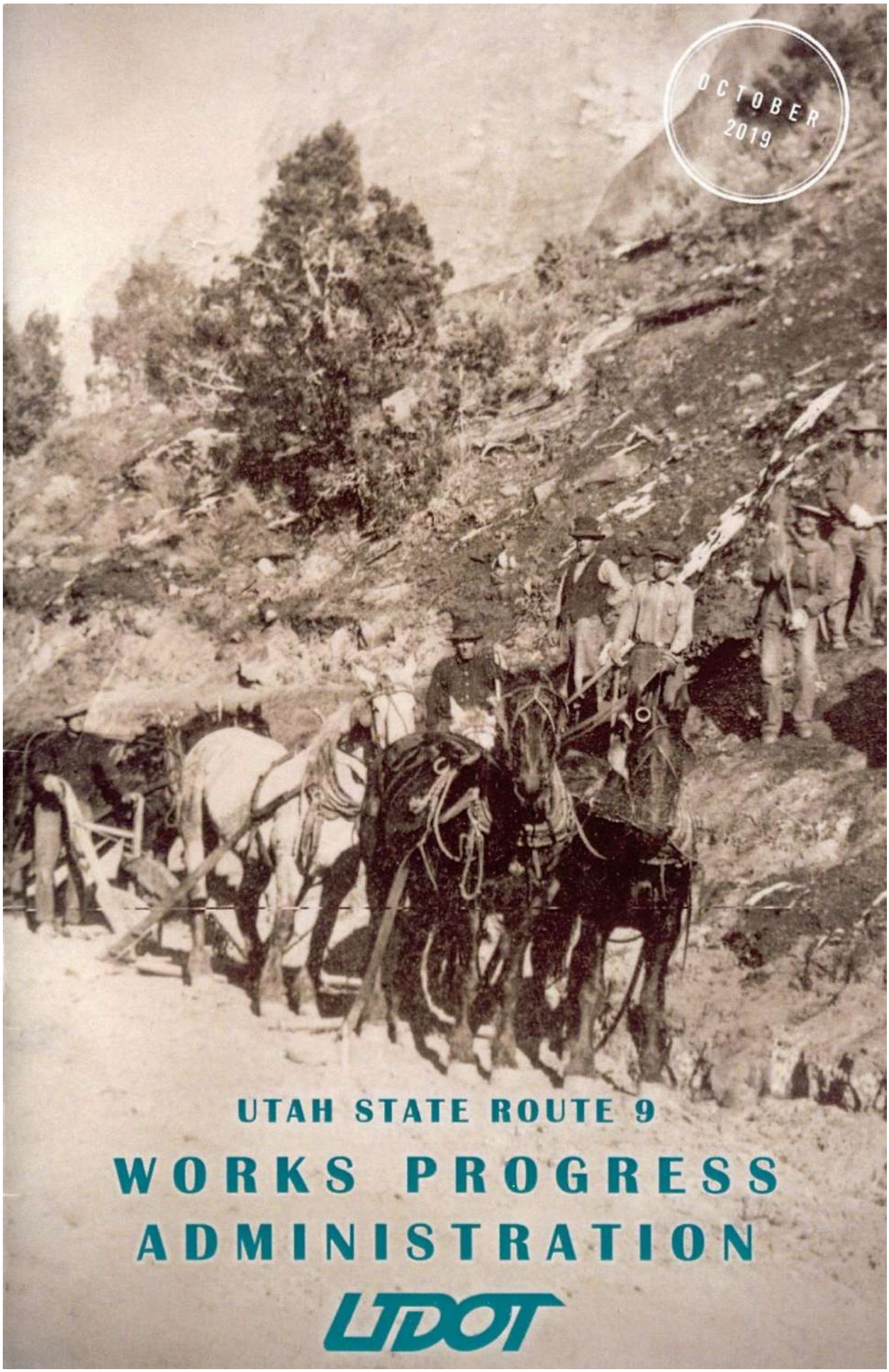

UTAH STATE ROUTE 9

WORKS PROGRESS ADMINISTRATION

UDOT

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Introduction

In 2017 the Utah Department of Transportation (UDOT), in cooperation with the Federal Highway Administration, proposed to construct improvements to Utah State Route 9 (SR-9) through Rockville and Springdale to the entrance of Zion National Park (ZION) in Washington County, Utah. The project included lane leveling, pavement overlay, and shoulder widening to provide a safe and efficient means of travel. Part of this work necessitated the partial removal of masonry curb and gutter constructed by the Works Projects Administration (WPA) in 1940 and 1941. These features had been determined to be Eligible for listing on the National Register of Historic Places.

To help mitigate the impacts to the Eligible historic features, UDOT, in consultation with the Utah State Historic Preservation Officer, requested that this brief history of the site be written and made available to the public.

Resources used in the preparation of this historic context included Utah State Road Commission (USRC) Project Design Sheets (1926, 1938, and 1940), miscellaneous USRC documents, secondary references, photographs, and personal interviews. Resources were culled from the Utah State Archives, UDOT archives, the Special Collections of both Southern Utah University and University of Utah, and the Huntington Library.

This historic context is divided into the following six sections: 1) Early Road History, 2) Federal Involvement, 3) 1940 to 1941 Road Improvements, 4) WPA Gutters/Ditches/Canals, 5) WPA Ancillary Features, and 6) Post-1941 Road Improvements.

Early Road History

The area that includes the upper Virgin River was first explored by Nephi Johnson in 1858. He identified a number of locations where farmers might settle and, in 1861 and 1862, a total of 33 families were called by Brigham Young to settle along the upper Virgin River Drainage. The first of these communities were Virgin City (known then as Pocketville), Grafton, Adventure (near Grafton), and Shonesburg, along the eastern fork of the river. Many of these settlers were from Cedar City and Sanpete County, Utah (Alder 1996; Daughters of the Utah Pioneers 1950; Stout 1972).

Flooding in 1861 and more massive flooding in 1862 destroyed portions of these communities, especially Grafton, and wiped out their initial attempts at irrigation. To escape these flood-prone locations, many of the settlers moved farther up the valley, eventually settling Rockville, Northrup, and Springdale. A few hardy families even settled in the extremely isolated valleys at the headwaters of the Virgin River in what is now Zion National Park. Rockville eventually became the regional center of the valley, establishing stores, a church, a school, and a water-driven mill. During the Black Hawk War of 1865 to 1866, all residents of the valley temporarily congregated at Rockville for defense. In subsequent years, a series of small diversion dams was built along the river and several canals were constructed to irrigate the floodplain fields in the summers. The most important crops were maize, sorghum (cane), and cotton. Cotton turned out to be an undependable crop for this climate and was later replaced by fruit orchards (Alder 1996; Daughters of the Utah Pioneers 1950; Stout 1972).

