Thornton, Colorado

BULL CANAL SEGMENT
LEVEL I DOCUMENTATION

prepared for

US Army Corps of Engineers
Colorado State Historic Preservation Office
Thornton Development LLC

completed by

Tatanka Historical Associates, Inc.
612 S. College Ave., Suite 21
Fort Collins, CO 80524
tatanka@verinet.com
970.221.1095

10 October 2012
USACE File #NWO-2012-1826-DEN
CO OAHP Site #5AM.457.12

Tatanka Historical Associates Inc.

612 S. College Ave., Suite 21
P.O. Box 1909
Fort Collins, Colorado 80522
tatanka@verinet.com
970.221.1095

10 October 2012

Matthew McCullor
US Army Corps of Engineers
Omaha District
CENWO-PM-AB
1616 Capitol Ave.
Omaha, NE 68102-4901

Project: Bull Canal Segment, Thornton, CO
Level I Documentation

Dear Matt,

Tatanka Historical Associates has completed its Level I documentation of the Bull Canal segment to meet Colorado Office of Archaeology and Historic Preservation standards, which are detailed in Colorado Historical Society Publication #1595.

Accompanying this report are the Management Data Form (OAHP 1400), Linear Component Form (OAHP 1418), black and white photographs with an accompanying photo log, and measured drawings of the existing canal segment. These have all been prepared and printed in an archivally stable format.

Thanks for your help with the project.

Sincerely,

Ron Sladek
President

TABLE OF CONTENTS

INTRODUCTION

This project originated in mid-June 2012, when Thornton Development LLC engaged Tatanka Historical Associates Inc. to complete Section 106 (National Historic Preservation Act) documentation and analysis on a segment of the historic Bull Canal in Thornton, Colorado. Because the canal is considered a tributary to Big Dry Creek and the South Platte River, development of the site and possible impact to the canal requires approval of a Section 404 (Clean Water Act) permit from the US Army Corps of Engineers (USACE).

The site crossed by the canal segment is located adjacent to an exit off Interstate 25 north of Denver, in an area that is experiencing increasing development interest and pressure. Plans for the currently vacant property call for its commercial development, and improvements will require moving the segment to run along the site's northern and western edges. These plans are what triggered the requirements for Section 106 analysis and Section 404 permit review.

This report and the accompanying site forms, photographs and drawings fulfill the Level I submittal requirements of the Colorado State Historic Preservation Office's Office of Archaeology & Historic Preservation (SHPO-OAHP), as detailed in publication #1595.

PHYSICAL DETAILS

This segment of the Bull Canal is approximately 550 meters or 1,800' in length, and runs from its intersection with Interstate 25 on the southwest to E. 144th Ave. on the northeast. ***(see Figures 1 & 2)*** The resource is defined laterally by a 50'-wide right-of-way (measured from the canal's center line) that includes the canal segment and its parallel ditch riders' road.

The canal segment is located in the NW ¼ of the NE ¼ of Section 22, Township 1 South, Range 68 West. This corresponds to the southeast quadrant of the intersection of Interstate 25 and East 144th Avenue in Thornton, Adams County, Colorado. The location may also be described as Latitude 39.955918, Longitude -104.985041. Situated at an elevation of approximately 5,170' above sea level on the high plains east of the Rocky Mountains, the canal segment is surrounded in all directions by open fields along with the adjacent roadways. While the adjacent fields may have historically been used for crop production and livestock pasture, today they are unused and covered with short native prairie grasses along with a small number of cottonwood trees.

Eroded spoils piles from excavation and maintenance of the ditch are located along the east side of its northeastern reach and along the northwest side of the segment's southwestern reach. The canal passes underneath the adjacent roadways through concrete box culverts. While a complex of several commercial buildings previously occupied the open field to the east, these were removed in recent years, leaving little trace of their previous presence. The nearest area body of water is Big Dry Creek, which runs parallel to the canal about one-half mile to the east.

