A Historical Context and Methodology for Evaluating Trails, Roads, and Highways in California

Prepared by
The California Department of Transportation
Sacramento, California

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2016

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MANAGEMENT SUMMARY

The California Department of Transportation (Caltrans) prepared this study in response to the need for a cohesive and comprehensive examination of trails, roads, and highways in California, and with a methodological approach for evaluating these types of properties for the National Register of Historic Places (NRHP). This study augments the Advisory Council on Historic Preservation's regulations at 36 Code of Federal Regulations Part 800, and is consistent with the *First Amended Programmatic Agreement among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as It Pertains to the Administration of the Federal-Aid Highway Program in California* (2014 PA). The study is also intended to comply with the California Environmental Quality Act (CEQA), California Public Resources Code section 5024, and the California Register of Historic Resources (CRHR), eligibility criteria (5024.1[c]) for the listing of historic resources.

The study provides a broad historic overview documenting the development of trails, roads, and highways in California from prehistoric times to the creation of today's modern highway system. This holistic approach was predicated upon the strong relationship between California's modern highway system and trails and roads that span hundreds, if not thousands, of years. While railroads and bridges played a significant role in the state's transportation history, neither property type is discussed in any detail in this study, since a plethora of published and unpublished books and articles have already been written about railroads, and a historic context study and evaluation process has been adopted for bridges. While this study does address archaeological resources, the focus is largely on built environment properties, particularly roads and highways.

Chapter 1 begins with a general introduction to the historic context and describes the wide range of variables that led to the creation of trails, roads, and highways in California. Chapter 2 discusses pertinent literature regarding the range of transportation properties and studies that provide guidance regarding the identification and evaluation of transportation properties. Chapter 3 presents the reader with the range of property types or categories for trails, roads, and highways that include: Native American (prehistoric, ethnographic, ethnohistoric) trails; recreation trails; exploration trails or routes; emigrant trails; wagon and stage roads; toll roads; county roads; city roads; parkways/scenic roads/recreation roads; service roads; private roads; state highways; transcontinental highways; freeways; and Interstate highways. There are situations where transportation categories or properties overlap, such as an emigrant road which later was adopted as a wagon road, or a state highway that was adopted as a transcontinental highway. Whatever the case, it is the responsibility of the researcher to ascertain what categories or property types' best fit the resource being evaluated. Chapter 3 also describes the National Task Force for Historic Routes' (NTFHR) four principal types of potentially significant historic routes: cultural; exploration and discovery; aesthetic; and engineered. These definitions should not be considered as types of properties, but rather as broad themes that can be applied to the various transportation categories or property types described above. Transportation properties can have overlapping themes, as well as representing multiple property types or categories.

Chapters 4, 5 and 6 provide overviews of each of the different categories or property types beginning with prehistoric or Native American trails through modern highways, as well as associated roadside features. Chapter 7 expands upon the NTFHR's "types of potentially significant historic routes," and Chapter 8 covers the proposed methodology for evaluating transportation properties, an essential part of this study. Chapter 9 provides a short guide for using the study, and Chapter 10 includes a bibliography with both references cited and other published and unpublished sources relating to the broad range of transportation properties that may be encountered in the field. A list of acronyms and abbreviations and a glossary of terms used in this study are included as Appendixes A and B, respectively.

Any questions or comments on this study should be directed to the Chief, Cultural Studies Office, Division of Environmental Analysis, MS 27, P.O. Box 92874, Sacramento, CA 94274-0001.

ACKNOWLEDGMENTS

This report is the sixth thematic study prepared by the Caltrans in the past five years. The other studies addressed agriculture, mining, townsites, workcamps, and suburban housing tracts. This study was prepared under the auspices of the Caltrans Cultural Studies Office, Division of Environmental Analysis. Dana E. Supernowicz, Caltrans Architectural Historian, served as the primary author.

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CHAPTER 1
Historic Trails, Roads, and Highways

Introduction

This historic context study and evaluation methodology examines trails, roads, and highways in California that evolved from prehistoric times through the early 1970s. The 1970s generally marked the end of modern highway development in California and the beginning of a sustained period of postmodern highway improvement.[1] The intent of this study is not to provide an exhaustive account of every trail, road, and highway in California, but rather to inform the reader about the causal effects of trail, road, and highway development or construction in the state, with respect to culture, engineering, economics, and politics. Chapters 8 and 9, in concert with the historic context found in Chapters 4–7, lay out a methodological approach for determining the significance of transportation properties. Appendixes A and B provide a list of acronyms and abbreviations and a glossary, respectively. Additional materials related to this topic may be found online at http://www.dot.ca.gov/ser/guidance.htm#trails.[2]

Notwithstanding the miles of abandoned roads in California, today there are approximately 50,000 lane miles of pavement that the California Department of Transportation (Caltrans) administers. While the interstate highway system is exempted from compliance under the National Historic Preservation Act, Section 106, and U.S. Department of Transportation Act, Section 4(f), with a few exceptions, it is not exempt from state cultural resource laws. Beginning in the 1980s Caltrans prepared a historic context study and evaluation methodology for bridges. As such, bridges are not the focus of this study, even though they are integral parts of most transportation systems.[3] Nor does this historic context address railroads. Railroads are documented in numerous books and articles, having played a significant role in the history of the state's transportation network.

In recent years, renewed interest in historic trails, roads, and highways is evident through a wide variety of published books, articles, and cultural resource studies. Today, organizations, such as the Oregon-California Trails Association (OCTA), the National Pony Express Association, the Lincoln Highway Association (LHA), and the National Historic Route 66 Federation play an important role in identifying and preserving transportation resources (Figure 1). Over the past three decades, Native Americans working alongside ethnographers and archaeologists, have identified cultural trails, some established hundreds, if not thousands, of years ago. Native American trails accessed sacred sites, while others supported trade, gathering foodstuffs, and hunting game.

Figure 1. *U.S. Route 66 through the Mojave Desert, late 1930s (courtesy of the National Historic Route 66 Federation).*

1 For the purposes of this study, "postmodern" refers to the transition from simply constructing roads and highways to a focus upon regional and statewide planning and other forms of transportation, as well as new models for financing transportation systems, such as toll roads.

2 The additional guidance documents include: Timeline; Historic Roads and Highways; Legislature-Designated Historic Roads; Scenic Highways; Interstate Highways; Toll Roads; Oregon–California Trail Guidelines; Listed Roads and Highways; Caltrans Evaluated Roads and Highways; and Route Numbers and Dates of Construction.

3 Caltrans, *Historic Highway Bridges of California* (Sacramento, CA: Caltrans, 1990). On file, Caltrans Headquarters Library, Sacramento http://www.dot.ca.gov/hq/env/cultural/crmpub.htm.

Figure 2. *Christopher "Kit" Carson, famous scout and guide (from a painting by William Tylee Ranney, 1813–57).*

Historic trails, roads, and highways all share one common feature: the fact that they are linear resources with a beginning and an end. California's trails, roads, and highways did not develop in isolation; instead, many of the state's transportation systems were products of a national movement to open up the West to exploration and later exploitation of its natural resources. Western explorers, such as John Fremont and Christopher "Kit" Carson, followed Native American trails (Figure 2). Later emigrant parties heading west followed many of the same trails to California during the Gold Rush. Throughout this nation's history, transportation systems remained some of the most egalitarian types of human contrivances. For many years, transportation systems offered free passage for anyone who chose to follow their paths. The transition from a "free road" to a "user fee" or "toll road" changed the course of road construction in the United States and ushered in the era of pay-as-you-go systems of roads and highways financed largely by private companies. No longer was free passage a given right for all Americans, and roads and highways soon became profitable enterprises. Ironically, it was the locomotive that stymied road development in the United States, as evidenced by thousands of miles of railroad lines that were built throughout the nation between 1865 and 1900, most of which were subsidized by the federal government.

Trails, roads, and highways are also explicitly geographic (Figures 3 and 4). As historical geographers John A. Jakle and Robert L. Janiskee pointed out, "each generation determines the content of its geographical space and the spatial distribution of that content."[4] Historic trails, roads, and highways share geographical traits and form cultural landscapes that can help guide research toward a broader understanding of human intervention and change, and may assist in interpreting the environment and planning for the future. Trails, roads, and highways were often layered, one atop the other, as improvements were made. Many trails, roads, and highways also required enormous labor and skill to build. Consequently, the cost of construction, in terms of both dollars and human sacrifice, was substantial.

[4] John A. Jakle and Robert L. Janiskee, "Why Covered Bridges? Toward the Management of Historic Landscapes: The Case of Parke County, Indiana." In *Pattern and Process: Research in Historical Geography,* ed. Ralph E. Ehrenberg (Washington, DC: Howard University Press, 1975), 193.

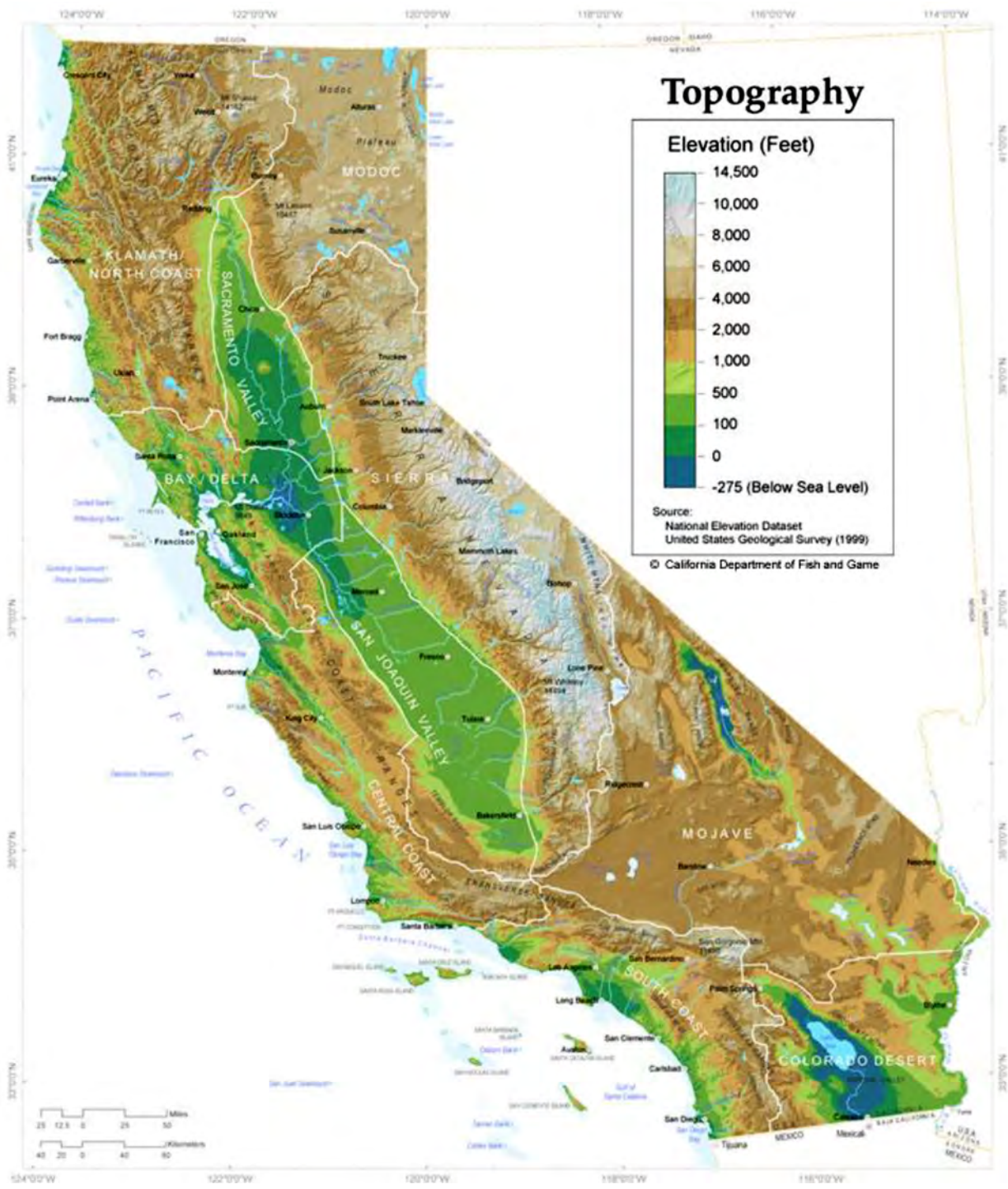

Figure 3. *Topographical map of California. The map visually displays the diversity and regional differences in California's natural ecology and topography. The state's varying topography and climate presented challenges for road designers and engineers (courtesy of the California Department of Fish and Game).*

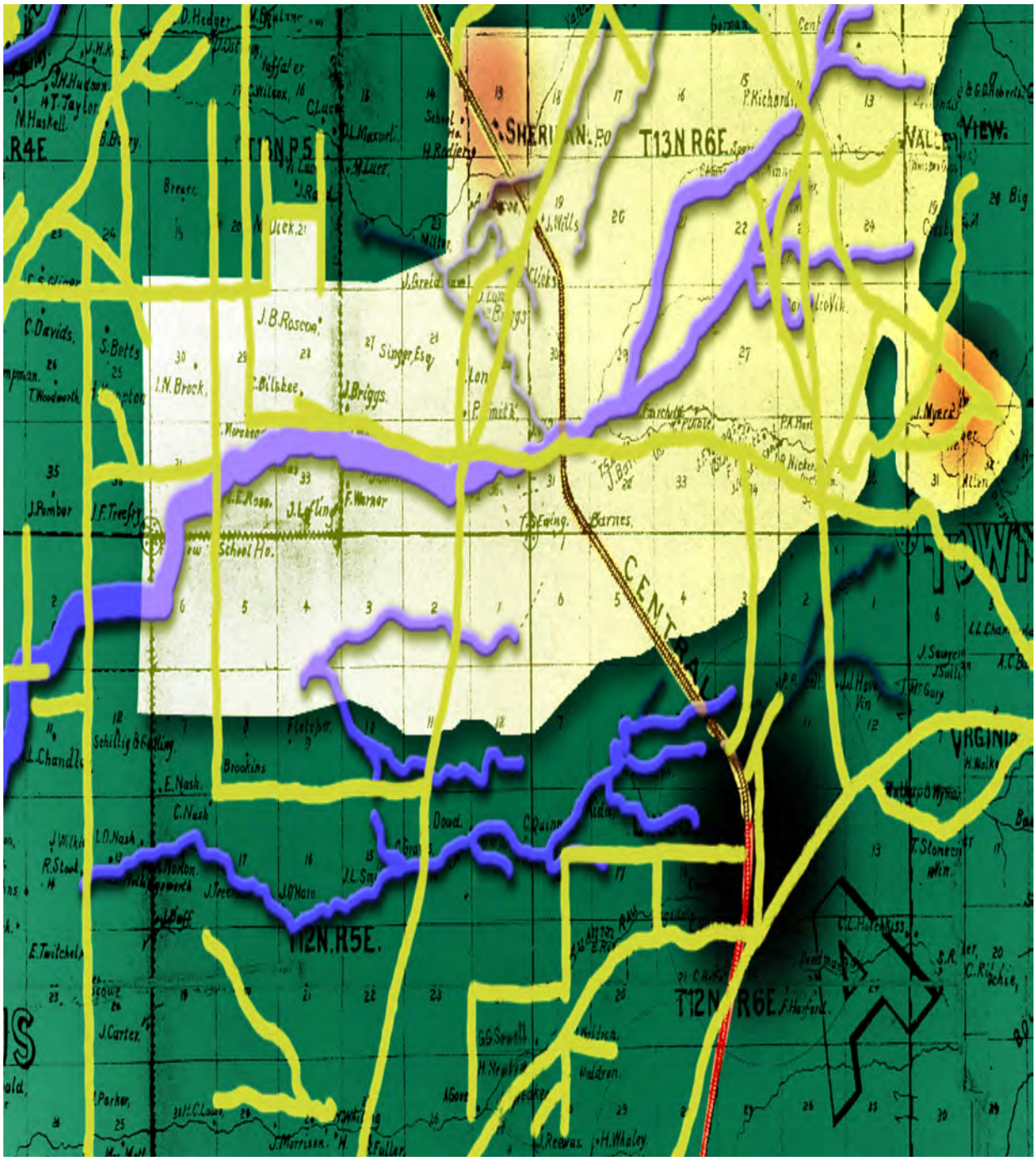

Figure 4. *Geographic information system (GIS) layering, illustrating the technique of scaling historic analysis using a variety of maps, as a tool for interpreting physical and cultural change. The purple and blue lines represent the area's hydrology.*

Trails, and later roads and highways, also share a common purpose: to move people and products from one location to another. In this regard, transportation systems yielded immense economic value for the development of industry, trade, and, ultimately, culture. Roads and highways also provided opportunities for recreation and access to state and national parks, as evidenced in Figure 5, depicting the Blue Ridge Parkway in Virginia, and Figures 6 and 7, in Yosemite National Park. Figure 8 represents a Southern Pacific Company promotional map of California from 1885.

Figure 5. *Blue Ridge Parkway, Virginia, ca. 1940s (courtesy of the Library of Congress, Prints and Photographs Division, Washington, DC, HAER-NC, 11-ASHV.V, 2-212).*

Figure 6. *Yosemite National Park in the distance, from Big Oak Flat Wagon Road, early 1900s (courtesy of the Library of Congress, Prints and Photographs Division, Washington, DC, LC-USZ62-97670).*

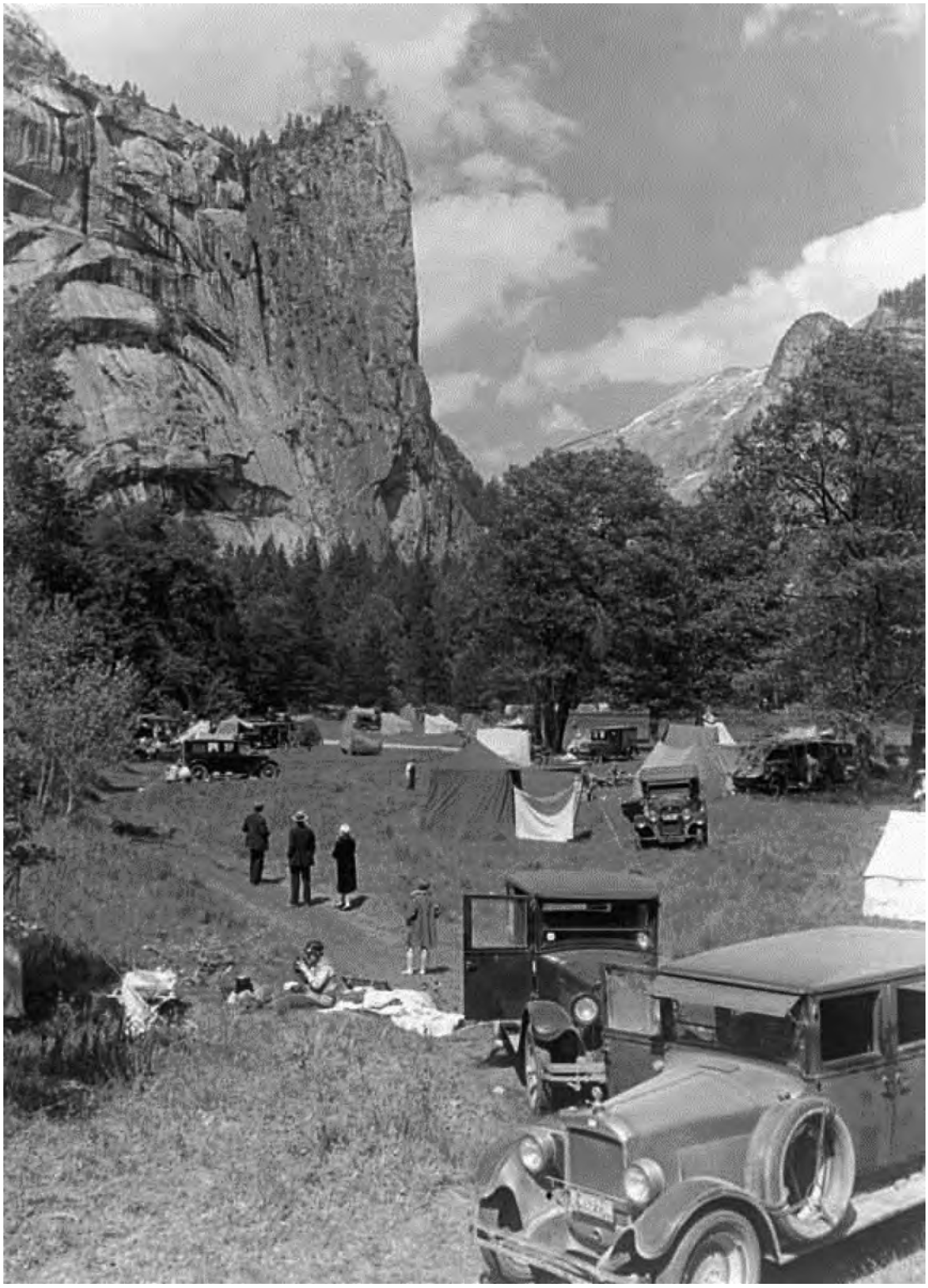

Figure 7. *Automobile camping in Stoneman Meadow, Yosemite National Park, in 1927 (courtesy of the San Joaquin Valley Library System, Mariposa County Library, San Joaquin Valley and Sierra Foothill Photo Heritage collection).*

Figure 8. *"The Unique Map of California," ca. 1885, Southern Pacific Company, State Board of Trade. Prepared for tourists, the map displays the routes that connected many of the state's most popular tourist attractions (courtesy of the David Rumsey Map Collection).*

Figure 9. *Lyons Coffee Shop from the late 1950s illustrates the predilection of commercial restaurant chains to develop Modernist, cutting-edge architecture reflective of popular culture (courtesy of Arnold Del Carlo, Sourisseau Academy for State and Local History, San Jose State University).*

Figure 10. *Gold Rush Coffee House in Eureka, designed in the shape of a coffee can, an example of contemporary roadside architecture from the 1990s (courtesy of the Jon B. Lovelace Collection of California Photographs in Carol M. Highsmith's America Project, Library of Congress, Prints and Photographs Division, Washington, DC, LC-DIG-highsm-22230).*

By the twentieth century, roads and highways had become the vehicles for major migrations, such as the Dust Bowl migration of the 1930s. Route 66, for example, personifies a transportation corridor that witnessed mass migrations of people to California during the Great Depression of the 1930s. The route also symbolizes America's fascination with the automobile, travel, leisure, and the American West.

Roads and highways also influenced popular culture and roadside attractions (Figures 9 and 10). By the 1950s, futurist styles of architecture, commonly referred to as "Googie," began to personify America's fascination with Modernism, particularly "space-age" designs.[5]

Googie Architecture or Roadside Attractions, such as restaurants, create a strong visual link between the roadway and popular culture

California's historic legacy of trails and roads spans thousands of years. Each trail, road, and highway provided an important connection between villages and homes, linking rural America with urban communities, the fabric of which is instilled in this state's culture and its economy. Highways and roads increased commerce and trade and provided access to employment opportunities.

[5] The origin of the name "Googie" apparently dates to 1949, when architect John Lautner designed the West Hollywood coffee shop named "Googies." The name "Googie" had been a family nickname of Lillian K. Burton, the wife of the original owner, Mortimer C. Burton. Author Allen Hess also coined the term in his book *Googie Redux: Ultra Modern Roadside Architecture* (2004). Whatever the origin of the term "Googie" was, this form of architecture clearly evolved in southern California during the 1950s and 1960s as a tool for roadside advertising that adopted unique and often exaggerated forms of visual displays to market various products or services. This form of roadside architecture peaked in the late 1960s and declined afterwards, as mass marketing and large franchise, commercial establishments eclipsed the older mom-and-pop–type establishments.

