A Phoenix from the Ashes: Interpreting Destruction and Reconstruction at Salt Lake City's Denver and Rio Grande Western Railroad Maintenance Facility (42SL728)

Stephanie, Lechert†, Sheri Murray Ellis* and Anne Oliver†
*†SWCA Environmental Consultants, *Certus Environmental Solutions*

Remains of the Denver and Rio Grande Western Railroad train maintenance facility (42SL718), originally built in 1882 in Salt Lake City, Utah were discovered during construction of the Utah Transit Authority's new Depot District Service Center in July 2014. Subsequent monitoring and mitigation uncovered and documented 94 features and thousands of artifacts across the site. These features and artifacts, placed in the context of historic background research, tell the story of 70 years of construction and reconstruction at the train maintenance facility in the aftermath of four destructive fires. Site 42SL718 provides a unique look at the evolution of the railroad on the west side of Salt Lake City between 1882 and the late 1950s, and reveals how this area retains its ties to modern transportation-related buildings and structures.

It is easy to forget that fire was once a common, if dangerous, part of urban life. Although constant efforts were made to reduce its risk, fire has been a major force in shaping cities into the places we know today. In the late nineteenth century, one strategy to control the incidence and spread of fire was to place hazardous sites, particularly heavy industrial sites like factories and rail yards, at the edges of cities. During the summer of 2014, a crew from SWCA Environmental Consultants (SWCA), in conjunction with Certus Environmental Solutions (Certus), conducted monitoring and mitigation-level documentation at just such a site, an approximately 1.4-acre portion of the Denver and Rio Grande Western Railroad maintenance facility (42SL718) in Salt Lake City, Utah (Figure 1). The site was uncovered during construction of the Utah Transit Authority's new Depot District Service Center. Archaeological discoveries soon made it apparent that evidence of several iterations of the maintenance facility remained beneath the surface of the vacant lot. These observations were supplemented by archival research, which revealed that the history of the facility, in use from 1882 through the late 1950s, was characterized by at least four periods of construction or reconstruction after destructive fires and a fifth period that ended with the demolition of the facility (Figure 2).

Historical Background

When the Salt Lake Valley was first settled in 1847 by members of the Church of Jesus Christ of Latter-Day Saints (hereafter referred to as the Latter-day Saints or Mormons), the area was largely isolated from the rest of the nation. Few, if any, established trails existed, and no rail lines passed near the area. Communications beyond the settlement were limited to hand-delivered messages, and all supplies that could not be produced or extracted locally were brought in by wagon. The completion of the Transcontinental Railroad north of the valley in 1869 changed everything. Within a few years, rail lines, many of which were local interurban lines built and owned by Utah-based entrepreneurs, wove their way throughout the Utah Territory, connecting the once-remote Mormon settlements to the national landscape.

The development of the railroad network both spurred and responded to discoveries in the mining industry in the 1870s and 1880s. During

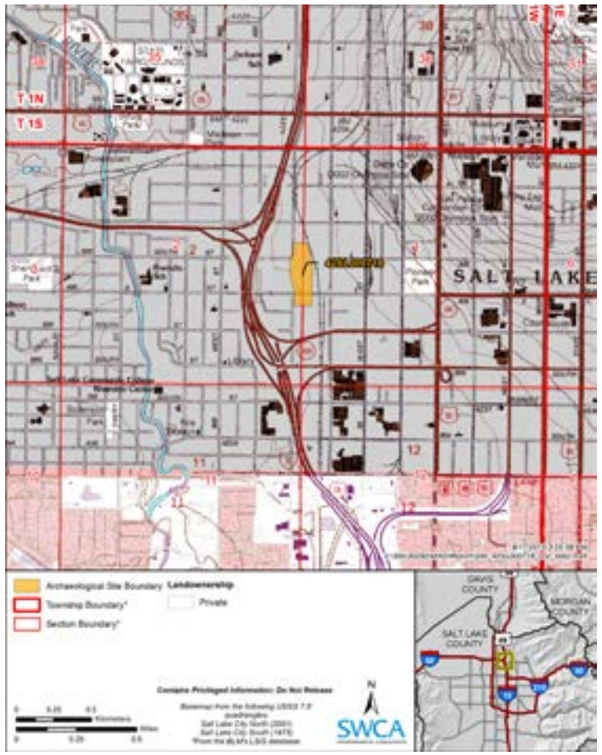

Figure 1. Project location. The archaeological site boundary corresponds with the study area for the project.

these early years, the Union Pacific Railroad Company dominated the freight transport sector. The company owned, operated, or otherwise controlled most of the major rail trunk lines that carried mineral products to buyers outside of Utah. The vast wealth pouring out of Utah mines and smelters and into Union Pacific Railroad Company coffers attracted a lot of attention, and soon eager entrepreneurs appeared on the stage.

The Denver & Rio Grande Railway was incorporated in Colorado in 1870 by Civil War veteran General William Jackson Palmer and his associates with the intention of providing a link between the transcontinental railroads that passed to the north and south of the state (Bradley 1996). Intense competition brought an end to this plan, and the Denver & Rio Grande Railway focused instead on the construction of a transcontinental bridge line between Denver and Salt Lake City that would also tap into the lucrative traffic from the mineral and coal mines in the mountains of Colorado and Utah (Carr and Edwards 1989:188). In 1881, the Denver & Rio Grande Railway created a subsidiary company, the Denver and Rio Grande Western Railway (D&RGW, later the Denver and Rio Grande Western Railroad), to oversee construction of the line. The new route crossed the Rocky Mountains into Utah, passing through the town of Green River, the rugged Book Cliffs, and the Wasatch Range, and on

Figure 2. The D&RGW's Salt Lake City maintenance facility in September 1948, prior to demolition in the 1950s. Photograph by Emil Albrecht in the Don Strack Collection. Used with permission by Don Strack.

to Salt Lake City. The D&RGW soon came to epitomize mountain railroading and maintained the highest main line railroad in the country—at nearly 11,000 feet for one stretch—through spectacular scenery. The company eventually adopted the motto, "Thru the Rockies, Not Around Them" (Denver & Rio Grande Western Railroad n.d. [1936]). The mountain route also led the D&RGW to adopt a "fast freight" strategy using multiple engines to pull shorter trains with more frequent service in an effort to compete with the flatter routes and shorter travel times of competitors (Griffin 2003). As the route neared completion, the D&RGW established a regional maintenance facility in Salt Lake City. It is the remnants of this facility that were discovered during construction excavations in the summer of 2014.