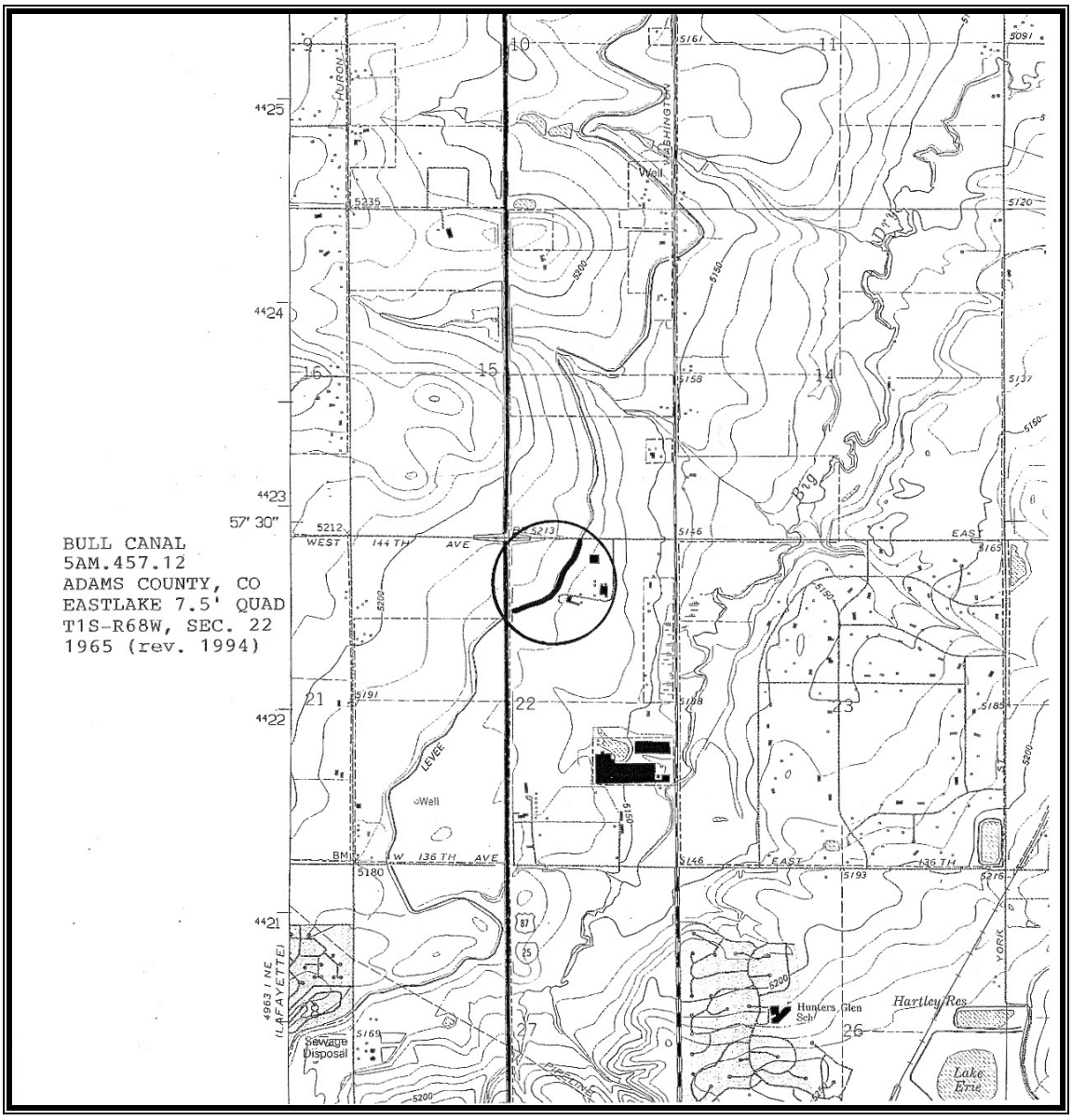

Figure 1
USGS Eastlake 7.5' Topographic Quadrangle
1965 (revised 1994)