Many, if not all, transportation-related properties have backstories. While most cultural resource studies focus on the physical attributes of trails, roads, and highways, these types of resources could not have been created, designed, and built without the efforts of people, most of whom were immigrants who had recently arrived in the United States. Their stories often go untold and are poorly documented.

During the nineteenth and twentieth centuries, roads and highways provided not only jobs but also the means for thousands of individuals and families to migrate between regions, states, cities, and towns (Figure 11). For years, poets, journalists, and songwriters described the "road" or the "highway" as a metaphor for something much more important. In 1856, Walt Whitman expressed the sense of freedom that prevailed for those traveling along the "open road":

> *"Afoot and lighthearted*
> *I take to the open road,*
> *healthy, free, the world*
> *before me,*
> *The long brown path*
> *before me leading*
> *wherever I choose*
>
> *(Walt Whitman, "Song of the Open Road," 1856)*

Figure 11. *Migrant worker on a California Highway in 1935, during the Great Depression (courtesy of the Library of Congress, Prints and Photograph Division, Farm Security Administration, Office of War Information Photograph Collection, Washington, DC, LC-USF347-003801-ZE).*

During the twentieth century activists and songwriters, such as Woody Guthrie, reflected on their relationships with "the road" and the harsh treatment of many of America's Dust Bowl migrants as they traveled west looking for jobs and a better way of life. During the last half of the twentieth century, novelists and Beat Poets, such as Jack Kerouac, expressed a more contemporary or perhaps romantic vision of the "open road." As Kerouac remarked in his novel *On the Road:*

> *"What is that feeling then you're driving away from people and they recede on the plain till you see their specks dispersing?—it's the too-huge world vaulting us, and it's good-bye. But we lean forward to the next crazy venture beneath the skies.[1]"*

During the past few decades, historians, geographers, landscape architects, archaeologists, engineers, and transportation planners have struggled to preserve historic transportation features or systems, While striving to maintain and modernize the highway system, agencies such as Caltrans have made a considerable effort to document and in some cases list certain highways as historic (Figure 12). Besides state and federal agencies, the California State Legislature through resolution also designates certain highways for their historic significance.

The few roads and highways that have reached the distinction of listing on the National Register of Historic Places (NRHP) represent only a fraction of the thousands of such facilities or features crisscrossing California. The California legislature has established guidelines for listing or commemorating scenic and historic highways.[6] Similarly, the National Trails Systems Act established specific criteria for not only designating national scenic and recreation trails but also nationally significant historic trails, such as the Oregon-California Trail, Old Spanish Trail (part of the Southern Trail or Trails), the De Anza

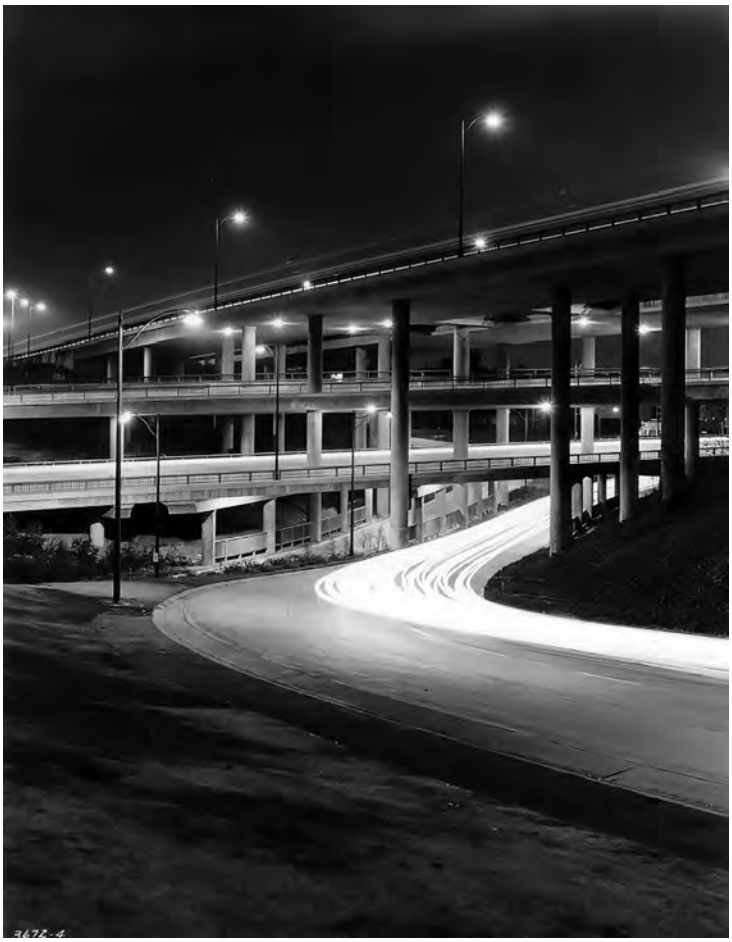

Figure 12. *Night view of the state-of-the-art four-level interchange near downtown Los Angeles, 1954 (Caltrans Transportation Library, Sacramento).*

A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view.

In California, as of 2015, roughly 70 transportation-related facilities have been designated as Historic Roads and Scenic Highways. In addition, 11 routes have "honorific" designation through state legislation.

[6] For definitions regarding designating scenic and historic highways in California, refer to California *Streets and Highways Code*, Sections 260–284.

Trail, and the Pony Express Trail.[7] Although transportation features share many common elements, what distinguishes California's transportation history from the rest of the United States is the state's immense size, population, as well as its cultural history and topography.

The management, design, and implementation of transportation projects need to consider the potential impact to historic trails, roads, and highways, including those that have scenic value. In this regard, the approaches taken by transportation agencies must be flexible, and design standards should be clearly articulated in advance of construction. Foremost, it is essential to understand the characteristics of the historic road or highway, why the property is significant, and how its features reflect that significance (Figure 13). Collaboration at all phases of the transportation planning and project-development process is essential. The tools, outcomes, and, ultimately, final disposition or treatment of a historic trail, road, or highway is dependent upon the cooperation of transportation agencies, historic preservationists, and stakeholders, engaging in an open dialogue and applying appropriate standards and tools.

Finally, without the skill and dedication of employees of the Division of Highways and, later, Caltrans, along with federal funding, the state's roads and highways would be in abysmal shape (Figure 14). The general public also deserves a great deal of credit for helping pass crucial bond measures that over the years funded much needed highway construction and maintenance. While trails, roads, and highways once formed the foundation of the state's transportation network, providing opportunities for recreation and tourism, the transportation system of the future will certainly be more diverse and include many intermodal methods, including bullet trains, dedicated bicycle lanes or routes, and ferries.

Figure 13. *Old U.S. Route 40 between Sacramento and Roseville, 1950s. Note that the highway still retained two lanes and was flanked by a tree row, grasslands, and scattered homes (California Division of Highways, The California Freeway System, 23).*

[7] The National Trails Systems Act (16 *U.S. Code* 1241–51) was passed by Congress in 1968, creating a national system of recreation, scenic, and historic trails, by designating the Appalachian Trail and the Pacific Crest Trail as the initial components of that system and by prescribing the methods by which, and standards according to which, additional components may be added to the system, as has been the case during the last two decades. In 1994, the proposed Southern Route was comprised of ten different trails. One of those ten trails, "The Old Spanish Trail," is a National Historical Trail.

Figure 14. *California Division of Highways Sacramento equipment shops, 1924. The equipment or maintenance arm of the Division of Highways was critical then as it is today for making the state highway system safe and efficient (Caltrans Transportation Library, Sacramento).*

Literature Regarding Trails, Roads, and Highways

Because of the voluminous nature of the state's transportation history, a concerted effort was made to review a wide range of transportation-related studies during the development of this historic context. There are, however, a number of published books, articles, and studies that can be considered seminal in that they are unique to a particular type of property, holistic in their approach, have been widely accepted by the broader academic or scientific community, have been implemented by transportation agencies, and help address specific research questions necessary to interpret California's transportation history.

The review of literature related to trails, roads, and highways included published books, articles, newspapers, maps, and historical photographs. It also examined unpublished or grey literature, including, but not limited to, government-sponsored studies, such as those carried out by the National Cooperative Highway Research Program (NCHRP), the American Association of State Highway and Transportation Officials (AASHTO), Caltrans, documents and information housed at the California Historical Resources Information System, and the California Office of Historic Preservation (OHP).

California's transportation history predates written history, and the topic of pre-Euroamerican transportation systems, primarily trails, requires nontraditional forms of research and analysis in regards to identification and authentication. While written records of pre-Euroamerican trails are scarce, ethnographic literature and oral tradition are important tools, along with written records, when documenting trails created by native peoples.

Although written over 60 years ago, *Trade Routes and Economic Exchange among the Indians of California* by James Thomas Davis is still regarded as an important statewide study of pre-Euroamerican trail systems in California. Similar studies were conducted in Pennsylvania and other states, and historical documents often referred to "Indian trails" as primary modes of travel, being part of westward expansion and exploration.[8] In recent years, anthropologists, ethnographers, and archaeologists have taken a more holistic approach to documenting Native American trails. This broader approach takes into careful consideration the concept of cultural or ethnographic landscapes.[9] Unlike the traditional modes of documenting Native American trails, using the concept of a cultural landscape and a more nomothetic approach, cultural resource professionals now synthesize anthropological or ethnographic data, as well as physical evidence, to reconstruct lifeways that include transportation routes or systems.

With a focus on California, hundreds of period journals, narratives, and diaries were published before the close of the nineteenth century. Of particular importance was the account provided by Lieutenant Colonel Juan Bautista de Anza (October 23, 1775–June 1, 1776), followed by José Joaquín de la Santísima Trinidad Moraga during his expedition through California's Central Valley (August 22, 1745–85), and Richard Henry Dana, Jr.'s, *Two Years Before the Mast,* published in 1846 and focused upon the

[8] Paul A.W. Wallace, "Historic Indian Paths of Pennsylvania," *Pennsylvania Magazine of History and Biography* 76, no. 4 (October 1952): 411–39.

[9] J. H. Cleland, "Ethnographic Trail Systems as Large-Scale Cultural Landscapes: Preservation and Management Issues," In *Exploring the Boundaries of Historic Landscape Preservation: Proceedings of the Twenty-ninth Annual Meeting of the Alliance for Historic Landscape Preservation 2007*, ed. Cary Goetcheus and Eric MacDonald (Clemson, SC: Clemson University Digital Press, 2008) 41–55.

California coast.[10] The journals of John Charles Fremont, published in 1845, which included topographic maps of the Sierra Nevada crossing, were of interest to the Gold Rush migrants who crossed the Great Plains en route to California. [11] Fremont set out in the spring of 1843 on his second exploring expedition, which included the famous scouts Kit Carson and Thomas Fitzpatrick. His instructions from the U.S. government were to explore from the Colombia River region to the Pacific Ocean. Fremont had hoped to head east across the Great Basin to the Rocky Mountains, but his provisions were low, and his stock was unfit for the eastward journey. He decided instead to cross the Sierra Nevada and resupply in the Sacramento Valley.

Among the numerous California Gold Rush diaries and journals, those of J. Goldsborough Bruff were very detailed in their descriptions of the overland journey to California in 1850–51, including descriptions of early transportation.[12] Another important author during the California Gold Rush was Edward Gould Buffum, who published his experiences in California in 1847–49. His narrative, first published in 1850, was followed up in 1859 by a second narrative that described the changes to California's culture and landscape, including transportation, since his first visit in the late 1840s.[13]

By the late 1850s, published works on California became quite popular, and the state's transportation system, though still in its infancy, had greatly expanded. In the late 1850s, scientists, explorers, and journalists sought accurate information on the state's climate, geology, soils, and culture. William Henry Brewer (1828–1910) was a professor of chemistry at Washington College in Pennsylvania when he joined the staff of California's first State Geologist, Josiah Dwight Whitney, in 1860. He served with Whitney until 1864. On returning east, Brewer became Professor of Agriculture at Yale, a post he held for nearly forty years. In 1930, some 60 years later, Brewer's narrative, entitled *Up and Down California in 1860–1864,* was published by Yale University and chronicled his expeditions with Whitney's geological survey of California, including vivid descriptions of the state's social, agricultural, and economic life.[14] Of particular importance to that study were Brewer's descriptions of the trails, wagon routes, and transportation systems he encountered during his surveying expedition from southern to northern California (Figure 15).

As scientific inquiry garnered support from universities and the public, engineers began a concerted effort to document the state's natural resources, including those associated with water. The University of California, Riverside's, Water Resources Collections and Archives contains both primary and secondary source material, including U.S. Geological Survey Water-Supply Papers and original papers prepared by

[10] Robert G. Cleland, ed., *The Gabriel Moraga Expedition of 1806: The Diary of Frey Pedro Muñoz* (Whitefish, MT: Kessinger, 2011); Center for Advanced Technology in Education, *Web de Anza: An Interactive Study Environment on Spanish Exploration and Colonization of "*Alta California*," 1774–1776*, http://anza.uoregon.edu (accessed January 2015); Charles Edward Chapman, "The Echeveste-Anza Calculation of the Probable Cost of the Second Anza Expedition," in *The Founding of Spanish California*: *The Northwest Expansion of New Spain, 1687–1783* (New York: Macmillan Company, 1916), 461-466; Richard Henry Dana, *Two Years Before the Mast* (New York: Harper, 1846).

[11] John C. Fremont. *Report of an Exploring Expedition to the Rocky Mountains in the Year 1842 and to Oregon & North California in the Years 1843-44, by Brevet Capt. J. C. Fremont of the Corps of Topographical Engineers, Under the Orders of Col. J. J. Abert, Chief of the Topographical Bureau* (Washington D.C.: Gales and Seaton, 1845).

[12] Joseph Goldsborough Bruff, *Gold Rush: The Journals, Drawings, and Other Papers of J. Goldsborough Bruff, Captain, Washington City and California Mining Association, April 2, 1849–July 20, 1851*, ed. Georgia Willis Read and Ruth L. Gaines (New York: Columbia University Press, 1949).

[13] Edward Gould Buffum, *Six Months in the Gold Mines: From a Journal of Three Years' Residence in Upper and Lower California, 1847–8–9* (Philadelphia: Lea and Blanchard, 1850).

[14] William H. Brewer, *Up and Down California in 1860–1864: The Journal of William H. Brewer, Professor of Agriculture in Sheffield Scientific School from 1864 to 1903*, ed. Francis P. Farquhar (New Haven, CT: Yale University Press, 1930).

Pioneer explorers like Brewer and Whitney played an important role in introducing the nation and other scientists and engineers to California's unique geography

some of the region's most preeminent water engineers.[15] Water engineers often delineated existing trail and road systems that provided access to water sources and future reservoir or aqueduct sites.

In regards to context development and planning tools vital to this study, of importance are the two volumes prepared under contract through an interagency agreement with Caltrans by historian Dr. Kenneth N. Owens (1991), entitled *Historic Trails and Roads in California: A Cultural Resources Planning Study*. While Owens' study was far from comprehensive, it does provide a broad overview for interpreting the historical development of trails and roads in California and a protocol for consistency in identifying and recording such properties. Equally important are the various studies of historic trails, roads, and highways authorized by Congress, particularly those by the National Park Service (NPS), such as the Pony Express Trail, the California and Oregon Trail, the Santa Fe Trail, the Lincoln Highway, and the Route 66 Corridor Preservation Program.[16]

At the national level is Paul Daniel Marriott's study, *The Preservation Office Guide to Historic Roads: Clarifying Preservation Goals for the State Historic Preservation Offices, Establishing Preservation Expectations for State Transportation Departments*.[17] Marriott's study represents one of the best and most comprehensive planning tools related to roads and highways developed to date. Also at the national level is the NCHRP's web-only

Figure 15. *Brewer survey party of 1864, from left to right: James T. Gardiner, Richard D. Cotter, William H. Brewer, and Clarence King (courtesy of the U.S. Geological Survey, http://online.wr.usgs.gov/outreach/highlights/enlarged/1864party.html).*

[15] See also Walter C. Mendenhall, *Some Desert Watering Places in Southeastern California and Southwestern Nevada*. Water-Supply Paper 224 (Washington, DC: U.S. Geological Survey, U.S. Government Printing Office, 1909); David G. Thompson, *Routes to Desert Watering Places in the Mohave Desert Region, California* (Water Supply Paper 490-B. Washington, DC: U.S. Geological Survey, U.S. Government Printing Office, 1921).

[16] Anthony Godfrey, *Historic Resources Study*: *Pony Express National Historic Trail* (Washington, DC: NPS, 1994); U.S. Department of the Interior National Park Service (NPS), *California and Pony Express National Historic Trails: Comprehensive Management and Use Plan Environmental Impact Statement* (Washington, DC: NPS, 1998); U.S. House, *Lincoln Highway Study Act of 2000,* HR 2570, https://www.govtrack.us/congress/bills/106/hr2570 (accessed May 2015); U.S. Congress, *Route 66 Corridor Preservation Program* Public Law 106-45 (*Congressional Record* 145 August 10, 1999), http://www.nps.gov/orgs/1453/upload/ROSI-Act.pdf (accessed January 2015).

[17] Paul Daniel Marriott, *From Milestones to Mile Markers* (Washington, DC: National Trust for Historic Preservation, 2003). Marriott provided a useful model for a holistic approach in identifying and evaluating historic roads and highways throughout the nation, although specific historic roads and highways were not addressed in any detail in the study.

publication, *Design and Management of Historic Roads*, which provides a respectable overview of the "inherent flexibility" in the "current policies and practices found in transportation planning and project development processes used to preserve historic roads."[18]

State agencies have completed a number of studies that address historic contexts, evaluation criteria, and design guidelines associated with the history of transportation. *Taking the High Road* by Christina Slattery and Steve Jacobitz explores two different approaches to preserving historic roads and transportation features in Nebraska and Florida. In 1995, the Washington State Office of Archaeology and Historic Preservation, in cooperation with the Washington State Department of Community, Trade and Economic Development, funded an inventory and evaluation of historic properties associated with transportation in the state.[19] Prepared by Florence K. Lentz, the study is broad in scope and the historic context examines roadside features or attractions, such as inns, motels, and restaurants. Comparably speaking, Washington State has many fewer highway miles than California, making it much easier to address each highway and define features along its course.

In 2001, the Nebraska SHPO initiated a comprehensive statewide survey of historic properties along five of the state's earliest automobile routes. The goal of the year-long study, which was carried out in cooperation with the Nebraska Department of Roads (NDOR), was to address a lack of knowledge of where historic roads and related resources were located that often hindered the successful and timely identification and evaluation of historic properties, as required by Section 106 regulations, resulting in project delays. NDOR, in concert with the SHPO, which is a division of the Nebraska State Historical Society, are both involved in planning highway projects and managing cultural resources.

In the late 1990s, the Arizona Department of Transportation (ADOT) contracted with Dames and Moore, Inc. (now URS Corporation), to assess its historic roads and highways. Again, in 2011, ADOT, in cooperation with the U.S. Department of Transportation Federal Highway Administration (FHWA), completed a history of Arizona's transportation system from prehistoric times to the present. The study is one of the few comprehensive contextual studies of a state's transportation history.[20]

In 2006, a historical transportation study was prepared by Fraser Design for the U.S. Department of the Interior Bureau of Land Management focusing on the history of Wyoming's Powder River Basin. The study addressed pioneer trails and automobile roads and included registration requirements for NRHP eligibility.[21]

In 2009, Ann B. Miller prepared a final report for the identification and application of criteria for determining National Register eligibility of roads in Virginia, and in the same year Marlin R. Ingalls prepared a study of Iowa's *Historic Automobile Roads: A National Register Study of Pre-1948 Arterial Highways*. Between 2011 and 2012, KSK Architects and Planners completed *New Jersey Historic Roadway Study*

[18] Mary E. McCahon, Larry Sutherland, and Steven Shaup, *NCHRP Web-Only Document 189: Design and Management of Historic Roads* (Contractor's Final Report for Project 25-29A. National Cooperative Highway Research Program, Transportation Research Board of the National Academies. Fort Lauderdale, FL: TranSystems, January 2012), http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_W189.pdf (accessed September 2014), i.

[19] Florence K. Lentz, *An Inventory and Evaluation of Historic Properties Associated with Transportation in Washington State* (Reports in Archaeology and History 100-90. Cheney, WA: Eastern Washington University Archaeological and Historical Services, 1995).

[20] Mark E. Pry and Fred Andersen, *Arizona Transportation History* (Final Report 660. Phoenix: Research Center, Arizona Department of Transportation, 2011).

[21] Fraser Design, *Powder River: Historic Context for Transportation Routes and Sites in the Powder River Basin, Wyoming* (Loveland, CO: Fraser Design, February 2006).

and Historic Roadway Design Guidelines. Ingalls' study is particularly important, because it provided a detailed historic context of applied engineering technology used in developing Iowa's historic transportation system, and described the techniques that were applied throughout the United States, including California. The New Jersey Department of Transportation (NJDOT) study included a historic context, together with detailed design guidelines. The NJDOT study involved a collaborative effort that also included private cultural resource consultants, the New Jersey SHPO, and the FHWA.[22]

Beginning in 2009, the Texas state legislature approved funding using "transportation enhancement" or TEA (Transportation Equity Act) dollars for an ambitious project documenting a variety of highways in Texas, including the Bankhead Highway. An award was presented to the preservation team of Hardy-Heck-Moore who prepared the study under the auspices of the Texas State Highway Commission. The study included a historic context for the highways through Texas and a survey of roadside attractions along their routes. The authors used a geographic information system (GIS) to develop layers of data regarding the highway corridor and to ultimately to use that data to make informed decisions regarding NRHP eligibility and state landmarks, and to assist in statewide transportation-planning efforts. The project is ongoing, with its culmination coming on the 100th Anniversary of the Bankhead Highway, which dates to 1916. In addition to the aforementioned study, the Texas Department of Transportation produced a draft statewide NPS Multiple Property Nomination form, "Historic Road Infrastructure of Texas 1866–1965."[23]

In 2011, the Alaska Department of Transportation developed a programmatic approach for dealing with its historic roads and highways.[24] The primary purpose of the Alaskan study was to efficiently proceed with necessary transportation projects and, in cooperation with the FHWA and the SHPO, develop a systematic approach to evaluating the NRHP eligibility of roads that receive program funding.[25]

In 2013, the Montana Department of Transportation completed an NRHP nomination for a segment of Old U.S. Highway 91. The district nomination included roughly 32 miles of highway that was certified by the keeper of the NRHP on August 27, 2013.[26]

California, particularly Caltrans, has had an active role in determining the eligibility of its highway system. Old U.S. 99 in Fresno County, the Feather River Canyon Highway (State Route [SR] 70), portions of Highway 1 and the Redwood Highway, the Arroyo Seco Parkway-Pasadena Freeway, a segment of Highway 99 in the southern San Joaquin Valley, the eastern portion of Highway 94 in San Diego County,

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[22] KSK Architects Planners Historians, Inc. with Armand Corporation, Inc., and Michael Baker, Jr. Inc. *New Jersey Historical Roadway Study*. Prepared for New Jersey Department of Transportation (NJDOT), the Federal Highway Administration (FHWA), and New Jersey Historic Preservation Office, January 2011. See also KSK Architects Planners Historians, Inc., et al., *New Jersey Historic Roadway Design Guidelines*, prepared for NJDOT, FHWA, and New Jersey Historic Preservation Office, April 2012.

[23] B. Jensen.