These communities would remain highly isolated during the 19th century, and manufactured goods, easily available elsewhere in the territory, were difficult to come by. This isolation also provided relief from federal anti-polygamy enforcement, and a number of polygamist families settled in the upper valley. The region remained vulnerable to the river's periodic flooding and periods of drought, especially the drought years of 1933 and 1934. In 1909, Zion National Monument was established and, in 1919, it was made a national park. However, the portion of land that abuts Springdale was not added to the park until 1930. In that year, the tortuous back road through the park to Kane County was completed. For the first time, residents had more than just one access route into the valley (Alder 1996; Daughters of the Utah Pioneers 1950; Stout 1972).

Transportation was a major impediment to the growth of the communities on the east Virgin River during the first 65 years of their settlement. The first "road" to traverse the Hurricane Fault, the current SR-9, originated as little more than an improved Indian trail known as "Johnson's Twist." Given the narrow corridor that exists between the Virgin River and the steep benches to the west and north, it is unlikely that this trail deviated more than a few hundred feet from the current SR-9 alignment. The trail was gradually upgraded by those who used it but remained primarily a road for pack animals and wagon traffic (Alder 1996).

Travel into the east Virgin River Valley was limited to this gradually improved wagon road throughout the 1800s and the first two decades of the 1900s. In 1916, the route was added to the state highway system and in the 1920s, was designated State Route 15, Farm Access Road Number 14 (Knowlton 1963). It was not until 1977 that the road was re-designated as SR-9 to avoid confusion with the newly constructed Interstate 15. **Figures 1, 2,** and **3** below illustrate the conditions of the road corridor at the same location in Springdale during the 1880s, 1915, and 1938.

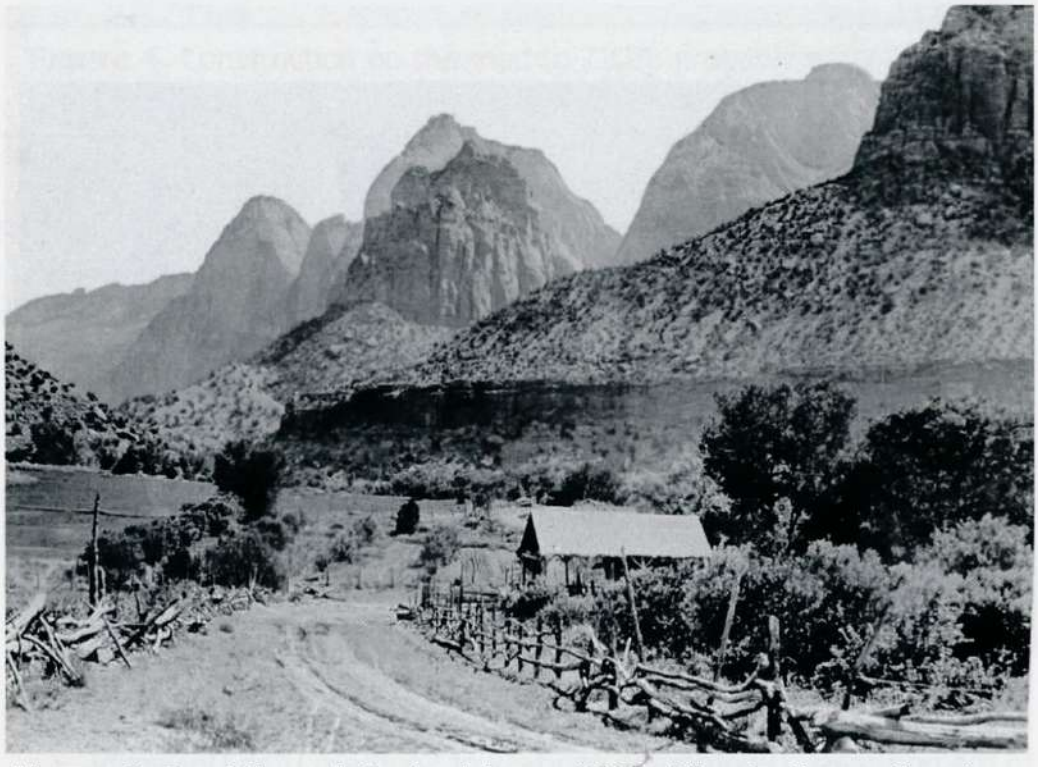

Figure 1. Road through Springdale, ca 1880s. View to the northeast. (Photograph courtesy of Southern Utah University Special Collections.)

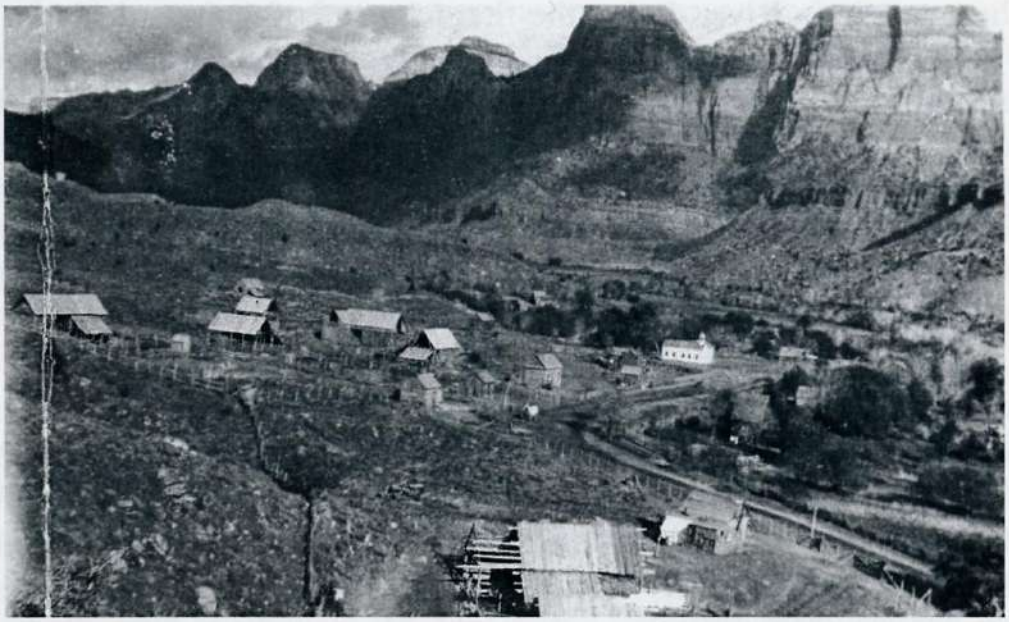

Figure 2. Road through Springdale, ca 1915. View to the northeast. (Photograph courtesy of Southern Utah University Special Collections.)

