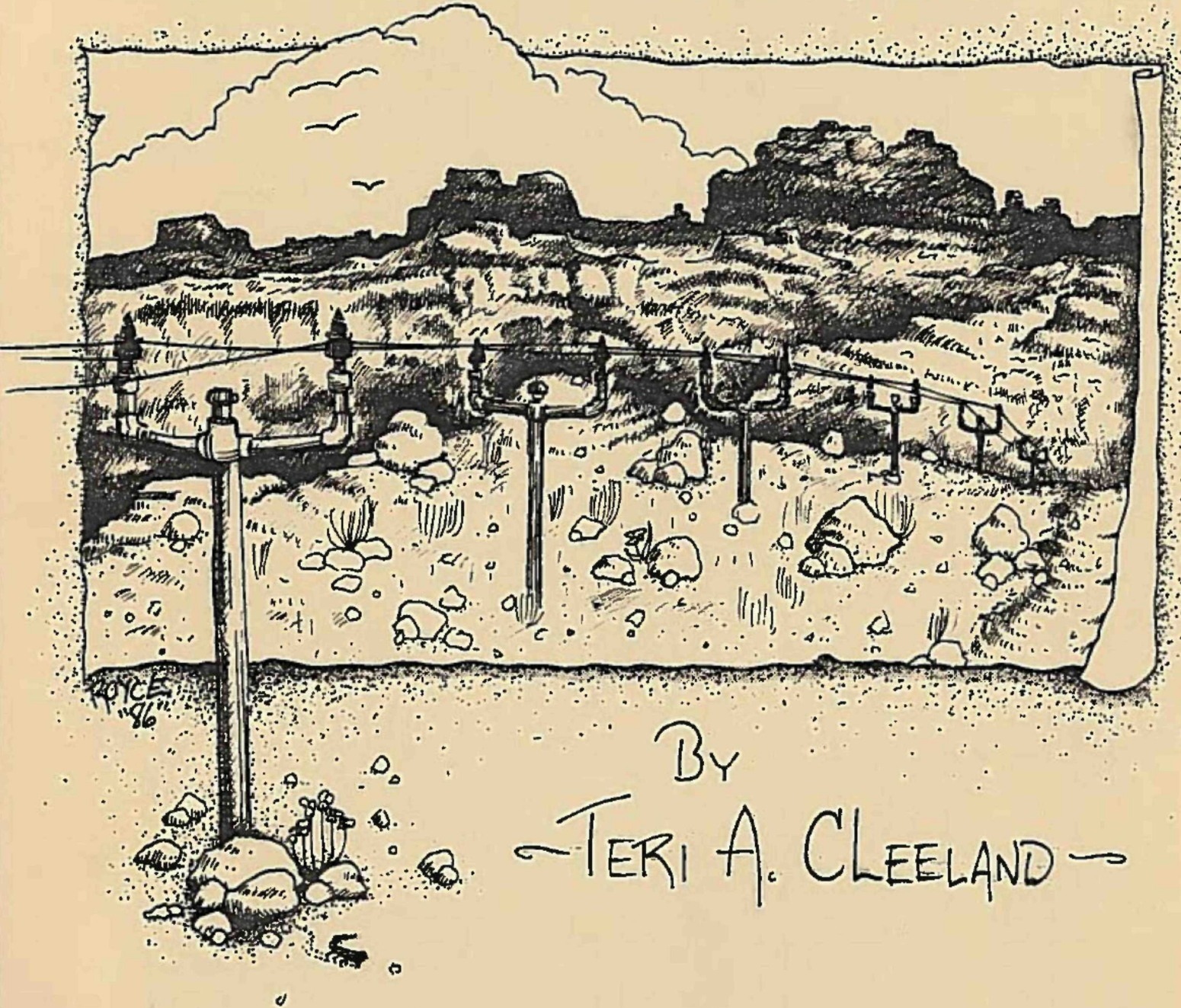


HISTORY OF THE TRANS-CANYON TELEPHONE LINE ~ GRAND CANYON NATIONAL PARK ~



By
~ TERI A. CLEELAND ~

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THE TRANS-CANYON TELEPHONE LINE,
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For
Mountain Bell

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PREFACE

This paper resulted from research I conducted for the National Register nomination of the Trans-Canyon Telephone Line in Grand Canyon National Park. Mountain Bell sponsored the research and nomination of this important historical resource, and I commend them for their efforts in historic preservation. From this report, I hope that the reader will gain a new perspective on the history of Grand Canyon and learn why it is important to preserve this piece of the past.