[24] FHWA, Programmatic Agreement among the Federal Highway Administration, the Advisory Council on Historic Preservation, the Alaska Department of Transportation and Public Facilities, and the Alaska State Historic Preservation Officer, Regarding Alaska's Highway System Roads Affected by the Federal Highway Program in Alaska (Juneau, AK: FHWA, amended September 2010). http://www.dot.state.ak.us/stwddes/desenviron/assets/pdf/resources/ak_road_pa_022310.pdf (accessed January 2014).

[25] Ibid.

[26] Montana Department of Transportation, *National Register of Historic Places Registration Form for the Old U.S. Highway 91 Historic District* (Helena, MT: Montana Department of Transportation, 2013 http://www.nps.gov/nr/feature/places/13000624.htm (accessed January 2015).

and a section of SR 74 in Riverside County, represent a few of the highways or segments of highways where California Register of Historic Resources and/or National Register criteria has been applied. [27]

While government-funded reports provide useful historical overviews of specific transportation systems, there has been a plethora of published books and articles in the last few decades describing the Westward Movement and the transportation networks that have allowed mass migration to occur throughout the Intermountain West and the Pacific States. Of particular importance is Will Bagley's broad-based study of emigrant trails entitled *Overland West: The Story of the Oregon and California Trails, Volume 1: So Rugged and Mountainous: Blazing the Trails to Oregon and California 1812–1848*.

Historians and geographers that have interpreted the evolution of this nation's highway system include: David James St. Clair*, The Motorization of American Cities* (1986): Tom Lewis, *Divided Highways: Building the Interstate Highways, Transforming American Life* (1999); Owen D. Gutfreund, *Twentieth Century Sprawl: Highways and the Reshaping the American Landscape* (2007); Diane Perrier, *Onramps and Overpasses: A Cultural History of Interstate Travel* (2009); and, most recently, Earl Swift, *The Big Roads: The Untold Story of the Engineers, Visionaries, and Trailblazers Who Created the American Superhighways* (2011).

In addition to the aforementioned published studies, there have been a number of holistic transportation-related studies or promotional publications, theses, and dissertations that focus on historic roads and highways in California. Of particular importance are California Highways and Public Works. *Centennial Edition: September 9, 1850–September 9, 1950* (Adams, ed. 1950); Herbert M. Goodwin, Jr. dissertation, "California's Growing Freeway System" (1969); George Petershagen's master's thesis, "Towards a State Highway System: California's Roads and Highways, 1850–1895" (1991); Dana E. Supernowicz unpublished study along U.S. Highway 50 between Union Hill and Lake Valley, El Dorado County, California (1993); Forsyth and Hagwood, One Hundred Years of Progress: A Photographic Essay on the Development of the California Transportation System (1996); indexes for *California Highways and Public Works* journals (1937–67) compiled by Jill Hupp (1997); and Jeffrey Brown's paper, "Statewide Transportation Planning in California: Past Experience and Lessons for the Future" (2000). Norman Root, former Caltrans highway engineer, authored a number of unpublished papers focusing on the history of California's highway system. Root was also a strong advocate of historic highway preservation.[28]

Finally, primary source documents, including contract reports, public utilities commission records, site plans, drawings, maps, newspapers, journals, board of supervisor's minutes, photographs, and aerial

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[27] The historic evaluation reports that document these routes are on file with Caltrans headquarters, Sacramento: Supernowicz, *Historic Resource Evaluation Report for State Route 94*; Eugene Heck, *State Route 74 Hurkey Creek Bridge Replacement Project, Historic Property Survey Report, PM 62.4/63/7, Riverside County* (Sacramento, CA: Caltrans, August 2010).

[28] The California Highways and Public Works indexes compiled by Jill Hupp, Caltrans, are available online at http://www.dot.ca.gov/ser/downloads/cultural/CalHwyIndex.pdf. George F. Petershagen is a former Caltrans historian who worked in Sacramento at the headquarters office and has since retired. Dana E. Supernowicz is currently a Caltrans historian working at the Sacramento headquarters office and is the principal author of the unpublished study entitled Dana E. Supernowicz., "Surmounting the Sierra: An Historical Narrative and Determination of Eligibility for the Highway 50 Corridor Between Union Hill and Lake Valley" (Placerville, CA: El Dorado National Forest, 1993). Norman F. Root, a former Caltrans engineer, deserves special recognition for his contributions, many of which have gone unpublished, toward preserving and documenting the history of Caltrans and the roads and highways it administers in the state. Root, now deceased, was an active member of the LHA, chairman of the Caltrans Centennial Coordinating Committee in 1994, and chair and secretary of the Caltrans Historical Committee for many years. Root was a strong advocate of establishing a transportation museum in Sacramento.

photographs, all provide important information on specific roads and highways in California and neighboring states. Caltrans headquarters library in Sacramento curates documents, maps, photographs, and oral history associated with the department's efforts at road and highway construction in the state since the early 1900s (Figure 16). The California State Archives maintains a similar photograph collection of statewide transportation projects and curates several large collections related to the State Railroad Commission, which formed in 1915, and the records of the state engineer, Ham Hall (Figure 17). Other libraries in California that focus on transportation include the Institute of Transportation Studies, otherwise known as the (Harmer E.) Davis Transportation Library at the University of California, Berkeley, and the Dorothy Peyton Gray Transportation Library in Los Angeles, a part of the Los Angeles County Metropolitan Transportation Authority. County and city libraries, along with museums and historical societies, also maintain collections that include documents, as well as photographs and maps, including early views of various roads and highways.

Figure 16. *Grapevine Kern County looking north towards Bakersfield, 1934 (Caltrans Transportation Library, Sacramento).*

Figure 17. *Irrigation map of San Bernardino and vicinity, 1880, by former California State Engineer William Hammond Hall, depicting irrigable lands, land ownership, towns, and early transportation features. The map also illustrates how land surveys during the nineteenth century formed relatively uniform grids that also formed transportation routes, north to south and east to west (courtesy of the California State Archives, Ham Hall Collection, Davis Rumsey Map Collection, Cartography Associates).*

Defining Trails, Roads, and Highways

What defines a trail, road, or highway may appear to be obvious, although abandoned roads and highways often look much different today than during the periods in which they were used and maintained. Similarly, trails, particularly those used by Native Americans, are often overlain by modern roads and highways, or in some cases, they are simply overgrown and largely invisible from lack of use. In these cases, the trail or road can be characterized as a transportation corridor, since its specific location cannot be positively determined. Therefore, a definition and taxonomy of trails, roads, and highways is important in order to identify, interpret, and evaluate these types of linear properties and establish credible historic contexts.[29]

As previously noted, over the past few years, several broad state and national studies have helped to define historic trails, roads, and highways, particularly Marriott's (2010) guide to historic roads, Pry and Anderson's *Arizona Transportation History* (2011), and Ingalls' (2009) focused study of historic automobile roads in Iowa. It is also important to note that archaeologists have demonstrated over the past several decades a keen interest in historic trail and road identification and, in many instances, have teamed with historians and vocational organizations to document these types of properties.

While Marriott's study provided a solid nationwide perspective for defining roads in a thematic context, along with recommending goals for preserving important trails, roads, and highways, Ingalls' study focused on historic automobile roads in Iowa. Ingall's study provides a regional, yet comprehensive, historic context that can be applied to other automobile roads and highways throughout the United States, including California, and presents specific criteria for defining the wide-variety of automobile roads that may be encountered in the field. Pry and Andersen's study of Arizona's transportation history takes a more thematic approach and is important because of its broad historic context, which begins with Native Americans and ends with a contemporaneous history of the state's transportation systems.

Historic trails, roads, and highways generally fall into the following categories or property types:

- Native American (prehistoric, ethnographic, or ethnohistoric) trails
- Recreation trails
- Exploration trails or routes
- Emigrant trails
- Wagon and stage roads
- Toll roads
- County roads
- City roads
- Parkways/scenic roads/recreation roads
- Service roads
- Private roads

[29] The California Streets and Highways Code provides definitions for

- State highways
- Transcontinental highways
- Freeways
- Interstate highways

Although there are 15 proposed categories of trails, roads, and highways, as described above, there is a great deal of overlap across categories, since roads often began as trails and later evolved into highways.[30] Although different thresholds of significance have been applied to historic trails, roads, and highways, most recently significant historic roads have been defined as "roads that, through design, experience, or association, have contributed to our culture in a meaningful way."[31] This definition is inclusive of most trails, roads, and highways, because of the impact these types of resources have had on cultural exchange and economic prosperity. The National Task Force for Historic Routes (NTFHR)[32] has identified four primary types of potentially significant historic routes:

- Cultural
- Exploration and discovery
- Aesthetic
- Engineered routes[33]

Unlike the 15 categories or property types discussed above, the NTFHR categorization is based largely upon a "thematic" approach. Even so, the 15 categories of transportation properties fit into one or more of the themes suggested by the NTFHR. The following are brief descriptions of each type of historic route based upon the NTFHR categories.

Cultural routes. Cultural routes have evolved through necessity or tradition, without a formal initial goal or objective to guide location, or have garnered national attention as routes of mass migration or popular culture, such as Route 66 (Figure 18). Pre-automobile routes are often overlain by automobile roads or highways and have generally undergone significant changes and modifications since their inception, often leading to multiple layers of use. Multiple layers of use often provide interesting historical juxtapositions but are also a challenge for preservationists. These routes may have evolved from Native American or Spanish period trails, or simply from convenient connections between farms and villages, such as along railroad grades. Generally, the only original features of these routes are the historical corridors through which they pass, or in other cases the original route runs parallel with the newer route. Historical maps, along with remaining roadside features, such as hostelries, motels, restaurants, and motor courts, generally provide important information regarding the history of the routes, as well as settlement and travel patterns (Figure 19). Road-construction projects leave identifiable markers or pieces of the road's fabric that assist in interpreting its history of period of use.

[30] The California Streets and Highways Code, Chapter 4 provides general information on the state highway and freeway system, http://www.leginfo.ca.gov/.html/shc_table_of_contents.html, accessed October 2015.

[31] Daniel Marriott, *The Preservation Office Guide to Historic Roads* (New York: James Marston Fitch Charitable Foundation, 2010) available online at http:www.historicroads.org/documents/GUIDE.pdf; see also Paul Daniel Marriott, *Saving Historic Roads: Design and Policy Guidelines* (National Trust for Historic Preservation, Preservation Press, John Wiley & Sons, Inc., New York, NY, 1998); see also http://contextsensitivesolutions.org/content/reading/historic-roads/resources/historic-roads-defined/, accessed October 2015.

[32] In 1993, Paul Daniel Marriott began examining the issues and threats facing one parkway and became aware of the engineering, legal, and social issues facing historic roads across the country. His research culminated in a policy paper presented in 1994 to the engineering community at an AASHTO conference. The paper, which identified the need for research on the preservation of historic roads, resulted in the establishment of the NTFHR.

[33] A "route" as defined by the NTFHR task force is inclusive of trails, roads, and highways.

Figure 18. *Section of old Route 66 in the California desert (courtesy of Chad Moffett, Mead & Hunt, Sacramento, California).*

Figure 19. *View of Route 99 between Tulare and Fresno (courtesy of the Library of Congress, Prints and Photographs Division, Farm Security Administration, Office of War Information Photograph Collection, Washington, DC, LC-DIG-fsa-8b33566).*

Figure 20. *De Anza Trail from Mexico to northern California (courtesy of the NPS, http://www.nps.gov/juba).*

Figure 21. *Juan Bautista de Anza National Historic Trail, Old Stage Road, San Juan Bautista to Salinas (courtesy of Phil Stoffer, PhD, geologist, http://geologycafe.com).*

Exploration and discovery routes. Exploration and discovery routes were created by or evolved from discreet political, military, or mass migrations associated with important events, congressional appropriations, and surveys (Figures 20 and 21). While some form of engineering standards may have been applied to these routes, the original impetus to create the routes began with exploratory investigations involving very limited road development. These are the least-likely types of transportation properties to retain physical evidence, partly because of their transitory nature and the lack of improvement when they were in use.

Aesthetic routes. Aesthetic routes represent trails, roads, and highways of which the primary rationales for development were the design and provision of specific visitor experiences (Figures 22 and 23). Aesthetic routes, such as parkways, were designed and developed for the purpose of leisure, recreation, and commemoration. Trails, such as those in Yosemite National Park, for example, were created to take advantage of the aesthetics of the park's natural beauty. As a general rule these types of transportation properties were generally well documented, often engineered, and evolved during the first few decades of the twentieth century. Aesthetic highway routes include the Redwood Highway through Redwood National Park, State Highway 9 through Big Basin State Park, the Arroyo Seco or Pasadena Freeway, and the Cabrillo Freeway in San Diego. Special materials, plantings, lighting, structure, and building facades generally contribute to the unique character of

these roads. Alterations to any component of these roads, such as the alignment, details, and associated landscape, may affect the historic integrity of the resources.[34]

Engineered routes. Engineered routes were created with specific design elements that addressed the natural topography of a trail, road, or highway corridor. The aesthetic experience of these routes was often secondary to their actual design. Speed, safety, and economy often determined the design. Exceptions exist, such as the Feather River Canyon Highway 70, which required sophisticated engineering, particularly tunnels to circumvent steep canyons, and decorative rock retaining walls and turnouts for viewing the natural beauty of the Feather River. Applied engineering principals should not be confused with design aesthetics with the exception that both engineering and design were at times combined to achieve a particular aesthetic (Figures 24 and 25).[35]

While the NTFHR's four categories of historic trails, roads, and highways have merit, there is overlap between categories. For example, aesthetic routes may be engineered routes, and engineering standards may have been applied to a number of exploratory and discovery routes.

A study prepared by Dames and Moore for ADOT suggested that roads have two primary areas of significance: engineering and transportation.[36] ADOT's focus was perhaps too narrow, but certainly, engineering and transportation were key elements of any road or highway. As previously noted, in February 2011, ADOT published *Arizona Transportation History*,

Figure 22. *Arroyo Seco Freeway, July 1940. The Arroyo Seco or Pasadena Freeway was designed for both aesthetics and engineering (Caltrans Transportation Library, Sacramento).*

Figure 23. *Cabrillo Freeway, San Diego 1954 (Caltrans Transportation Library, Sacramento).*

[34] Marriott 2010.

[35] Ibid.

[36] Owen Lindauer, Ph.D. "Old Roads: Are They Historically Significant," In *Preservation Notes: The Newsletter of the Committee on Historic Preservation and Archaeology of the Transportation Research Board* (Raleigh, NC: Center for Transportation and the Environment, Committee on Historic and Archaeological Preservation in Transportation, October 1999 (http://www.itre.ncsu.edu/ADC50/preservationnotes.htm (accessed May 2015).

Figure 24. *Feather River Canyon Highway 70 tunnel. Note that the masonry work surrounding the tunnel entrance reflects standard engineering practice and aesthetic design (Caltrans Transportation Library, Sacramento).*

Figure 25. *Arroyo Seco Parkway, Figueroa Tunnels, Los Angeles. Note the Art Deco decorative detail on the face of the tunnel (courtesy of the Library of Congress, Prints and Photographs Division, Washington, DC, HAER-CAL, 19-LOSAN, 83G-5).*

a topical overview of Arizona's historic trails, roads, and highways for its Centennial, which presented a broad perspective of transportation history in the state.[37] Paul Daniel Marriott (2003), in *From Milestones to Mile Markers*, and David H. Copps (1995), in *The View from the Road: Guide for Assessing Rural Historic Landscapes*, further refined the characteristics of historic roads, particularly the interface between the physiographic, ecological, and historic contexts.

Besides being linear, generally speaking, every trail, road, and highway has three parts: the physical trail, road, or highway itself; its legal boundary or right-of-way, if one exists; and its broader setting. The trail or road prism was designed and used for the movement of people and goods, originally in non-vehicular apparatuses and, later, in vehicles. The surface of a transportation property can vary from packed dirt to macadam, asphalt, and concrete and is an important characteristic of its physical structure but not necessarily its larger importance. The shoulders on both sides of a road or pavement are also parts of the road prism. The right-of-way includes the physical and, most often, legal boundaries of the roadway. Within the right-of-way, road-related improvements may include lighting devices, signs, sidewalks, street trees, aboveground utilities, waysides, and scenic overlooks.[38] All these elements, combined, form the components of any transportation property.

The idea behind defining, designating, or commemorating certain

[37] Pry and Andersen, 2011.

[38] David H. Copps, *The View from the Road*: *Guide for Assessing Rural Historic Landscapes* (Chicago: Island Press, 1995).

historic trails, roads, and highways has its antecedents during the early twentieth century, when official designation or commemoration of historic and scenic roads and highways garnered support by organizations and government agencies. Although designed and built to expressly provide recreationists the ability to explore the nation's natural scenery, routes such as the Blue Ridge Parkway, created in the mid-1930s during the Great Depression, gained widespread attention and led to the designation of other, similar routes, some of which were first opened by explorers, such as Meriwether Lewis and James Clark.[39] The nation's fascination with exploration and discovery routes gained importance after World War II, as highways began to replace minor county roads, and increased leisure time led to demands for expanding recreation opportunities for motorists.

In California, clubs and organizations helped foster the early (or pre-1940s) historic trail or road designations, such as the Native Sons and Daughters of the Golden West, which was founded in 1875 to promote the tenets of Manifest Destiny and the lore of the early days of California. While the actual term "Manifest Destiny" has its antecedents in the nineteenth century, the ideology that surrounded the concept remained an important part of the American psyche and clearly had a profound influence on transportation and the settlement of the American West (Figures 26 and 27).

During the past several decades, federal land-management agencies, such as the Bureau of Land Management, the U.S. Forest Service, and the National Park Service have made a concerted effort to identify historic trail systems through the lands they administer and to assist in their marking.[40] The criteria for historic designation for trails, roads, and highways will be explored in greater detail in Chapters 7–9, but first, it is important to further define the types of transportation properties that may be encountered in the field.

Figure 26. *Pioneer Monument at Cajon Pass, erected in 1917 to honor the brave pioneers of California. The monument is 12 feet high and 7 feet square. At the base is an inscription. It is located near the edge of the old "National Old Trails Highway," at the juncture of the Santa Fe and Salt Lake Trails (courtesy of the San Bernardino Public Library, Pioneers of San Bernardino photograph collection).*

[39] The highway along the National Scenic Columbia Gorge has been officially designated as the Columbia River Highway Historic District. The historic route includes tunnels, stone walls, turnouts, and numerous scenic vistas.

[40] In 2011, the Bureau of Land Management completed the *BLM Historic Trail Inventory Project: ARRA-Funded Data Baseline Collection* (Schlanger 2011). A Microsoft PowerPoint presentation of the results of the study can be found online at http://www.pnts.org/wp-content/uploads/2010/06/Resource-Inventories-Sarah-Schlanger-BLM.pdf.

Figure 27. *Bolling Memorial Grove (redwoods) plaque, Avenue of the Giants, along Old Highway 101, Humboldt County, California (courtesy of the Library of Congress, Prints and Photographs Division, Washington, DC, HAER-CA, 269-26).*

Prehistoric, Protohistoric, and Historical-Period Trails

What defines a trail varies depending upon the resource and its primary function and use over time. The broadest definition of a trail is some form of track or mark left by something that has passed. In this definition, humans, as well as animals, have contributed to the creation of paths that, through time, became travel corridors or trails. For the purposes of this study, the focus is solely on paths that were used by humans but, in some instances, may have initially been created by animals, such as migration routes used by herds of deer. More importantly, the path or track must contain evidence of human use, whether ethnographic, morphological, structural, or artifactual.

There are four principal trails of interest to historians and archaeologists: Native American, exploration, trade, and emigrant. Recreation trails often overlay historical trails, and while recreation trails may have historic value or interest, their function is largely in their aesthetics and opportunity for outdoor activities. Native American trails span thousands of years and signify important trade routes and corridors used for ceremonial purposes. Exploratory trails reflect the nation's desire to expand its territorial or jurisdictional boundaries in the West and affirm its ideological values associated with Manifest Destiny. Both Spain and, later, the United States instigated and funded exploratory missions into the American Southwest and Pacific regions beginning in the sixteenth century. As settlements expanded throughout the Southwest and Pacific regions, increased trade promulgated the need for more efficient and reliable transportation systems. The most noteworthy route through the region that would later become California was the El Camino Real, which connected Mission San Diego de Alcalá in San Diego in the south to Mission San Francisco Solano in Sonoma in the north.[41]

Although emigrant trails existed long before the California Gold Rush, it was the discovery of gold in 1848 that resulted in the development of numerous routes and subroutes leading west, including those used in previous centuries by the Spanish and traders. Emigrant trails have received a great deal of interest in the past few decades, in articles, books, and films, and Congress has funded numerous studies under the auspices of the NPS, to document and identify significant emigrant routes in the western United States, such as the Oregon-California Emigrant Trail.[42]

As previously noted, recreation trails, such as the trails that developed in the San Gabriel Mountains as a result of the Back to Nature and Outdoor Movements during the late nineteenth and early twentieth centuries or recreation trails in national parks, such as Yosemite, often overlap with Native American and historic trails. In Northern California, noteworthy examples include the Rim Trail that encircles Lake Tahoe, the Carson Emigrant Trail over Carson Pass, the Pony Express Trail that crosses the state through Lake Tahoe and terminates in San Francisco, and the Jeepers Jamboree or Rubicon Trail that follows a

[41] Alice Fisher Simpson, "Historic Trails of the Padres," *California Highways and Public Works, Centennial Edition, September 9, 1850–September 9, 1950*, ed. Kenneth C. Adams (Sacramento, CA: California Division of Highways, 1950), p. 3-6, copy on file Caltrans Headquarters, 1120 N. Street, Sacramento, California. Fisher's account tends to perpetuate the "romantic" ideology of the route by previous authors and journalists.

[42] The NPS is preparing a feasibility study to evaluate some 64 routes for possible addition to the Oregon, California, Mormon Pioneer, and Pony Express National Historic Trails. The study was authorized by Congress in response to years of sustained public interest, under the Omnibus Public Land Management Act of 2009.

prehistoric and ethnographic trade route and a historical wagon road between Georgetown on the west, and Meeks Bay, Lake Tahoe on the east.

The Back to Nature Movement in southern California was particularly important during the first two decades of the twentieth century. Often coined "The Great Hiking Era," during the 1910s dozens of cabins and resorts were built in the San Gabriel Mountains, along with trails, some of which required payment of tolls.[43] The movement coincided with the Back to Nature Movement and a growing populace who sought the pleasures of the outdoors as the U.S. became more industrialized and urban. The San Gabriel Mountains were nearly at the back doors of many foothill communities, such as Altadena, Pasadena, Sierra Madre, and Arcadia. During the early twentieth century, the mountains were a visual reminder for Angelinos that despite urbanization, a large part of Los Angeles County remained wild and largely undeveloped.

NATIVE AMERICAN TRAILS

In the past few decades, Native Americans have actively pursued designation of sacred or traditional places. Some of these places include structures or objects, places associated with origin stories and oral traditions, and places used for ceremonies and other spiritual activities that, in certain circumstances, include trails.

One of the first studies of Native American trails in California was L.L. Sample's *Trade and Trails in Aboriginal California*, published in 1950. Sample's study was followed in 1961 by a more scholarly study by James T. Davis entitled *Trade Routes and Economic Exchange Among the Indians of California*.[44] Davis drew a correlation between historical-period and modern highways and the relationships of those transportation routes to Native American trails. His narrative was supplemented by several maps (Figure 28) that illustrate those relationships. Prehistoric trails have been widely documented in the desert region of southern California.[45] According to Archaeologist Stephen Byrne, "prehistoric trails systems in the Picacho Basin are some of the most numerous and complex in the Colorado Desert."[46] In 2010–11, Byrne, along with other colleagues, mapped 16 km of trails at six sites, varying from 30 to 50 cm in width. Features found along the trails included rock cairns, circles, alignments, lithic scatters, and ceramics.[47]

In recent years, the NPS has developed specific guidance for identifying "traditional" sites for both Native and non-Native Americans.[48] Consequently, Native American trails are included in the enabling legislation as potential candidates for designation as Traditional Cultural Properties (TCPs), even though the physical manifestations of the resources may be gone or indistinguishable from the natural

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[43] William C. Tweed, *A History of Outdoor Recreation Development in National Forests, 1891–1942* (Clemson, SC: Clemson University, Department of Parks, Recreation, and Tourism, 1989), 2–3; John W. Robinson, *The San Gabriels: Southern California Mountain Country* (San Marino, CA: Golden West Books, 1977), 127–138.