Figure 3. Road through Springdale, ca 1938 after the 1926 improvements but before the improvements of 1940 to 1941. View to the northeast. (Photograph courtesy of Southern Utah University Special Collections.)

Poor funding and primitive technology restricted development of quality roads until after the passage of the 1916 Federal Highway Act. Prior to

then, road maintenance was the purview of county crews who graded the dirt roads using horse-drawn, split-log drags that leveled the road surface (**Figure 4**).

Figure 4. Construction on the road to ZION, probably early 20th century. (Photograph courtesy of Southern Utah University Special Collections.)

These muddy roads were quickly rutted by the narrow-wheeled wagons of the period. Specialized "mountain buggies" and reinforced freight wagons were developed to handle the unusually rough conditions (**Figure 5**). In 1917, road improvements were made by convicts from the Utah State Prison in Salt Lake City (Whalen 2012).

Figure 5. A mountain buggy in use near Rockville. (Photograph courtesy of Southern Utah University Special Collections.)

The first major road improvements were designed in 1926 to widen and straighten the road and to bring it up to USRC standards. An additional impetus for this work was that the road was to be extended through ZION to Mount Carmel beginning in 1927 and an increase in traffic was anticipated. The project area designated by the USRC in 1926 as "81" (comprising project area segments 81-B and part of 81-C) began at approximately 1 mile inside the current South Gate boundary of ZION and extended all the way to La Verkin. Project 81-B extended from the park boundary for 6.44 miles to the western edge of Rockville. A segment of the current project area extending one mile farther west was designated part of project area 81-C (USRC 1926 [sheet 81-B1]).

Extensive improvements were made to project 81-B in 1926. Two plan sheets (USRC 1926 [sheets 81-B4, 81-B5]) have been located for this project; these extend from the ZION boundary to near the current center of Springdale. Prior to 1926, the road appears to have been an approximately 16-foot-wide dirt road that wound crookedly to avoid boulders, irrigation canals, and steep topography (**Figure 6**). A stone fence ran along the east side of the road through Springdale.

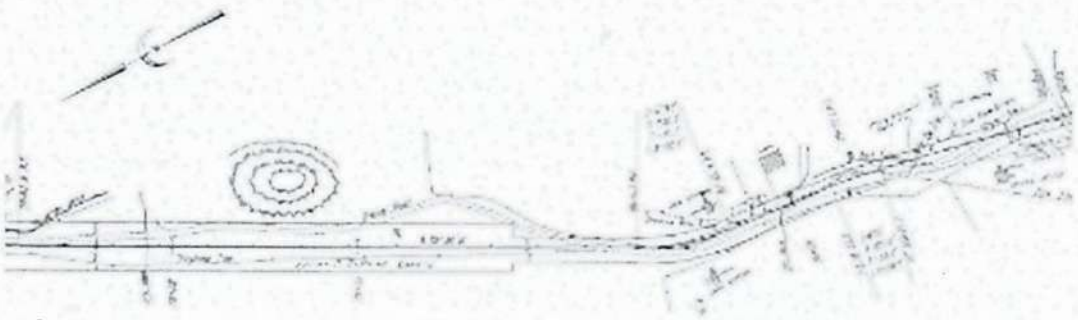

Figure 6. A portion of sheet 81-B5 showing the relationship between the existing and proposed road (USRC 1926).

The 1926-era construction straightened and expanded the road surface to 24 feet wide but with no road shoulders or ditches installed (USRC 1940 [sheets 81-B4, 81-B2]). To construct the road, a number of pre-existing features needed moved or relocated. These included long stretches of stone fences, irrigation canals, culinary water lines, telephone poles, and cabins and sheds. Some parallel segments of the much-older Springdale Consolidated Irrigation Canal were relocated to one side of the new road alignment or the other, crossing under the road perpendicularly where necessary. Several older stone box and wood culverts were removed at this time and new improvements were added, including box culverts, concrete bridges, "syphons," a "submerged bridge," timber river protection, and guard rails. In addition, new 36-, 30-, 24-, or 18-inch corrugated metal pipe or corrugated galvanized metal pipe culverts with masonry headwalls were installed. Some of these culverts were removed in 1940 to 1941 or later, but many of the 1926-era culverts are still in use today.

Although the 1926 plan sheets for the portion of project 81-B south and west of Springdale have not yet been located, it is probable that similar improvements were made along the project's entire extent.

Federal Involvement

With the onset of the Great Depression in the 1930s, improvements to transportation corridors slowed. The effects of the Great Depression were felt throughout Utah, and the USRC had little funding for road improvements (Knowlton 1963). In an effort to boost the economy and strengthen the work force, a number of "New Deal" programs were established by the Roosevelt Administration. One of these programs, the Works Progress Administration (WPA), which was established in 1935, was a replacement for the then-existing Civil Works Administration. The WPA (renamed in 1939 as the Work *Projects* Administration) would be the most visible program in accomplishing community work projects. The State of Utah, especially the USRC, received much more than its per capita allotment of these funds, mainly due to the influence of Utah's Governor Blood, a former USRC Commissioner, who lobbied Washington heavily during this time (Knowlton 1963). The WPA was designed to put Americans back to work on projects that would help individual towns and cities. Unlike the WPA's counterpart, the Civilian Conservation Corps (CCC), WPA projects required matching funds, in that each project had to have a share of the financing provided by the individual state or city.

One of the WPA's requirements was that prison labor could no longer be used on federally funded road projects (Smith 2009). At its peak in 1938, the WPA provided paid jobs for three million unemployed men and women, including an average of 11,000 per year in Utah (Knowlton 1963). Between 1935 and the agency's disbanding in 1943, the WPA employed 8.5 million people. Most people who needed a job were eligible for employment in some capacity, and hourly wages were typically set to the prevailing wages in each area (McElvaine 1993).

