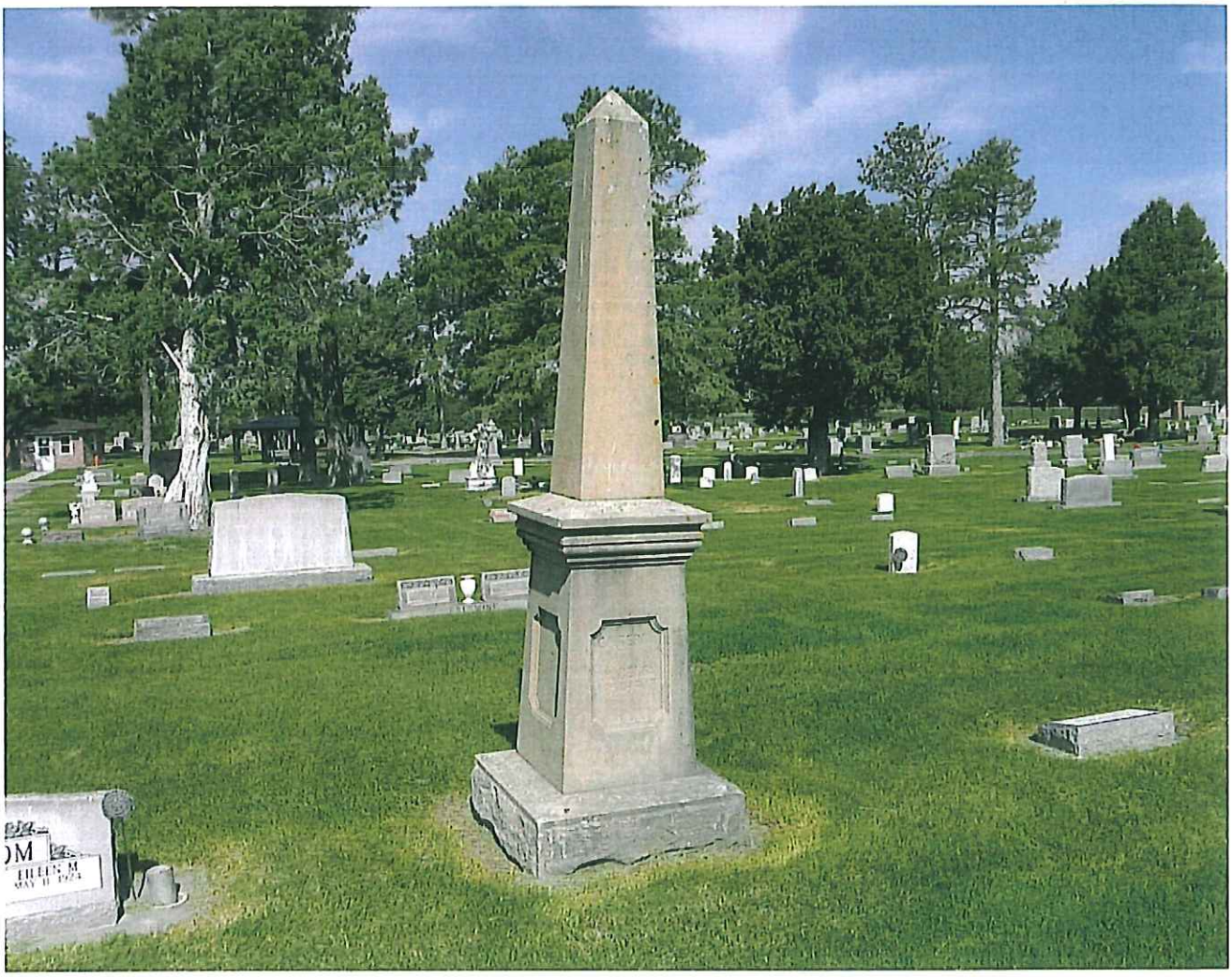
Berg found employment with the railroad and subsequently moved to Chadron. His masonry skills from Sweden proved to be unlike those of previous workers along the northern Nebraska line.