[44] James T. Davis, "Trade Routes and Economic Exchange Among the Indians of California," In *Reports of the University of California Archaeological Survey, No. 54*, 1961, http://digitalassets.lib.berkeley.edu/anthpubs/ucb/text/ucas054-001.pdf (accessed May 2015).

[45] Paul D. Campbell, *Survival Skills of Native America* (Salt Lake City, UT: Gibbs-Smith, 1998); Jamie H. Cleland and Rebecca McCorkle Apple, *A View across the Cultural Landscape of the Lower Colorado Desert: Cultural Resource Investigations for the North Baja Pipeline Project* (San Diego: EDAW, 2003).

[46] Stephen Byrne, "Prehistoric Trails of the Picacho Basin in the Colorado Desert, Imperial County, California," *SCA Proceedings* 25 (2011), 1.

[47] Ibid., 4.

[48] Patricia L. Parker and Thomas F. King, *Guidelines for Evaluating and Identifying Traditional Cultural Properties* (National Register Bulletin 38. Rev. ed. Washington, DC: NPS, 1998), http://www.nps.gov/nr/publications/bulletins/nrb38/ (accessed November 2014).

Figure 28. *Map depicting Native American trails, as compared to California highways. The map on the left displays Native American trails throughout California as illustrated by James T. Davis (1961), and the Caltrans map on the right displays the state's modern highway system.*

topography. Native Americans may attribute natural features, such as rivers, islands, cliffs, caves, and mountains, as warranting sacred site designation, and perhaps listing as a TCP. Trails used to access these features or locations may be considered sacred, and potentially significant, if they provide the means to continue to carry out traditional practices, such as trade, hunting, gathering materials for basketry or medicinal plants, which are important in ceremonies.[49]

Native American trails also have been referred to as "pilgrimage routes."[50] Examples include the Salt Song Trail and other ethnographic trails in the Mojave Desert and the Lolo Trail in Montana and Idaho, often marked with rock cairns.[51] Similar rock-cairn-marked trails were identified as part of the Gasquet-Orleans Road (or "G-O Road") Project within the Klamath National Forest, along the northern coast of California. Cave Rock at Lake Tahoe and Mount Shasta also reflect pilgrimage sites accessed by Native American trails (Figure 29). [52]

[49] Ojibwa, "American Indian Sacred Places," *Native American Net Roots*, December 17, 2009, http://nativeamericannetroots.net/diary/315 (accessed November 2014).

[50] A "pilgrimage route" has been defined as a "sacred place," although in this case, it is a "linear" sacred place. The pilgrimage becomes a sacred event and, in certain cases, follows a designated trail or corridor. For more information on pilgrimage routes, refer to Ojibwa, 2009.

[51] Ruth Arlene Musser-Lopez and Steve Miller, "Archaeological Trails and Ethnographic Trails: Can They Meet?," *SCA Proceedings* 24 (2010): 1–25; Ojibwa, "American Indian Sacred Places."

[52] Mathew S. Makley and Michael J. Makley, *Cave Rock: Climbers, Courts, and a Washoe Indian Sacred Place* (Reno, Nevada: University of Nevada Press, 2010).

Figure 29. *Cave Rock, Lake Tahoe, ca. 1866. The cave has been designated a sacred cultural site by the Washoe, despite highway tunnels that were driven through the rock in the twentieth century (courtesy of the Lawrence & Houseworth Collection, Library of Congress, Prints and Photographs Division, Washington, DC, LC-USZ62-22270).*

Native American trails may be marked with a variety of indigenous materials specific to the regions or trail locations. Kish D. La Pierre, in "Preliminary Report of a Rock Feature Complex on the East Side of Searles Lake (CA-SBR-12134/H) West Mojave Desert, San Bernardino County, California," reported that rock cairns, alignments, rock rings, stone circles, rock stacks, and semicircular enclosures have all been identified in California.[53]

Another type of Native American trail or route that reflects ethnohistoric conditions in California includes the routes that marked forced relocations of tribal communities, as was the case in 1863, when over 400 native peoples were relocated from the Chico area of the upper Sacramento Valley to Round Valley, in Mendocino County. The forced relocation is known as the "Concow Trail of Tears" or the "Nome Cult Trail." Native Americans commemorated the forced relocation in 2007, when various northern California tribes participated in the weeklong event.[54]

Archaeologist James H. Cleland explored the question of whether Native American trails may be treated as ethnographic or cultural landscapes.[55] As Cleland explained, Native American groups continue to occupy their traditional territories and maintain exceptionally strong cultural continuity, as evidenced in contemporary culture by the unbroken use of native languages, the maintenance of oral history and traditional oral narratives, the continued practice of certain ritual and ceremonial activities, and a strong identification with the land. A strong identification with the land is typical of cultural persistence throughout Southern California Tribes as they continue to occupy their pre-contact homeland and express a close personal affinity with the places of their ancestors.[56]

The relationship of linguistic continuity and territorial occupation is a topic that has been hotly debated for 100 years, although both areas of inquiry are worthy of further study when it comes to making decisions regarding the boundaries of cultural landscapes. Examining ethnographic or traditional properties, such as trails, at the landscape level of analysis is intriguing; however, applying regulatory standards to ethnographic landscapes should be done with caution (Figure 30). Trail systems may encompass thousands of acres of land, and in many cases, the actual trail trace may be entirely gone due to natural and human causes. Despite the complexity of such studies, Cleland's holistic approach deserves consideration

[53] Kish D. La Pierre, "Preliminary Report of a Rock Feature Complex on the East Side of Searles Lake (CA-SBR-12134/H) West Mojave Desert, San Bernardino County, *California. Pacific Coast Archaeological Society Quarterly*, 43, no. 1 and 2 (2007), printed June 2010, 84-100.

[54] Christina Aanestad, "Native Americans Walk the California Trail of Tears," *North Coast*, San Francisco Bay Area Independent Media Center, September 19, 2007, rev. June 26, 2013, www.indybay.org/newsitems/2007/09/19/18448509.php (accessed June 2014).

[55] J. H. Cleland, "Ethnographic Trail Systems."

[56] Ibid., 46–47.

Figure 30. *Native American trail through a desert pavement (CA-IMP-4805), Picacho Basin, Colorado Desert, Imperial County, California (courtesy of Stephen Byrne [2011]).*

when examining large swaths of land where Native American culture is apparent in sites, features, artifacts, and oral tradition.

Paleoclimatic shifts, combined with topography, influenced the location and duration of prehistoric and later ethnographic or ethnohistoric trails in California. The last glacial period occurred during the last years of the Pleistocene, from approximately 110,000 to 10,000 years ago. This glacial period clearly limited travel in portions of the Intermountain West, the Great Basin, and the region that later became California. A slow warming period began some 9,000 years ago and allowed transhumance on a much larger scale and at higher elevations. Sierra Nevada passes, such as Donner, Echo, and Carson, were often free of impenetrable snow year-round, and migration patterns shifted to take advantage of the climatic changes. The "Little Ice Age," as it has come to be known, reportedly spanned the years 1550–1850 a.d ., with three cold intervals separated by intervals of slight warming: one cold interval beginning about 1650, another about 1770, and the last in 1850.

In summary, elements that influenced Native American trail creation or development include the following:

- Accessing traditional hunting or gathering sites
- Accessing spiritual or traditional sites
- Following trade routes

Much work remains to understand the origins and use of Native American trails. Combing archaeological and ethnographic research provides important tools for addressing these ephemeral cultural resources. Historical documents, particularly historical maps, journals, and diaries, may also provide valuable information to verify Native American trail locations.

SPANISH AND MEXICAN PERIOD TRAILS, 1769–1847

Spanish-Mexican period (1769–1847) trails are generally classified as trail systems that developed prior to the California Gold Rush and the establishment of California as a state in 1850. While the El Camino Real (Figures 31 and 32) is most often treated as a "highway," it actually began as a trail used principally by pedestrians and, later, two-wheeled carts.[57] The route quickly evolved as its importance grew, and it soon developed into a roadway or highway. Hence, its treatment in this study will focus upon its history as a roadway or highway and not as a trail.

[57] For a general history of the route designations and history, refer to California Highways, "Trails and Roads: El Camino Real," http://www.cahighways.org/elcamino.html; Max Kurillo and Erline M. Tuttle, *California's El Camino Real and Its Historic Bells* (San Diego: Sunbelt Publications, 2000).

Figure 31. *El Camino Real, 1930s, with an improved road surface to accommodate automobile traffic (Caltrans Transportation Library, Sacramento).*

Figure 32. *El Camino Real bell marker at Mission San Fernando Rey de España and Los Angeles Plaza–El Camino Real, ca. 1937 (courtesy of the Los Angeles Public Library photograph collection).*

With the exception of the El Camino Real, the historical-period development of Spanish-Mexican period transportation systems lay principally in the American Southwest during the late seventeenth century, with the creation of missions, presidios, and *asistencias*.[58] Prior to the 1830s, with the exception of the El Camino Real, transportation routes within the inland sections of central and northern California were minimal, at best. However, in southern California, although it has received less notoriety until recent years, the "Old Spanish Trail" had a profound influence on its early stages of development.[59]

The Old Spanish Trail included two principal branches. The South or Main Branch that headed northwest past Colorado's San Juan Mountains near Green River, Utah; and the North Branch went north into Colorado's San Luis Valley and crossed over Cochetopa Pass in south-central Colorado and later followed the Gunnison and Colorado Rivers to meet the South Branch trail near Green River. From Central Utah the trail trended southwest to a region now shared by Utah, Nevada, and Arizona. It then crossed through southern Nevada near present-day Las Vegas, through the Mojave Desert, and onto Mission San Gabriel and the Pueblo of Los Angeles.[60]

The Old Spanish Trail ultimately linked two provinces of Mexico. In 1829, Antonio Armijo, a merchant from Santa Fe, led 60 men and 100 mules over the route, opening it to wagons and freight. Armijo then established a new trail, adopting parts of Jedediah Smith's routes of 1826 and 1827 and Rafael Rivera's route of 1828. Armijo avoided the most arduous sections of the Mojave Desert, traveling south of Death Valley, following seasonal drainages, and taking advantage of natural springs. He arrived at Mission San Gabriel at the Pueblo of Los Angeles on January 21, 1830, although the men had to rely on mules for food during their final days on the trail. In California, they traded various goods carried with them from Santa Fe for horses and mules, many driven back to Santa Fe.[61]

Armijo's return journey reportedly marked the first time a caravan or pack train completed a round trip between Santa Fe and Los Angeles. Trade between the United States and Mexico increased as a result of Armijo's expedition. Following his return, New Mexico's governor appointed Armijo "Commander for the Discovery of the Route to California." [62] The opening of trade with California resulted in increased trade, emigrants from New Mexico following the trail to California, and outlaws using the trail to raid California ranchos. The trail also increased raids for Indian slaves, despite official condemnation of the practice.[63]

As previously noted, the Old Spanish Trail led to the development of several main routes and numerous alternates. Around 1852, William Wolfskill and George Yount opened a North Branch trail that followed the Colorado River to present-day Needles and then followed the Mojave River to Cajon Pass. Emigrants and traders favored this new route, since it was more direct. In later years several variations of the North and South Branch trails were also used. All of the branches or routes came together in southern Utah, fanning out once again into separate trails and striking through southern Nevada towards

[58] An *asistencia* was a small-scale mission with a divine service but lacking a resident priest. Of the five *asistencias* operating in Alta California, only one, that of San Rafael, achieved full mission status (Woodrow James Hansen, *The Search for Authority in California* (Oakland, CA: Biobooks, 1960).

[59] The Old Spanish Trail became the fifteenth national historic trail when Congress adopted Senate Bill 1946 in November 2002, and President George W. Bush signed the bill early in December. For a detailed account of historic trails and wagon roads in the southern California desert, refer to Elizabeth von Till Warren and Ralph J. Roske. *Cultural Resources of the California Desert, 1776-1980* (United States Bureau of Land Management, Desert Planning Unit, Riverside, California, 1981).

[60] Elizabeth von Till Warren, "Old Spanish Trail History," *Old Spanish National Historic Trail Association*, 2001. http://www.oldspanishtrail.org/learn/trail_history.php (accessed May 2015). The website provides a digital copy of the article.

[61] Ibid.

[62] Ibid.

[63] Ibid.

southeastern California. At the Mojave River, the routes again merged, ultimately funneling travelers over the Cajon Pass and into southern California. Later, portions of the Old Spanish Trail were overlain with Brown's Toll Road (1860s–70s), which was itself later bypassed for another route that today is part of U.S. Interstate 15 (I-15).[64] Today, the group of main or primary trails and alternates, together, form the official "Old Spanish Trail" (Figure 33).[65]

By the late 1840s, the importance of the Old Spanish Trail had declined. There was no longer a need to link Santa Fe with Los Angeles by trail, since other routes that were less circuitous and faster had opened up. During the California Gold Rush, emigrant routes moved to the north and connected to the Oregon Trail and, later, the California Trail, bypassing the southern route. Although pack trains following the Old Spanish Trail continued to trade with the Mormons, by 1853, they were no longer welcome in the Utah Territory.[66]

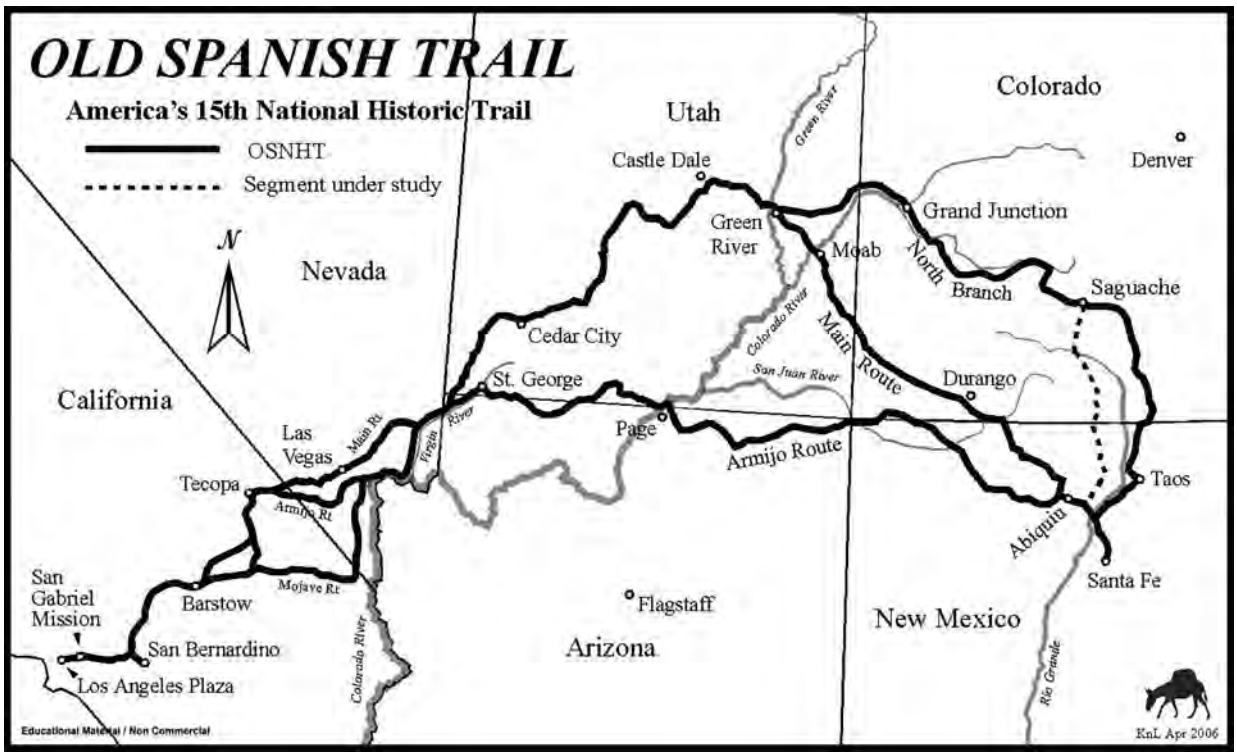

Figure 33. *Old Spanish Trail, Santa Fe to Los Angeles (courtesy of the Old Spanish Trail Association, http://www.oldspanishtrail.org/learn/maps.php).*

[64] Richard D. Thompson and Kathryn L. Thompson, *Pioneer of Mojave: The Life and Times of Aaron G. Lane* (Desert Knolls Press, Apple Valley, CA, 1995).

[65] Ibid. The Old Spanish Trail gained notoriety during the 1840s with the publication of John C. Fremont's (1845) report of his 1844 journey from California to the states, the return leg of his expedition to Oregon for the U.S. Topographical Corps.

[66] Interest in the Old Spanish Trail began to increase beginning in the 1920s following the publication of an article by Joseph J. Hill entitled "The Old Spanish Trail: A Study of Spanish and Mexican Trade and Exploration Northwest from New Mexico to the Great Basin and California," *Hispanic American Historical Review* 4, no. 3 (August 1921): 444–73), and during the early 1930s by the publication in 1930 of George Brewerton's *Overland with Kit Carson*. William R. Palmer of Cedar City, Utah, organized the Spanish Trail Association in 1946. The association placed 100 markers along the trail between Santa Fe and Los Angeles, but disbanded soon after accomplishing that task, around 1950. LeRoy and Ann Hafen of Utah published their definitive history of the Old Spanish Trail in 1954 (*Journals of* Forty-Niners*: Salt Lake to Los Angeles*, vol. 2, *Far West and Rockies Series*, ed. LeRoy R. Hafen and Ann W. Hafen (Glendale, CA: Arthur H. Clark, 1954)). The publication inspired additional research, and the post–World War II off-road vehicle craze encouraged the public to explore the desert, stimulating more interest in the trail.

The *Old Spanish National Historic Trail Feasibility Study and Environmental Assessment: Old Spanish Trail*, prepared by the NPS, recognized several main routes and the Armijo trace in identifying the period of significance for the trail. Equally important to the American Southwest was the El Camino Real De Tierra Adentro, the Spanish colonial "royal road" in New Mexico and Texas that originally extended to Mexico City, Mexico. The route has been officially designated a National Historic Trail by the NPS.[67]

Other routes that entered southern California during the first few decades of the nineteenth century. In 1823–25, Jose Romero, Jose Maria Estudillo, and Romualdo Pacheco led an expedition in search of a route to Yuma, Arizona, and reportedly became the first explorers to travel through the Coachella Valley near Palm Springs.[68] The Coco-Maricopa (or Cocomaricopa) Trail, as it came to be called, passed along the base of the Santa Rosa Mountains and connected the coastal region of California with the Colorado River. The trail was initially developed as a Native Americans trade route. In 1862, William David Bradshaw determined that the trail was the shortest route between the California coast and the recently discovered gold mines along the Colorado River. The trail later served as the primary route for stagecoaches traveling between coastal southern California and the gold fields near present-day Ehrenberg, Arizona. It also became part of the official U.S. mail route between Los Angeles and Santa Fe, New Mexico.[69] By the late 1870s, however, along with the completion of the transcontinental railroad and the decline of the La Paz gold mines, the importance of the Cocomaricopa Trail and, later, the Bradshaw Trail waned. Today, State Highway 111 closely approximates the original course of the Bradshaw Trail. During the 1930s, the Bradshaw Trail was revived in the form of the Ocean-to-Ocean Highway. The federal government granted rights-of-way for the highway in 1938 and designated it U.S. Route 60/70/99. Segments of the present-day Varner Road were also once part of the original Ocean-to-Ocean Highway.[70]

EMIGRANT TRAILS, 1848–56

Trade was the principal use for those who followed the Spanish Trail and its various branches. Emigrants also followed the southern routes, but clearly not in the same numbers as the main emigrant trails leading into California, such as the Oregon and California Trails. The years 1848–56 were chosen because those dates mark the key years in which overland emigration occurred in California (Figure 34). While emigration occurred during the early 1840s, exemplified by the Stephens-Townsend-Murphy Party (1844) and, later, the infamous Donner Party (1846–47), most emigrants bound for California arrived during the latter years.[71]

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[67] National Park Service (NPS), El Camino Real Tierra Adentro, "The Royal Road to the Interior," http://www.nps.gov/elca/index.htm, accessed June 2015.

[68] City of Palm Desert, *Comprehensive General Plan/Archaeological and Cultural Resources Element*, http://ohp.parks.ca.gov/pages/1072/files/PalmDesert.pdf, IV-4–IV-5.

[69] Frank Norris and Richard L. Carrico, *A History of Land Use in the California Desert Conservation Area: Contract No. YA-512-RFP7-140,* Prepared for Desert Planning Staff, Bureau of Land Management, U.S. Department of the Interior, Riverside, California, August 1978, 31-34; City of Palm Desert, *Comprehensive General Plan*.

[70] City of Palm Desert, *Comprehensive General Plan*.

[71] The Stephens-Townsend-Murphy Party consisted of ten families who migrated from Iowa to California prior to the Mexican-American War or the California Gold Rush. The Stephens Party is significant in California history because they were the first wagon train to cross the Sierra Nevada during the expansion of the American West. They pioneered the first route at or near what was later named Donner Pass in 1844. Their crossing was a year before Fremont's, two years before the Donner Party's, and five years before the 1848–49 Gold Rush. The Donner Party (sometimes referred to as the Donner-Reed Party) set out for California in a wagon train and were delayed by deep snowfall in the Sierra Nevada near Truckee during the winter of 1846–47.

Figure 34. *Emigrant trails map (courtesy of Oregon California Trails Association (OCTA). The map displays the principal emigration routes to California, including the Spanish, Oregon, and California trail systems.*

The term "emigrant trail" has generally been applied to routes followed by individuals or families within the boundaries of the United States as part of overland or individual migrations, as opposed to other routes that were used primarily for trade or exploration. Whereas, western emigration is generally associated with overland emigrant trails created during the mid-nineteenth century. The four major trails or trail systems that are generally associated with overland emigration in the United States include the Oregon Trail, the Mormon Trail, the California Trail (multiple routes), and, to a lesser degree, the much earlier Spanish Trails, including the Santa Fe Trail or Southern Trail and its various branches. Each of these trail systems has undergone rigorous study over the past two decades, although the main focus has been designation under the National Historic Trail System Act (Public Law 90-543, as amended through Public Law 111-11, March 30, 2009; also found in 16 U.S. Code 1241–51).

Gold seekers and emigrants were motivated by religion, the acquisition of cheap land, and the lure of gold and other riches. Historians have estimated that roughly 500,000 emigrants came west following the emigrant trails, although the exact numbers may never be known, because no complete record exists. In later years, the same trail systems would provide emigrants the same means to travel from the west to the east as new mineral discoveries occurred, particularly in Nevada, Montana, Colorado, and Arizona.

The trip was arduous and fraught with risks from infectious diseases, such as typhoid and cholera; malnutrition; and inclement weather, and up to one-tenth of the emigrants reportedly died along the various routes.[72] Richard L. Rieck provided a compelling analysis of emigrant-trail deaths, noting that by far, disease was the most common cause.[73] The majority of deaths occurred among the elderly and children, with cholera and typhoid fever being the most prevalent cause largely due to bad water along the trails. Another factor was a lack of food and water faced by emigrants who traveled during late summer, as opposed to spring when grasses and water sources were replenished by winter rains and snowmelt.

