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The transition from folk to engineered roads in the Mojave Desert

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ABSTRACT

In 1916 the federal government directed the United States Geological Survey (USGS) to begin a program to survey water sources as well as mapping and marking roads in the Mojave Desert, the first federal effort at doing so for automobile routes. Improved highways arrived later but based on an entirely different approach; these were maintained by a highway department which carried out numerous improvements over time based on goals of reducing travel cost. This engineered highway network has little in common with the earlier road network and remains in use today. This research will examine these changing road networks of the Mojave Desert from 1917 to 1940 to identify whether the changing purpose of these routes can explain how one road network so effectively replaced another despite using the same type of vehicles. Maps of the 1917, 1922, and 1940 road networks were digitized and cost distance routes generated in GIS in an attempt to replicate both the 1917 and 1940 networks. The expectation is that the 1940 network was based on optimization while that of 1917 was instead based on creating feasible routes between water sources that avoided physical barriers. The ability of cost distance routes to replicate the 1940 routes but not those of 1917 confirms that these two networks were based on different principles. Despite this transition a few early roads remain in the desert and the mapping work of the USGS remains relevant in the twenty first century.

There were only 8000 automobiles registered in the United States in 1900, including just 780 in California and a mere ten in Nevada.[1] Despite these modest numbers they soon became relatively common in the sparsely populated Mojave Desert of these two states. They saw wide usage as autostages during several mining booms, running hundreds of miles across empty desert between scattered cities and outlying mining camps.[2] In 1908 the region was even crossed by a record setting transcontinental trip and the New York to Paris automobile race.[3] What was missing from the Mojave Desert was a good road network for these autos; desert roads of the period were in poor condition, unsigned, and potentially dangerous for inexperienced travelers.

George Parsons (1850–1933), a member of the Los Angeles Chamber of Commerce, emerged as an advocate for better signage of desert roads.[4] A colorful writer, he claimed that the sight of skeletons was common in the desert as a result of unprepared travelers dying of thirst while lost, though accounts of the region, and especially the Death Valley country, are rife with such stories.[5] Parsons lobbied the federal government to take up the job of mapping roads to springs and wells as well as marking these watering places with directional signs, and in 1916 Congress passed a law directing the United States Geological Survey (USGS) to do so.[6] The USGS had been very active in this region, mapping and examining water and mineral resources, and it can be argued that among government agencies they played a leading role in the exploration and settlement of the desert.

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[1] Federal Highway Administration, *Highway Statistics Summary to 1995*, Washington, 1995.

[2] R.R. Elliott, *Nevada's Twentieth Century Mining Boom: Tonopah, Goldfield, Ely*, Reno, 1966; R. Lingenfelter, *Death Valley and the Amargosa: A Land of Illusion*, Berkeley, 1986.

[3] C. McConnell, *Coast to Coast by Automobile: the Pioneering Trips, 1899–1908*, Palo Alto, 2000; J. Fenster, *Race of the Century: The Heroic True Story of the 1908 New York to Paris Auto Race*, New York, 2005.

[4] G.W. Parsons, *A Thousand-Mile Desert Trip and Story of the 'Desert Sign Post'*, Los Angeles, 1918; G.W. Parsons, Status of the desert sign post, *Mining and Oil Bulletin*, 5 (1919) 393–394.

[5] Lingenfelter, *Death Valley and the Amargosa*.

[6] United States Congress, *An act Providing for the Discovery, Development, and Protection of Streams, Springs, and Water Holes in the Desert and Public Lands of the United States, for Rendering the Same More Readily Accessible, and for the Establishment of and Maintenance of Signboards and Monuments Locating the Same*, Public Law 215, *U.S. Statues at Large* (1916) 518.

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Fig. 1. David G. Thompson (standing) and assistant with USGS car during Mojave Desert Survey, September 5, 1917. Source: USGS Denver Library Photographic Collection, Thompson D.G. Collection, Library ID: tdg00014. In the public domain.

To fulfill their Congressional mandate, the USGS sent four teams to survey 60,000 square miles (155,399 square kilometers) in southern California and western Arizona from July of 1917 to June 1918.[7] One of these, in the Mojave Desert, was under the supervision of David Thompson (Fig. 1).[8] The teams mapped the desert's many roads, springs and wells, and put up metal directional signs at 305 locations, each giving distance and directions to nearby watering places and towns (Fig. 2). They also took 200 water samples for analysis and wrote four road guides with accompanying road maps. This survey effort was originally planned to be extended throughout the remaining 500,000 square miles (1,294,994 square kilometers) of arid lands in the west, but America's involvement in the First World War ended this, and despite calls to continue the project after the war it was abandoned.[9] No maintenance or updating for the signs and maps took place. However, each of the four completed surveys was part of a larger geographic reconnaissance of these regions that included additional field work from 1919 to 1921.[10] Reports from these surveys were published later, though with no updates to the maps or road logs.