The WPA was organized into a number of different divisions. The Division of Engineering and Construction planned and supervised construction projects, including airports, dams, and sanitation systems (Smith 2014). The division also worked on transportation projects; over four billion dollars was spent on highway, road, and street projects between 1935 and 1943, during which time572,000 miles of highway, 67,000 miles of city streets, and 78,000 bridges were constructed across the nation (Knowlton 1963).

The WPA was a national program, but one that operated its road projects in cooperation with state and local governments, which typically provided 10 to 30 percent of the total costs. Usually the local sponsor provided land

and often also trucks, tools, and supplies, with the WPA responsible for wages (and the salaries of supervisors, who were not on relief) (Howard 1943). The labor force lived locally or else were responsible for providing their own room and board; contrary to the CCC, there were no man camps provided in the WPA (Smith 2014) (**Figure 7**).

Figure 7. A WPA road improvement project in the Southeast, ca 1939. (Photograph courtesy of the U.S. National Archives.)

For each project, Certificates of Labor and Materials had to be submitted to calculate the amount of aid allowed through federal funding (Bloxom 1982). A Certificate of Labor and Materials calculation sheet for some of the 1940 to 1941 WPA work in the project area is included as **Figure 8**. The WPA, along with the CCC, also provided some skills training. Many men hired for WPA road construction projects may have been previously trained in masonry or other construction skills by CCC instructors (**Figure 9**) (Howard 1943).

F.A.P. 81-B Sheet 14

CERTIFICATE OF LABOR AND MATERIALS—Continued.

Item No.	Quantity.	Unit.	Item.	Price.	Amount.
			Brought forward		
F			Actually incurred Eng. & Cont. Engineering per attached statement		8127.96
			Contingencies		
			Roadway		
W.O.11			Repairing Rockville Canal	Force Acct.	65.23
" "			Sprinkling Expense	" "	14.08
- -			Shifting & Repairing Pipes & Cementing Joint	" "	61.16
	1701	cu yd	Extra allowance acct. difficult borrow	.10	170.10
	500	" "	" " " excavation that sluffed on the road after surfacing had been placed	.20	100.00
W.O.20			Building rock walls sta. 94+60	Force Acct	278.71
			Moving gate to field to save 16' of 12" pipe	" "	1.50
			Building approaches from new road and excavation of new head ditches on account of change in alignment from old road	" "	175.25
			Building log crib, sta. 270+15, W.O.2	Labor	
	135.1	cu yds	Excavation	2.00	270.20
	3042.5	lin ft	Placing 8" Logs	.20	608.50
	400	each	Drift Pins, complete in place	.20	80.00
	323.8	cu yds	Rock Fill	1.50	485.70
			MATERIAL FURNISHED BY STATE		
	222	pieces	Logs Actual Cost	4.43	983.46
	140	rods	Wire fencing " "	.70	98.00
			Subtotal Contingencies Roadway	3291.89	~~3391.89~~
			OAK CREEK BRIDGE		
W.O.16			Cutting 4" C.I.P.	Force Acct	5.50
			MESQUITE WASH BRIDGE		
W.O.4			Scraping Pipe Handrail	" "	3.52
			Subtotal Contingencies	3300.91	~~3400.91~~
			Total Engineering & Contingencies Claimed		~~11528.87~~ 11428.87
G			Total engineering & contingencies on which Federal aid can be paid ~~$10473.52~~ 10467.22		
	Recapitulation		10472.29 11428.87		
			Total actual cost B+F (~~104735.29+11528.87~~)	116101.16	~~116264.16~~
			Total cost on which federal aid is computed B+G	115139.51	~~115208.81~~
			Maximum legal Federal aid @ 78.9%	90845.07	~~90899.75~~
			Carried forward	$	

Figure 8. A sample Certificate of Labor and Materials calculation sheet for project 81-B(3) (USRC 1941).

Figure 9. CCC laborers being trained in the construction of masonry curb and guttering. Location unknown. (Photograph courtesy of the U.S. National Archives.)

Stone masonry associated with CCC and WPA projects had a number of typical characteristics, including high-quality work with large, pitched-faced blocks and wide, recessed pointing (**Figures 10** and **11**). Alternating different colored rock within the same structure was often done in a style that might be considered garish today (Smith 2009). All of these characteristics are visible in the WPA SR-9 work.

Figure 10. WPA masons chiseling pitched-faced sandstone blocks in Grayson Kentucky. (Photograph courtesy of the U.S. National Archives.)

Figure 11. WPA laborers lining a roadside canal in the State of Washington. (Photograph courtesy of the U.S. National Archives.)

1940 to 1941 Road Improvements

In an effort to increase traffic flow and improve conditions on the road leading to ZION, the USRC began a gradual upgrading as well as a road beautification project. The USRC believed that the highways were the windows to the state and the "culture of a people is judged by its highways" (Knowlton 1963). It was determined by the USRC that highways were not just the road surface but also included all slopes, structures, parkways, and vegetation within the right-of-way (ROW) leading up to and within ZION. In its early years, visitors to ZION would just pull their wagons off the side of the road to camp (**Figure 12**).

Figure 12. William Louis and Mary Jane Bean Crawford at their road camp in ZION, early 20th century. (Photograph courtesy of Southern Utah University Special Collections.)

Beginning in the 1920s, the Utah Parks Company, a subsidiary of the Union Pacific Railroad, ran tour buses from the train station in Cedar City to ZION. This service was often hindered by the poor condition of the roads (**Figure 13**). Subsequent improvements to SR-9 and construction of the ZION–Mt. Carmel Tunnel opened the park up to many more visitors and to the new "motor tourists" (**Figures 14** and **15**).

Figure 13. Utah Parks Company tour bus near Springdale, 1922. (Photograph courtesy of Southern Utah University Special Collections.)