With the completion of the Transcontinental Railroad in 1869, the stream of emigrants following the trails had largely subsided, although emigration leaving California was common through the 1870s and into the 1880s, some of it headed towards Nevada, Arizona, and as far north as British Columbia.[74]

The main route of the California Trail branched from the Oregon Trail west of Fort Hall and headed southwest toward present-day Nevada and thence along the Humboldt River and over the Sierra Nevada. By the mid-1850s, emigrants that had arrived at the eastern side of the Sierra Nevada had a choice of routes and alternate routes. Beginning in the north emigrants has a choice to follow the Nobles Trail, Lassen Trail, Beckwourth Emigrant Trail, Donner Trail, the Placer Emigrant Route, the Johnson Cut-Off or Cutoff Route, Daggett Trail, Mormon-Carson Trail, the Calaveras Big Trees Route, the Grizzly Flat Cut-Off, and the Sonora Pass Route.[75]

The journey to Oregon or California would generally take between 4 and 6 months, depending upon conditions along the trail, such as weather, feed, water, and the experience of the trail guide. Most Oregon- and California-bound emigrants left the Missouri River in the late spring and attempted to reach their destinations by the late summer or early fall. Unfortunately, many reached the deserts of Nevada and Utah during the peak of the summer dry season and suffered the consequences associated with the lack of water and feed, combined with intense heat.

Confrontations with Native Americans were rare, although stealing of horses and cattle occurred periodically along the trails. Most emigrants traveled in large parties, or "trains," of up to several hundred "farm" wagons, generally pulled by oxen or mules. During the 1850s, largely to encourage emigration, a number of trail guides were published, including The Prairie Traveler (1859), Lansford W. Hastings' The Emigrants' Guide to Oregon and California (1846), and John Calhoun "Cockeyed," Johnson's "Cut-Off" flyer that listed locations where water and provisions were available between the Carson Valley and Johnson's ranch, east of Placerville, El Dorado County.[76]

Most of the early emigrant wagon trains that headed west utilized a type of farm wagon pulled by oxen or mules that was considerably smaller than the Conestoga wagon used along the Eastern United States. The emigrant's farm wagons were lighter and outfitted to survive the arduous westward journey,

[72] Robert L. Munkres, "Devil's Gate," *Overland Journal* 7, no. 1 (1989): 2–18.

[73] Richard L. Rieck, "A Geography of Death on the Oregon and California Trails, 1840–1860," *Overland Journal* 9, no. 1 (1991), 13–21.

[74] Richard White, *Railroaded: The Transcontinentals and the Making of Modern America* (New York: Norton, 2012); Stephen E. Ambrose, *Nothing Like It In The World: The Men Who Built the Transcontinental Railroad, 1863–1869* (New York: Simon & Schuster, 2000); David H. Bain, *Empire Express: Building the First Transcontinental Railroad.* (New York: Penguin, 1999).

[75] NPS, "Feasibility Study: 4-Trails Feasibility Study—The California Trail Study Routes," *California National Historic Trail*," http://www.nps.gov/cali/learn/management/feasibility-study.htm (accessed June 2014).

[76] A copy of Johnson's flyer or playbill is available at the Bancroft Library, University of California, Berkeley. The Johnson Cut-Off was used for a few short years in about 1852–56, providing a route suitable for wagons; see also Supernowicz, *Surmounting the Sierra*.

although even farm wagons succumbed to the crossing, and emigrants often abandoned their wagons en route to the gold fields.[77]

As a general rule of thumb, emigrant-trail traces generally conform in width to the actual size of the smaller farm wagons vs. the larger Conestoga wagons or large freight wagons used during the Comstock Lode era to move goods between California and Nevada.[78] Emigrant trails, as compared to engineered roads, are more primitive and were generally created through simple hand-labor. Larger rocks or boulders were moved to the side of the trail using oxen and chains. The distinction between an emigrant trail and a road is often blurred because many of the emigrant trails or portions of the trails were improved so that they could be adapted for larger wagons, freighters, and stagecoaches. During the twentieth century wagon and stage roads, county roads, transcontinental highways, state highways, and U.S. highways, adopted or overlaid portions of emigrant trails.

SOUTHERN EMIGRANT TRAILS

The southern emigrant trails, which span over 5,600 miles across the Southwest, have to date received relatively little attention compared to the emigrant routes to the north, such as the Oregon and California Trails, and their various branches. The Southern Trail, which is often discussed by a variety of names—including the Santa Fe Trail and the Gila Trail, which were previously discussed in terms of their roles as important trade routes, provided the gateway used by emigrants and, later, Argonauts en route to the gold fields of California from the southern states and northern Mexico. The Army of the West, which included the Mormon Battalion, adopted the Southern Trail and its various alternates (Figure 35), and were instrumental in bringing California, Arizona, New Mexico, Nevada, and parts of Utah and Colorado into the United States.[79]

Jedediah Smith, the first American to reach California overland in 1826, used the Southern Trail system, as did the first four known Americans that permanently settled in California: Wolfskill and Yount in 1831, Warner in 1831, and Williams in 1832.[80]

Two main emigrant routes that entered southern California. The Old Spanish Trail (discussed earlier) left Santa Fe passed through Utah and Nevada near present-day Las Vegas, thence to Rancho Santa Ana del Chino. The Old Emigrant Trail left the Gila Trail at Yuma Crossing (at the border of Arizona and California) and headed northwest toward Rancho Santa Ana del Chino, picking up the Old Spanish Trail and terminating in Los Angeles.[81] One of the major branches of the Southern Trail was the Warner Springs–Temecula Trail. The trail was followed in January 1847 by the Mormon Battalion, who left Council Bluffs, Iowa in 1846 via Yuma and Warner Hot Springs and passed through Temecula in present-day Riverside County before their arrival in San Diego.

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[77] Michael A. Capps, "Wheels in the West: The Overland Wagon," *Overland Journal* 8, no. 4 (1990): 2–10.

[78] OCTA, *Mapping Emigrant Trails Manual*, 5th ed. (Independence, MO: OCTA, 2014), http://www.octa-trails.org/media/dynamic/files/580_1%20Preface%20%20and%20Introduction.pdf (accessed January 2014).

[79] OCTA, Southern Trails Chapter, *Proposal for a New Southern National Historic Trail*, http://southern-trails.org/PDF/Proposal_for_a_%20New_Southern_National_Historic_Trail.pdf (accessed April 2015). Emigrant Trails Historian and OCTA member Donald Buck addressed some of the confusion with the Southern Trails or Route. Buck suggested that "the easiest way to make sense out of the muddle of names is to call (1) the wagon route from Santa Fe—along the west side of the Rio Grande—opened up by Cooke (with Graham's improvement) to Warner's Ranch the Southern Trail (Cooke-Graham Wagon Road); (2) the pack trail used by Kearny, from the Rio Grande along the upper Gila River to the Pima villages, the Gila Trail; and (3) the cutoff to Tucson the Apache Pass Trail" (Buck, *Naming Emigrant Trails in the Southwest*, http://www.southern-trails.org/PDF/NamingEmigrantTrailsInTheSouthwest.pdf, accessed April 2015).

[80] OCTA, Southern Trails Chapter, *Proposal for a New Southern National Historic Trail*.

[81] Patricia A. Etter, ed, "The 1849 Diary of Stanislaus Lasselle," *Overland Journal* 9, no. 2 (1991): 3–33.

Figure 35. *The map displays the entire route and branches of the Southern Trails to California in 1849. Los Angeles and San Diego were the principal western destinations for the trails and trail branches (Courtesy Southern Trails Chapter of the Oregon-California Trails Association, southernhistorictrail.org).*

The subsequent discovery of gold in 1848 brought an influx of emigrants over the trail on their way to the gold fields of northern California. In September 1858, the Butterfield Overland Mail began using the route, with stops at Warner Springs, Temecula, and Laguna or present-day Lake Elsinore. The semiweekly trips averaged 20–25 days, with four stagecoaches a month passing through Temecula. During the Civil War, the U.S. military reportedly used the route to access portions of southern California.[82]

The Cooke-Graham Wagon Road, about 1,100 miles long, was opened in 1846, during the Mexican War, by Lieutenant Colonel Phillip Cooke, who was leading the Mormon Battalion, and was realigned in 1848 by Major Graham from the San Pedro River to the Santa Cruz River. It became the principal emigration route during the Gold Rush to southern California. From the Gila River, the trail turned west to the Yuma crossing of the Colorado River and then across the desert to Warner's Ranch, in California. There the trail split, with one branch going northwest to Los Angeles through Temecula and the other branch going southwest to San Diego.[83]

The Beale Road, approximately 500 miles long, and the Mojave Road, approximately 150 miles long, resulted from the federal government's plan to survey and build a wagon road along the Thirty-fifth Parallel, extending from Fort Smith, Arkansas, to southern California. Edward F. Beale was selected to explore and survey the route from Albuquerque to the Colorado River during 1857. Between 1858 and 1859, Beale was tasked with improving the Fort Smith to Santa Fe Trail and extending those improvements on the route he had surveyed from Albuquerque to the Colorado River. At the time Beale was completing his road building leading to the river, a Mojave "Indian uprising" on the river led to the building of Fort Mojave in 1859.[84] A wagon road was built running east from the Salt Lake Road across the Mojave Desert in order to supply the fort from California, known as the Mojave Road. The road connected with the western end of Beale's new road at Fort Mojave. Modern I-40 approximates the Beale Road from Albuquerque to Kingman, Arizona, and then continues westward to the site of Fort Mojave, on the eastern side of the Colorado River. The Mojave Road continues westward from the river, across the East Mojave Desert, to near the present-day Barstow, in southern California.[85]

The Salt Lake to Southern California Road, approximately 750 miles long, was begun in late 1847–48 as a Mormon pack trail from Salt Lake City that was connected to the western half of the Old Spanish Trail near present-day Cedar City. The route then continued on to the Pueblo of Los Angeles. Improvements occurred to the trail in 1849, which allowed the passage of wagons, and gold seekers to avoid late-season travel over the Sierra Nevada along the northern emigrant trails. The Mormon settlement of San Bernardino, founded in 1851, led to two-way wagon traffic along the route during the 1850s. Modern I-15 approximates the wagon road from Salt Lake City to Las Vegas. From there, the route lies west of the interstate until near Barstow, where I-15 parallels the wagon route to Cajon Pass. From the pass, the route dropped down into San Bernardino and ended in Los Angeles.[86]

The importance of the Southern Emigrant Trails waned after the arrival of the railroad in southern California in the 1870s. Some of the old trails became the basis for modern-day roads, such as I-15 and California Highway 79 through portions of San Bernardino and San Diego County.

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[82] OCTA, Southern Trails Chapter, *Proposal for a New Southern National Historic Trail*.

[83] Elizabeth Larson, "Major Graham's Wagon Route: The Long Way to California," http://www.over-land.com/graham.html (accessed May 2013).

[84] Alfred L. Kroeber and G.B. Kroeber, *A Mohave War Reminiscence, 1854–1880* (New York: Dover, reprint 1994).

[85] Ibid.

[86] Ibid.

NORTHERN AND CENTRAL EMIGRANT TRAILS

At the time of the California Gold Rush, humans had traversed the Sierra Nevada for thousands of years, albeit with much difficulty. European and American explorers, fur trappers, and traders followed Native American trails that once connected trading, hunting, and food gathering areas. While the great migration during the Gold Rush had largely ended by the mid-1850s, the ideology of Manifest Destiny had not escaped the minds of Americans, and the systematic settlement of the Far West demanded better transportation systems. Physical evidence associated with these early routes is clearly ephemeral, much of it having been overlain by later road development or simply overgrown by chaparral.

One of the first attempts to cross the Sierra Nevada occurred in 1841, when the Bidwell-Bartleson party opened up the route that later became the main branch of the California Trail.[87] The first documented winter crossing of the Sierra Nevada by Euroamericans was made in February 1844, when Kit Carson and John C. Fremont entered the upper elevations of what would become known as Alpine County as guides for Fremont's second expedition. Setting out in May 1843 to explore the Oregon Trail, Fremont reached Oregon six months later. Continuing to explore new territory, he turned south near Goose Lake and became lost between the Walker and West Walker Rivers. The party decided to cross the Sierra Nevada to reach Sutter's Fort, to replenish their supplies; they made their crossing near the present-day Carson Pass and then proceeded northwest.[88]

In 1846, following Fremont's crossing of the Sierra Nevada, Langford Hastings, a California lawyer and author of a popular emigrant guidebook, promoted a new trail as an alternative route to California. The cutoff left the main Oregon-California Trail just west of South Pass and went south past Fort Bridger, in the present state of Wyoming; through the Wasatch Mountains; and across the Great Salt Lake region to the Humboldt River, where it connected once again with the main branch of the California Trail. Between 1846 and 1850, emigrant parties followed Hastings Cutoff, including the infamous Donner Party.[89]

The California Trail developed as a branch of the 1840s Oregon Trail, having numerous branches and cutoffs (Figure 36). Emigrants began the overland crossing from a variety of jumping-off points in three states. Independence and St. Joseph, in western Missouri, were the two most popular locations for provisions and easy access to the first leg of the trail. After portions of the Missouri River were dredged in the early 1850s, Kansas City, Lawrence, and Topeka, in Kansas, were also used as provisioning points for the eastern leg of the trail. From the various provision points, emigrants often followed the Missouri River up to the Platte River. Another option was to follow the Kansas River and then the Little Blue River toward the Platte River.[90]

Livestock, such as oxen and mules, required water. So, the California Trail tended to follow rivers across the dry prairies, including the North Platte River which flows west through Nebraska into Wyoming. Near present-day Casper, Wyoming, the California Trail followed the Sweetwater River to the west over South Pass and then worked its way through the Rocky Mountains. Another shortcut routed emigrants from South Pass due west toward Fort Hall.

[87] Doyce B. Nunis, Jr., *The Bidwell-Bartleson Party: 1841 California Emigrant Adventure; The Documents and Memoirs of the Overland Pioneers* (Santa Cruz, CA: Western Tanager, 1992).

[88] Donald Jackson and Mary Lee Spence, eds., *The Expeditions of John Charles Fremont*, 3 vols. (Urbana, IL: University of Illinois Press, 1970–84).

[89] Donald L. Hardesty, "Donner Party Archaeology," *Overland Journal* 10, no. 3 (Fall 1992): 18–26.

[90] Keith H. Meldahl, *Hard Road West: History and Geology along the Gold Rush Trail* (Chicago: University of Chicago Press, 2012); Susan Badger Doyle, ed., *Journeys to the Land of Gold: Emigrant Diaries from the Bozeman Trail* (. Helena, MT: Montana Historical Society, 2000), 40–43.

Between 1849 and 1850, dozens of "emigrant guides" were printed and used by emigrants heading west to California. A number of guides, however, provided erroneous information that resulted in lost time and, in the worst cases, fatalities along the route

Figure 36. *Applegate Trail, near Tule Lake, California. The Applegate trail was among a dozen or so cut-off trails that branched off the main trail (courtesy of Bob Black, Trails West, Inc.).*

The main trail from South Pass headed southwest, crossed the Green River at Lombard Ferry, and continued onto Fort Bridger. At Fort Bridger, the Mormon Trail branched southwest toward Salt Lake City, while the main trail went northwest from Fort Bridger to Fort Hall, Idaho. From the Raft River southwest of Fort Hall, most California bound emigrants forked southwest past the City of Rocks, Idaho, toward Nevada, while Oregon Trail users continued along the Snake River to Fort Boise and eventually reached the Oregon border. Most of the California-bound emigrants opted to go through Salt Lake City, where they rejoined the main trail at the City of Rocks. In Nevada, the trail followed the Humboldt River westward to its termination. From the Humboldt River, the trail trended southwest across the Forty Mile Desert to the Truckee or Carson River, at the base of the Sierra Nevada. From the eastern side or base of the Sierra Nevada, the trail split following various alternative routes to the north and south, depending upon the emigrants' final destination.[91]

[91] Frank McLynn, *Wagons West: The Epic Story of America's Overland Trails* (New York: Grove Press, 2002); NPS, *California National Historic Trail*, http://www.nps.gov/cali/index.htm (accessed May 2015).

The many branches of the main California Trail stemmed from the stiff competition among ranchers, entrepreneurs, and the fledgling mining camps strewn throughout the Mother Lode Region of California (Figure 37). Each camp was concerned about is own economic well-being and longevity, and the trails were key to sustainability through increased commerce, trade, and settlement. Between 1849 and 1852, county boundaries remained fluid as populations increased and decreased. The only communities that had solid population bases were Marysville, Sacramento, and Stockton. Virtually all the gold-mining camps shared concerns that if the gold ran dry the town would depopulate - a fear realized by numerous gold camps. Besides providing various routes to California, emigrant trails fostered trade and commerce in the Gold Rush–era camps scattered throughout the Sierra Nevada foothills (Figure 38).

The principal branches of the emigrant trails leading into northern and central California included the following:

Applegate Trail (1846) avoided the Forty Mile Desert by leaving the Humboldt River in Nevada early, at present-day Rye Reservoir; crossed the Black Rock Desert to Fandango Pass; passed Goose Lake; and continued to the Lost River and, eventually, the Willamette Valley in Oregon (Figure 37).

Lassen Cutoff (1848) was established by Oregonians headed to the gold mines in California. It branched off the Applegate Trail at Davis Creek, passed through Devil's Garden to the Pit River east of Mount Lassen, and turned west to Lassen Rancho, California, and, from there, to Sacramento. In some years, as many as one-third of the emigrants mistakenly took the Applegate Trail–Lassen Cutoff, a much longer and more difficult trail than the Truckee or Carson routes.

Nobles Road (1851) led from the Applegate Trail at Rabbithole Springs, in the Black Rock Desert of Nevada, to Shasta City, California.

Figure 37. *View of Sportsman's Hall (way station), ca. 1866, about 10 miles east of Placerville, on the Sacramento–Virginia City Wagon Road (courtesy of the Library of Congress, Prints and Photographs Division, Washington, DC, Lawrence & Houseworth Collection, LC-USZ62-27098).*

Figure 38. *California emigrant-trails map, displaying the various trails and branches leading into California (courtesy of the NPS, http://www.nps.gov/cali/parkmgmt/feasibility-study.htm, accessed October 2015).*

Yreka Trail (1851) led from the Applegate Trail to Yreka, in Siskiyou County, California.

Truckee (River) Trail (1844) crossed the Forty Mile Desert to the Truckee River to follow it west, past present-day Reno, Nevada; over Donner Pass; and through Emigrant Gap to Sutter's Fort, in Sacramento.

Nevada City Road (1850) branched off the Truckee Trail, passed through Emigrant Gap, and terminated in Nevada City.

Placer Emigrant Road (1852) was constructed through private conscription from citizens living in Auburn, Placer County. The route branched off the main trail north of present-day Carson City and headed east over the divide into the Lake Tahoe Basin and thence through Squaw Valley, down the dividing ridge near the headwaters of the Middle Fork of the American River, to Auburn.

Henness Pass Road (1850) branched off the Truckee Trail at present-day Verdi, Nevada, and headed west for Camptonville and onto Marysville. In 1860, it became one of the routes used to move goods to the Comstock Lode silver mines in Nevada.

Beckwourth Trail (1850) left the Truckee Trail near present-day Sparks, Nevada, heading west towards Marysville (Figures 39 and 40).

Johnson's Cutoff (1852) branched west from Eagle Valley (present-day Carson City) and passed through the southern end of the Lake Tahoe Basin over Johnson Pass (north of Echo Summit) and west to John Calhoun "Cockeyed" Johnson's Ranch near present-day Camino before entering the gold camps of El Dorado County.

Georgetown Trail (1852) left the Johnson Cut-Off Trail at the ridgeline near present-day Wrights Lake Road, north of U.S. Highway 50, and continued to the northwest, to Georgetown, El Dorado County.

Daggett Trail (1850) left the southern end of the Carson Valley near present-day Genoa and headed west over the route later selected as the Kingsbury Grade, connecting with the Johnson Cut-Off Route at Friday's Station, in present-day South Lake Tahoe.

Luther Pass Trail (1854) connected the Mormon-Carson Route to Johnson's Cutoff and allowed travelers to avoid Lake Tahoe and to access mining camps in El Dorado County.[92]

Carson Trail or the Mormon Emigrant Trail (1848) crossed the Forty Mile Desert past the west side of the Carson Sink and connected with the Carson River near Fallon, Nevada, running west through Hope Valley and passing near Red Lake, in Alpine County. The Devil's Ladder, as it was called, climbed 700 feet (210 m) in half a mile, requiring ropes, chains, and pulleys to lift the wagons up the steep incline. From atop Carson Pass, emigrants went to the southwest over West Pass (the Kirkwood ski area) and then descended toward present-day Pollock Pines and the gold-mining camps of El Dorado and Amador County (Figure 41).

Big Tree Road (1851) provided a cutoff from the Mormon-Emigrant Trail from Markleeville through to mining camps in Tuolumne County.

Grizzly Flat Cut-off Road (1852) was a branch of the Mormon-Carson Route and left the trail along Emigrant Road or Iron Mountain Road as a cutoff to take emigrants to the mining camp of Grizzly Flat, El Dorado County.

Volcano Road (1852) was a branch of the Mormon-Carson Route that left Coral Flat near Pioneer on present-day Highway 88 and brought emigrants to the mining camps of Amador County, including Volcano.

Sonora Road (1852–54) left the Carson Trail and headed south to the Walker River along the base of the Sierra Nevada, until it traversed Sonora Pass and then descended to Strawberry and Sonora, Tuolumne County. [93]

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[92] NPS, *California National Historic Trail*, http://www.nps.gov/cali/index.htm; NPS, "California Trail," *California National Historic Trail*, http://www.nps.gov/cali/planyourvisit/upload/CALImap1-web.pdf, a detailed pdf map of all the various branches of the California Trail; OCTA, "Oregon-California Trails Association," http://www.octa-trails.org/ (accessed May 2015). The OCTA website includes California Trail maps, photographs, site descriptions, and diary quotations. For an index of overland trail documents, see http://www.paper-trail.org/search.asp; Trails West, "California Trail," http://emigranttrailswest.org/virtual-tour/california-trail/. The website includes numerous images of various routes over the Sierra Nevada; also see Bureau of Land Management, "California Trail Historic Interpretive Center," http://www.blm.gov/nv/st/en/fo/elko_field_office/blm_programs/blm_special_areas/california_trail_historic.html.

[93] NPS, The California Gold Rush, *California National Historic Trail*, http://www.nps.gov/cali/historyculture/gold_rush2.htm (accessed May 2015).