Parsons' dream of better desert roads was slowly realized after the war ended as the California state highway system spread into the heart of the Mojave. Unlike the USGS, the California Highway Commission (today's Caltrans) did not merely mark roads but built new ones, carried out maintenance, and improved them to keep up

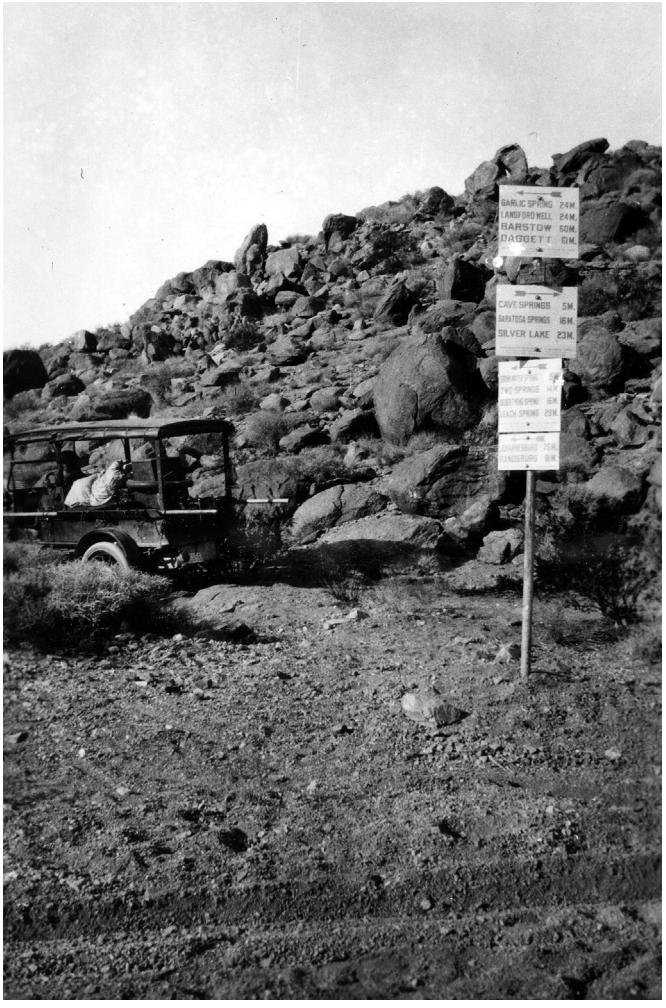

Fig. 2. Example of signs posted by USGS. Text on sign indicates direction and distance to 13 towns or springs. Source: USGS Denver Library Photographic Collection, Thompson D.G. Collection, Library ID: tdg00147. In the public domain.

[7] J.S. Brown, *Routes to Desert Watering Places in the Salton Sea Region, California*, USGS Water Supply Paper 490-A, 1920; D.G. Thompson, *Routes to Desert Watering Places in the Mohave Desert Region, California*, USGS Water Supply Paper 490-B, 1921; C.P. Ross, *Routes to Desert Watering Places in the Lower Gila Region, Arizona*, USGS Water Supply Paper 490-C, 1922; K. Bryan, *Routes to Desert Watering Places in the Papago Country, Arizona*, USGS Water Supply Paper 490-D, 1922.

[8] Thompson referred to the desert as the Mohave, but Mojave has become the preferred spelling, except in Arizona.

[9] Parsons, Status of the desert sign post.

[10] J.S. Brown, *The Salton Sea Region, a Geographic, Geologic, and Hydrologic Reconnaissance With a Guide to Desert Watering Places*, USGS Water Supply Paper 497, 1923; C.P. Ross, *The Lower Gila Region, Arizona: a Geographic, Geologic, and Hydrologic Reconnaissance with a Guide to Desert Watering Places*, USGS Water Supply Paper 498, 1923; K. Bryan, *The Papago Country, Arizona: a Geographic, Geologic, and Hydrologic Reconnaissance with a Guide to Desert Watering Places*, USGS Water Supply Paper 499, 1925; D.G. Thompson, *The Mohave Desert Region: a Geographic, Geologic, and Hydrologic Reconnaissance*, USGS Water Supply Paper 578, 1929.