I wish to thank the trans-canyon lineman, Marvin Hanchett, who initiated the project and enthusiastically assisted throughout. Dick Parcell, manager of the Flagstaff office, and Anne Hampton, of Hampton House, were also instrumental in guiding the project to its successful completion. The professionals at the National Park Service Grand Canyon Study Collection, particularly curator Ed Chamberlain, provided cheerful and expert assistance during the research phase of the project. The historical photographs are from their collection.

This report is dedicated to the Arizona Telephone Pioneers, who keep our interest in telephone history alive.

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Introduction

The trans-canyon telephone line crosses one of the seven natural wonders of the world: the Grand Canyon in northern Arizona. It is approximately eighteen miles long and roughly parallels the Bright Angel and North Kaibab Trails from the South Rim to Roaring Springs, with a spur line running two miles up the South Kaibab Trail to the Tipoff (Figure 1). The line consists of a series of 592 metal poles strung with copper-weld wire (Figure 2). The Civilian Conservation Corps installed the line in 1935 and added another circuit to it in 1938-1939. It is owned and maintained by Mountain Bell.



Figure 2. Close-up of a telephone pole, the trans-canyon line.

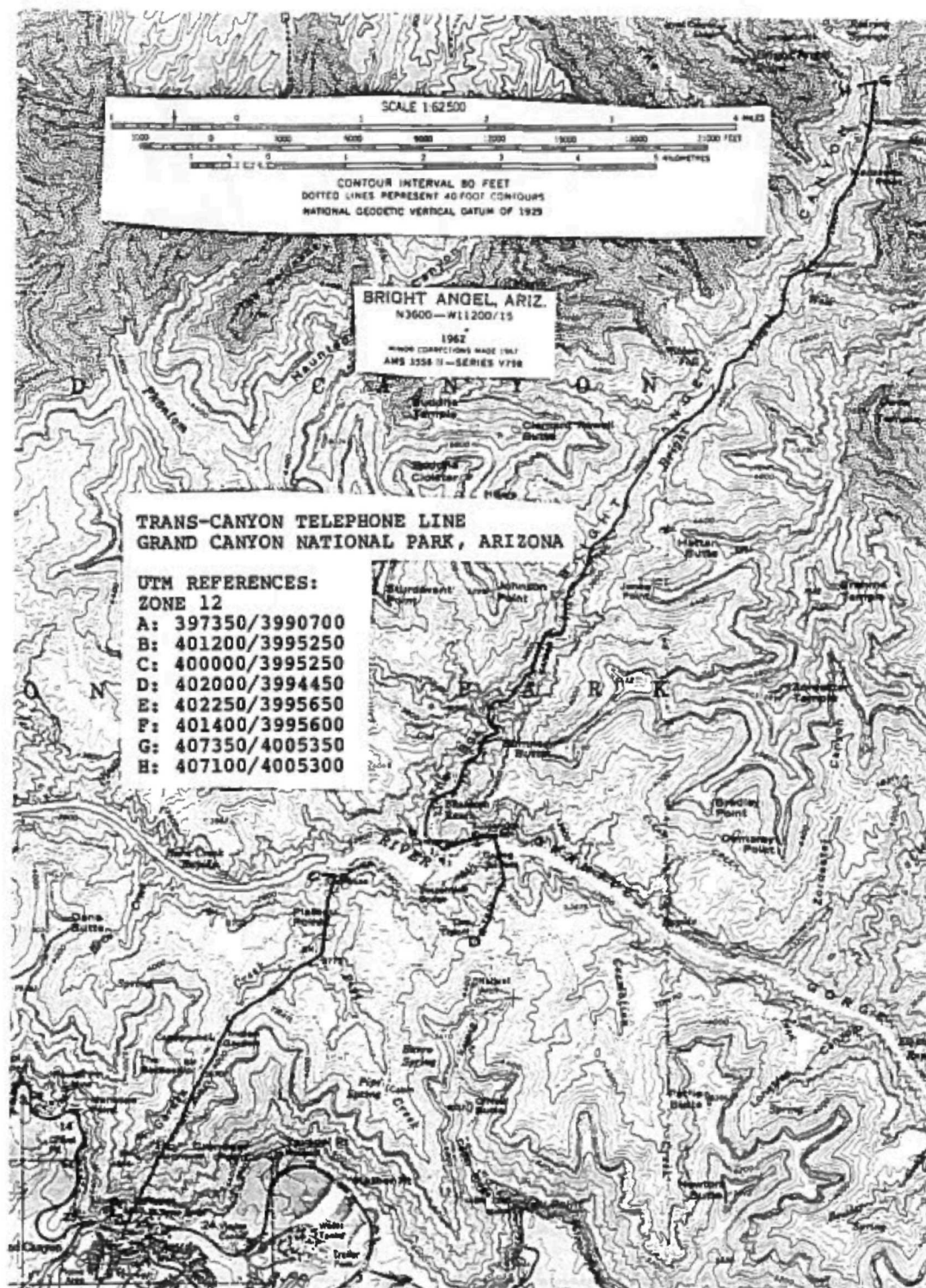


Figure 1. Topographic map showing the location of the trans-canyon telephone line.