Episodes of Fire and Rebuilding

At least five fires have been documented at the D&RGW's Salt Lake City maintenance facility since its initial construction, and each was followed by a period of reconstruction, renovation, or expansion, as follows:

- 1882 to 1905: Initial construction and expansion through Fire #1
- 1905 to 1913: Reconstruction through Fires #2 and #3
- 1913 to 1922: Reconstruction through Fire #4
- 1922 to 1938: Reconstruction through Fire #5
- 1938 to the late 1950s: Reconstruction through facility closure and site demolition

Figure 3. View of the D&RGW maintenance facility and its surroundings in 1905. Photograph used with permission of the Utah State Historical Society, Shipler Commercial Photographers Collection, Mss C 275, Shipler #14811.

1882 to 1905: Construction and Expansion through Fire #1

Beginning in 1882, the D&RGW developed the western terminus of their new mountain route on a 90-acre plot at what was then the western edge of Salt Lake City (Carr and Edwards 1989:188; Salt Lake Tribune 1882a). The site was to house the rail yard itself, along with machine shops, one or more roundhouses, and a passenger depot. Construction of the yard proved to be challenging because the location was reportedly low and swampy, which was the primary reason it had not been developed previously as the city expanded to the west from its initial downtown core. D&RGW builders imported fill material from a nearby gravel pit to level the area and build it up above the standing surface water (Salt Lake Tribune 1882b). The layout of the yard was arranged such that future expansion would be possible without acquisition of additional property. The roundhouse was designed to accommodate 44 engine stalls, 22 of which were to be constructed initially and the rest added later when needed (Salt Lake Tribune 1882b). As built, the machine shops, boiler house, wood working shops, and other facilities at the yard were located near 300 South between 600 West and 700 West in Salt Lake City. The first buildings were erected on foundations of "piles and rocks" and were constructed of "brick and stone" (Salt Lake Tribune 1882c). The maintenance facilities were completed and in use by the end of March 1883, when the D&RGW's Denver–Salt Lake City segment was completed (Salt Lake Tribune 1883).

Significant changes were made to the yard beginning in 1900 (Figure 3). A planned expansion of the rail yard shop facilities necessitated expansion of the track system itself, both to move trains and equipment to the appropriate shops and to store the increasing number of engines and rail cars moving through the yard. By late 1900, construction crews were at work realigning existing tracks and installing new ones. At the time, the D&RGW owned the land between 600 West and 700 West and as far south as 800 South. The land south of 500 South was reportedly largely vacant and was to be used for several new siding tracks (Salt Lake Tribune 1900a).

A new power plant to supplement the existing coal-fired steam system was constructed at the facility in 1901 (Salt Lake Tribune 1901). The power plant and dynamo system were designed to improve the efficiency of energy use and decrease the cost of operations by reducing the volume of coal needed to fire the plants and overcome the energy waste of the existing system (Salt Lake Tribune 1900b). The plant was expected to help advance the yard as one of the most modern railroad maintenance facilities in the United States (Salt Lake Tribune 1900c).

The actual and planned expansion of the yard prompted the D&RGW to request that the Salt Lake City Council approve the closure of several existing roads so that permanent structures could be erected in their place (Salt Lake Tribune 1900c). The request was granted in 1901, but it would take another 2 years for construction of the new and expanded facilities to begin in earnest. When construction contracts were issued in late 1903, the D&RGW estimated capital costs of the expansion to be no less than $255,000 (Salt Lake Tribune 1903). However, some of this investment proved to be for naught. Fire broke out in the shops just before Christmas in 1905, destroying an estimated $40,000 worth of buildings and equipment (Salt Lake Tribune 1905a, 1905b). The engine house and car shop (also known as the repair shop) were burned to the ground, and the paint shop was damaged but narrowly saved. Railroad cars were built primarily of wood until the mid-1920s and were extremely flammable. Car shops burned easily due to both the amount of dry, seasoned wood in the buildings and the railroad cars that were inside for repair (Don Strack, personal communication 2016).

1905 to 1913: Reconstruction through Fires #2 and #3.

The fire of 1905 slowed the D&RGW's plans but did not stop them. The company soon set about rebuilding the lost and damaged structures, reconfiguring elements of the facility layout in the process. The best documentation for construction after the 1905 fire comes from the Sanborn Map Company's fire insurance maps from 1911, which document the site layout and the numerous facilities found there. The Salt Lake City shops could complete all levels of freight car and passenger car construction, repair, and maintenance. Within the area studied for this project, buildings and structures included a boiler house, compressor room, carpenter shops, a planing mill, a shop for turning car wheels and axles, a pattern shop, a blacksmith shop, and a 10-foot-tall trestle (Figure 4). The planing mill would have been the location of all component manufacture related to wooden cars (Don Strack, personal communication 2016). Lumber yards, warehouses, and an iron works were adjacent to the rail lines (Sanborn Map Company 1911:Sheets 71, 72, 120, 132, 143, 144, 145, 153, and 154).

In 1913 two fires occurred, one in January and one in June. The first fire broke out in the tin shop in the area of the yard between 300 South and 400 South. An apparent "water famine" resulted in a lack of pressure in the water lines feeding the yard, and fire fighters were unable to combat the flames effectively (Salt Lake Tribune 1913c). The fire destroyed the tin shop and an adjacent office building, and damaged the roundhouse and machine shop. Repairs and rebuilding began immediately, but the effort would be short-lived as the second fire in June became a massive conflagration that consumed all of the D&RGW facilities between 400 South and 500 South. The car shops, paint shop, blacksmith shop, wheel shop, foreman's office, woodworking mill, 25

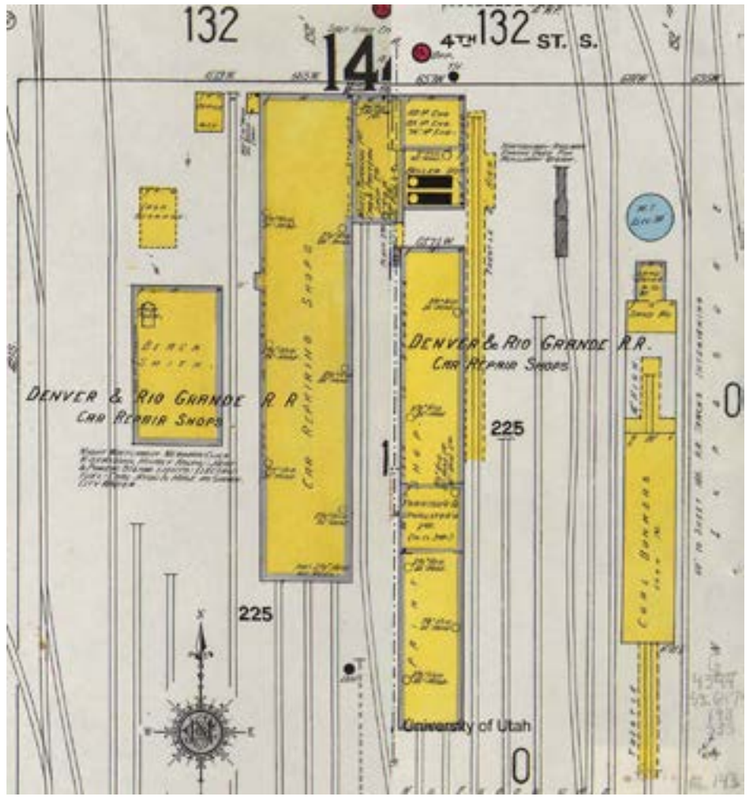

Figure 4. Sanborn fire insurance map from 1911 showing the section of the rail yard within the study area. Images courtesy the University of Utah Marriott Library's Digital Collections, Sanborn Fire Insurance Map Collection.

freight cars, five passenger coaches, and part of the boiler house were lost (Salt Lake Tribune 1913b). These two fires proved the costliest and most damaging for the facility in its history (Figure 5).