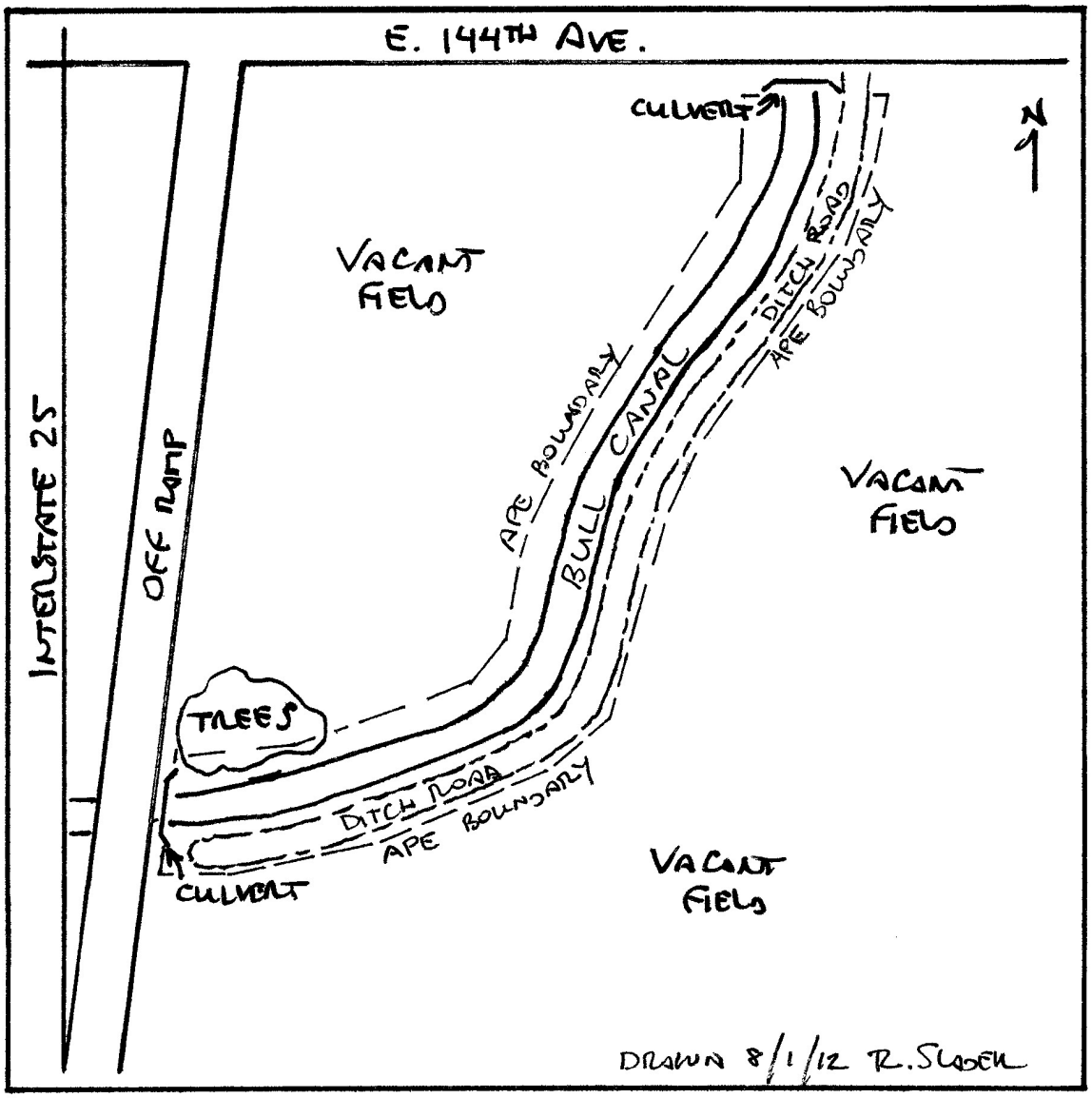

Figure 2
Bull Canal Segment

HISTORY OF THE BULL CANAL

The history of the Bull Canal is directly tied to the growth of Colorado's farm economy in the early twentieth century and the related expansion of irrigation systems into previously unreached areas of the state's semi-arid northeastern plains. Irrigation ditches had been used by New Mexicans and Californians throughout the middle decades of the nineteenth century, and irrigation arrived on the Colorado frontier during the 1840s and 1850s when Hispanic settlers introduced it to the San Luis Valley. The ditches, or acequias, of southern Colorado proved highly successful, enabling the growth of farms and settlements, and contributing to the spread of Hispanic population and culture throughout the region.