Location

The line runs from rim to river, descending nearly a mile from pine forest to desert. Over most of the way, the terrain is rough and rocky, with many steep cliffs; the landscape is generally desert-like, with sparse forest vegetation toward the rims.

From the south, line begins in the vicinity of the Bright Angel Lodge. It descends one thousand feet down steep cliffs alongside the cross-canyon water line to Mile-and-a-Half Resthouse on the Bright Angel Trail, where an emergency telephone is located. The line drops another thousand feet in elevation on the east side of the trail to Three-Mile Resthouse, which also has an emergency telephone. After descending the Redwall escarpment, the line continues north to Indian Gardens. The ranger station there has a telephone extension. Below Indian Gardens, the line runs alongside the original Bright Angel Trail down Salt Creek Canyon to Pipe Creek. The line then rejoins the present trail and terminates at the River Rest House on the Colorado River, which has an emergency telephone.

The other section of the line begins at the emergency telephone located at the Tipoff, above the Inner Gorge on the South Kaibab Trail (Figure 3). It drops about twelve-hundred feet to the east side of the Kaibab Suspension Bridge, where it crosses the Colorado River, and runs along the North Kaibab Trail to Phantom Ranch (Figure 4). Here it serves both the National Park Service and Fred Harvey facilities. The line continues north alongside the trail to Cottonwood Camp, where the ranger station has an extension. It continues north for another two-and-a-half



Figure 3. The trans-canyon telephone line at the Tipoff.



Figure 4. The trans-canyon telephone line at the Colorado River.

miles to Roaring Springs, the source of water for both rims, where it terminates.

Description

The telephone poles are fashioned from pipe manufactured by the Jones and Laughlin Company. The pipe is in four- and eight-foot sections, which could be screwed together depending on desired pole height. The poles are fitted with cross-arms to hold the circuit lines. The poles vary in overall height from about two to twelve feet, determined by the nature of the rugged terrain, but most are about eight to ten feet high. The telephone line itself is an open-wire copper line with welded sleeves. It has a variety of insulator types, including: original aqua glass "Hemingray-9", "Hemingray No. 40", "McLaughlin No. 9", porcelain "Thomas", and an unmarked porcelain type. Today, nylon insulators are used as replacements.

The line stands today essentially as it did when installed in 1935, although the top cross-arms on many poles were added when a second circuit was installed in 1938-1939. Most of the original telephone wire remains in use today.

Two sections of the original line have been removed: about one and a half miles of line between the River Rest House and Phantom Ranch in 1982, and about three miles of line from Roaring Springs to the North Rim several years previously. The poles from the river section do duty today in the Bright Angel and Indian Gardens campgrounds. Hikers hang their backpacks on the cross-arms to deter rodents.

Mountain Bell installed a microwave transmitter at Phantom Ranch in 1982. Telephone calls are relayed via the telephone line to the microwave, which transmits the calls to the South Rim switching station. Telephone stations at the three Resthouses along the Bright Angel Trail provide emergency connections along the line directly to the Park Service dispatcher on the South Rim. Many an injured or disabled hiker has been rescued as a result of these emergency lines. Although the telephone line no longer runs from rim to rim, it is still an essential trans-canyon communication system and a reminder of the days when man first asserted himself, via technology, in the timeless canyon.

The Telephone in Arizona and the Grand Canyon

The first telephone exchange in Arizona was established by the Consolidated Telephone, Telegraph, and Electric Company in Tucson on April 1, 1881. It later became the Arizona Telephone and Telegraph Company, and under this name, established exchanges all over the state. On May 20, 1912, the Mountain States Telephone and Telegraph Company bought all of the exchanges from the A. T. and T., including the one located at Flagstaff. In 1912, Grand Canyon had no central exchange; the telephone system operated under a confusing maze of private and government ownership.