Figure 39. *Beckwourth Trail. In this location the emigrant trail is likely overlain by an asphalt road as it passes through the town of Beckwourth (courtesy of Bill Bishell, Trails West, Inc.).*

Figure 40. *Trails West standard T-rail marker along the Beckwourth Trail in Grizzly Valley, Plumas County (courtesy of Bill Bishell, Trails West, www.emigranttrailswest.org).*

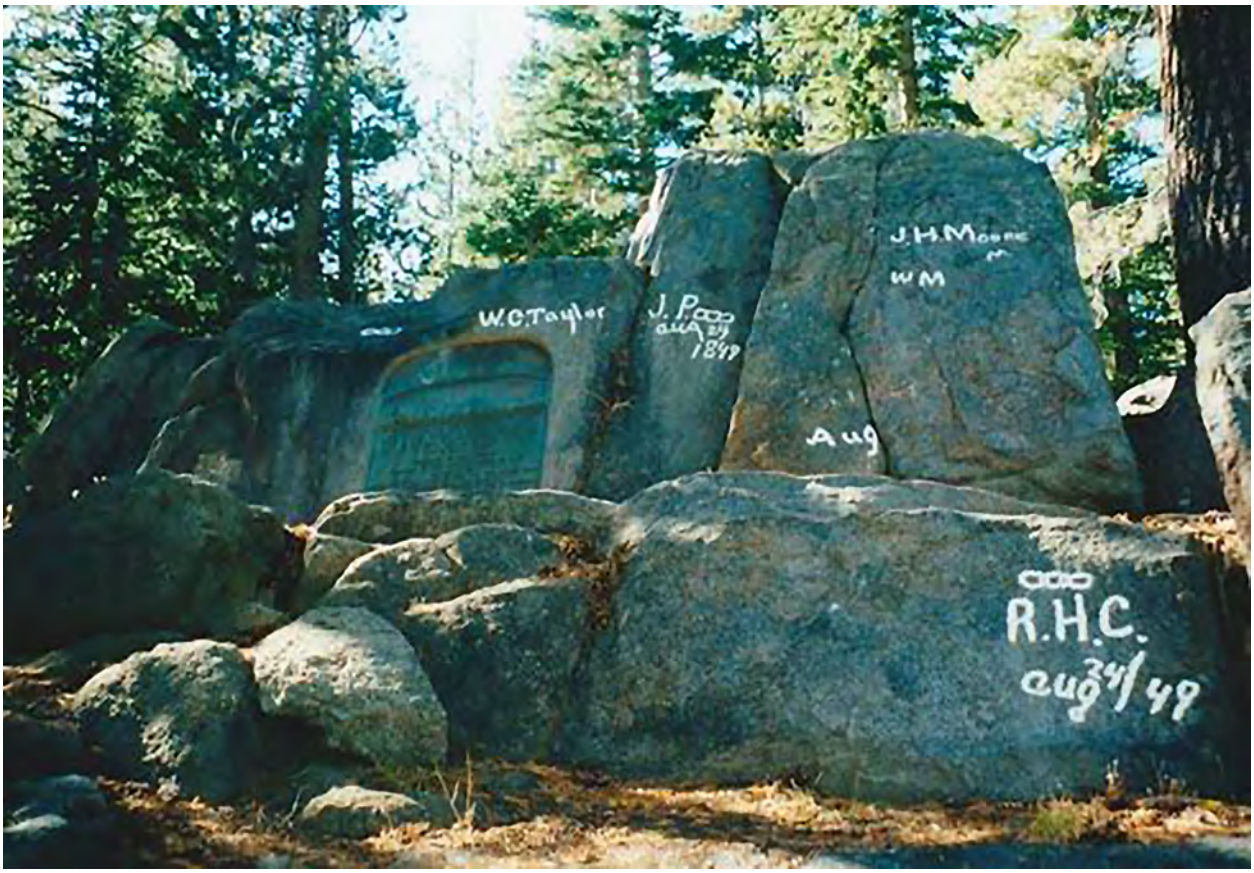

Figure 41. *Carson Pass marker rocks at Devil's Ladder, along the Mormon Emigrant Trail (courtesy of Bob Black, Trails West, www.emigranttrailswest.org).*

Emigrants often scribed or marked rocks or boulders along the corridor of the trail. Later marker rock became advertisements for commercial businesses, such as early-day gas or service stations.

Historical-Period Roads and Highways

Historical-period roads and highways are ubiquitous features upon this nation's landscape. The history of California's roads and highways overlap in many ways, sharing a common thread that began in the eighteenth century with the creation of the California mission system and evolved into today's modern interstate highway system. The histories of roads and highways also share common themes, including culture, commerce, trade, technology, and engineering. These themes reflect the evolution of roads and highways in California from the late eighteenth century through the twentieth century and are not exclusive of one another.

Equally as important to the physical presence of any one road or highway is its relationship to westward expansion, industrialization, urbanization, and modern America. Roads and highways altered the natural environment and influenced the broad settlement patterns that helped shape this nation's cultural landscape.

Elements that distinguish a road from a trail include size, construction, and a surface adequate for wagons, stages, and, later, automobiles to pass. The distinction between a road and a highway is somewhat superficial, because both fulfill similar needs. For example, in the Midwest and Northeast the National Road, which is reportedly America's first official "interstate highway," was established by an act of Congress in 1806. The Indiana portion was built between 1829 and 1834, linking the eastern seashore with the western interior. In 1996, the National Road, which includes six states, was designated by the U.S. Department of Transportation, Federal Highway Administration, a state scenic route, and in 2002, the National Road from Maryland to St. Louis was designated an All-American Road.[94] In essence, the terminology used to describe roads vs. highways was often misleading, and the assumption that highways evolved as improvements to roads was not always the case. Both, however, were essential for linking communities and cities with rural America.

As Franklin W. Burch explained, "transportation, and, in this case roads and highways, have always been recognized and historically evaluated for their role in nation-building and form the first stage of complex locational and regional analysis."[95] Burch's observations are important, since transportation was the key to both social and industrial growth in the United States. Its importance should not be overlooked in regional or local historical analysis.

Whether one is discussing a road or highway, it is important to understand the physical characteristics of the property. One of the most important characteristics of a road or highway is its alignment, or how it is articulated upon the landscape. Horizontal alignment is how a road curves and bends to the left and right. Thus, while roads designed for the greatest efficiency—defined as the shortest distance between two points—are as flat and straight as possible, those that had to cross mountainous landscapes or those

[94] Ricky Longfellow, "Back in Time: The National Road," *Highway History,* FHWA, http://www.fhwa.dot.gov/infrastructure/back0103.cfm (accessed September 2014); see also http://www.in.gov/indot/files/IBP_HistoricNationalRoad.pdf, accessed October 2015.

[95] Franklin W. Burch, "Archives and Design of Transportation Research," In *Pattern and Process: Research in Historical Geography*, ed. Ralph E. Ehrenberg (Washington, DC: Howard University Press, 1975): 216.

developed as scenic roads were often designed with curves to round hills or offer the best scenery. Roads and highways built prior to the introduction of modern earthmoving equipment commonly available after 1900 that could cut through barriers, such as mountains, tended to follow the natural topography and reflect not only a horizontal alignment but also a vertical alignment or cut. Both horizontal and vertical alignments required specific engineering standards that involved analysis of the geophysical conditions of the project area, grade percentages, the radii of curves, etc.[96]

AASHTO is the principal standards-setting body that publishes specifications, test protocols, and guidelines used in highway design and construction throughout the United States. Despite its name, the association represents not only highways but air, rail, water, and public transportation, as well. The American Association of Highway Officials was founded on December 12, 1914. On November 13, 1973, the name was changed to "American Association of State Highway and Transportation Officials" The name change reflected a broadened scope, to cover all modes of transportation, although most of its activities are still specific to highways.[97] By the 1950s, with the advent of the interstate highway system, uniformity of design became a common practice to assure safety and efficient operations, although design standards were frequently modified as innovations and new techniques were developed.[98]

The setting of a road is formed by the area beyond the road prism or right-of-way and includes roadside architecture and natural landscape features, such as topography and vegetation. In essence, the setting forms the geographical, spatial, and historical contexts in which the road has developed over time. Together, these features define the road itself and the character of the landscape through which it passes.

Prior to the 1850s, California's system of roads and highways was spotty, at best. By the mid-nineteenth century the El Camino Real, clearly one of the oldest roads or highways in California, had witnessed modest improvements in certain sections, but was still wholly inadequate for large stagecoaches and freight wagons. Besides pack mules, the first vehicles to follow the El Camino Real were carts used by the rancheros to transport hides, tallow, and barley and other grains. In 1848, Argonaut James Carson described the "California cart" or the "*carreta*," the main vehicle used on the El Camino Real through the eighteenth and mid-nineteenth centuries:

> The wheels are made by cutting blocks from the butts of buttonwood trees, are about twenty inches in thickness, and from two to four feet in diameter; through this, a hole for the axle is made, and about six inches in diameter; the axletree is made of heavy oak timber; the tongue or pole is usually about fifteen feet in length. . . . The body of the box is made of small poles, arranged around the bed, like a cage.[99]

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[96] Kenneth C. Adams, *California Highways and Public Works. Centennial Edition: September 9, 1850–September 9, 1950* (Sacramento, CA: California Division of Highways, 1950). The source most frequently used by designers or engineers during the design of a highway project is commonly referred to as the "Green Book." Its official title is *A Policy on Geometric Design of Highways and Streets*, and it has been published by AASHTO, in one form or another, since the late 1930s. Though often viewed as dictating a set of national standards, this document is actually a series of guidelines on geometric design, within which the designer has a range of flexibility.

[97] AASHTO, "http://www.transportation.org/Pages/Organization.aspx, accessed October 7, 2015.

[98] Tom Kuennen. "In 1956, Intestate Construction Begins." In *Interstate 50: 50 Years of the Dwight D. Eisenhower National System of Interstate and Defense Highways*. Faircount Publishing (2006) 52-58.

[99] James A. Carson, *Recollections of the California Mines: An Account of the Early Discoveries of Gold, with Anecdotes and Sketches of California and Miners' Life, and a Description of the Great Tulare Valley* (Oakland, CA: Biobooks, 1950), 62–63.

The size and shape of the early California cart was probably similar to the emigrant farm wagons used to cross the plains and deserts of the American West en route to California. If so, the trails or traces would have been quite a bit narrower than the ones left by freight wagons and stagecoaches, which became quite common in California during the late 1850s and 1860s when trails were being converted to roads.

The most significant event toward the formation of roads and highways in California was the discovery of gold at Coloma in 1848 and the subsequent California Gold Rush that ensued. Prior to the California Gold Rush and before the arrival of the throngs of emigrants bound for California during the 1850s, transportation routes through the state were unpredictable and poorly maintained. The "modern era" of road and highway development, however, began in the early 1900s, concurrent with the increasing availability of the automobile and the "Good Roads Movement."[100] After 1900, the history of California roads and highways is linked to the automobile as well as the issuance of bonds in order to finance the construction of new or improved roads and highways.

Transportation Planner Jeffery Brown proposed seven distinct "eras" or "themes" in statewide transportation planning in California, as follows:

1. Creating the State Highway System (1895–1919)
2. A Golden Age for California's Rural Highway Program (1920–33)
3. From Long Range Planning to Short-Term Fixes (1933–41)
4. Planning for Post-War Highways (1941–55)
5. Mass Production of Highways (1955–75)
6. Multi-Modal Transportation in an Era of Declining Resources (1975–92)
7. ISTEA and its Aftermath (1992–2000).[101]

Brown's chronology of transportation planning followed a similar progression as suggested by Raymond Forsyth and Joseph Hagwood in their *Photographic Essay on the Development of the California Transportation System* (1996). Forsyth and Hagwood divided their photographic essays into four periods of transportation planning: Beginnings, 1895–1918; Progress and Depression, 1919–39; The Freeway Era, 1940–69; and The Environmental and Multi-Modal Era, 1970–95. Of importance to this study is the fact that both studies suggested a marked change in transportation planning that began in the 1970s, the ending date for this historic context.

The following discussion will explore how historic roads and highways evolved in California from a legal, political, or administrative perspective, including the establishment of the California Division of Highways, and how they are connected by culture, trade, and commerce, and required engineering and technological skills that were tested throughout the state.

[100] Potter, Isaac, pub. *Good Roads: An Illustrated Magazine Devoted to the Improvement of the Public Roads and Streets*. Vol. 1, No. 1, January 1892.

[101] Jeffrey Brown, "Statewide Transportation Planning in California: Past Experience and Lessons for the Future" (Institute of Transportation Studies, University of California, Los Angeles), paper presented at the California Futures Conference, Sacramento, CA, November 13, 2000. The Intermodal Surface Transportation Efficiency Act of 1991 (Public Law 102-240; ISTEA) is a United States federal law that posed a major change to transportation planning and policy, as the first U.S. federal legislation on the subject in the post-Interstate Highway System era.

PRE-AUTOMOBILE ROADS AND HIGHWAYS

Roads and highways in California, however defined, were born out of necessity. During the late eighteenth and early nineteenth centuries, roads provided a mechanism to supply the chain of missions from San Diego to San Francisco and were essential to the broader goals of political stability for the Spanish and, later, Mexican governments. During the mid-nineteenth century, trails leading from the Southwest and into California were improved to accept wagons and, later, stagecoaches. To the north, former emigrant trails were improved to accommodate wagons and stagecoaches. This trend continued unabated through the late nineteenth century, and by the early 1900s, wagon and stage roads became automobile routes.[102]

Figure 42. *View to the east, along the Lake Bigler/King's Canyon Toll/Wagon Road near Spooner Summit, Lake Tahoe, ca. 1866. The wagon road was later adopted as part of the Pioneer Branch of the Lincoln Highway (courtesy of the Library of Congress, Prints and Photographs Division, Lawrence & Houseworth Collection, LC-USZ62-11012).*

Unlike emigrant trails, pre-automobile roads and highways generally required some degree of engineering or design. Even emigrant road builders required some knowledge of natural landforms and gradients minimally feasible for wagon travel. Unfortunately, not all roads and highways were created equal and hastily laid-out routes often included steep grades and circuitous paths in order to avoid side-hill cuts (Figure 42).

The history of modern roads and highways in California can be traced back to the founding of this nation and the creation of California's mission system. California's first highway was known variably as "El Camino Real," meaning "the Royal Road," or the "King's Highway" (Figures 43 and 44), not to be confused with the El Camino Real de Tierra Adentro (Spanish for "The Royal Road of the Interior Land"), now a National Historic Trail linking Mexico City, Mexico, and Santa Fe, New Mexico. California's El Camino Real stretches roughly 600 miles and is also referred to as the California Mission Trail, since it links together the chain of mission built in California between 1769 and 1833. Developed under the Spanish crown and its viceroys, the fledgling road shared many common elements with similar transportation corridors in Spain that linked villages and fortifications.[103]

[102] Stewart Mitchell, "Crossing the Sierra." In *California Highways and Public Works. Centennial Edition: September 9, 1850–September 9, 1950*, ed. Kenneth C. Adams (Sacramento, CA: California Division of Highways, 1950), 49–70. Mitchell was a former California Division of Highways Principal Bridge Engineer, discussed the multitude of wagon and stage routes over the Sierra in "Crossing the Sierra." The article included numerous photographs and maps of the various routes.

[103] California Highways, "Trails and Roads: El Camino Real;" Grand Boulevard Initiative, "History of El Camino: El Camino/Monterey Highway; The Well Traveled Road," www.grandboulevard.net/about-us/history-of-el-camino.html (accessed October 2011).

Figure 43. *El Camino Real at the San Mateo Bridge crossing 1870s (courtesy Bancroft Library, BANC PIC 1974.006:13--ffALB).*

Figure 44. *Map of the El Camino Real and Missions drawn by Prentiss, Mabel Emerton Prentiss, 1903 (courtesy of the UCLA, Library Special Collections, Charles E. Young Research Library, Map G4360 P2, 1769–1824).*

The El Camino Real, stretching from San Diego to San Francisco, deserves special recognition as the oldest highway in California.[104] Although the El Camino Real is recognized as California's first "highway," as previously noted, it began as a trail or path used principally by pedestrians and pack animals, and later by two-wheeled carts. Its transition from a trail to a highway came slowly, with the introduction of wagon traffic along the route by the early nineteenth century and automobiles by the early 1900s. Both its historic context and bucolic setting lined with stately eucalyptus trees gave the highway a strong visual sense of place.

Unlike roads and highways in northern and central California, where mountainous terrain created serious obstacles, southern routes also bore formidable challenges that included crossing large swaths of desert where water and feed were scarce. As previously described, the Southern Route or Southern Trail included a number of alternative routes that were created principally for trade but were used by the military and later by emigrants en route to California. By the 1850s, the impetus to improve some of these routes garnered interest from the federal government, including the Beale and later Mojave roads.

In southern California, road and, later, highway development was generally associated with military contracts. In central and northern California, the emphasis was on improving trade, commerce, and emigration. The Sierra Nevada remained a formidable barrier to human travel for thousands of years. The Sierra Nevada presented not only a real obstacle to easy passage but it also created a psychological barrier to settlement and growth. During the nineteenth century, the psychology of settlement was fundamentally a product of popular literature, artists, and photogravures. Today, evening news reports describe the next approaching storm and the probability of road closures due to ice and snow. During the 1860s, newspapers in both California and Nevada featured stories about daring stagecoach rides in the middle of the night, the fastest coaches and drivers receiving most of the praise. Other stories portrayed deadly accidents along the travel ways. These stories and others about transportation over the Sierra Nevada live on in both fact and fiction, creating a unique sense of place—a cultural and natural landscape that was beautiful, mysterious, and often dangerous.[105]

J. Ross Browne, special agent for the federal government and author, described his trip from Placerville to Washoe or the Nevada Territory (Figure 45) in the late 1850s. According to Browne:

> *The road from Placerville to Strawberry Flat is for the most part graded, and no doubt is a very good road in summer; but it would be a violation of conscience to recommend it in the month of April. The melting of the accumulated snows of the past winter had partially washed it away, and what remained was deeply furrowed by the innumerable streams that sought an outlet in the ravines. In many places it seemed absolutely impracticable for wheeled vehicles; but it is an article of faith with California teamsters that wherever a horse can go a wagon can follow. There were some exceptions to this rule, however, for*

[104] "The official state definition of El Camino Real is as follows (per Assembly Bill 1707, ch. 739, October 12, 2001): State highway routes embracing portions of I-280, Route 82, Route 238. U.S. 101, I-5, Route 72, Route 12, Route 37, Route 121, Route 87, Route 162, Route 185, Route 92, and Route 123 and connecting city streets and county roads thereto, and extending in a continuous route from Sonoma southerly to the international border and near the route historically known as El Camino Real shall be known and designated as 'El Camino Real.' The pre–AB 1707 definition (established by Assembly Bill 1769, ch. 1569, in 1959) was: State highway routes embracing portions of I-280, Route 82, U.S. 101, I-5, and Route 72, and connecting city streets and county roads thereto, and extending in a continuous route from San Francisco southerly to the international border and near the route historically known as El Camino Real are known and designated as 'El Camino Real.' Note that there are other routes that are part of El Camino Real, most significantly San Diego County Route S11" (California Highways, "Trails and Roads: El Camino Real").

[105] J. Ross Browne, "A Peep At Washoe," *Harper's New Monthly Magazine* 22, 127 (December 1860): 1-17; see also J. Ross Browne, *A Peep at Washoe or Sketch of Adventure in Virginia City,* Introduction by Oscar Lewis (Lewis Osborne: Palo Alto, 1968), 46-47.

Figure 45. *Pack train in the Sierra Nevada, late 1850s, illustrated by J. Ross Browne (1860).*

the road was literally lined with broken-down stages, wagons, and carts, presenting every variety of aspect, from the general smash-up to the ordinary capsize. Wheels had taken rectangular cuts to the bottom; broken tongues projected from the mud; loads of dry-goods and whisky-barrels lay wallowing in the general wreck of matter; stout beams cut from the roadside were scattered here and there, having served in vain efforts to extricate the wagons from the oozy mire. Occasionally these patches of bad road extended for miles, and here the scenes were stirring in the highest degree. Whole trains of pack-mules struggled frantically to make the transit from one dry point to another; "burros," heavily laden, were frequently buried up to the neck, and had to be hauled out by main force. Now and then an enterprising mule would emerge from the mud, and, by attempting to keep the edge of the road, lose his foothold, and go rolling to the bottom of the canon, pack and all. Amid the confusion worse confounded, the cries and maledictions of the vaqueros were perfectly overwhelming; but when the mules stuck fast in the mud, and it became necessary to unpack them, then it was that the vaqueros shone out most luminously. They shouted, swore, beat the mules, kicked them, pulled them, pushed them, swore again; and when all these resources failed, tore their hair, and resorted to prayer and meditation.[106]

[106] Ibid., 10.

Ironically, Browne's vivid description of travel over the Sierra Nevada during the 1860s is not unlike the problems and challenges that confront modern highway planners of today. Road closures are still common during the winter along trans–Sierra Nevada highways, and rain events often result in rock and mudslides closing highways until the debris is removed (Figure 46).

Figure 46. *Freighters driving their teams over Johnson Summit (near present-day Echo Summit) after a path was shoveled through deep snowbanks, ca. 1866 (Library of Congress, Prints and Photographs Division, Washington, DC, Lawrence & Houseworth Collection, LC-USZ62-20358).*

Notwithstanding the importance of the California Gold Rush, one of the most significant events in the history of the American West was the 1859 discovery of large quantities of silver in the Nevada Territory. Although gold had been found in the territory as early as 1848 in varying amounts, mining had been limited largely to the placers found along the Truckee River and in Gold Canyon. The discovery of gold and silver farther east, in what became known as the "Comstock Lode," created an outmigration from California that lasted for nearly two decades.

Between 1860 and 1880, hundreds of new wagon and stage roads were built throughout California. The construction of new roads in California during the 1860s–70s directly related to the various stages of economic growth in the state. As posited by historian Gerald D. Nash, California's economy underwent three significant stages of growth: "an agricultural economy (1870–1900); an industrial economy (1900–40); and a technology economy 1940–70)."[107]

During the late nineteenth century, California's economy was based largely upon agriculture. However, certain counties, such as those in the Mother Lode Region, depended upon resource-extraction industries, such as mining and lumber, for their economic well-being. In all regions of the state, a reliable transportation system was instrumental to creating and sustaining economic growth. Wagon and stage roads fulfilled an important need, and their maintenance was integral to supporting local economies.

Another facet of wagon and stage roads was the development of tourism-related destinations, such as Yosemite National Park, set aside in 1864 as a "grant" for public, resort, and recreation use and established as a National Park in 1890. Yosemite was followed by the creation of General Grant National Park in 1890 (later incorporated into Sequoia Kings Canyon National Park in 1940, and the Mariposa Big Tree Grove, established as a National Park in 1906. Wagon and late auto-stage companies provided transportation to the various parks and resorts scattered throughout California.[108] In other situations, rail connections linked stage or wagon roads directly to tourist destinations, as was the case on the North Shore of Lake Tahoe, where stagecoaches and steamships ferried passengers to their final destinations, such as Glenbrook or Camp Richardson Resort.

[107] Gerald D. Nash, "Stages of California's Economic Growth, 1870–1970," *California Historical Quarterly* 51, no. 4 (Winter 1972): 315.

[108] For more information on tourism in Yosemite National Park, refer to Stanford E. Demars, *The Tourist in Yosemite, 1855–1985* (Salt Lake City: University of Utah Press, 1991).

In 1900, the first automobile entered Yosemite National Park along the Wawona Stage and Wagon Road, heralding a new form of transportation within the park. Over the next several years, other automobiles entered the park and valley. Park officials felt, however, that automobiles and motorcycles were incompatible with the horse-drawn stagecoaches and carriages still in general use, and consequently, automobiles were prohibited in the park until April 1913, when the Secretary of the Interior announced that cars once more could enter Yosemite National Park.[109]

As automobiles became more common throughout the nation, stagecoach operators and freighters found themselves competing for space on the roads and highways. Between 1910 and 1920, auto-stages began to replace the horse-drawn stagecoaches. In 1911, the California Legislature passed the Railroad Commission Act and reorganized State Railroad Commission that regulated commerce in California, including stage lines (Railroad Commission Act, Statutes of California 1911, ch. 20). The era of wagon and stage roads precariously retained some degree of strength, even after the advent of automobiles, particularly in remote areas.

TOLL ROADS

Toll roads developed in California during the 1860s, with little regulation from the state and federal governments. Prior to the 1860s, most of the roads in the state were free from any user fee. With meager state or local financing, most roads suffered from a general lack of maintenance.