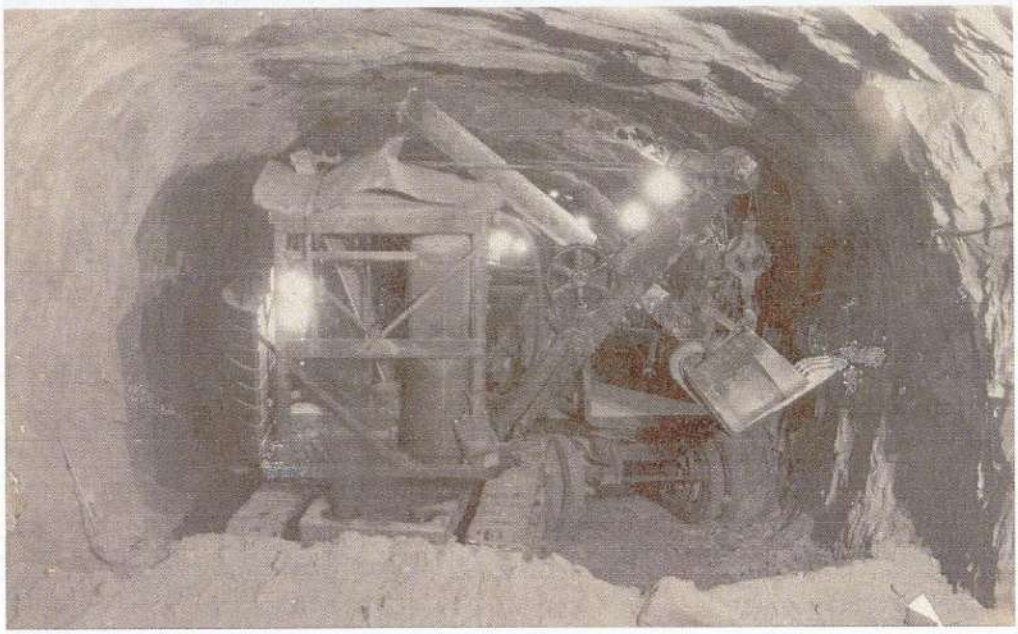

Figure 14. Nevada Construction Company's Bulldog Mack shovel operating on compressed air during construction of the ZION–Mt Carmel Tunnel, ca 1929. (Photograph courtesy of Southern Utah University Special Collections.)

Figure 15. Tourists and Utah Parks Company busses in front of the Temple of Sinawava, ca 1930s. (Photograph courtesy of Southern Utah University Special Collections.)

Two projects—81-B3 (USRC 1938) and 81-B4 (USRC 1940)—were planned and conducted between ZION and Rockville in the late 1930s and early 1940s. The plans for project 81-B3 date to 1938, while plans for 81-B4 were not drafted until 1940. For this reason, some past researchers (i.e., Nielson 1996) have concluded these were sequential projects dated several years apart. However, the two project numbers appear to constitute a single

project designated the Roadside Development Project. When originally proposed in 1938, the combined projects were expected to cost $150,000 (Whalen 2012). The USRC designer for this project was Dale Despair and the supervisor of the WPA labor force was Howard Isom (USRC 1938 [sheet 81-B3 1]).

Project 81-B4 consisted of earthwork and preparation of roadbed and sidewalk components paid for by state road funds and roadside development funds (USRC n.d.). The other designated project, 81-B3, consisted of a variety of roadside improvements funded by the WPA, including removing or pruning existing trees and stumps, constructing foot bridges, removing existing stone fences, and building new stone steps. More significantly, project 81-B3 also included the construction of masonry curbs, gutters, and portions of irrigation canals within the town centers of Springdale and Rockville, as well as "scenic turnoffs" at a few locations along the route. Many of the proposed stone-lined ditches replaced older earthen ones, improving the streetscape views and reducing water loss through seepage (Whalen 2012).

It is possible that 81-B3 was designated separately from 81-B4 and planned two years earlier to accommodate the procurement of federal WPA funding. Because these projects began at the ZION boundary and terminated in Rockville, references to the "left" side of the road in the following discussion refer to the east and south (downhill/down river) sides of the road, while references to the "right" side refer to the west and north (uphill/up river) sides.

The two projects were built nearly simultaneously. Project 81-B4 (the earthworks and roadbed preparation) was initiated first and constructed between March 8 and August 24, 1940 (USRC 1940 [sheet 81-B4 3]). Project 81-B3, the WPA roadside improvements, were constructed between July 22, 1940 and May 30, 1941 (USRC 1938 [sheet 81-B3 3]). It is clear that the USRC considered the two as a single project. The USRC described the two as a joint project in an undated document (USRC n.d.).

The construction carried out in 1940 through 1941 involved major improvement to the entire road section. Project 81-B4, which did not utilize WPA funding, covered the new earthworks, roadbed reconstruction, and sidewalk components. Outside of the town centers of Springdale and Rockville, the new roadbed was constructed to be 18 feet wide with 7-foot-wide sloped shoulders, 4-foot-wide berms, and unlined

ditches (USRC 1940 [sheet 81-B4 2]) and consisted of oil and gravel mixed in place. This replaced the 24-foot-wide roadbed constructed in 1926 that lacked shoulders or ditches.

In the town centers, the new roadbeds were also 18 feet wide, but with 11.5-foot-wide shoulders to accommodate parallel parking. The road surface in the town was of a bituminous material. In both towns, 4-foot-wide "oil mulch" sidewalks (i.e., compacted oil and gravel) were constructed on both sides of the bituminous road. None of these sidewalks remain today, but the current modern concrete sidewalks appear to have been constructed at the same locations. In both Springdale and Rockville large numbers of fruitless white mulberry trees (*Morus alba* var. *Kingman*) were planted adjacent to the sidewalk exteriors (USRC 1940 [sheets 81-B4 7, 81-B4 8]).

Earthwork included removing rock and soil on the uphill (west or north side) of the road and infilling on the downhill (east or south side). The largest amount of earthwork occurred in the 2 miles north of Rockville where the steep rock bajada of the mesa plunges into the Virgin River floodplain and also in the area immediately south of ZION.

Bituminous road surfaces (short for "bituminous concrete" or asphalt) were laid down in Springdale and Rockville in 1940. This surface is obtained from natural bitumen or, more commonly, the fractional distillation of crude oil, which is used as a binder with locally sourced aggregate particles. This mixture is heated, poured hot, and compacted using mechanized rollers (Butler 1994).