Based in Chadron, Berg was the foreman of

Right: This photo was taken at Lead, South Dakota, around 1903. Berg's family often traveled with him in a railcar fitted for living quarters. Pictured left to right: John and Jennie Haglund with baby, Leonard, Charles Berg and his wife, Martha, unknown man, and Anna and Hugh Mathews. Haglund and Mathews were Berg's sons-in-law. *—Courtesy Mike and Terri Shelby*

the railroad's construction crew that built drainage structures on lines in Nebraska, Wyoming, and South Dakota. Apparently, this skilled mason took it upon himself to build drainage structures that could not only stand the test of time, but also add an element of architectural beauty to an otherwise bland but necessary feature of the railroad.

Before Berg's arrival, the roofs of small culverts typically consisted of stone slabs laid across stone side walls, often requiring the culvert to have a smaller opening. Other early types of small drainage structures were iron culverts with stone headwalls and pile bridges in areas requiring larger openings. These pile bridges were originally built from untreated timbers and had a short life



Above: The largest stone arch culvert on the Cowboy Line is No. 437 located three miles west of Johnstown. This culvert was built in 1903 for Plum Creek and has a massive opening of 32 feet and a length of 232 feet. —*Jerry Penry photo*

Left: This image shows the inside of Culvert 756. It was built in 1896 6.5 miles east of Harrison and has an 8-foot opening. —*Jerry Penry photo*

span. In many instances, Berg and his crew were building the stone arch culverts under an existing pile bridge while trains continued to cross during construction. Once the crew completed a stone arch culvert, they filled in the pile bridge over and around the new stone arch culvert.

Berg's wife, Martha, died at Chadron in 1913. Around this time, Berg may have ceased employment with the railroad since research indicates he had worked for the railroad for 25 years. The last known date on a stone arch culvert is 1911. It is around this same time period that a new method of building large, cost effective drainage structures using concrete mixed with stone aggregate began to predominate.

Berg married Christine Newblom, a sister-in-law to Martha, in 1914. Six years later, the couple moved to Marshalltown. Christine died in 1932. Charles A. Berg died at Marshalltown on No-

Above: The stubs of timber piling can still be seen coming up from the floor in Culvert 437 that was built in 1903. These pilings supported the wooden framework while the culvert was being built. *—Jerry Penry photo*

vember 14, 1937, at the age of 79. He is buried in the Greenwood Cemetery on the west side of Chadron with a buff-colored stone obelisk for his tombstone. Berg most likely crafted this marker himself upon the death of his first wife since her name is on the stone. In a separate cemetery near Chadron, Berg made a similar grave marker for his father. The engraving on both stones is strikingly similar to the engraving found on the keystones of some of the stone arch culverts.

Culvert Construction

Building a stone arch culvert required first constructing an internal wooden framework to support the stone blocks arching toward the center of the roof. Each block had to be precisely cut and shaped to fit a particular position on the culvert. Unlike the construction of stone box culverts, the stone arch culverts had to be planned in advance with each block cut and shaped at the

Right: Each stone block around the arch had to be individually shaped to fit the right position and had to match the other blocks going outward from the arch. *—Jerry Penry photo*

Left: Charles A. Berg and his crew pose in front of the Fremont County Courthouse in Lander, Wyoming. Berg is standing in the font row. —*Courtesy Mike and Terri Shelby*

quarry as individual pieces of a puzzle.

The center keystone, formed in the shape of a wedge, was key to the roof's structure and kept it from collapsing. Only a skilled mason would have attempted this construction technique. It required expertise the average railroad worker would not have acquired unless under the tutelage of someone like Berg. Once the culvert was in place with the keystones down the center of the roof in position, the wooden support structure was removed. Pilings down the center of the framework were usually cut off, or if the stone floor was first put into place, the pilings rested upon the stone floor. In the massive Plum Creek culvert, the wooden center pilings can still be seen 110 years later just below the surface of the water, sticking up through holes in the stone floor.

The source for the stone used in the construction of these stone arch culverts is not positively known. One potential source was a quarry south of Glenrock, Wyoming. Other more plausible sources were quarries located just east of Hot Springs, South Dakota.