After decades of Native American presence combined with the arrival of modest numbers of trappers, traders and explorers, the northern Colorado frontier experienced a sudden influx of Anglo-Americans starting in the late 1850s and early 1860s as reports of a gold strike spread across the nation. While most of these Gold Rush era arrivals were eager to find wealth in mining and headed into the mountains, others saw their future in the lands below and sought to establish farms. Beginning in the early 1860s, an increasing number of Colorado's pioneers settled on lands adjacent to the rivers that emerged from the Rocky Mountains north and west of the settlement of Denver. There they found rich soils but little precipitation in the dry climate. Determined to build thriving farms, some began to construct small irrigation ditches to bring water from the rivers to their crop fields. Their efforts proved successful, launching an age of irrigation that has continued through the present time.

Modest pioneer ditches, those that brought water to the lowlands along the rivers, were excavated by hand and horse along Clear Creek and Boulder Creek, as well as the South Platte, Cache la Poudre, Big Thompson, and St. Vrain. Many of these individually owned and developed farm ditches traveled short distances to water nearby fields for the small-scale production of food crops and hay for livestock. Over the following years, some were extended and received improvements that allowed them to irrigate larger areas. Mutual ditches, owned and used by more than one party, were developed for the benefit of their common owners. Throughout the 1860s and 1870s, many but not all of northeastern Colorado's irrigation ditches remained modest in length but provided an ever-growing population of pioneer farmers with much needed water for their fields and livestock.

Before long, organized efforts to construct larger ditches and canals were launched by mutual companies and both for-profit and non-profit ditch companies. In many cases, investors acquired existing pioneer ditches and water rights, and the ditches were improved to include a growing amount of acreage. In others, rights-of-way were acquired and new ditches were constructed, snaking through the countryside as they extended into areas not previously served by water systems. These efforts, many of them boosted by investment capital that became available starting in the 1880s, allowed for the creation of networks of ditches and canals, some of them extensive irrigation systems, that still cross the high plains and serve farms throughout much of northeastern Colorado.

During the 1880s, northeastern Colorado experienced a period of drought that increased the need for substantial irrigation systems that would support the growing agricultural economy and more reliably ensure the stability of food products for both people and animals. Prior to that time, many ditches stayed relatively close to the rivers and were only able to irrigate fields below the rivers' nearby elevation. In order to run ditches across the highlands above the river floodplains, they had to emerge from their sources at higher elevations often miles upstream. This meant that new ditches needed to be constructed at greater length and cost than before, requiring equally greater organizational expertise, larger work forces, and an influx of capital investment.

High plains farmers started to organize more effectively between the 1870s and 1890s to create irrigation districts. Water laws geared to the arid conditions and limited water supply of the American west started to emerge in the 1840s in California and spread to Colorado in the 1860s. Ditches and water rights were bought and sold on the open market, yet there was no reliable method for the measurement of water as a commodity. In the late 1880s and 1890s, the Colorado legislature passed laws requiring that headgates and measuring devices be installed on all ditches emerging from rivers, as well as between storage reservoirs and their outflow canals.

For many years, field calibrations were required to determine water flows, although these proved to be imprecise. In the early twentieth century, Ralph Parshall, a professor at the Colorado Agricultural & Mechanical College in Fort Collins (now Colorado State University) invented the Venturi or Parshall flume. This device, relatively inexpensive to manufacture and install, eliminated field variables and provided irrigators and water rights investors with the precision measurements that had long been needed. Parshall flumes were soon installed on many hundreds of ditches and canals throughout Colorado and other western states.