It is unclear just when telephone service arrived at Grand Canyon, but one merchant there advertised long-distance service in 1901: "If you want to talk to anyone in Williams or along the rim of the Grand Canyon let us know. Get our rates; they are right. Long-distance 'phone, at Timerhoff's."¹

As early as 1903, a line set on wooden poles ran from the South Rim to Indian Gardens, a tourist destination about 3,000 feet below the South Rim and midway to the Colorado River on the Bright Angel Trail. Entrepreneur Ralph Cameron probably installed it, for he controlled the Bright Angel Trail and Indian Gardens with mining claims and a toll road franchise. By 1916, the Santa Fe Railway had built a telephone line from the South Rim to their tourist camp located at Hermit Basin. The camp was several miles west of Indian Gardens, at the same elevation. In 1922, when the Park Service built their original trans-canyon telephone line, they proposed running a spur line from Indian Gardens west to Hermit Camp. The line was likely removed along with the rest of the Hermit Camp facilities in about 1930.

Until the summer of 1929, several individual concerns like the Park Service and the Santa Fe Railway Company operated separate telephone systems using outmoded equipment. Then the Mountain States Telephone Company brought a central switchboard and new equipment to the South Rim. The Park Service built and maintained all of the telephone lines in the Park, which were connected to the Mountain States switchboard. The symbiotic relationship between Mountain States and the Park Service lasted until 1957, when Mountain States bought all of the Park Service lines for a sum of \$17,440.62. The replacement cost of the trans-canyon line alone was estimated at that time to be \$43,240.00. It was the most expensive of the many lines transferred to the company. Mountain States, now Mountain Bell, continues to own and maintain all of the telephone lines at Grand Canyon.

The trans-canyon line is the only telephone line in the state of Arizona which is still maintained from mule-back. Al Kendall, who just recently retired, maintained the telephone line for twenty years. Marvin Hanchett, the muleskinner lineman, has taken charge for the past two years (Figure 5). He's worked on every pole along the rough and rocky line.



Figure 5. Marvin Hanchett repairing the trans-canyon line.

THE TRANS-CANYON TELEPHONE LINE

Historical Background

Congress established Grand Canyon National Park on February 26, 1919. The National Park Service (NPS), created only three years earlier, took control of the park from the Forest Service, who had managed it as a National Monument since 1908. When the

Park Service arrived at Grand Canyon, it found a dearth of facilities, staff, and funding. Yet visitation was growing at a rapid rate, and despite the limited staffing and funds, Park management had to quickly rise to the challenges of administering and protecting the vast natural beauty of Grand Canyon.

The Park had the unique distinction of being split by the impressive gorge which separated the administrative center of the South Rim from the more remote North Rim. It is difficult to imagine the isolated situation of the North Rim in the early years of this century. Virtually cut off from the rest of Arizona by the depths of the Grand Canyon, it was also isolated from far away population centers in Utah by the dirt roads which were sometimes impassable during the muddy rainy season, and blocked by snow in the winter.

Although the two rims were only ten air miles apart, travel between them in 1919 was an arduous task. One had to hike or ride a mule over a primitive twenty-five mile long trail system (the precursor to today's well-maintained trails) and cross the Colorado River on a rusty old cable car. The alternative involved travelling hundreds of miles over dirt roads by automobile, and crossing the Colorado River on a hand-drawn ferry. The Park administration needed a rapid and reliable communication system between the rims. Moreover, plans for inner canyon development would soon bring staff and tourists to Indian Gardens, Phantom Ranch, and the North Rim, increasing that need.

Because of funding limitations, facilities were first developed on the South Rim. However, by 1921, the Park Service start-

ed to improve the inner canyon trail system in the main trail corridor which followed the Bright Angel fault to the North Rim. The Fred Harvey Company began to build a tourist resort, later known as Phantom Ranch, at the mouth of Bright Angel Creek. In 1922, the United States Geological Survey (USGS) established a river gauging station and residence for their hydrographer there. The park needed to station a ranger in the inner canyon to oversee the various activities. All of these functions required a reliable communication system.

The 1922 Trans-Canyon Telephone Line

The essential telephone line arrived at the bottom of the Grand Canyon in mid-January 1922. A small crew hired by NPS for the project installed the single wire line on trees and rocks. They probably worked with limited funding, since they did not use telephone poles. One of the men who worked on the line was Weaver Wren, the father of Flagstaff dentist Howard Wren. Little is known about the men who constructed the 1922 line or how they overcame the considerable engineering difficulties the canyon posed.