Using mixed oil and gravel to form compact roadbeds became very common in the Southwest around the turn of the century after the discovery of oil in California (**Figure 16**) (Pierre 1998). This paving method is explained in the following 1907 article excerpt:

> *The process, as now in use, took some time and experimenting to perfect. At first oil was sprinkled on top of the road, just as water is used. Although this laid the dust, to some extent, yet it was not very satisfactory, because the oily particles, flying around in the air, stuck to everything they came in contact with and left grease spots on the clothes. The best and most used process of today consists of first plowing up the road to the depth of about one foot. The clods are then broken up if not too*

large by harrowing, but sometimes sledge hammers and mallets must be used. After the soil is thoroughly pulverized, a road grader is used to make the road even, and shape it so that it will shed water. After being again harrowed and rolled crude oil is sprinkled over it, after being heated to a temperature of from one hundred and seventy to three hundred degrees Fahrenheit. From one hundred twenty to three hundred barrels per mile, depending on the width of the road, are used. If the road has very heavy traffic, sometimes as many as four hundred barrels per mile are used. In a few weeks, a second coating is applied and then coarse gravel or sand, usually river sand is the best, is sprinkled over the top to absorb the surplus oil. After the road has been used a few weeks, it becomes as solid as macadam, the oil having mixed with the fine soil and thus forming a solid mass. The color of the road is from dark brown to black. The oil has little or no effect on rubber and does not hurt rubber-tired vehicles to any extent. After a few weeks no oil stains are left on the tires and the dust is effectually laid for one and sometimes two years. (Ohnemuller 1907)

Figure 16. Newly constructed oiled gravel road near Fernley, Nevada, ca 1927. (Photograph courtesy of the U.S. National Archives.)

Many local men from Springdale and Rockville were hired to work on the WPA aspect of the project. Virginia Gifford of Springdale recalls that her father and several of her uncles worked on this project while living in their own homes. These men had not previously worked on WPA or CCC projects and were not provided specific training in masonry techniques, but learned their trade on the job. They also worked on SR-9 within ZION during a separate USRC project. The men indicated that they enjoyed working with the WPA and were grateful to have the steady work. (Virginia Gifford, personal communication 2016)

WPA Gutters/Ditches/Canals

The greatest effort expended by the WPA labor force was the construction of roadside water control features within the towns of Springdale and Rockville. The purpose of these was to catch drainage from the road and to provide water for roadside trees. They also facilitated the parallel parking of cars in the town sections without interference with through highway traffic. All stone features were constructed "of native red sandstone to blend with the rocks in the adjacent cliffs" (URC n.d.).

The design plans (USRC 1938 [sheets 81-B3 3, 81-B3 4, 81-B3 7, 81-B3 8]) do not provide many details on the nature of these features, only a descriptive name and their locations. The Typical Cross Sections sheet (USRC 1938 [sheet 81-B3 2]) provides cross sections and minimal dimensions (**Figure 17**).

Most of these features were still extant and in good condition when revisited in 2018. The sandstone used on all of these features appears to be from a single source, likely from a small quarry located northwest of the Springdale Cemetery (Virginia Gifford, personal communication 2016). This material is similar to that currently quarried from the Bitter Seeps quarry south of Fredonia (Gary Stark, personal communication 2016). This is a hard sandstone that grades in color from red to pink to lavender. Where the rock in these features has been exposed to water over the last 75 years, it has turned white due to efflorescence, the migration of salt crystals to the surface. This exposure has also contributed to the rocks spalling and crumbling within the road (Gary Stark, personal communication 2016). With the exception of capstones, all of the rocks are simple split slabs with no surface treatments. Three separate gutter styles are present within the two towns and are described below.

Three distinct gutter types providing different functions were constructed by the WPA. For this report, they have been designated as Type B "gutter," Type C "rock-lined ditch," and Type D "rock canal."

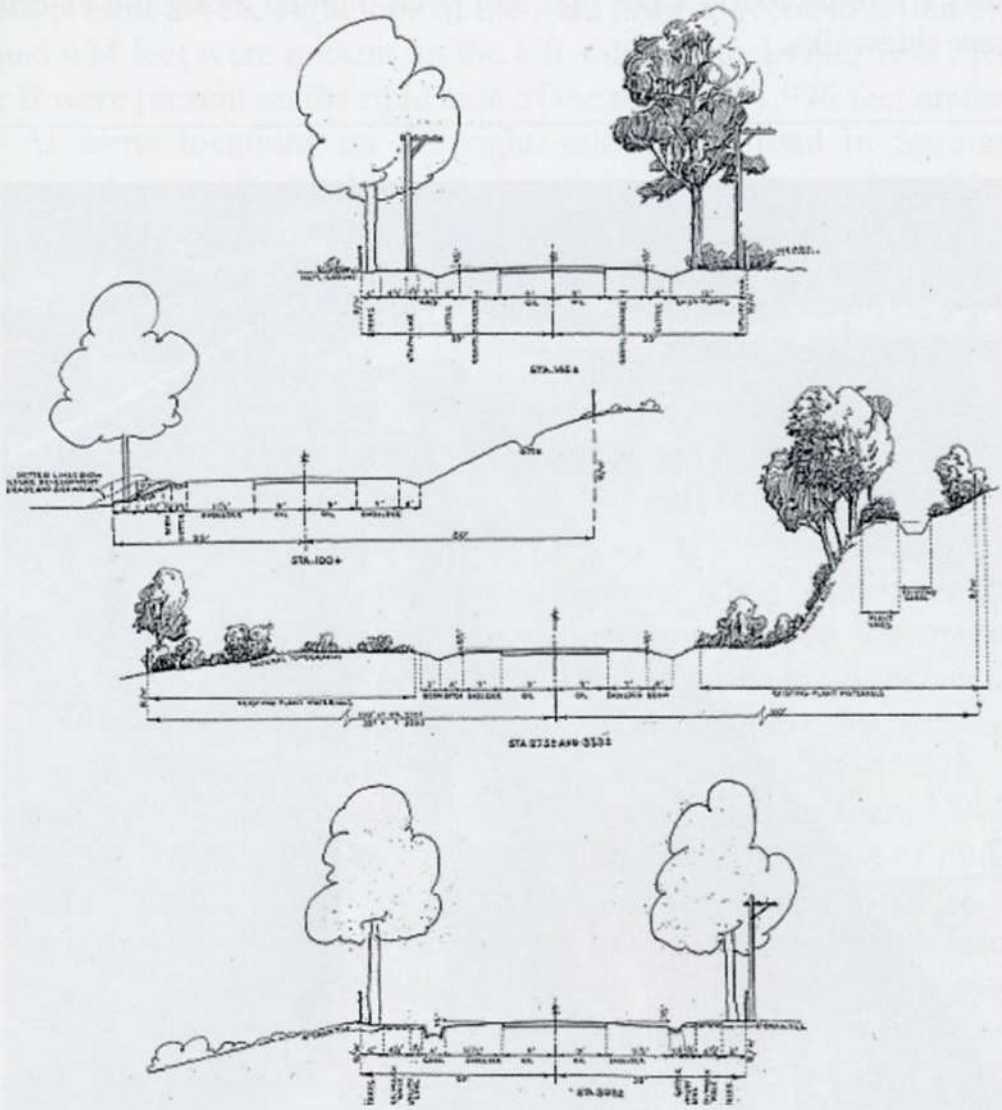

Figure 17. Typical project road cross sections. From the top these are: 1) a level area outside of town; 2) a moderate slope outside of town; 3) a steep area outside of town with adjacent irrigation canal; and 4) a level area in town with landscape plantings, sidewalks, a "rock canal" on the left, and "curb and gutter" on the right (USRC 1938 [sheet 81-B3 2]).