As described by Daniel B. Klein and Chi Yin, toll roads were created with two purposes in mind, "use-and-esteem and residual returns."[110] In essence, road companies were created as business enterprises and as a community of municipal enterprises. Another form of toll road was known as a "coterie enterprise," whereby a wealthy individual or company financed the road.[111]

The vast majority of nineteenth-century toll roads formed in California were created either for residual returns or as coterie enterprises. In essence, most toll roads were developed for profit, as opposed to free or county roads, which often competed with the well-financed toll-road enterprises.[112]

The creation of toll roads or turnpikes, as they were often called, dates to the end of the eighteenth century. By 1790, there were approximately 600 in operation along the eastern seaboard. Once made of packed earth and macadam, by the mid-1840s some toll roads were being built with wooden planks, mainly through private enterprise.

The charging of tolls helped offset the construction costs and to provide sufficient means to pay the costs of ongoing maintenance and, at best, return a profit. The toll-keeper was an important figure for any toll road, acting as a representative of the company or government entity, providing security, overseeing maintenance, and collecting tolls (Figure 47).[113]

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[109] NPS, *Yosemite Roads and Bridges*, http://www.nps.gov/history/history/online_books/hih/yosemite/yosemite2.htm.

[110] Daniel B. Klein and Chi Yin. "Use, Esteem, and Profit in Voluntary Provision: Toll Roads in California, 1850–1902" *Economic Inquiry* 34 (October 1996): 678.

[111] Ibid.

[112] *Bartram v. the Central Turnpike Company and Bartram v. Ogilby et al (*Sacramento, CA: California State Supreme Court, 1864), copy on file, California State Archives, Sacramento.

[113] Daniel B. Klein and Chi Yin, "Use, Esteem, and Profit in Voluntary Provision: Toll Roads in California, 1850-1902," Economic Inquiry 34 (October 1996), 679.

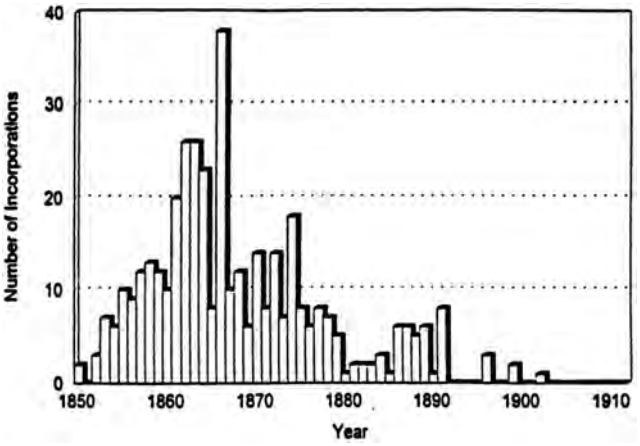
Figure 47. *Freight teams en route for the Comstock Lode on the 1860s Swan-Henry Toll Road, El Dorado County (present-day Lover's Leap), ca. 1866. Hostelries like the one in the photo provided meals, overnight lodging, and on occasions served as toll stations (Library of Congress, Prints and Photographs Division, Washington, D.C., Lawrence & Houseworth Collection, LC-USZ62-17737).*

In California, the need for toll roads was largely a response to extremely poor or, in many cases, non-existent transportation systems. Beginning in 1850, in order to overcome the deficiency of adequate roads and highways, California instituted a number of laws that enabled the formation of toll roads. As Table 1 reflects, there was a dramatic increase in toll road franchises between 1860 and 1870 with a spurt of incorporations in the late 1880s through 1890, decreasing thereafter (Table 1).[114] These new laws eased restrictions on the creation of private companies and reduced subscription requirements to $300 per mile, and authorized counties to set toll rates.[115] While the state's actions regarding toll-road incorporation resulted in a boon in toll roads in California, particularly during the 1860s, by the 1870s, counties had garnered more local control over toll roads through their jurisdictions and limited

[114] California State Legislature, Chapter IV of Chapter 128, *The Statutes of California*, 1850, 359f.; and California State Legislature, Chaps. 73 (April 22) and 121 (May 12), *Statutes of California*, 1953, 114–15, 169–76.

[115] Klein and Yin, 680.

Table 1. Incorporated Toll Roads in California, 1850–1910 (Klein and Yin 1996)



"special act" creation of new toll roads. In 1863, the *Sacramento Bee* reported that there were 80 turnpikes, 80 toll bridges, and 111 ferries operating in California.[116] It is likely that all 80 turnpikes were in fact toll roads that charged user fees, which varied depending upon the type of vehicle. Generally, large freight wagons paid higher tolls than stages or individual wagons. In the same year, the Pioneer Stage Line between Placerville and Virginia City reportedly carried 1,103 passengers for revenue of $527,390.[117]

Although the number of toll roads chartered in the state was in the hundreds, during the 1850s through the 1870s many were never built, or those that were built were frequently abandoned. Toll-road development was also quite speculative and based upon assumptions that trade and commerce would increase or at least hold steady. Unfortunately, economic conditions in California during the 1850s through the 1870s were quite fluid, and many booms quickly turned to busts, particularly if they involved mineral exploitation.[118]

Many of the toll-road companies that operated in California had their headquarters in San Francisco and were incorporated with joint stock subscriptions. As historian George Petershagen noted, "California toll roads were built and maintained by pioneer businessmen as profit-making ventures."[119] The vast majority of toll roads built in the period between 1850 and 1880 were in the state's central and northern mountains, particularly the Sierra Nevada and Klamath-Siskiyou ranges. Besides the initial funds used to construct roads, maintenance costs were extremely high, and during severe rain events, such as the winter of 1861–62, many, if not all, of the state's toll roads were damaged or destroyed.[120]

Toll roads continued to compete with "free" roads, under the auspices of local county governments, even though repair and maintenance on the roads was an ongoing issue, compounded by severe weather events and insufficient funds for their upkeep. The state offered assistance for road upkeep through the passage of legislation, particularly those roads deemed of statewide or national importance for trade and commerce.[121] In southern California, toll roads developed as a response to increasing commerce

[116] Caltrans, "Named Roads" (Sacramento, CA: Caltrans), manuscript copy available, Cultural Studies Office, Caltrans, Sacramento.

[117] J. S. Holliday, *Rush For Riches*: *Gold Fever and the Making of California* (Berkeley, CA: University of California Press, 1999), 226.

[118] A good example is the discovery of the Comstock Lode, which resulted in a huge market for virtually every type of product, most of which were transported from California to the mining communities of the region. By the late 1870s, the mineral wealth of the region had declined, and the amount of tolls collected had ground to a trickle, in large part because of the construction of the Transcontinental Railroad in 1869. For additional information on transportation features along the routes to the Comstock Lode refer to George Herbert Cross, *Early Inns of California*, and for a general overview of transportation and the Comstock Lode, refer to Grant H. Smith, *The History of the Comstock Lode*.

[119] George F. Petershagen, "Towards a State Highway System: California's Roads and Highways, 1850–1895" (Master's thesis, History, California State University, Sacramento, 1991), 1.

[120] John D. Newbold, "The Great California Flood of 1861–1862" *San Joaquin Historian* 5, no. 4 (Winter 1991): 1-8.

[121] In California, toll road legislation was initiated in 1850 and revised in 1853. The act was again amended in 1870. See Klein and Yin, 680-681.

and trade between Arizona Territory and California. In March 1862, the governor of California signed into law a bill to "grant the right to construct a turnpike road from the great bend of the Mojave River in the county of San Bernardino, through Williamson's Pass to the Pacific Coast, at or near the town of Buenaventura, in the county of Santa Barbara."[122] The proposed turnpike or toll road was one of the first in southern California.[123]

According to Klein and Majewski, during the 1880s there were approximately 400–600 toll-road companies in operation in the U.S.[124] However, by the 1910s, toll roads had dramatically declined as a result of changing ideologies regarding social reforms and free access to public transportation. The concept of toll roads or pay-as-you-go roads gained interest again during the late 1920s and 1930s, as a mechanism to finance the nation's transcontinental or interregional highway system. During the mid-1930s, the Bureau of Public Roads floated the idea of developing a system of toll roads. In 1939, the Bureau published *Toll Roads and Free Roads*, a feasibility study for a system of transcontinental roads.

During the mid-1930s, the state of Pennsylvania initiated surveys along a former railway corridor between the state capital at Harrisburg and Pittsburgh (Figure 48). The new toll route, commonly referred to as the Pennsylvania Turnpike, operated with a five-member commission. The turnpike was significant in two ways. First, it was the nation's first achievement in designing a "superhighway," albeit rather short in length, and second, its engineering became standard practice in the industry. Perhaps, of equal importance were its cultural and design elements, which limited access and propelled private companies like Howard Johnsons to iconic status, having received the franchise to develop restaurants and motor lodges along the route.[125]

The development of toll roads declined in California through the 1940s. With the advent of the interstate freeway system, toll roads lost their appeal, largely because of increased federal spending for new highways.

New, more creative means for funding toll roads evolved in the 1970s. One example was in Orange County, where demands for alternative routes culminated in the planning of the San Joaquin Hills and Foothill/Eastern Transportation Corridor project in the 1980s. The idea of charging tolls as a way to finance the proposed roads once again surfaced in 1984, but no real decision was made until public joint-powers agencies were formed to manage financing, construction, and operations of the roads. No one initially envisioned them as toll roads. In 1986, two agencies were born: the Foothill/Eastern Transportation Corridor Agency (TCA) and the San Joaquin Hills TCA. Ultimately, government transportation dollars remained scarce, and the only means to build the roads came from charging tolls. Both toll roads, which are owned and maintained by the state of California, were built largely without taxpayer dollars.[126]

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[122] *Daily Alta California*, "Southern Coast Wagon Road," *Daily Alta California* 14, no. 4400 (March 8, 1862), 1.

[123] In 1856, Lieutenant R. S. Williamson, on a railroad surveying party, discovered that the pass, sometimes called "Williamson Pass," could provide the lower grades to make Los Angeles–Central Valley train travel possible, by the detour all the way to Mojave and over Tehachapi Pass, almost 70 miles farther than present-day Interstate 5. Vol. 5 of the 1856 railroad surveys (R. S. Williamson 1856) covers southern California, highlighting the geology, deserts, valleys, and flora of southern California, as far north as San Francisco. There are illustrations of the settlements of Los Angeles and San Diego; the deserts, valleys, and mountains; the botany; and many plates of fossil shells.

[124] Daniel B. Klein and John Majewski, "Turnpikes and Toll Roads in Nineteenth Century America," http://eh.net/encyclopedia/turnpikes-and-toll-roads-in-nineteenth-century-america, accessed July 2015.

[125] Ibid., 132–135.

[126] Transportation Corridor Agencies, "Background and History," https://www.thetollroads.com/aboutus/toll-roads-history.php.

Figure 48. *Pennsylvania Turnpike, 1940, shortly after its completion (courtesy of the Library of Congress, Prints and Photographs Division, Farm Security Administration, Office of War Information Photograph Collection, LC-USW3-005721-D).*

THE INFLUENCE OF THE AUTOMOBILE ON ROAD AND HIGHWAY CONSTRUCTION

At the close of the nineteenth century, with horse-drawn wagons, stages, and buggies the primary modes of transportation, the nation's interest in other forms of transportation had reached epic proportions. In the cities, interurban railroads and streetcars competed with horse-drawn vehicles; however, nearly everyone agreed that the nation's rural roads and highways were in abysmal condition (Figure 49). Regardless of the demand for better roads, the vast majority of working-class Americans had neither the time nor the money to participate in leisure activities. In 1900, despite rapid industrialization, most of California's economy was still dependent upon agriculture, and the average worker in the United States made roughly $450 per year. During the early 1900s, the average automobile was selling for nearly $1,500, well beyond the means of most middle-class working families.

The disparity in the quality of the nation's roads during the late nineteenth century culminated in what is generally referred to as the "Good Road Movement." Officially founded in 1880, the Good Road Movement expanded its interests by publishing a serial magazine beginning in 1892, simply called *Good Roads*. The monthly magazine devoted to the improvement of public roads and streets was published in New York and remained in business through 1921.[127] Originally focused on bicycle clubs or organizations, in later years the magazine focused on technical issues, routinely publishing accounts of experiments using various road-surfacing techniques geared towards automobiles (Figure 50).

[127] *Good Roads* 1 (January–June 1892).

Figure 49. *Farm wagon pulling an automobile from a muddy roadway, ca. 1917. Scenes like this were common during the early 1900s (Caltrans Transportation Library, Sacramento).*

Figure 50. *Buggy passing a ranch house and barn along a recently macadamized road surface (right) near Nicolaus, Sutter County, California, circa early 1915 (courtesy of the Sutter County Library).*

At the turn of the nineteenth century, the Good Roads Movement spread throughout the nation, and its overall objectives were embraced by a wide variety of organizations, particularly bicycle clubs and, later, automobile clubs, who shared the same concerns regarding the quality of the nation's roads. While the problems associated with poor roads affected rural communities more acutely than metropolitan cities where streets were often graveled or paved, the desire to leave the metropolis and explore the countryside, whether on foot, by bicycle, or in a motor vehicle, had become extremely popular (Figures 51, 52, and 53). The transport of goods or materials in the United States, however, was still largely carried out through rail service.

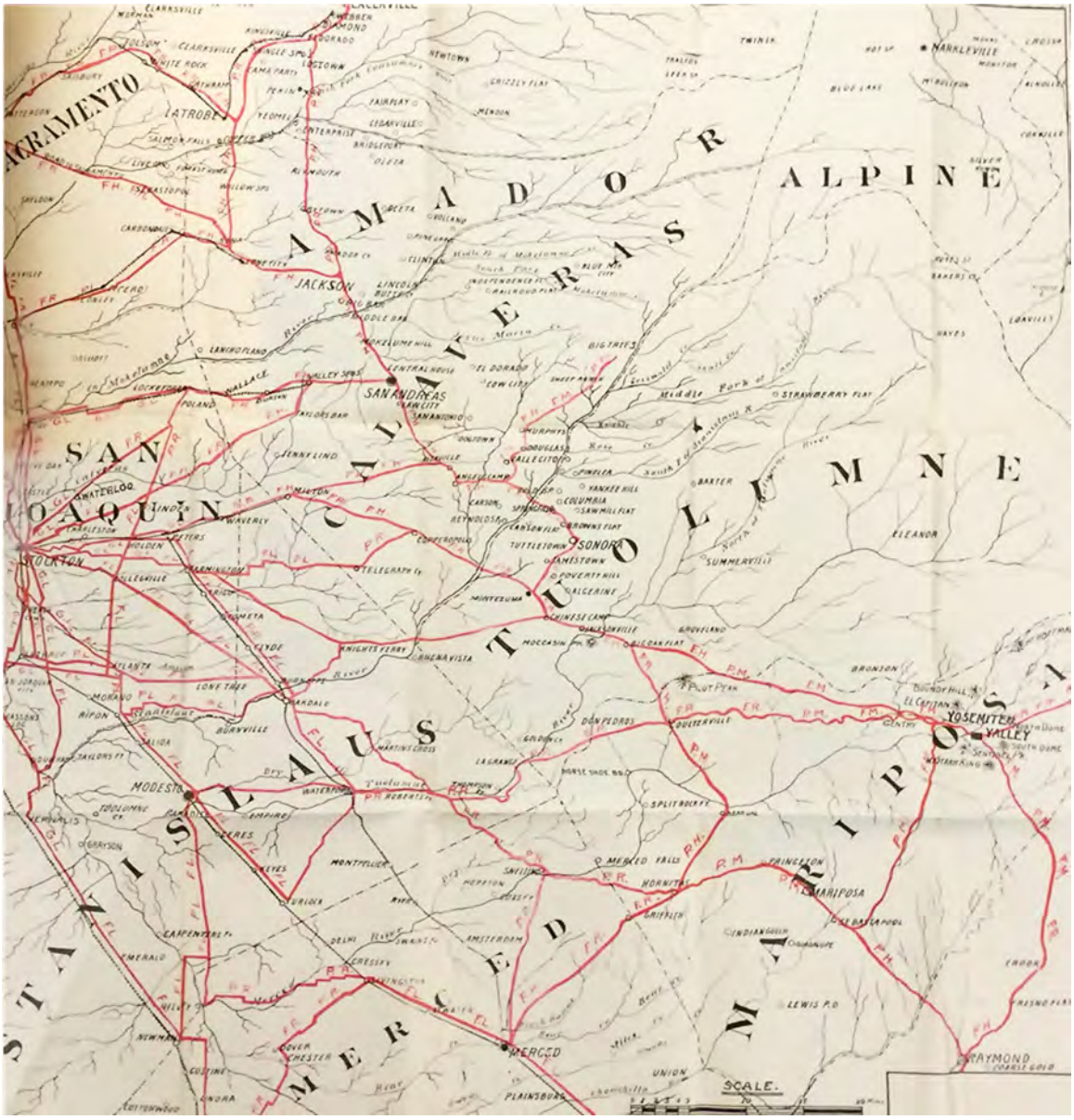

Figure 51. *Proposed bicycle routes in central and northern California counties (George W. Blum, The Cyclers' Guide and Road Book of California, 1896; courtesy of the California State Library, History Room, Sacramento).*

Figure 52. *Early-day bicyclist in San Rafael, California, ca. 1910 (courtesy Anne T. Kent California Room, Marin County Free Library).*

Figure 53. *Bicycle touring was a popular pastime in the early 1900s, as evidenced by this photograph of young bicyclists on an overnight adventure in the El Modena area of Orange County, 1911 (courtesy of the Anaheim Public Library, Anaheim, California).*

Coinciding with the Good Roads Movement was the Back to Nature Movement of the 1890s, influenced by hiking clubs that sought refuge away from the city.[128] Both movements had many advocates in southern California, where climate and wealth provided the ideal setting for outdoor leisure activities. Similarly, the San Francisco Bay Area became home to a number of automobile and outdoor clubs, the most influential and well known being the Sierra Club, which was incorporated in 1892.[129] The formation of bicycle clubs, hiking clubs, and automobile clubs was not merely coincidental, since club members often shared the same goals and objectives—namely geared towards road improvements.[130]

By the late nineteenth century, America had dramatically changed. The nation was more industrialized than it ever had been, workers had more leisure time, cities had become overcrowded, and the desire to explore the outdoors was at record highs. The convergence of these changes could not have come at a better time, as the world was about to experience a new form of transportation in the form of a motorized vehicle (Figure 54).

The development of the internal combustion engine and the subsequent creation of gas- and electric-powered automobiles during the late 1890s had significant consequences for the backers of the Good Roads Movement and the impetus to federalize road planning and construction. The development of motorized vehicles occurred at a particularly opportune time in the history of this nation. At the close of the nineteenth century the nation was on the verge of unprecedented industrial growth and population expansion.

[128] Christine M. Boyer, *Dreaming the Rational City: The Myth of American City Planning* (Cambridge, MA: MIT Press, 1997).

[129] Michael P. Cohen, *The History of the Sierra Club, 1892–1970* (San Francisco: Sierra Club Books, 1988).

[130] For a detailed discussion of the development of automobile clubs in California, refer to Kathy Talley-Jones and Letitia O'Conner, *The Road Ahead: The Automobile Club of Southern California, 1900–2000*.

Figure 54. *Early-day automobile touring in California, ca. 1907 (courtesy of the Santa Ana History Room, Santa Ana Public Library).*

Figure 55. *Traffic on old Route 101 in Los Angeles. Note the electric trolley tracks in center of the roadway (Caltrans Transportation Library, Sacramento.*

The demand for better roads was propelled by new technologies and the desire to personalize transportation. The middle class had more disposable income, while the upper class had the money and fortitude to demand services that met their desires for business, recreation, and leisure.

During the late 1890s and early 1900s, automobiles were more a curiosity than they were practical machines suitable for everyday use. According to the *Los Angeles Almanac,* the first automobile in southern California was assembled in 1897 and built in a shop on Fifth Street in Los Angeles by S. D. Sturgis for J. Philip Erie. Erie was apparently the first to drive an automobile on Los Angeles roads. Seven years later 1,600 cars reportedly cruised the streets of Los Angeles, where the maximum speed limit was eight miles per hour in residential areas and six miles per hour in business districts (Figure 55).[131]

By the 1910s, automobile production in the United States ramped up, although few roads existed at the time that would safely and efficiently accommodate automobile use. By the time Henry Ford introduced the Model T to the American public in 1908, automobiles could be seen plodding along the El Camino Real and, during the late spring and early summer, automobiles crossed the Sierra Nevada over roads that had formally been used by wagons and stagecoaches (Figure 56).[132]

The Model T democratized the automobile industry by making it affordable for most middle-class Americans, and its development coincided with the state's efforts to initiate a program of road construction through the sales of bonds administered by the newly formed California Division of Highways. By 1915, even with the number of automobiles on the road, the nation's road and highway system was wholly inadequate for their use.

[131] Los Angeles Almanac, "First Automobile in Southern California," www.laalmanac.com/transport/tr10.htm.

[132] The City of San Mateo, "Settings and Opportunities." In *El Camino Real Master Plan* (San Mateo, CA: City of San Mateo, September 18, 2001).

Figure 56. *Early-day automobile along the Placerville–Lake Tahoe Wagon Road (old U.S. 50/Pioneer Branch of the Lincoln Highway), below Sugarloaf Rock, just west of Kyburz, ca. 1910 (Caltrans Transportation Library, Sacramento).*

Notwithstanding the importance of improvements to roads and highways, automobile use had consequences for the nation's bridges. Most nineteenth-century bridges, many still in use, were designed for horses and buggies, along with freight and farm wagons, not for automobiles, particularly trucks. The collapse of bridges from the weight of motorized vehicles was a common occurrence during the first two decades of the twentieth century. Like roads, bridges also became a concern for transportation agencies, automobile manufacturers, and the motoring public.

Another important aspect of the widespread use of automobiles was their influence on gender, and particularly the freedom and mobility it afforded thousands of women throughout the United States. In recent years, gender studies have garnered importance in historical analysis, including research associated with the history of transportation, recreation, travel, and mobility. The internal combustion engine revolutionized travel throughout Europe and the United States during the first two decades of the twentieth century. As historian Margaret Walsh pointed out, "although historians of twentieth-century transport and travel have made some progress in identifying and examining the automobile's growing impact on American life, the majority of their findings have remained production oriented and male-dominated."[133] Most of the gendered approaches to understanding the importance and the role of the automobile have focused on the first few decades of the twentieth century. While women did not explicitly influence the development of roads and highways, their influence was recognized by the automobile industry, and roadside attractions, such as motels and restaurants, were adapted to their needs and desires.

[133] Margaret Walsh, *Gender and the Automobile in the United States*, Automobile in American Life and Society http://www.autolife.umd.umich.edu/Gender/Walsh/G_Overview1.htm.

Figure 57. *Alice Ramsey in 1909, during her 3,800-mile cross-country automobile tour (courtesy of the National Automotive History Collection, Detroit Public Library, Image Na020123).*

In 1909 Alice Ramsey was the first woman to be credited with driving across the United States

On June 9, 1909, Alice Ramsey (Figure 57) set out on a 3,800-mile journey across the United States. It would mark the first time a woman had completed the transcontinental drive. The 22-year-old Vassar graduate made the trip along with three women companions. The four women began the trip in New York and arrived in San Francisco 59 days later, crossing through 14 states.[134] Women, like men, also participated in automobile touring and were trained in the basic principles of automobile repair (Figures 58 and 59).