The Northern Arizona Leader announced that "the first telephone line across the Grand Canyon . . . has been working perfectly from Grand Canyon to Roosevelt Chalet [Phantom Ranch], 11 1/2 miles. There are stations at Indian Gardens and Pipe Creek."² The crew completed the line up Bright Angel Canyon to the North Rim on July 27, 1922. The Park Superintendent's report for the year 1923 mentions the new line: "The telephone system

has been maintained in satisfactory condition. Its extension to the North Rim last season has proved of inestimable value."³

Communication boon that the telephone line was, users still experienced problems with it. In 1925, the USGS, who relayed daily river level observations by telephone to the Weather Bureau, reported having considerable difficulty making calls on account of "the telephone line being out of commission, or unusual use of the line by other parties."⁴ The single wire line could only support one conversation at a time, and increasing use soon taxed it. Unfortunately, there was little the park could do about the situation without funding to improve the line. Ironically, the Great Depression would bring the needed funds to Grand Canyon.

The Civilian Conservation Corps

When Franklin D. Roosevelt took office in the midst of the Depression, he instituted a plan which would have an enormous effect on National Parks and other government lands. The "Emergency Conservation Work [ECW] Act" of March 1933 authorized the Department of Labor to recruit young men as Civilian Conservation Corps (CCC) enrollees, organized and transported by the War Department and put to work by the Departments of Agriculture and Interior. The National Park Service gained recruits to perform a variety of projects. At Grand Canyon, they did road and trail work, constructed buildings and bridges, cleared brush and planted trees--and completely rebuilt the trans-canyon telephone line.

The 1935 Trans-Canyon Telephone Line

Although the park had plans for the telephone line reconstruction in late December 1933, the project did not begin until November 1934. In that month, CCC enrollees surveyed the proposed line and cleared a right-of-way as far as the Colorado River, roughly along the old Bright Angel Trail. The ruggedness of the canyon is demonstrated by the fact that the task required nearly four-hundred man-days of labor. In December 1934, workers began to set poles, operating out of a side camp at Indian Gardens. Figure 6 is a photograph of the hardy crew at Indian Gardens, and Figure 7 shows two of them installing a pole nearby.

The park needed to use telephone poles which were suited to the rugged canyon, keeping in mind that men or mules would haul in all supplies. The poles had to be permanent, inconspicuous, and easy to transport. Since the rocky terrain required drilling for poles, a small diameter was also desirable. Standard wooden poles were too large, unwieldy, and subject to rot, eventually necessitating replacement. The park decided that two-inch galvanized iron pipe would be an ideal material for pole construction. It fulfilled all the requirements, and was inexpensive as well. It came in two lengths: four feet and eight feet, the maximum length for a mule-load. These lengths could be fitted together if necessary, and the flexibility of such poles was well-suited for the craggy terrain, since pole height varies from one to eleven feet. CCC workers custom fitted the poles with the cross-arms which held the circuit.

This type of pole is unique, although at least one other example of metal pole construction in the west is known. That is



Figure 6. The CCC crew at Indian Gardens, 1935.