The development of commercial irrigation systems in Colorado was largely inspired by the success of the cooperative Union Colony's 1870s canal system, which transported water from the Cache la Poudre River dozens of miles across the prairie to crop fields in Weld County. This combined with passage of the Colorado Irrigation Act in 1881, which established the Office of State Engineer and launched a government-regulated system of water rights administration that investors could rely upon. Entrepreneurs and investment capitalists noticed that there was money to be made in western irrigation.

Funds became available as irrigation turned into a business enterprise. The impact was seen and felt across the northeastern Colorado landscape as ditches and canals were constructed in every direction and lush crops began to grow on previously dry fields. Between 1860 and 1890, it is estimated that the number of irrigated acres in Colorado rose from 35,000 to more than one million. By 1900, Colorado had more acreage under irrigation than any other state in the nation. Fifty years later, the state held around 17,000 miles of irrigation ditches and canals. (Holleran, 2005) Colorado irrigation systems of the late nineteenth and early twentieth centuries came to be viewed as profit-making opportunities in much the same way as railroads, electrical grids, and oilfields.

As a growing number of ditches and canals were developed during the late nineteenth century, it became apparent that the supply of water in area streams and rivers could not match seasonal demand. Following the drought of 1888, this reality sparked the construction of hundreds of water storage reservoirs on the plains between Denver and Fort Collins. These ranged in size from small farm ponds to massive lakes.

In 1902, Denver retailer and real estate investor Thomas Croke teamed with Ottawa Joseph ("O. J.") Standley and Milton Smith to incorporate the Farmers Reservoir & Irrigation Company (FRICO), an enterprise whose goal was to develop a system of canals and reservoirs that would provide water to the rapidly developing farm country north and northwest of the city.

New Jersey native Milton Smith lived in Denver, where he worked as an attorney. O. J. Standley, a native of Nebraska, also resided in Denver and served as vice-president of Chicago Title & Trust. Given their backgrounds and place of residence (they continued living in Denver for years after launching FRICO), it is clear that Croke, Standley and Smith pursued the development of irrigation projects not as farmers but as entrepreneurs and investors. Their effort coincided with the explosion of the sugar beet industry in northeastern Colorado, which boosted the agricultural economy over the following decades.

For some time, Standley had been seeking a site to build a water storage reservoir north of Denver, initially settling upon Barr Lake near Brighton. However, Croke and Standley decided instead to greatly enlarge and improve Kinnear Reservoir northwest of the city into what became Standley Lake. To accomplish this project and develop an irrigation system supplying downstream farmlands between the reservoir and the South Platte River, the men created the Denver Reservoir & Irrigation Company. The Denver Company served as the construction division of FRICO and moved forward with their projects. From that time on, O. J. Standley served as company president and became the driving force behind the creation of the massive Standley Lake Irrigation System.

Construction of Standley Lake began in 1908 and continued into early 1910 with a massive earth moving effort to raise the dam wall. Rather than employing horses, this work was accomplished with large steam shovels and dragline dredges. By early 1910, FRICO had expanded to hold more than 200,000 acres of agricultural land across several irrigation districts north of Denver, with options placed on thousands more. It also held a developing system of irrigation canals and reservoirs, and acquired the rights to more than 400,000 acre-feet of water on the plains and in the mountains above.

Between 1909 and 1912, Thomas Croke served in the Colorado state senate. Although a member of the agriculture and irrigation committee, he was unable to forestall financial problems that soon beset the Standley Lake project. With rapid expansion, by 1910 the Denver Reservoir & Irrigation Company had taken on so many ambitious efforts in such a short period of time that it found itself overextended and short on funds to finish several of its projects. In May 1910, work at Standley Lake ground to a halt and the site went silent. The massive earthwork sat partially built, awaiting an uncertain future.