1913 to 1922: Reconstruction through Fire #4

As destructive as the 1913 fires were, they spurred the D&RGW to envision a larger presence in Salt Lake City with new car shops large enough to accommodate building all future passenger and freight cars to serve the company's operations in the western states (Salt Lake Tribune 1913b). The new car shops would not be constructed on the site of the old building but near 1000 South, instead. Temporary structures were erected between 400 South and 500 South while the company determined how to redevelop that land.

As the clean-up from the 1913 fires progressed and plans for rebuilding some of the facilities were refined, the D&RGW recognized a need for a viaduct over the rail yard along 400 South, where vehicle traffic was frequently delayed by the passage of trains. A 3,000-foot steel, timber,

Figure 5. Fire at the D&RGW maintenance facility in 1913 with bystanders watching from the tops of boxcars. Photograph used with permission of the Utah State Historical Society, Mss C 275, Shipler #01647.

and concrete viaduct was built in 1913 (Salt Lake Tribune 1913a), but this structure was nearly destroyed by fire just 9 years later, in June 1922 (Salt Lake Telegram 1922). Though no source for the fire was reported, speculation focused on sparks from a passing locomotive.

The viaduct was rebuilt shortly after the fire, but little information can be found about the reconstruction of the yard facilities between 400 South and 500 South during the 1910s. It appears that the temporary structures built immediately after the 1913 fire continued to be used for many years. This was likely due in part to financial woes plaguing the D&RGW—the company defaulted on debt and went into receivership in 1915—and in part to the takeover of all U.S. railroads by the federal government during World War I. American railroads were controlled by the U.S. Railroad Administration between December 1917 and March 1, 1920, at which time control was returned to the previous owners.

1922 to 1938: Reconstruction through Fire #5

When railroad ownership was returned to private enterprise in 1920, the D&RGW was in a financial position to resolve its 1915 receivership problems. By 1923, the D&RGW embarked on another round of construction to improve the rail yard and its associated facilities. The work was part of a $1 million improvement and expansion program for the Salt Lake division of the rail line and was to include additions to existing shop facilities and the storehouse,

Figure 6. Aerial image of Salt Lake City in 1931 showing the D&RGW maintenance facility, view facing northeast. The facility is spanned by the 400 South viaduct, which is visible at the center of the photograph. Photograph used with permission of the Utah State Historical Society, Utah State Historical Society Classified Photo Collection, 19045.

reconstruction (replacement) of the engine house and roundhouse, and construction of new car shops (Salt Lake Telegram 1923). A clinic/hospital was also to be constructed in the yard during this time. Labor unrest and other woes plagued the construction efforts off and on for several months, but the facilities were completed in June 1924 (Figure 6) and the D&RGW reportedly employed nearly 1,000 workers by 1926 (Deseret News 1924; Salt Lake Telegram 1924, 1926; Salt Lake Tribune 1924). D.C. Cunningham (also listed as D.G. Cunningham in some news articles), Superintendent of "Motive Power," declared the facilities the "best equipped establishment of its kind in the West" and stated that they were capable of "[turning] out a rebuilt freight car every thirty-five minutes" (Salt Lake Telegram 1926).

But the specter of fire was never too far from the rail yard. In January 1938 another fire broke out, this time in the car shops located under and south of the 400 South viaduct, near the location of 42SL718, the archaeological discovery discussed herein. Several local boys spied the fire and reported it within minutes to rail yard workers. Despite the quick efforts, the car shops were left in wreckage (Salt Lake Telegram 1938). Once again, the D&RGW set about rebuilding.

1938 to the late 1950s: Reconstruction through facility closure and site demolition

Sanborn maps indicate that by 1950 a larger boiler house (with a compressor room), a car wheel and axle turning shop, and a large carpentry and wood working shop had been constructed

in the area south of 400 South (Sanborn Map Company 1950:Sheets 143 and 144) (Figure 7). The boiler house was located partially under the 400 South viaduct, and the wheel and axle shop was attached to its southern side. A wood trestle extended along the east side of the boiler house and allowed for car loads of coal to be emptied into the building to serve the boilers. The boilers were coal-fired, producing steam that powered either the compressors (for air) or steam-driven generators for electricity to turn the overhead belt-drive systems for the machines in the car shop and the locomotive shop to the north (Don Strack, personal communication 2016).The carpentry shop was located immediately west of the boiler house. These buildings occupied the site that in 1911 had held similar facilities, including a blacksmith shop, car repair shop, wheel turning shop, boiler house, and paint shop (Sanborn Map Company 1911:Sheets 143 and 144).