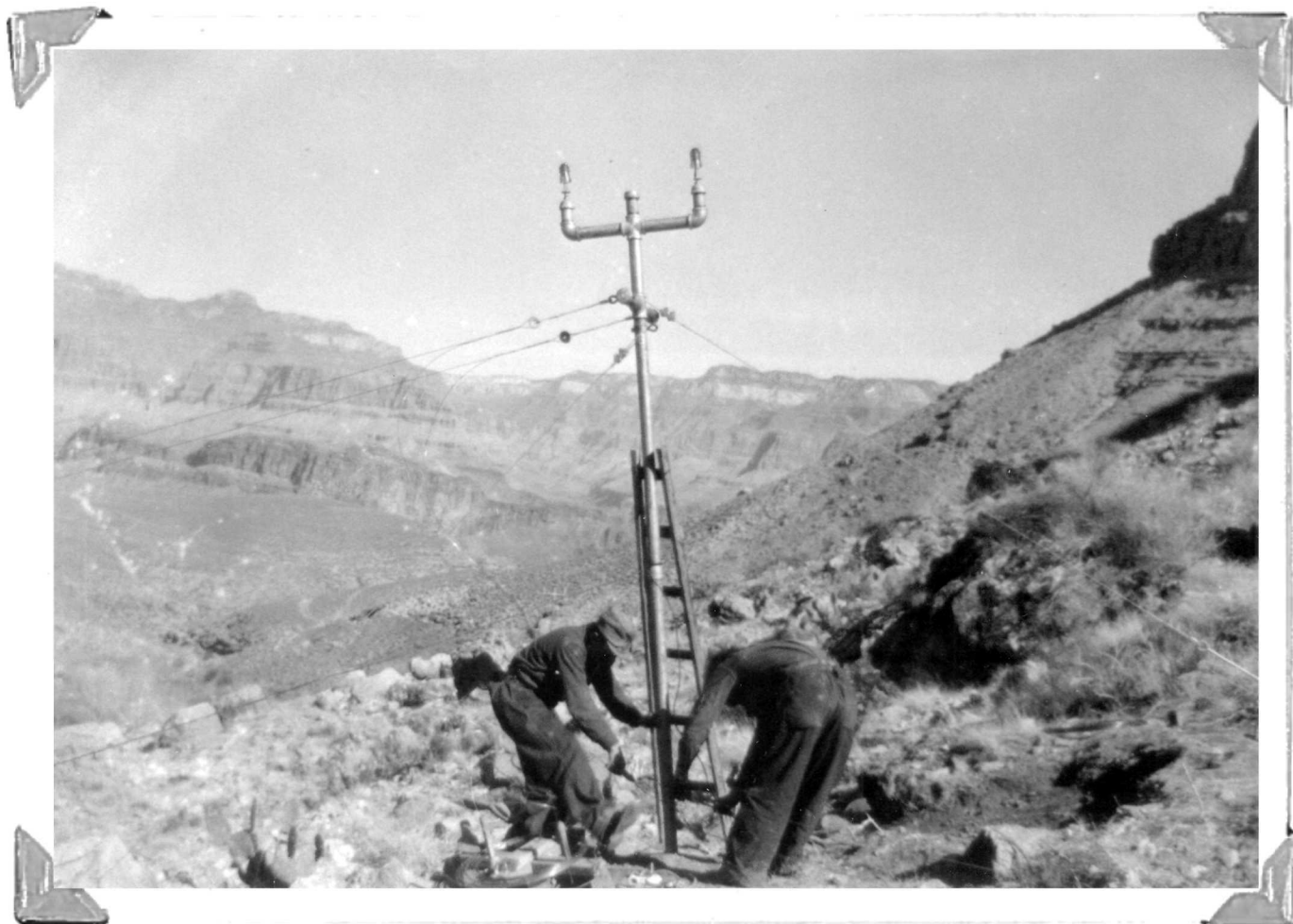


Figure 7. Installing a pole near Indian Gardens, 1935.

a telephone/telegraph line in Nine-Mile Canyon near Price, Utah, which was built in the late 1880s. The metal poles there, different than the inner canyon ones, became necessary because Indians constantly cut down the wooden poles.

The CCC enrollees lived in separate camps and worked on a variety of projects from those camps, so the Indian Gardens crew only worked on portions of the line from the South Rim to the Colorado River, moving into the canyon in winter and staying on the rim in summer. Likewise, the crew who installed the line from the River to the North Rim lived at Phantom Ranch in winter and the North Rim in summer. There was no single crew, then, who installed the entire line; it resulted from the efforts of many young men.

By March 1935, they had installed the line to a point just past Phantom Ranch. With the line from rim to river ninety percent complete, over fourteen-hundred man-days had been expended. A spur line ran past the Kaibab Suspension Bridge and up the South Kaibab Trail for about two miles to an emergency telephone at the Tipoff.

In March, CCC workers from the Phantom Ranch camp began the thirteen mile long telephone line section up Bright Angel Canyon to the North Rim. Figure 8 shows men installing a pole north of Phantom Ranch. They set up a side camp at Cottonwood Campground, seven miles from Phantom Ranch. By July, 1935, crews were working down from the North Rim and up from the bottom of the canyon. The crews finally completed the new trans-canyon line in September, 1935.



Figure 8. CCC workers installing the line north of Phantom Ranch.

I recently had the pleasure of speaking by telephone to two men who worked on these sections of the line. Mr. Nick Duncan of Kanab, Utah, was a crew leader on the line installation between Phantom Ranch and Roaring Springs. His crew was about 15 to 20 men in size, and the men worked in pairs. After they surveyed pole locations, these men used a single-jack hand drill to excavate a hole about eight inches deep. The telephone pole was placed in the hole and set with concrete. Mr. Duncan remembers

the work as being tough, but rewarding. It required stamina and ingenuity to run the line through the twisting, rocky canyon. Mr. Louis Purvis of Brownwood, Texas, was stationed at the North Rim in the summer of 1935, and worked from the top down to meet the crews coming up from Roaring Springs. The line came straight off of Uncle Jim Point, and dropped over 3,000 feet off sheer cliffs. It was not a job for the faint-hearted.