Ten months later, in March 1911, Denver newspapers reported that the effort would be restarted shortly with funding provided by Banque Franco-Americaine, with offices in Paris and New York. The bank agreed to provide $2,000,000 for the completion of various irrigation projects already launched by the company, including Standley Lake. However, the agreement also called for the Denver Reservoir & Irrigation Company to go into receivership and be placed under bank control. Croke, Standley and Smith had no choice but to let Banque Franco-Americaine take the financial reins of the project, and Arthur Day of New York City was appointed receiver. However, the three Denver founders continued to serve as directors and officers of the company.

When work resumed in the spring of 1911, the construction contract for Standley Lake remained with the Kenefick Construction Company. Under tremendous pressure, Kenefick increased the scale and pace of its effort. Hundreds of laborers were brought from Denver each day to work on the site. Excavators and trains moved at a remarkable pace, setting records in the heavy construction industry. At the same time the dam was being finished, the outflow canals, embankments and downstream ditches had to be prepared. The bulk of this work was handled by the Kenefick Company.

Dedication of the Standley Lake Dam took place on 7 September 1911. Upon completion, the earthen dam was reported to be the largest of its kind in the United States, and possibly the second largest in the world. Three million cubic yards of soil had been excavated and moved to create a dam wall measuring 700' wide at the base, 1.25 miles long, and 113' high. The lake was filled with water from Clear Creek, Coal Creek, Ralston Creek and Leyden Creek, delivered by way of the Croke (formerly Kinnear) Canal and Church Ditch. Water also entered the lake from the upper reaches of Big Dry Creek and Woman Creek above the reservoir. Additional water was secured from the Farmers High Line Canal. The twin outflow from Standley Lake divided the water below the dam between the Niver Canal and Big Dry Creek. Two years after the dedication ceremony, in August 1913, a Denver District Court judge lifted the receivership on the Denver Reservoir & Irrigation Company and the project was free and clear of its financial troubles.

In tandem with the construction of Standley Lake, FRICO's Denver Reservoir & Irrigation Company began to acquire a right-of-way for a new canal that would be constructed downstream. Between 1909 and 1911, numerous farmers in northeastern Jefferson County and western Adams County sold rights for the irrigation ditch to cross their properties. The canal would bring much-needed irrigation water to a more than forty-mile-long stretch of dry countryside north of Denver and west of the South Platte River. Around 1909, the Denver Company engaged noted Denver civil engineer George M. Bull to design a major water conveyance structure below Standley Lake. From that time on, this ditch was known as the Bull Canal.

George Mairs Bull was born in Troy, New York in 1873 and in 1897 received a civil engineering degree from the Rensselaer Polytechnic Institute. His first job out of college involved reconstruction work on the Erie Canal. Following that, Bull enlisted in the 1st Volunteer Engineers and served in Puerto Rico. Discharged after the Spanish-American War, he obtained employment with the Chicago Northwestern Railway and worked on a bridge project across the Des Moines River. Between 1900 and 1903, Bull

was employed as deputy engineer with the City of Troy, where he was placed in charge of the construction of municipal buildings and a new waterworks system. The next three years were spent in the employ of the New York State Barge Canal, working on hydraulic studies and the design of the Champlain Diversion Project. From 1906 to 1909, Bull worked as a design engineer for J. G. White & Company and the Arnold Company of Chicago. He then relocated to Denver, where he opened a consulting office and spent the next four decades providing engineering services on numerous water projects throughout the state.

Constructed in 1910-1911, the Bull Canal emerged from a headgate along the north side of Big Dry Creek in the south half of Section 28, Township 1 South, Range 68 West. This location was seven miles northeast of Standley Lake, just northeast of today's intersection of West 128th Avenue and Zuni Street. Over the years following the canal's initial construction, it was expanded beyond its original far northeastern terminus and bifurcated to form the Bull Canal II and Bull Canal III extensions along with five laterals. From its headgate along Big Dry Creek, the entire canal eventually extended for over forty miles to the northeast. Over the next century, the Bull Canal served as an integral part of FRICO's massive Standley Lake Irrigation System.