The most common style, designated here as Type B (**Figure 18**), is referred to as a "gutter" in Springdale (USRC 1938 [sheets 81-B3 3, 81-B3 4]) and "curb and gutter" in Rockville (USRC 1938 [sheets 81-B3 7, 81-B3 8]). Type B is asymmetrical with sandstone walls and bottoms. The side farthest from the road is 12 inches high and vertical. The side adjacent to the road is angled at approximately 40 degrees, with the top level with the road asphalt, which is 5 inches lower than the opposite side. This higher, exterior wall presumably constitutes the "curb." The level bottom is 7 inches wide. When the thickness of the masonry blocks is taken into account, the total width of the Type B gutter is 26 inches. Four-inch-

diameter ceramic pipes drained water from the ditch to the roots of the fruitless white mulberry trees that had been planted along the exterior of the new sidewalks.

Figure 18. Example of "curb and gutter" Type B in Rockville.

Project construction plans indicate that Type B features constituted all of the water control features on the right side of the road in both Springdale and Rockville. Approximately one-third of the features on the left side of

the road in both towns were also Type B. In Springdale, 2,468 feet of Type B were present on the right side of the road prior to reconstruction efforts and just 434 feet were present on the left side. In Rockville, 3,981 feet of Type B were present on the right side of the road and 1,996 feet on the left side. At some locations on the right side of the road in Springdale, successive layers of asphalt resulted in the roadbed being 3 to 4 inches higher than these features. At many of these same locations, the sandstone blocks had become severely eroded through efflorescence and flash flooding episodes (**Figure 19**).

Another style, designated Type D (**Figure 20**), is a large, rectangular ditch found in both Rockville and Springdale, referred to as a "rock canal" in Springdale (USRC 1938 [sheet 81-B3 4]) and "rock-lined canal" in Rockville (USRC 1938 [sheet 81-B3 8]). Type D ditches, the largest and most ornate of the feature types, are made of large, square sandstone blocks. The sides are each 2 feet high and canted outward approximately 3 inches; the level base is 3 feet across. These blocks are 8 inches thick, compared to the 6-inch-thick blocks used for Type B and C features. Along the roadside of the canal, capstones were used to prevent vehicles from driving into the canal. These capstones average 10 inches high, 18 inches wide, and 16 to 30 inches long; they tend to alternate the use of pink and lavender sandstone, which would have been much more pronounced when the rock was freshly quarried. The surface of each block has been pitched, with a clearly defined outer edge and a face roughly cut with a pitching chisel. At periodic distances, roadside drains have been installed beneath the capstones (**Figure 21**).

Figure 19. Highly eroded Type B gutter, Springdale.

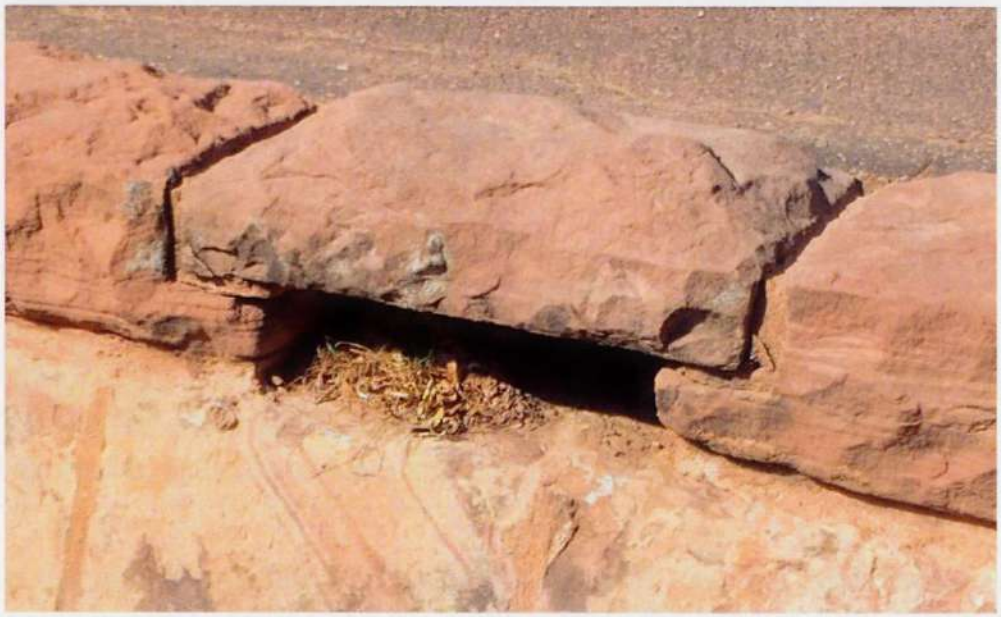

Figure 20. Type D capstones and drain, Springdale. Note the pitched faces of the capstones.

In Springdale, 619 feet of Type D were present on the left side of the road. In Rockville, 570 feet were present, also on the left side, although the capstones had all been removed along a 215-foot segment. In Rockville, the Type D canal is currently utilized by the Rockville Town Ditch Company for transporting irrigation water. In Springdale, the Type D canal was used by the Springdale Consolidated Irrigation Canal Company to transport irrigation water between 1941 and the late-1970s; portions of the canal in Springdale are now protected by wood covers. All Type D canals were preserved during reconstruction activities.

Figure 21. Example of a "rock canal," Type D, Springdale. Note alternating colored capstones.

Another style of feature, designated Type C (**Figure 22**), is a rectangular ditch feature extant only in Rockville on the left side of the road. This type is constructed of square sandstone blocks measuring 12 inches high and 15 inches across, with a level interior base. The 6-inch-thick blocks are level with the road asphalt, resulting in a total feature width of 27 inches. As with Type B, 4-inch-diameter ceramic pipes drained water from the

ditch to the roots of the fruitless white mulberry trees that had been planted on the exterior of the new sidewalks.