To protect the beauty of natural landscapes, the Park Service had a policy of keeping all construction as inobtrusive as possible, and each park had a landscape architect who supervised CCC projects. At Grand Canyon, landscape architect Harry Langley gave regular reports on the CCC work, and made suggestions for placing poles in inconspicuous places. For this reason, and because of engineering requirements, the line is located off the main trail whenever possible. In the first mile or so, it runs almost vertically down the steep canyon alongside the water-line which brings water from Indian Gardens. Below Indian Gardens, they built the line along the old Bright Angel Trail, which had been moved west and reconstructed five years earlier. The line had to run along the trail in places, to service telephone stations established at development areas like the Trail-side Shelters, Indian Gardens, Phantom Ranch, Cottonwood Campground, and Roaring Springs. The line also had to be accessible for maintenance purposes. Architect Langley recommended that the poles be painted complimentary to the surrounding rock formations. An excerpt from one report: "Trans Canyon telephone is nearing completion. A few poles remain to be set and some pole painting must still be done. This work is satisfactory as to

landscape features."⁵ The CCC finished painting the poles in November, 1935.

The Park Service owned and maintained the new twenty-five mile long line, which was connected to the Mountain States switchboard on the South Rim.

Park Superintendent Miner Tillotson wrote about the nearly completed new line on July 31, 1935: "There seems to be little question locally but what [sic] the telephone service between the North and South Rims, when the new circuits are entirely complete, will be far superior to any lines that extend out of the North Rim. . . . [and] the quality of transmission between the North and South Rims will be greatly improved."⁶

1938-1939 Modifications

Unfortunately, the new system became overloaded almost as soon as it was in place. The single circuit line could normally support about ten telephones, but by 1937 this one had twenty-two telephones connected to it. They belonged to the NPS, the CCC, The USGS, the Fred Harvey and Utah Parks concession companies, and private individuals, all who competed for use of the line. A five-minute per call limit had to be placed on the telephones, and government agencies used radios whenever possible. The line needed another circuit, and on November 1, 1938, a small group of CCC enrollees accompanied by the park electrician and a lineman once again descended the canyon to install one.

With the addition of a second circuit, three conversations could take place simultaneously over the line, because interaction between two balanced metallic circuits results in a third,

or "phantom" circuit. This third circuit between the North and South Rim headquarters did not go through the Mountain States switchboard, and thereby allowed Park Service conversations to remain confidential.

The new circuit required slight modification of the poles installed in 1935. New cross-arms had to be added to the tops of many poles, raising them an additional eighteen to twenty-four inches in height. Other poles, primarily on the North Kaibab Trail section, simply had plates added to the original cross-arm. The insulator pins used in the 1935 line were an unusual size, so the 1938 crew replaced them with standard-size lead pins, for easier and less expensive maintenance. The new circuit was completed by the summer of 1939, and the telephone line remains in service largely unchanged from that time.

Telephone Wire Technology

The most common varieties of telephone lines are open-wire and cable. Both types, suited for different purposes, have been in use since the late 1880s. The more expensive cable line is practical for urban areas because a single cable can carry hundreds of calls simultaneously. Inexpensive open-wire lines are better suited to rural areas, because they serve vast expanses of lightly populated land, and such lines can handle lighter call volumes.

When first developed, all telephone lines were open-wire iron lines similar to telegraph lines. These could be unreliable and subject to static from electrical interference. Copper lines had less resistance, resulting in less static, and were thus

superior for long-distance transmission. Copper telephone wire had been developed as early as 1880, but it was so thick that it was economically unfeasible to use. By the turn of the century, a physicist developed a method for using thin ("hard-drawn") copper wire in telephone lines, and as refined through the years, it became superior to the less expensive iron wire. However, galvanized iron wire was still popular when the Park Service constructed the 1922 trans-canyon telephone line. That iron line proved to be unreliable, so the CCC replaced it in 1935 with hard-drawn copper wire, referred to as copper-weld wire because it had welded sleeves. These sleeves splice together two lengths of line (Figure 9). For the time, copper-weld wire was the state of the art for open lines, and it remained in wide use