From its construction around 1910 through 1980, the Bull Canal was an earthen structure that was subject to erosion and seepage. In January 1981, FRICO's board of directors and its engineering consultants inspected the canal and discussed the problems of seepage and inaccurate water measurements. It was concluded that the best way to address these issues would be to line the entire canal with concrete. FRICO immediately moved forward with this project, starting with the northern Bull II and Bull III lengths in early 1981. The original length of the canal, known as Bull I, was fully lined by the end of that same year.

BIBLIOGRAPHY

A Hundred Years of Irrigation in Colorado: 100 Years of Organized and Continuous Irrigation, 1852-1952. Denver, CO: Water Conservation Board, 1952.

Bull Canal, Files 5AM.457.1 through 5AM.457.11. History Colorado, Office of Archaeology and Historic Preservation, 1987-2010.

Bull Canal, Rights-of-Way Acquisitions, 1909-1910 (FRICO Archive, Document #1212C).

The Daily News (Denver)
"Scenes at Standley Lake Dedication," 8 September 1911, p. 3.
"Facts About the Standley Dam," 8 September 1911, p. 3.
"Bull Canal, Near St. Vrain Junction, 17 Miles North of Denver" (photograph), 7 September 1911, p. 2.

The Denver Post
"Paris Sends $2,000,000 to Water Lands," 17 March 1911, p. 16.

The Denver Republican
"Immense Standley Lake System and Land It Irrigates," 19 March 1911, p. 7.

The Denver Times
"Biggest on Earth," 29 June 1911, p. 5.
"1,500 Men to be Employed on Irrigation Enterprise," 19 March 1911, p. 9.

Exchange of letters between Gunnar Thorsky, Canal Systems Engineering Consultant, and Ronald Halley Jr., President of Hydro-Triad Ltd., regarding inspection of the unlined Bull Canal, seepage issues, and preparation for concrete lining to be installed, January-March 1981 (FRICO Archive, Bull Canal File Records).

General Map of the Standley Lake Irrigation System, *Owned and Operated by the Farmers Reservoir and Irrigation Company*, March 1912.

George Mairs Bull Papers, 1841-1959. Archives Department, University Libraries, University of Colorado at Boulder.

Holleran, Michael. *Historic Context for Irrigation and Water Supply Ditches and Canals in Colorado*. Denver: Colorado Center for Preservation Research, 2005.

King, Joseph E. *Colorado Engineering Context*. Denver: Colorado Historical Society, Office of Archaeology & Historic Preservation, 1984.

Map of Preliminary Filing for Standley Lake Canal No. 1, Standley Lake Canal No. 2, and the Bed of Big Dry Creek. Farmers Reservoir & Irrigation Co., 1908.

Mehls, Steven F. *Colorado Plains Historic Context*. Denver: Colorado Historical Society, Office of Archaeology & Historic Preservation, 1984.

"Now in the $25,000,000 Class," *Greater Colorado Illustrated*, February 1910 (v.2, n. 2).

Rocky Mountain News

"Court Ruling Means $10,000,000 Product of Land Near Denver," 13 August 1913, p. 3.

"Resume Work on Reservoir Project," 17 March 1911, p. 1.

Sladek, Ron. "Standley Lake." Historical Report Prepared for the City of Westminster, Community Development Department, 22 December 2011.

Standley Lake Reservoir Operations and Bull Canal Water Deliveries, Historical and Future Conditions. Hydro-Triad Ltd., September 1981 (FRICO Archive, Bull Canal File Records). Note: This document mentions that the canal was currently being lined with concrete as a water conservation measure.

Steinel, Alvin T. *History of Agriculture in Colorado*. Denver: State Board of Agriculture, 1926.

Stone, Wilbur Fisk, editor. *History of Colorado*. Chicago: S. J. Clarke Publishing Co., 1918.

USGS Eastlake, Colorado 7.5' Topographic Quadrangle Maps, 1944, 1957, 1965, 1994.