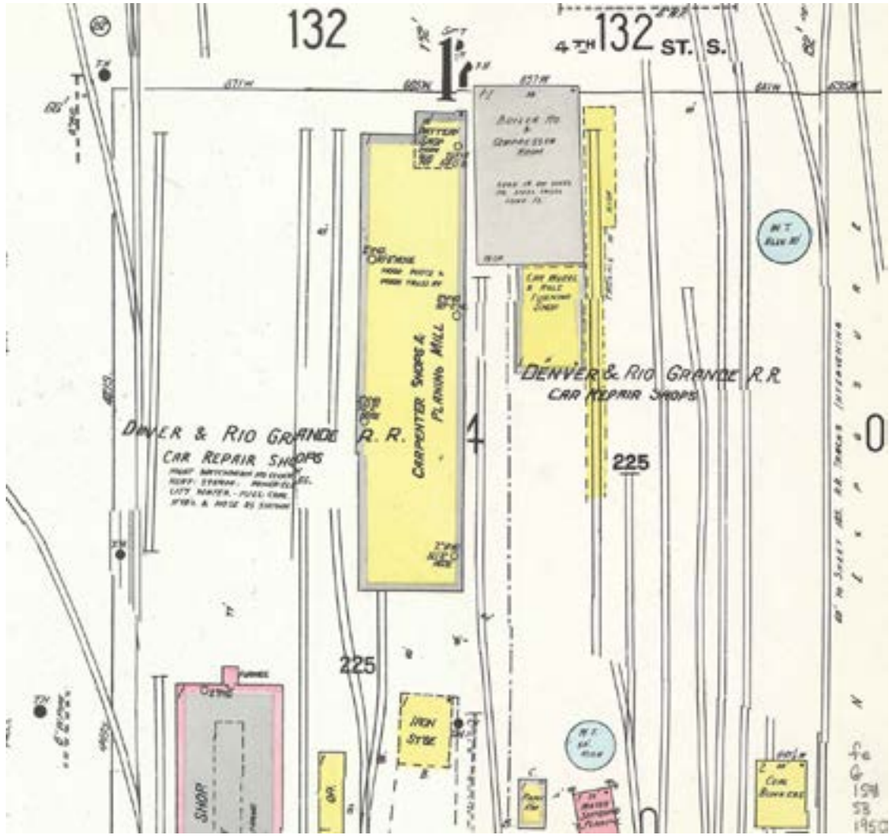

Figure 7. Sanborn fire insurance map from 1950 showing the section of the D&RGW rail yard within the study area. Use of Sanborn Fire Insurance Maps: portions of sheets 143 and 144 from the 1950 Sanborn Fire Insurance Maps of Salt Lake City, Utah reprinted / used with permission from The Sanborn Library, LLC. Images courtesy the University of Utah Marriott Library's Digital Collections, Sanborn Fire Insurance Map Collection.

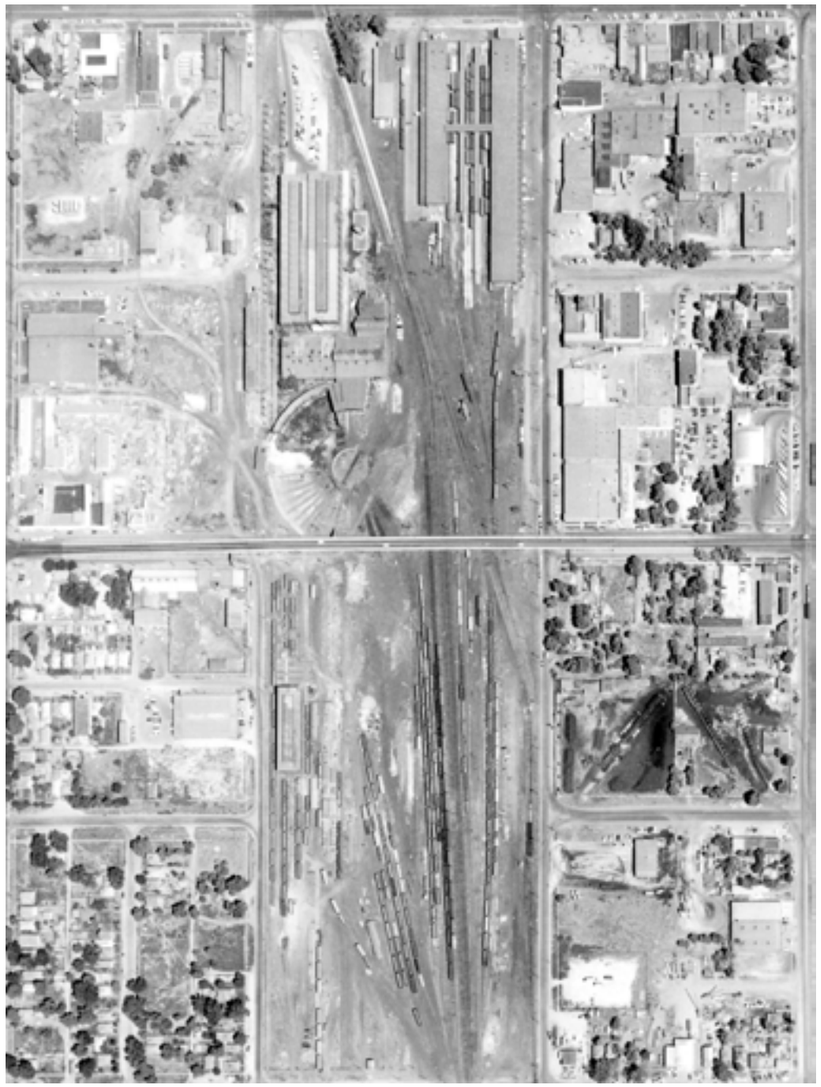

Figure 8. U.S. Department of Agriculture 1958 aerial image of the rail yard showing most of the maintenance facility buildings demolished. Photograph used with permission from the Utah Geological Survey Aerial Imagery Collection.

The years after 1950 were ones of contraction rather than growth at the historic D&RGW Salt Lake City rail yard. Increasing freight competition from the Union Pacific Railroad and the rise in popularity of long-haul trucking eroded the D&RGW's profits and operating capital. These factors, combined with improvements in diesel engine technology, caused the D&RGW to change and consolidate the nature of its operations. In 1951, the D&RGW closed the locomotive shop in Salt Lake City and shifted all such repair work to Denver. Five years later, in 1956, the company erected a diesel engine shop at the new Salt Lake City Roper Yard, directly south of the old yard and extending from about 2100 South to 3000 South (Strack 2015). Over the next several decades, the D&RGW slowly but gradually abandoned operations at the downtown yard and sold off the property. A 1958 aerial image from the U.S. Department of Agriculture documents that by this time all of the buildings and structures within the location of 42SL718 had been demolished, although several historic buildings and structures remained standing to the north (Figure 8). Demolition removed the surface structures, leaving behind subsurface elements.

Project Background

Site 42SL718 covers a small portion of the historic D&RGW yard and was uncovered during the construction of the Utah Transit Authority's new Depot District Service Center, which is intended to provide a compressed natural gas fueling area for the new public buses purchased to reduce emissions and pollution levels in the Salt Lake Valley. The Depot District Service Center is located between 200 South and 400 South and between approximately 650 West and 750 West, just east of Interstate 15 and west of downtown Salt Lake City. The former D&RGW (now Union Pacific) tracks border the site on the east, and the 400 South viaduct bridge passes over it. Early in the Utah Transit Authority's redevelopment project, construction crews uncovered a very large brick cistern and a concrete foundation, as well as pieces of a boiler system and a large metal auger. The mounds of excavated material surrounding the discovery contained additional pieces of concrete, metal, and other unknown objects. The size of the intact features hinted at the potential for a much larger subsurface component yet to be uncovered.

Initial research identified the discovery as the site of the historic D&RGW maintenance facility. Through consultation between the Utah Transit Authority, the U.S. Department of Transportation Federal Transit Administration (who had provided a grant to build the new fueling depot), and the Utah State Historic Preservation Office, the site was determined eligible for the National Register of Historic Places. In addition, it was determined that construction activity at the location would adversely affect the archaeological remains of the historic D&RGW facility. As a result, a treatment plan was prepared to mitigate the adverse effects, and subsequent monitoring and mitigation-level documentation were guided by the plan (Beck 2014; Lechert et al. 2015).