The Burke Quarry and the Evans Quarry near Hot Springs were early quarries served by the C&NW from the 14-mile spur off the main line to Rapid City from Buffalo Gap. Numerous structures in Hot Springs, including Union Station, were made from sandstone blocks originat-

Above: The station at Hot Springs, South Dakota, was built in 1891 from native sandstone from a nearby quarry. It is believed this same quarry supplied the stone for most of the stone arch culverts built by Charles A. Berg. —*Jerry Penry photo*

Above: Culvert 596 3/4 has a 6-foot opening but was built too small to handle the drainage. A three-span pile bridge was later built alongside. The culvert is located five miles west of Rushville. The culvert and bridge are similar to Culvert 654 and its bridge. —*Jerry Penry photo*

Above: It is not uncommon to find the initials of various men inside the culvert. These initials inside Culvert 578 east of Rushville are believed to be from Hugh Mathews who was Berg's son-in-law. —*Jerry Penry photo*

Above: The intricate masonry work by Berg and his crew can be seen where the tight-fitting stones of the wingwall meet the straight section of Culvert 578. —*Jerry Penry photo*

Opposite page left and right: Culvert 653, located three miles east of Chadron, was originally built as a single 10-foot opening in 1898. In 1911, a matching culvert was built next to it with the new stones woven into the earlier structure. The opposite page lower right image shows Pile Bridge 654 as it overwhelms the earlier stone arch culvert built at this location east of Chadron. *—Jerry Penry photos*

Left: Built in 1900, Culvert 588, located one mile west of Rushville, was partly dismantled when a depressed girder bridge later replaced it over Rush Creek. *—Jerry Penry photo*

Above: Culvert 759, located three miles east of Harrison, served a dual role as a drainage structure and a cattle underpass. It was built in 1901 with a 6-foot opening. *—Jerry Penry photo*

Above: The last stone arch culvert heading east on the Cowboy Line is No. 337 2/5 located three miles west of Atkinson. It was built in 1907 with a 54-inch opening. *—Jerry Penry photo*

Above: Culvert 758 6/9 is constructed of poor grade native limestone from the area located 3.5 miles east of Harrison. It was built beneath a 2-degree curve in 1896. This impressive structure has a 9-foot opening and is 202 feet long with extended wingwalls. —*Jerry Penry photo*

Above and right: The keystone for Culvert 439 located six miles west of Johnstown is marked with the year and Berg's initials. The keystone on Culvert 622 is marked for the year only. It is a second 10-foot structure added to an existing structure of the same size that was built in 1898 located 4.5 miles west of Hay Springs. —*Jerry Penry photos*

ing from these quarries. The stone from the Evans Quarry is known for its pink hue which is similar to the color of many of the stone arch culverts.

A cloudburst in June of 1937 washed out many bridges between Buffalo Gap and Hot Springs. The C&NW decided that repairing these bridges was cost prohibitive and so abandoned the line in 1939. Although access to the quarries near Hot Springs had once been a major source of revenue, builders had almost exclusively begun favoring concrete over stone.

At least a dozen additional stone arch culverts are known to exist between Dakota Junction, located west of Chadron, and Whitewood, South Dakota, north of Rapid City. Although not all of the stone arch culverts have markings on the keystones, nearly all of those found in western South Dakota have the same look and design as those

Above: Culvert 552, located five miles east of Gordon, was later assisted with two 84-inch concrete pipes to handle more drainage. —*Jerry Penry photo*

Above: Culvert 622 is a twin 10-foot structure that was built in 1898 and rebuilt in 1911. One of the original wingwalls had to be moved. —*Jerry Penry photo*

Above: The ends of Culvert 768 west of Harrison had concrete pipes added to the openings. —*Jerry Penry photo*

known to have been built by Charles A. Berg. The drainage structures on the Dakota Junction-to-Colony, Wyoming, line begin the numbering at Dakota Junction and increase going north. Each of the numbers on these structures are preceded by the letter "H."

The stone arch culverts provide an interesting chapter in the history of the Cowboy Line. If Charles A. Berg had never found employment with the railroad, these unique structures may never have been built.

Below: Culvert 767, built in 1901 with a 48-inch opening, later had an 84-inch concrete pipe added next to it. It is located 1.5 miles west of Harrison. —*Jerry Penry photo*