Figure 22. Type C "rock-lined ditch," Rockville.

The design plans refer to this type as a "rock-lined ditch," but there is a continuous 1,812-foot segment of Type C in Rockville where the plans indicate segments of both Type B and Type C should have been built (USRC 1938 [sheets 81-B3 7, 81-B3 8]). This is one of only two major

inconsistencies found between the 1938 plans and the 1940–1941 WPA construction.

Segments of "rock-lined ditches" were also proposed to have been built on the left side of the road at the northern and southern ends of development in Springdale (USRC 1938 [sheets 81-B3 3, 81-B3 4]). However, the historic features at those locations were torn out during the late 1970s when the Springdale Consolidated Irrigation Canal Company removed their facility from downtown and placed it in a pressurized pipe (Marion Callister, personal communication 2016). No Type C features are extant in Springdale; in Rockville, Type C features are still used as a secondary ditch to transport irrigation water from the Rockville Town Ditch. It appears the Type C features in Springdale were also used as secondary ditches, but to transport irrigation water from the Springdale Consolidated Irrigation Canal between 1941 and the late-1970s (Marion Callister, personal communication 2016).

WPA Ancillary Features

In addition to the main water control features, a number of smaller, ancillary features were constructed along SR-9 using WPA funding. Most of these remain intact, including:

- Three scenic turnoffs with parapet walls (bollards) near the current Majestic View Lodge (USRC 1938[sheet 81-B3 6]). The roadside bollards at Station 206 are extant and in good condition (**Figure 23**). The other two turnoffs have been either completely or partially demolished
- A rock parapet wall north of Springdale designed to protect a small house adjacent to and downhill from the road. The house has since been removed, but the parapet remains (**Figure 24**)
- Four short masonry retention walls in Springdale at locations where the road was at a different grade than the adjacent property. One wall is located in front of the residence immediately south of Sol Foods (**Figure 25**)
- Nine sets of masonry steps leading from the new elevated roadbed down to residential properties in Springdale. These steps averaged 3 to 7 feet in height
- Two masonry retention walls near the Red Rock Inn. This construction appears to be a major deviation from the original 1938 plans
- A "diversion gate," a narrow sandstone sluice leading from the Springdale Consolidated Irrigation Canal to the dich and gutters in Springdale. This may have been designed to provide water to street-side landscaping

A number of the ancillary WPA-built features have since been removed or replaced. These are foot bridges over Springdale Wash; one masonry retention wall; rock-lined drainage gutters; gutter inlets and outlets; a masonry island in front of the current Zion Canyon Giant Screen Theater; two of three scenic turnoffs and most of the associated parapet walls; a 4,000 foot-long alignment of 2 foot-diameter boulders lining the road; and rip rap placed along the Virgin River.

Prior to construction, the WPA removed or pruned numerous trees, mostly within the town of Rockville. These included cottonwoods, black willows, ash, mulberries, walnut, ailanthus, catalpa, black locust, honey locust, Chinese elm, peach, and pear (USRC 1938[sheets 81-B3 3–8]). One

landowner in Rockville, Mrs. Warren Hirschi, fought to have her original fruiting mulberry trees saved. (These trees were originally planted in an ill-conceived plan initiated by Brigham Young to develop a silkworm industry.) Mrs. Hirschi went so far as to climb into a tree brandishing a rifle to hold off the WPA employees. Her trees were eventually removed and new, non-fruiting mulberries planted (Whalen 2012).

Considerable effort was spent landscaping the project to "provide shade and aesthetic pleasure through the towns" as well as "making a more impressive landscape entrance to Zion National Park." More intensive landscaping occurred at the entrance monuments to the park and at an island at the nearby service station.

The low-growing desert cultivars that were planted included Sonoran scrub oak (*Quercus turbinella*), canyon live oak (*Quercus wilcoxii*), wild almond (*Empectocladus fasciculata*), blackbrush (*Coleogyne ramosissima*), Spanish bayonet (*Yucca glauca*), and prickly pear cactus (*Opunita* sp.) (USRC 1938 [sheet 81-B3 3]). These appear to have been an experimental attempt to replicate a natural desert landscape and to determine their reaction to transplanting. Wild grape vines were also planted for erosion control on some areas of bare earth, such as on the berm of the Springdale Consolidated Irrigation Canal (USRC n.d.). Outside of the towns, it was felt that a sufficient amount of native vegetation existed and that "to plant an additional amount would hide the natural beauty of the surrounding cliffs and views."

Figure 23. Masonry bollards at turnoff entrance at Station 206. View to the southeast.

Figure 24. Masonry parapet. View to the east.

Figure 25. WPA-built road retention wall and stone steps. View west from near Sol Foods. This is the highest of the nine sets of steps constructed.

Post-1941 Road Improvements

Since 1941, a number of improvements have been made to the road. These include asphalting the entire road alignment, probably in the 1950s; realigning the road a small amount at the western end of Rockville; replacing some of the larger culverts, such as at Mesquite Wash, with concrete bridges; constructing turn lanes and expanded shoulders adjacent to new developments; and adding road striping and signage (Billat and Billat 2015). In Springdale, a large amount of new or updated development has resulted in many new secondary roads, driveways, and parking lots being constructed. Many of these projects have resulted in portions of the WPA curb and gutter either being removed or paved over.

Another major change occurred in the late-1970s when the Springdale Consolidated Irrigation Canal Company removed their irrigation system from downtown Springdale and placed the main canal in a pressurized pipe along most of the canal's length. At this time, all Type C "rock-lined ditches" in Springdale were removed (Rawley Johnson and Marion Callister, personal communications 2016). New, shallow gutters were constructed at these locations (**Figure 26**). It is clear from the 1940 to 1941 design plans that these shallow gutters were not part of WPA construction. The longer segments of these new gutters overlapped both the original Type B "gutters" and the Type C "rock-lined ditches" (USRC 1938[sheets 81-B3 3, 81-B3 4]). These new gutters appear to utilize a different rock source, have a softer mortar mix than the WPA features, and show none of the clean pointing or other characteristics of WPA stonework. Marion Callister (personal communication 2016) remembers when the ditches here were removed and the new gutters installed in the late 1970s.

Figure 26. 1970s-era gutters installed in Springdale.

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