Methods

Construction activities related to the Depot District Service Center at 42SL718 were allowed to resume with an archaeological monitor in place to document any additional finds. Initial monitoring was conducted by Certus, and SWCA assisted with monitoring after mid-July 2014. SWCA and Certus continued monitoring for approximately 1 week, when ground-disturbing activities in the site area ceased. SWCA and Certus began mitigation activities at the end of July under the approved treatment plan. With oversight by SWCA and Certus archaeological monitors, the overburden was mechanically removed with heavy equipment so that the approximate horizontal and vertical extents of features would be visible. The archaeologists further exposed and cleaned the features using shovels, brooms, and other hand tools, and then documented them in profile and plan view before the features were removed by heavy equipment.

Figure 9. Partially uncovered concrete foundations, view facing south from the 400 South bridge.

Removal of one feature in this way often led to the discovery of another feature adjacent to or below it, and the newly discovered feature was exposed, documented, and removed in the same way (Figure 9). A selected sample of artifacts exposed during feature documentation was collected and will be retained by the Utah Transit Authority for possible use in an interpretive display. Additional research was conducted to place the rail yard in historic context and to better understand the chronology of construction and development at the site.

Results

In all, 94 features, including foundations, concrete footers, coal chutes, I-beams, glass caches, and augers, were identified during monitoring and mitigation activities within the main Depot District Service Center construction area. These features represented nearly 70 years of continuous construction and reconstruction of the same types of buildings and structures on the same location. For all mentions of feature locations and their relationships, see Figure 10.

In all, more than 25,000 artifacts were observed across the site during the investigations. Most were glass, brick, unidentified metal pieces, nails, and spikes. Other artifacts included ceramics of varying types, wire, plastic, unidentifiable objects, tools, milled wood, and wire. A sample of 1,060 artifacts was collected during the mitigation-level documentation.

Of the glass artifacts observed at the site, most represented shards from bottles, particularly beverage bottles. Many different maker's marks were found on the bottle bases, and most of the bases with marks were found in the two glass cache features (Feature [F]-66 and F-67). Three separate versions of the Wisconsin Glass Company's mark were observed in the assemblage (WIS G CO.; W. G. CO. MILW; and

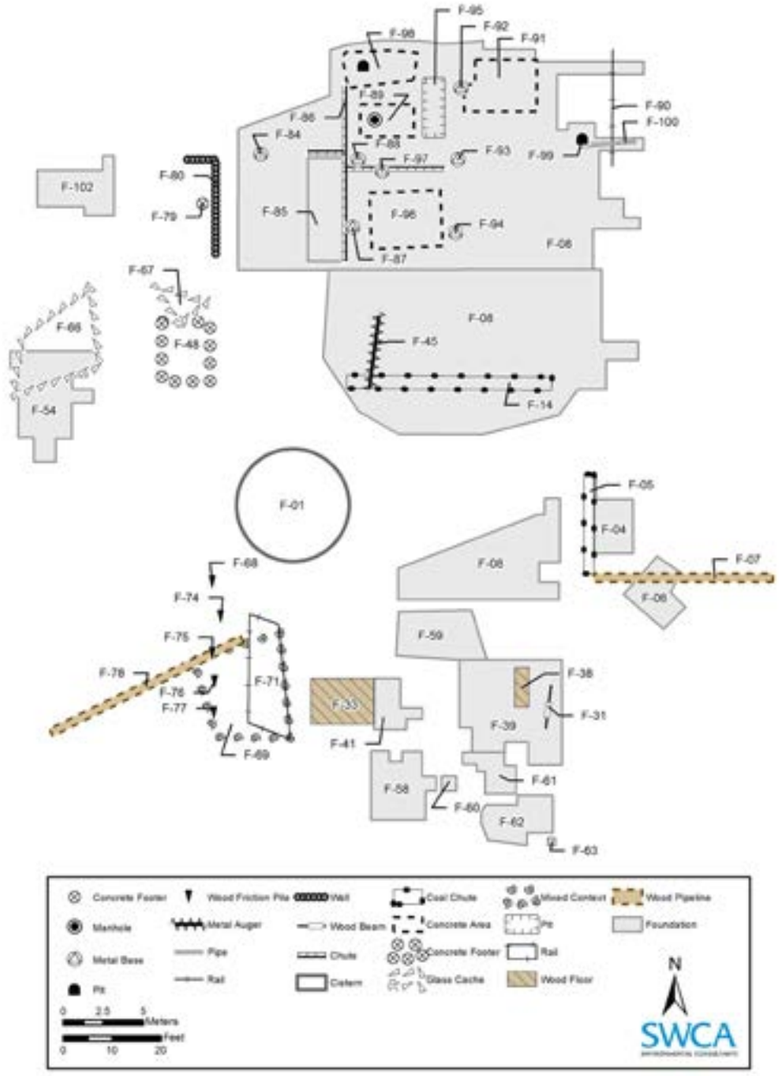

Figure 10. Site sketch map showing feature locations uncovered during monitoring and mitigation.

Figure 11. Example of round bottom ballast glass bottle found at 42SL718.

WIS GLASS CO. MILW). The Wisconsin Glass Company was located in Milwaukee, Wisconsin, and operated between 1882 and 1886 (Whitten 2015a). The L.G.CO mark was used by the Lindell Glass Company of St. Louis, Missouri, between 1875 and 1890; they produced large numbers of beer bottles and some blobtop-style soda bottles (Whitten 2015b). Alexander & David H. Chambers of Pittsburgh, Pennsylvania, a prolific glass company, produced bottles with the A. & D. H. C. mark between 1843 and ca. 1889 (Whitten 2015c). Several round bottom bottles, or ballast bottles, were also observed; one was embossed with BELFAST / ROSS'S (Figure 11). This bottle was imported from Ireland and dated from the 1870s to the 1910s (Lindsey 2015). Overall, the maker's marks indicate a date range between 1843 and 1890. Given the quantity of Wisconsin Glass Company marks, the actual date range for the deposition of these bottles is likely 1882 to 1890, indicating that the features from which they were recovered (F-66 and F-67) predate the first fire at the rail yard in 1905.

Bricks observed at the site were either tan high-fire bricks, which likely lined areas in the boiler building, or regular orange, red-orange, or dark red bricks, which likely came from structures. Several company stamps were observed on the bricks. Based on the marks, the bricks were imported from Colorado from the Pueblo Standard Fire Brick Company, the Golden Fire Brick Company, and the Denver Fire Clay Company. The D&RGW was headquartered in Colorado, so it is likely they purchased the materials there and shipped them to Salt Lake City on their trains.