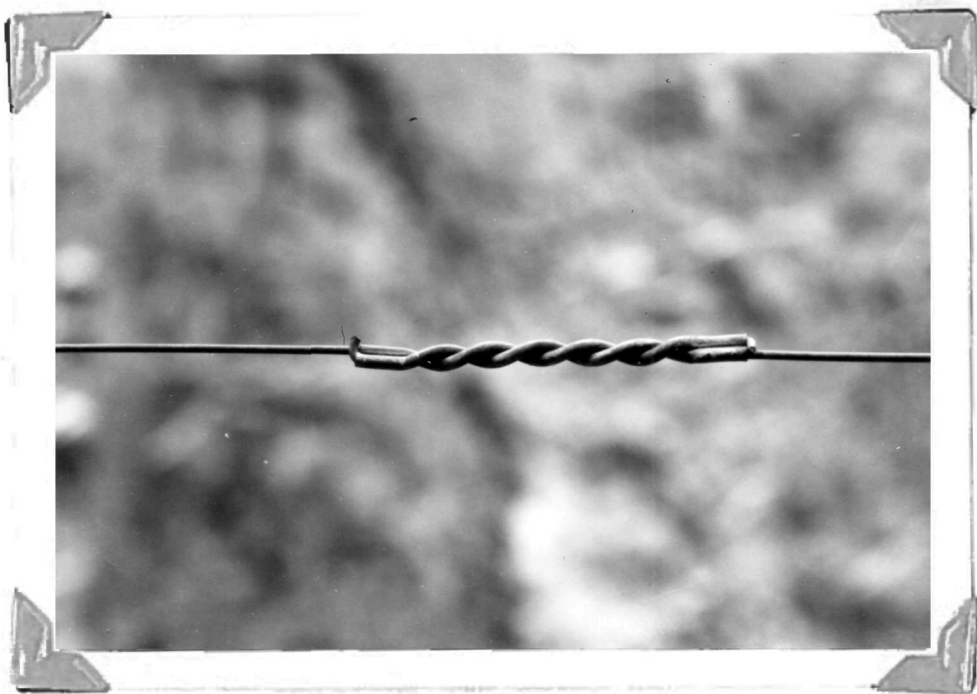


Figure 9. Close-up of a welded-sleeve on the trans-canyon line.

until the 1950s. Copper wires are still used in open wire lines, but today the sleeves are crimped together, a more expedient method. Much of the original copper line with welded sleeves remains in use today along the trans-canyon line.

Open wire lines are still used in highly isolated rural areas where few telephones are needed, but high maintenance and installation costs have virtually precluded the new construction of such lines today. (Since deregulation of the telephone industry, most of the historic cross-subsidies in the nation's telephone system have been eliminated, so that today users of a new open-wire line would have to pay all of the construction costs of such a line, a prohibitive amount). It has been estimated that less than one percent of the total circuit miles existing in the country today are open wire lines. Open wire telephone lines will become more and more uncommon as new technology is introduced.

Concluding Remarks

In this age of increasing technology, it is comforting to know that a bit of the past survives. The trans-canyon telephone line has been nominated to the National Register of Historic Places. When it is entered onto the Register in the summer of 1986, it will be the first telephone line in the United States to be so honored. It is historically significant as the oldest surviving line in the Grand Canyon and because of its administrative importance in unifying the North and South Rims of the then-new National Park. The unique pole design and survival of a

rapidly disappearing telephone technology give it added significance. Mountain Bell will ensure that the line continues to serve and interest many for years to come.

Notes

1. Coconino Sun, (Flagstaff), December 7, 1901.
2. Northern Arizona Leader (Flagstaff), February 14, 1922.
3. "Superintendent's Annual Report" for the year 1923, on file at the NPS Study Collection, Grand Canyon.
4. Letter dated August 31, 1925, from W.E. Dickenson, USGS District Engineer to Porter Preston, Superintendent of the Bureau of Reclamation, In "Miscellaneous USGS Correspondence 1/21-7/54" file, NPS Study Collection, Grand Canyon.
5. "Landscape Architects Report" for August 1935, In Accession #1195, NPS Study Collection, Grand Canyon.
6. Letter dated July 31, 1935, from Miner R. Tillotson, Superintendent of Grand Canyon National Park to R. D. McVay, Arizona Manager of Mountain States Telephone and Telegraph Company, In "Mountain States Telephone and Telegraph Correspondence 1928-1954", file D5027, NPS Study Collection, Grand Canyon.

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Interview with Marvin Hanchett, inner canyon lineman, Mountain Bell, Flagstaff, January 17, 1986.

Telephone interview with Louis Purvis, Brownwood, Texas, March 1, 1986.

Telephone interview with Nick Duncan, Kanab, Utah, March 1, 1986.