Several of the ceramic specimens have maker's marks stamped or printed on the bottom. The U.P.W. with a small eagle is the mark of the Union Porcelain Works of Greenpoint, New York; they produced table service pieces between 1854 and 1910 (Lehner 1988:479). An oval platter and a tea saucer bear the mark, GREENWOOD CHINA, TRENTON, N.J.. The Greenwood China Company used this mark between 1886 and 1910 (Lehner 1988:180). One mark from the base of a bowl reads, in part, MANUFACTURE…ROYALE / FABRICATION…/ MADE IN BELGUIM with a crown over a rectangle in the center of the wording. Unfortunately, portions of the mark are illegible due to aging and poor original application. Ceramic decoration includes transfer print in black, blue, and brown; gold lustre; flow blue; and salt glaze. Some vessels appear to have been undecorated. Whiteware, porcelain, ironstone, and stoneware were all observed, but the number of ceramic artifacts was not large enough to facilitate any conclusions about dates, distribution patterns, or associated ethnicity.

Discussion

The historical and archaeological investigations for 42SL718 provide interesting information about the D&RGW maintenance facility. First, the foundation features uncovered across the site represented several phases of construction. Based on newspaper accounts of fires and construction efforts, at least five major construction phases occurred at the maintenance facility. Because the D&RGW chose to rebuild in the same location after each of four major fire cycles, assigning dates to specific foundations and other features is difficult. Some foundations were built on top of other foundations, indicating distinct building periods and allowing several features to be roughly associated with one of the five phases listed above. Other foundations can be attributed to two broad periods—early and late—based on their spatial location and superposition. This jumbled set of features represented continuous site use and reuse for nearly 70 years for the same purpose by the same group. The fact that parts of the facility were rebuilt after fire not once, not twice, but four times for the same use is intriguing. Post-fire reuse and reconstruction are common practices throughout history, and often the new buildings and structures were improved to incorporate more fireproof materials and designs after each fire (Bankoff et al. 2012:1-20). The 1911 Sanborn maps show most of the rail yard buildings as "frame building iron clad" (Sanborn Map Company 1911:Sheets 132 and 144). The only construction difference shown on the 1950 maps is for the boiler house, which was rebuilt in corrugated iron on a steel frame with steel trusses on a concrete floor (Sanborn Map Company 1950:Sheets 132 and 144). Despite all of the fires at the rail yard, it does not appear that the D&RGW implemented all of their fireproofing construction options when rebuilding, especially given the dangerous industrial work that took place at the site. Cost and expediency may have outweighed some material improvements, and fire-prevention or fire-fighting measures not reflected in the archaeological or written record may also have been employed.

The archaeological evidence is consistent with the changes in site layout and function inferred from the documentary sources. Overlaying the documented features on the Sanborn maps provides a better understanding of what the large layers and pieces of concrete represented during the existence of the maintenance facility. Although the modern maps created with global positioning system (GPS) data do not line up perfectly with the hand-drawn maps of the historical period, the two sets of maps are sufficiently close that it is possible to interpret which former structures are represented by the archaeological remains.

The 1907 book, Railway Shop Up To Date, recommended that railroad maintenance facilities place powerhouses, which house boiler systems used to generate steam power, nearest the point of greatest power consumption, the locomotive machine shop, followed by the second greatest point, the planing mill (Editorial Staff of the Railway Master Mechanic 1907:140). The 1911 Sanborn maps show the boiler house and engine room placed near the paint shop and the car repair shops, and the 1950 Sanborn maps show

Figure 12. Cistern and foundation features cut by construction trench at the start of the project. Photograph courtesy of Sheri Murray Ellis.

Figure 13. Remains of the 6-foot-long boiler from a retired small steam locomotive.

the carpenter shops and planing mill, pattern shop, and the car wheel and axle shops closest to the boiler house and compressor room. The change in facility layout likely occurred after the 1913 fires and may have taken facility layout and design advice from the Railway Shop Up To Date or a similar reference of the time.

When the field data are overlain on the 1911 Sanborn map, the bottom third of the boiler house appears to have been cut off by the 2014 construction trench. The southern portion of a large foundation (F-08) lay in what appears on the 1911 Sanborn map to be the open area between the boiler house and the paint shop. F-08 may have also included remnants of the boiler house shown on the 1950 Sanborn map. In addition, the features observed on top of F-08 (F-84 through F-100) appeared to fit better in the 1950 building outline (see Figure 10).

While the top level of F-08 likely dated to the latest period (1938 to the late 1950s), channels found below it may have been from an earlier incarnation of the boiler house. Several east-west-trending channels were formed into the foundation. What was likely coal and ash mixed in with dirt was found in a 2-foot-wide chute measuring 32 feet long and ranging in depth from 5 to 8 feet, gradually getting deeper from east to west (F-14). In addition, near the west end of the chute was a north-south-oriented, v-shaped channel with a large metal auger in it (F-45). Mixed in among the soils in the chute and the channel were many pieces of fire brick, adding to the likelihood that the boiler system was located above or near these features. The artifacts and soils in the chute likely dated to before 1938. The cistern (F-01) was located southwest of the likely boiler location and probably dated to the initial construction of the facility based on the type of bricks used (Figure 12). The cistern likely provided the water necessary to run the original boiler based on the approximately 6-inch-diameter metal pipe observed trending

Figure 14. Example of incomplete wood friction pile point.

north toward the location where the boilers were found.

In the area west of the large foundation (F-08) and north of the cistern (F-01) and in the trench cut through the large foundation, two metal boilers of similar design and construction were unearthed prior to the start of monitoring. One boiler was approximately 6 feet long (Figure 13); the other was approximately 10 to 12 feet long. Railway Shop Up to Date noted that the horizontal water tube boiler was the most common boiler type used in power houses at that time and that "fire tube boilers of the locomotive type have been installed" at several railway shops (Editorial Staff of the Railway Master Mechanic 1907:144). Given the sizes observed, it is possible that the two boilers could have been from locomotive-type fire tube boilers. In addition, the 1911 Sanborn maps show a "stationary railway engine used for auxiliary steam" approximately 65 feet east of the boiler house. D&RGW's Salt Lake shops had the capability to construct new boilers and fireboxes and to perform all levels of needed locomotive repairs (Don Strack, personal communication 2016). Retired smaller locomotive boilers would have been used for stationary boilers (Don Strack, personal communication 2016). The smaller boiler was from a retired small steam locomotive used as the stationary engine noted on the Sanborn map, and the larger boiler was likely from the boiler house.

A small concrete foundation (F-04), a metal coal chute (F-05), and a concrete footer (F-06) on the east side of the large foundation (F-08) were likely associated with the foundations of the 10-foot-tall trestle that appears on the 1911 and 1950 Sanborn maps. The concrete footer, which was found positioned at an angle, may have been moved out of place during demolition activities either after fire clean-up or after the facility's closure.

A wood beam (F-31), two sections of wood floor (F-33 and F-38), and two concrete foundations (F-39 and F-41) were found in the upper layer of the site, and these features likely correspond with one of the later reconstruction episodes. Several concrete foundation features, F-58 through F-63, were identified underneath the aforementioned features and likely dated to an earlier time period. The features may have represented foundation remnants of the paint shop on the 1911 Sanborn maps. These earlier features were approximately the same depth below ground surface as the wood friction piles (F-68, F-74, F-75, F-76, and F-77) found on-site and likely dated after 1910 (Figure 14). A friction pile "is a load-carrying column that is driven into soil to support the weight of a structure" and "uses the friction between the pile's surface and the soil to support the load on the pile" (Schwartz 2000:124). Similar wood friction piles were found intact under the nearby D&RGW depot, built in 1910 by the D&RGW, during an engineering evaluation more than 25 years ago (personal communication, Richard Young, SWCA, to Stephanie Lechert, SWCA, July 2014). The soils directly beneath the features at this level below ground surface contained little or no coal and/or ash, whereas the features themselves were covered with dark gray soils. This change in soil color and texture may have represented the original level of construction, which had been covered in the ashy remains of one of the later fires. In addition, two train wheels were found under the F-62 foundation feature when the feature was removed, indicating that features in this area dated to before ca. 1910 and may have been part of the expansion of the facility from 1901 to 1904 before the 1905 fire.

A series of features discovered south-southwest of the cistern (F-01) was particularly interesting. F-71 was a segment of intact, north-south-oriented railroad rails and ties with four large sections of heavy iron chains welded to the rails (Figure 15). Directly above the rail and tie section was an area of dark black soil mixed with coal ash (F-69). The soils had a very mixed context and a variety of artifacts, including a piece of asphalt roofing, brick, glass, metal, and wood. Based on the soil color and mixed context, it is likely that the rail and tie section had been

Figure 15. In situ metal rails and wood ties with chains attached, measuring tape at 3 feet.

buried and forgotten in the aftermath of the 1913 fire. Immediately below the rail and tie section was a portion of a southwest-northeast-trending rectangular wood pipeline (F-78). Nothing was observed inside this section of pipeline, although a similar section (F-07) observed on the east half of the site was full of an unknown petroleum-based product. A wood friction pile was driven into the center of the wood pipeline approximately 10 feet west of the rail and tie section. Given the introduction of the friction pile into the pipeline and its location below F-71, the wood pipeline likely dated to the earliest days of the facility. The rail and tie section and the wood pipeline may have dated between 1882 and 1913 based on depth and the rough alignment of the rail and tie section to the spur illustrated on the 1911 Sanborn map.

The in situ concrete foundation (F-102), concrete footers (F-48, F-54, and F-79), and concrete wall section (F-80) to the west of F-08 likely represented the carpenter shops, planing mill, and pattern shop that dated after 1938. The soils surrounding these features had less ash and coal remains mixed in. The glass caches (F-66 and F-67) were found beneath the aforementioned features at a lower depth below ground surface. Portions of the F-66 glass cache were covered with a layer of dark gray to black ashy soil, possibly indicating the glass had been deposited prior to or during the clean-up activities from the 1905 or 1913 fire, based on the approximate date range provided by the maker's marks.

Conclusions

When the D&RGW railroad arrived in Salt Lake City in June 1882, it marked a significant event in regional history. Not only did the railroad provide an important means of transporting goods and people, it was also a significant driver in changing the social and cultural fabric of the

Salt Lake Valley. Site 42SL718 was not the most glamorous archaeological discovery nor the easiest to decipher, but it illuminated a critical element of D&RGW operations. By creating a construction chronology based on the facility's period of operation and multiple fire events and by correlating this chronology with soil changes and consistencies, it was possible to assign features approximate dates or date ranges. The large concrete foundation (F-08) was the most difficult to date, given a lack of accurate facility plans and the depth of multiple levels of concrete that measured, in total, 11 feet deep. The presence of these many levels did, however, provide evidence of repeated reconstruction. Other features, such as the intact section of railroad rails and ties (F-71), provided better clues for dating based on their below-surface depth and position relative to other layers of features. Overall, the features uncovered during the project appeared to date from the earliest days of the railroad to 1958 and were the result of railroad growth and urban development, punctuated by the four destructive fire cycles discussed above. The site is a good example of how industrial locations, particularly large and complicated ones like rail yards that require large spaces and fixed infrastructure, undergo continual use and cycles of construction, in this case over the course of more than 70 years. It is also a good example of the archaeological challenges of interpreting palimpsests, particularly when reconstruction events did not just involve rebuilding on the surface of the lower level, but intruded into it.

When first built, the D&RGW rail yard and maintenance facility sat alone on vacant land in the low, swampy area west of downtown, away from the core of Salt Lake City. Eventually, Salt Lake City grew to surround the rail yard, which was likely considered a nuisance by its new neighbors. This, in combination with aging infrastructure and the inability to expand the facility boundaries, prompted the D&RGW to build its new maintenance facility and diesel repair buildings at the larger Roper yard area to the south in the late 1950s. This relocation may also have been spurred by the urban renewal movement occurring in many cities after World War II. In Salt Lake City, this resulted in the demolition of nearby neighborhoods like Chinatown and Japantown and their replacement with new development. The construction of improved transportation networks serving the automobile, which was rapidly eclipsing passenger and freight train travel, formed an important part of the movement, and the construction of Interstate 15 to the west of the yard in the late 1950s and 1960s is a prime example. The highway alignment reused a part of the old rail corridor but was built with a strong curve to the west to avoid the old D&RGW maintenance facilities, a testament to the site's ongoing, if diminishing, use.

The redevelopment of the area surrounding the old D&RGW maintenance facility affected other rail-related facilities as well. The Rio Grande passenger depot was purchased by the State of Utah in 1977 and now houses the Utah Division of State History. The Union Pacific line and rail yard were removed and eventually replaced with the mixed-use Gateway District just prior to the 2002 Winter Olympics that were hosted in Salt Lake City. The Union Pacific Depot was rehabilitated as a public event venue and an entrance point for the Gateway District mall. While shoppers and area residents go about their daily lives, most are unaware of the importance of these rail remnants in the industrial and commercial growth and history of Salt Lake City and Utah. The rail lines that still snake through the city were, and continue to be, arteries flowing with the activities of commerce, commuting, and growth. Fittingly, more than 130 years after initial construction began on the site for the D&RGW maintenance facility, the project that uncovered it all is tied to the construction of new transportation-related buildings and structures. ■

Stephanie Lechert
Historical Archaeologist
SWCA Environmental Consultants
257 E 200 S Ste 200
Salt Lake City, UT 84111
slechert@swca.com

Anne Oliver
Historic Architecture Team Lead
SWCA Environmental Consultants
257 E 200 S Ste 200
Salt Lake City, UT 84111
aoliver@swca.com

Sheri Murray Ellis
Certus Environmental Solutions
655 7th Avenue
Salt Lake City, UT 84103
sheri@certussolutionsllc.com

References

Bankoff, Greg, Uwe Lübken and Jordan Sand (editors)
2012 *Flammable Cities: Urban Conflagration and the Making of the Modern World*. University of Wisconsin Press, Madison, Wisconsin.

Beck, R. Kelly
2014 *Treatment Plan for UTA's Depot District Service Center Project in Salt Lake County, Utah: Denver & Rio Grande Western Railroad Train Maintenance Facility Discovery*. Prepared by SWCA Environmental Consultants, Salt Lake City, Utah. Prepared for Utah Transit Authority, Salt Lake City. Copies available from Utah Division of State History, Salt Lake City.

Bradley, Colleen P.
1996 An Inventory of the Denver & Rio Grande Western Railroad, Collection Number 513. Available at: http://www.historycolorado.org/sites/default/files/files/Researchers/Denver_Rio_Grande.pdf. Accessed March 7, 2016.

Carr, Stephen L. and Robert W. Edwards
1989 *Utah Ghost Rails*. Western Epics, Salt Lake City, Utah.

Denver & Rio Grande Western Railroad
n.d. [1936] Denver & Rio Grande Western Railroad Guide Book. Available at: http://www.ghostdepot.com/rg/library/guide%20book/guidebook.htm. Accessed March 7, 2016.

Deseret News
1924 200 Employees of D. & R. G. W. to Return to Work. Deseret News May 31, 1924. Salt Lake City, Utah.

Editorial Staff of the Railway Master Mechanic
1907 *Railway Shop Up To Date: A Refernce Book of Up to Date American Railway* Shop Practice. Crandall Publishing Company, Chicago.

Griffin, James
2003 *Rio Grande Railroad*. Voyageur Press, St. Paul, Minnesota.

Johnson, Brandon
2010 One Building's Life: A History of Salt Lake City's Denver and Rio Grande Depot. *Utah Historical Quarterly* 78(3):196-217.

Lechert, Stephanie, Mike Cannon and Lisa Benson
2015 *Historical and Archaeological Investigations of the Denver & Rio Grande Western Railroad Train Maintenance Facility at UTA's Depot District Service Center in Salt Lake County, Utah*. Prepared by SWCA Environmental Consultants, Salt Lake City, Utah. Prepared for Utah Transit Authority, Salt Lake City. Copies available from Utah Division of State History, Salt Lake City.

Lehner, Lois
1988 *Lehner's Encyclopedia of U.S. Marks on Pottery, Porcelain, and Clay*. Collector Books, A Division of Schroeder Publishing Co., Inc., Paducah, Kentucky. Originally published 1988.

Lindsey, Bill
2015 Bottle Bases. Available at: http://www.sha.org/bottle/bases.htm. Accessed November 23, 2015.

Salt Lake Telegram
1922 Disastrous Fire Closes Local Overhead Crossing to All Traffic. Several Months May Be Required to Make Necessary Repairs. *Salt Lake Telegram*. Salt Lake City, Utah.
1923 Work Starts on Rio Grand Improvements. *Salt Lake Telegram* May 10, 1923. Salt Lake City, Utah.
1924 Shop Workers Return to Jobs at New Plant. *Salt Lake Telegram* June 2, 1924. Salt Lake City, Utah.
1926 New D. & R.G.W. Shops Big Asset. Employ 1000 Men; Payroll $130,000. *Salt Lake Telegram* November 10, 1926. Salt Lake City, Utah.
1938 S.L. Railroad Shops Razed by Fire. *Salt Lake Telegram* January 8, 1938. Salt Lake City, Utah.

Salt Lake Tribune
1882a Denver & Rio Grande. January 1, 1882. Salt Lake City, Utah
1882b The Denver & Rio Grande Western. June 29, 1882. Salt Lake City, Utah.
1882c Denver & Rio Grande, Description of the Depots and Machine Shops in Salt Lake. September 3, 1882. Salt Lake City, Utah.
1883 The New Railroad. March 30, 1883. Salt Lake City, Utah.
1900a Rearrange the Yards, Most Important Work on the Rio Grande Western. October 9, 1900. Salt Lake City, Utah.
1900b Electric Power Plant, Rio Grande Western May Build One Here. June 21, 1900. Salt Lake City, Utah.
1900c Will Employ 800 Men, Further Details of Rio Grande Western Shop Plans. December 13, 1900. Salt Lake City, Utah.
1901 Plans for New Plant, Rio Grande Western Ready to Erect Shops. February 14, 1901. Salt Lake City, Utah.
1903 Plans for the Shops, What the Rio Grande People Will Do. September 18, 1903. Salt Lake City, Utah.
1905a Damage Done is About $40,000, Destruction at Rio Grande Shops Greater than First Estimated. December 22, 1905. Salt Lake City, Utah.
1905b Flames in the Rio Grande Shops, Engine-House and Repair Shops are Burned to the Ground. December 21, 1905. Salt Lake City, Utah.
1913a Rio Grande is Building Unique Viaduct, Only One of its Kind in the United States. September 21, 1913. Salt Lake City, Utah.
1913b $250,000 Fire Destroys D. & R.G. Repair Shops; Greater Shops Planned. June 19, 1913. Salt Lake City, Utah.
1913c Rio Grande Shops Ablaze; No Water. January 7, 1913. Salt Lake City, Utah.
1924 Rio Grande Shopmen Return to Work Soon. *S* June 1, 1924. Salt Lake City, Utah.

Sanborn Map Company
1911 Fire Insurance Maps for Salt Lake City, Utah. Available at: http://content.lib.utah.edu/cdm/search/searchterm/sanborn%20fire%20insurance%20maps!salt%20lake%20city%201911/field/all!all/mode/all!all/conn/and!and/order/title/ad/asc. Accessed Agusut 13, 2015.
1950 Fire Insurance Maps for Salt Lake City, Utah. Available at: http://content.lib.utah.edu/cdm/search/searchterm/sanborn%20fire%20insurance%20maps!salt%20lake%20city%201950/field/all!all/mode/all!all/conn/and!and/order/title/ad/asc. Accessed August 13, 2015.

Schwartz, Max
2000 *Basic Concrete Engineering for Builders.* Craftsman Book Co., Carlsbad, California.

Strack, Don
2015 Rio Grande in Utah, 1908 to 1988. Available at: http://utahrails.net/drgw/rg-in-ut-1908-1988.php. Accessed June 1, 2015.

Whitten, David
2015a Glass Manufacturers' Marks on Bottles and Other Glassware ~ Page 5. Available at: http://www.glassbottlemarks.com/bottlemarks-5/. Accessed August 17, 2015.
2015b L.G.CO. Mark on Antique Glass Bottles & Jars. Available at: http://www.glassbottlemarks.com/l-g-co/. Accessed August 17, 2015.
2015c Glass Manufacturers' Marks On Bottles & Other Glassware ~ Page 1. Available at: http://www.glassbottlemarks.com/bottlemarks/. Accessed August 17, 2015.