AUTOMOBILE CLUBS AND ASSOCIATIONS

Automobile ownership was, at first, a participatory event that included car rallies, club membership, social events, and outings. Many, if not most, of this nation's automobile clubs began from very humble beginnings. Certainly, this was the case in northern and southern California at the turn of the century. Spurred largely by poor roads, early automobile club members lobbied local and state governments for better roads. The Automobile Club of California (ACC), created in 1901, emerged from the fledgling Auto Club of San Francisco, established a year earlier.[135]

In 1902, the American Automobile Association (AAA), the largest such organization in the United States at the time, was created from various Eastern automobile clubs in Chicago. In the meantime, the ACC was expanding its membership in the San Francisco Bay Area. The club endorsed a recommendation to revive the El Camino Real into a modern thoroughfare in 1904, and in 1906, the board appropriated $6,000 to help finance the construction of a road into San Mateo (Figure 60), along the peninsula.[136]

[134] Ruben, "Alice Ramsey's Historic Cross-Country Drive: In 1909, 22-Year-Old Alice Ramsey Made History as the First Woman to Drive across the United States," http://www.smithsonianmag.com/womens-history/alice-ramseys-historic-cross-country-drive-29114570/?no-ist; see also Cheryl Jensen, "By Blazing a Coast to Coast Trail, She Helped Put a Nation on the Road" (*New York Times*, June 6, 1999)."

[135] Robert Patton, *The First 80 Years* (Los Angeles: California State Automobile Association, 1984), 1–2.

[136] Ibid., 2.

Figure 58. *Woman instructing other women in automobile repair, ca. 1920 (courtesy of San Jose State University Special Collections, John C. Gordon Collection csju-JG-035).*

Figure 59. *A group of women showing off their new Studebaker automobile in the City of Orange, ca. 1920s (courtesy of the Orange Public Library, Orange, California).*

Figure 60. *Early road map of Santa Clara and San Mateo counties (San Jose Mercury, newspaper 1895). Note that the El Camino Real is depicted on the map as running through the heart of the Santa Clara Valley and up the San Francisco Peninsula.*

Despite opposition, the ACC was able to convince members of the California Legislature in 1905 to adopt a set of uniform regulations governing the use of highways by motor vehicles operating in the state. The regulations ultimately struck down local ordinances that prohibited automobile use on certain roads in the state. In the same year, the ACC produced the first detailed road and highway map of the San Francisco Bay Area.[137]

Between 1905 and 1907, the ACC attempted to organize other clubs throughout California. In 1907, spearheaded by P. J. Walker, a San Francisco contractor, the California State Automobile Association (CSAA) was formed. The ACC remained active through the 1910s and forged ahead, focusing largely on politics and good roads rather than social events.[138] The creation of the CSAA marked a critical turning point in establishing the automobile as one of the most fundamentally important tools in California commerce, trade, and politics during the twentieth century. While automobile clubs remained an important part of local motoring, the CSAA became the catalyst for the Good Roads Movement in California.

Meanwhile, automobile clubs had formed in southern California. The most influential was the Automobile Club of Southern California (ACSC), an affiliate of AAA, established in Los Angeles in

[137] Ibid.
[138] Ibid., 2–3.

Figure 61. *Headquarters of the Automobile Club of Southern California (ACSC), ca. 1930 (courtesy of the Werner Von Boltenstern Postcard Collection, Department of Archives and Special Collections, Loyola Marymount University, Los Angeles).*

1900 (Figure 61).[139] The AAA developed in the same manner as other automobile clubs in the early 1900s throughout the United States. Club members held car rallies, sponsored club events, supported bond issues associated with road improvements, and posted road signs to assist motorists. One of the chief goals of the AAA was to promote tourism in southern California, particularly in the Los Angeles Basin.

The club pursued that goal in a variety of ways, including brochures, maps, signage, and its own serial publication, known originally as *Touring Topics* (1909) and changed to *Westways* in 1934.[140] The magazine had broad appeal, not only to the motoring public, but also to a more affluent public, whose lifestyles involved increased leisure time and a desire to explore California's diverse natural and cultural landscape.

Throughout the 1920s, car sales soared in the United States. Both northern and southern California witnessed a boom in car sales as automobile companies became more numerous and car dealerships became more commonplace (Figure 62). Automobiles were still somewhat of a luxury item, however, the Ford Model T was followed by numerous modestly priced vehicles marketed in large and small cities across America. By the 1930s, many of the small automobile companies of the previous two decades were overshadowed by the big-name manufacturers, such as General Motors, who held 43 percent of all automobile sales, and Chrysler who held roughly 25 percent. During the same time other smaller automobile manufacturers went bankrupt or ceased operations. Table 2 below illustrates the dramatic increase in vehicle registration and automobile sales between 1907 and 1920 in California.[141]

The steady increase of automobile sales and vehicle registration between 1910 and 1920 had a profound effect upon the automobile clubs of California, boosting their membership and lobbying efforts toward improving the state's transportation system (see Table 2). During the early 1900s, the AAA influenced transportation legislation at the state capitol.[142]

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[139] Kathy Talley-Jones and Letitia Burn-O'Connor. *The Road Ahead*: *The Automobile Club of Southern California*. Automobile Club of Southern California, 2000.

[140] Ibid., 10–12.

[141] U.S. Bureau of Public Roads, *Report of a Study of the California Highway System by The United States Bureau of Public Roads to The California Highway Commission and Highway Engineer* (Washington, DC: U.S. Government Printing Office, 1920), 121.

[142] Ibid., 42–44.

Figure 62. *Car dealership, Anaheim, ca. 1916, showing off a group of Ford Model T cars (courtesy of the Anaheim Museum, Anaheim, California).*

Table 2. California Motor Vehicle Registration and Revenue, 1907–1920

Years	Total	Trucks Only	Increase By Years	Total License Receipts (in dollars)
1907	14,051		4,031	
1908	19,561		5,510	
1909	23,633		9,072	
1910	44,122		15,489	
1911	60,779		16,657	
1912	91,194		30,415	
1913	118,716		28,522	
1914	123,516	6,156	3,800	1,343,110
1915	163,795	8,189	40,279	2,059,683
1916	235,440		68,645	2,192,790
1917	310,916		75,476	2,846,030
1918	370,800	13,953	53,884	3,540,396
1919	493,463		128,663	4,468,721
1920	545,000	32,555	51,537	4,922,250

In 1905, the club encouraged the legislature to approve a standard vehicle code, and in 1910 it opposed a state highway bond issue, because the state failed to distinguish how the funds would be allocated.[143] The club also lobbied the state legislature for a larger piece of the road-funding pie for southern California, where most of its members lived and worked.

Besides its publication arm, the AAA initiated a program of marking local and state roads with signage, much of which carried the club's name. Maps were also produced by the AAA, including general road maps but also those for touring the state's scenic areas and rich cultural heritage, such as the missions along the El Camino Real and the "ancient history" along the southern border route, following the Old Spanish Trail or old Route 80 (Figures 63 and 64). During the 1930s, most California road signs were replaced with signs conforming to national standards, although labor, equipment, and overhead were still borne by the club until 1956.[144]

HIGHWAY POLITICS AND LEGISLATION

In concert with major efforts by automobile clubs to promote "good roads," the California legislature was able to push through bond acts that led to major road improvements. On March 22, 1909, the California Legislature passed the State Highways Act, which took effect on December 31, 1910. The law authorized the Department of Engineering to issue $18 million in bonds for a "continuous and connected state highway system" that would connect all the county seats. To that end, the department created the three-member California Highway Commission (CHC) on August 8, 1911, to oversee the construction and maintenance of the system. As with the 1896 plan by the Bureau of Highways, the CHC traveled the state to determine the best routes for the new system of highways. In 1915, 15 million of bond-act money was appropriated for highway improvements. Both the 1909 and 1915 State Highway Acts were intended to fund road improvements in the state from north to south, along the coast, through the Central Valley, and on the eastern side of the Sierra Nevada.[145] The CHC offered the following confirmation about its goals in 1916:

> Everywhere, these are everybody's roads. A mile of good roads anywhere in California contributes not only to the local prosperity, but to the larger and all-inclusive interests of the entire State. The State highway, which opens to Shasta Canyon, clears away the mountain barriers between Oregon and Los Angeles [today known as Interstate 5 or I-5]. The Castaic Ridge road marvelously quickens communication between the southland and all the northern counties, to their mutual benefit. Not until this great State highway system is completed, and all the disconnected and isolated sections are brought into its unifying embrace will the people of the State fully realize and enjoy the advantages of the State highway system.[146]

While the commission showed a great optimism for accomplishing the development of a network of roads and highways, it was not until the 1950s that their vision was nearly complete, with the creation of the state highway system.

[143] Ibid., 46.
[144] Ibid., 47.
[145] California Highway Commission, "State Highway Progress" *California Highway Bulletin*, January 1, 1916.
[146] California Highway Commission, "Everybody's Roads," *California Highway Bulletin* 5 (July1, 1916), inset.

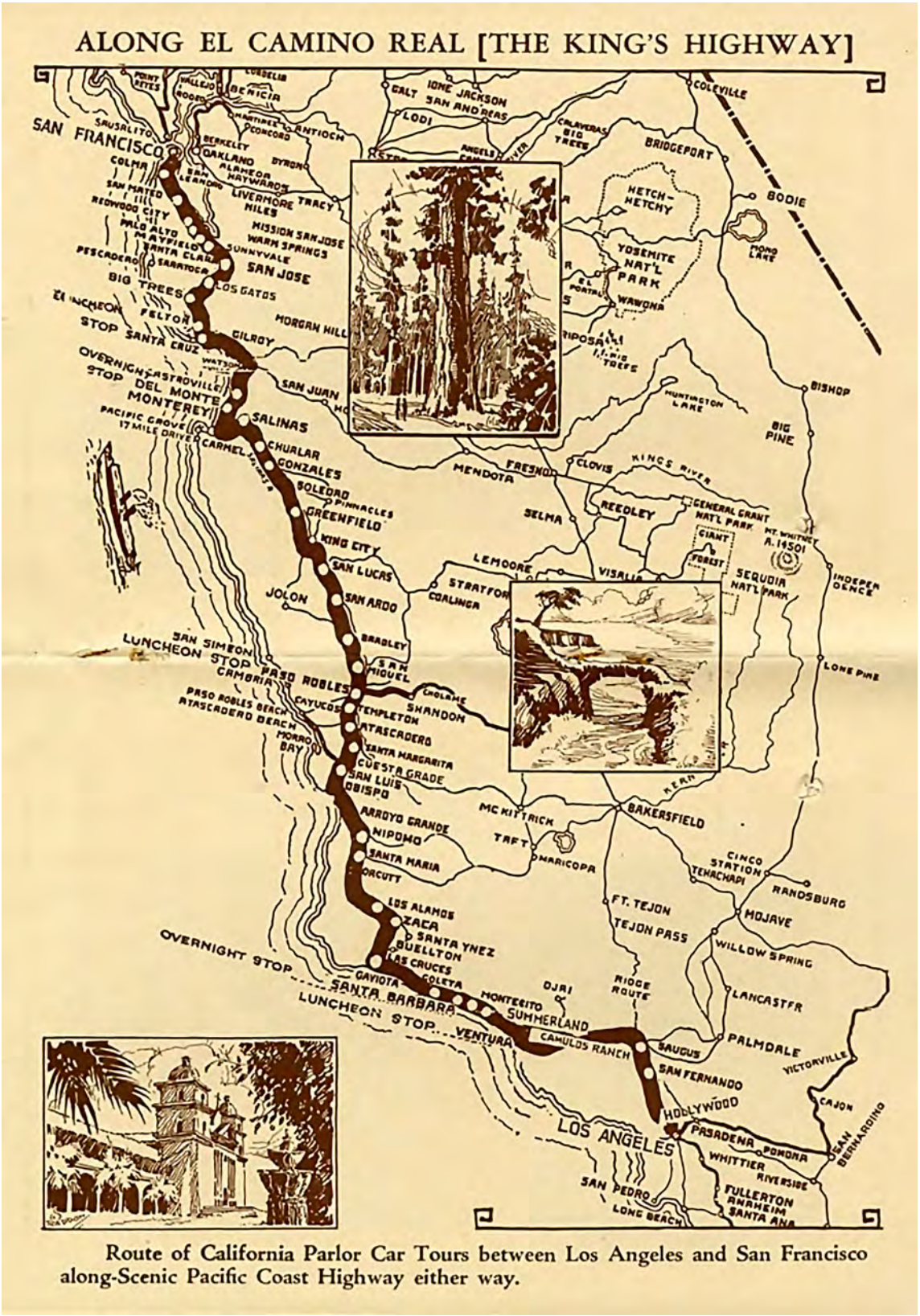

Figure 63. *Map, "Along the El Camino Real–King's Highway: Route of California Parlor Car Tours between Los Angeles and San Francisco along Scenic Coast Highway Either Way" (ACSC n.d. [ca. 1920]).*

Figure 64. *Southern Borderland Trunkline Highway (Old Spanish Trails Association n.d. [ca. 1930]).*

Between 1900 and the early 1920s, many individuals and organizations played important roles in pushing through road and highway legislation that helped pave the way for today's modern transportation system. During the 1910s through the 1920s, despite the federalization of roads and highways and the state's interest in developing a system of new highways, a strong grassroots movement spurred by automobile owners, clubs, local politicians, business leaders, chambers of commerce, and organized boosters, is credited with much of the progress made in road construction (Figures 65, 66, and 67).

For the most part, roads and highways during the first decade of the twentieth century were localized, since few were connected to form links between counties and regions. An article published by the *San Francisco Call* on August 8, 1912, read,

> GROUND BROKEN FOR SYSTEM OF NEW HIGHWAYS—Simple But Impressive Ceremony Marks Turning of Earth on El Camino Real—Emancipate Roads From Politics.[147]

One of the speakers at the event, Judge J. T. Ronald, president of the Pacific Highway Association, admonished politics in the guise of developing good roads:

> KEEP ROADS FROM POLITICS—Judge Ronald, a forceful speaker, paid a high tribute to the people of California, declaring that they had awakened finally to the vast possibilities of the unexcelled climate and unsurpassed scenery and soil of their native state. He told of the businesslike methods that are used in Washington and British Columbia in handling road problems and advised the people of California to bar politics from its highway commission. "If politics is eliminated and the public money is expended carefully, honestly and judiciously, you will find that property values throughout the state will increase from 10 to 100 per cent . . . .[148]

[147] *San Francisco Call,* "Ground Broken for System of New Highways," *San Francisco Call* 112, no. 69 (August 8, 1912), 3.
[148] Ibid.

Figure 65. *The Desert plank road in Imperial Valley, California, ca. 1916, one of state's more innovative approaches to addressing specific natural obstacles, such as shifting desert sands (Caltrans Transportation Library, Sacramento).*

Figure 66. *Concrete pavement demonstration at the California State Fair, 1916 (Records of the California Division of Highways, District 3, California State Archives, Sacramento).*

Between the 1870s and the 1920s, the Good Roads Movement swept through the United States. Advocates of the movement were led by bicyclists and, later, automobilists, who turned local agitation into a national political movement.

Figure 67. *Good Road Movement at the California State Fair, promoting Portland Cement, 1916 (Records of the California Division of Highways, District 3, California State Archives, Sacramento).*

GOOD ROADS AND THE TRANSCONTINENTAL HIGHWAYS

The Pacific Highway Association was among a number of organizations that emerged during the early 1900s to promote interstate or transcontinental highways. The largest and perhaps most influential organization was the Lincoln Highway Association (LHA).[149] Although the association's headquarters was in Detroit, Michigan, thousands of miles from California, its influence stretched across the entire nation.

Although the idea of a transcontinental highway dates to the nineteenth century, in 1912, Carl Fisher, an Indiana entrepreneur whose company produced headlights for gasoline-powered automobiles is credited with the concept of establishing a coast-to-coast transcontinental automobile highway (Figure 68). Fischer originally called his highway the "Coast-to-Coast Rock Highway." The road or route was projected to cost around $10 million. Communities along the route would provide the necessary road equipment and, in return, would receive free materials and a place along this nation's first transcontinental automobile highway. The goal was to complete the new highway, with its beginning point in New York City, in time for the 1915 Panama-Pacific Exposition in San Francisco.

Figure 68. *Carl Fischer, champion for the Lincoln Highway, 1909 (courtesy of the Library of Congress, Prints and Photographs Division, Washington, DC).*

In order to fund the idea of a coast-to-coast highway, Fischer requested cash donations from automobile manufacturers and accessory companies of 1 percent of their revenues. The public could become members of the association for five dollars. Fisher also believed that the route's success depended upon the backing of Henry Ford, but Ford never did back the project. According to Ford, the public would never learn to fund good roads if private industry did it for them. That put the fund in jeopardy, but fortunately, two prominent men from the automobile industry pledged money to Fisher's idea: Frank Seiberling, president of the Goodyear Tire Company, and Henry Joy, president of the Packard Motor Car Company. Henry Joy came up with the idea of naming the highway in honor of former President Abraham Lincoln. He wrote Fisher, urging him to write a letter of protest to Congress, which was considering funding of $1.7 million for a marble memorial to Lincoln. Joy thought a good road across the country would be a better tribute to the president. The name "Lincoln" conveyed a patriotic appeal to the highway, and Joy ultimately became the primary spokesperson for the highway.[150]

[149] NPS, *Lincoln Highway: Special Resources Study/Environmental Assessment* (Washington, DC: NPS, May 2004).

[150] James Lin, "A Brief History: Origins, 1912–1913," *Lincoln Highway*. http://lincolnhighway.jameslin.name/history/part1.html; NPS, *Lincoln Highway*, 3.

On August 30, 1912, the national offices of the LHA published a notice that the object of the association was:

> to immediately promote and procure the establishment of a continuous improved highway from the Atlantic to the Pacific, open to lawful traffic of all descriptions, without toll charges, and to be of concrete wherever practicable to be known as the Lincoln Highway, in memory of Abraham Lincoln. [151]

The future highway and its potential economic benefits quickly spread among the states chosen for the route. On November 1, 1913, the San Francisco Motor Car Dealers Association, along with city and state officials, held a mass meeting in San Francisco at the Valencia Theater to announce news about the highway.[152]

Various communities along the projected route held meetings to discuss the route. Ultimately, the route selected began at Times Square in New York and ended at the Palace of the Legion of Honor in San Francisco. For Americans, the Lincoln Highway was yet another important step in unifying the East and West Coasts. It also represented a pivotal achievement in developing a transcontinental method of automobile travel as an alternative to the epic linkage of the Central and Union Pacific Railroads in 1869. Because of topography, politics, and local boosterism, the route selected would not be one continuous linear line, but instead the route jogged, and followed a variety of alternative routes between New York and San Francisco. Despite the inconsistencies in route design, for the public at large, the perception was that a route crossing the entire continent was obtainable, and motorists were clamoring to begin the journey.

Between 1913 and 1919, states and local governments administered road improvements and maintenance along the route, while the federal government offered little monetary assistance. In 1916, the Packard Motor Company tested its newly designed pneumatic tires by running its trucks from Ohio to California. In Nevada, the motorcade headed south and entered California through the Tehachapi Mountains and into the Los Angeles Basin.[153] In 1919, a young Dwight D. Eisenhower helped lead a convoy of motor vehicles across the Lincoln Highway, the first of its kind (Figure 69). The convoy crossed the Sierra Nevada in the summer of 1919, over Johnson Pass, and down the "Pioneer Branch of the Lincoln Highway" toward Placerville and Sacramento.[154] Like other transcontinental motor trips, the military convoy was an experimental journey designed to test its fleet of vehicles. The use of trucks for carrying goods long distances garnered interest after the successful transcontinental motorcade of 1919. By the 1920s, trucks could be seen moving freight across California over the state's fledgling highway system. The downside was that trucks often carried enormous weight, and many of the state's bridges were inadequate to support the heavy loads.

During the 1920s, in order to promote the route, the ACSC (n.d.) published *Through the Eldorado National Forest, the Land of the Pony Express: Outing Bureau—Camping, Fishing, Hunting, Swimming, and Yachting Information*, ca. 1916. To the north, the main route of the Lincoln Highway over Donner Summit had gained notoriety for its natural beauty and recreational opportunities. By the late 1920s, automobile tourism had exploded, and guides, including maps, were published by automobile clubs throughout the United States.

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[151] *San Francisco Call* 114, no. 92 (August 31, 1912).

[152] *San Francisco Call* 114, no. 146 (November 1913).

[153] Dana E. Supernowicz, personal collection of photographs of the 1916 motorcade.

[154] NPS, *Lincoln Highway*, 5; Dana E. Supernowicz, "Bridging the Sierra: The Pioneer Branch of the Lincoln Highway." *Lincoln Highway Forum* 1, no. 1 (Fall 1993), 11–16.

Figure 69. *1919 Eisenhower motor convoy passing through Wyoming (Dwight D. Eisenhower Presidential Library, Museum, and Boyhood Home, http://eisenhower.archives.gov/).*

In 1928, in order to commemorate and mark the route, the Boy Scouts of America placed 3,000 concrete markers bearing the Lincoln Highway logo (an "L" in a rectangular graphic emblazoned in red, white, and blue) and a directional arrow along the entire route (Figures 70 and 71).[155] Only a handful of monuments still exist today in California. While some were destroyed during highway construction, others were vandalized or placed in museums.[156]

During the mid-1920s, the U.S. Bureau of Public Roads made an effort to mark the existing interstate highway system and create a nationwide grid of numbered routes. The routes included U.S. Highways 2, 20, 30, 40, 50, 60, 70, 80, and 90. For most of its length, the Lincoln Highway became part of the new numbering system, as U.S. Highway 30.[157] Among the various routes selected for the Lincoln Highway, motorists were able to traverse high mountainous passes, vast deserts, the plains, and urbanized cities (Figure 72). After World War II, the lure of the Lincoln Highway waned as states adopted freeways, and after 1956, with the passage of the Federal Highways Act, use of the original Lincoln Highway dramatically declined.[158]

[155] NPS, *Lincoln Highway*, 4.

[156] One of the original Lincoln Highway monuments can be found at the El Dorado County Historical Museum in Placerville. It was salvaged along present-day Highway 50, referred to as the Pioneer Branch of the Lincoln Highway.

[157] NPS, *Lincoln Highway*, 5.

[158] Ibid.

Figure 70. *Western terminus marker for the Lincoln Highway, in situ, near the Presidio Golf Course, San Francisco (courtesy of the photograph archives of the California Chapter of the LHA).*

Figure 71. *Myrtle and Midge, radio personalities at the western terminus of the Lincoln Highway, San Francisco, near the Presidio Golf Course, ca. 1930s (courtesy of the photograph archives of the California Chapter of the LHA).*

Figure 72. *Lincoln Highway (old Route 40) near Soda Springs ca. 1915 (Caltrans Transportation Library, Sacramento).*

The Victory Highway, in the addition to the Lincoln Highway, garnered attention for motorists during the first few decades of the twentieth century. In 1921, the Victory Highway Association was organized to locate and mark a transcontinental highway via St. Louis, generally south of the Lincoln Highway, dedicated to the American forces that died in World War I. By 1922, the association had decided to dedicate the route from New York City southwest to Camden, New Jersey; Philadelphia; Wilmington; Baltimore; and Washington, before turning west toward San Francisco.[159] Unlike the Lincoln Highway, the Victory Highway's importance was largely commemorative since it followed existing highways, already built and maintained by many state highway departments. The route passed through Lovelock and Reno and continued west down U.S. Highway 40 to Sacramento, thence to Antioch over the newly built bridge and on to San Francisco, its final destination. In Nevada, the Overland Trail Club founded in 1917, promoted the route by marking it with bright yellow and black enamel signs that included mileage and arrows. [160]

In southern California, road or highway boosters advocated for the improvement of old trails and wagon roads in order to make them passable for automobiles. One such route was the "Arrowhead Trail" or "Arrowhead Highway," which became the first all-weather road connecting Los Angeles to Salt Lake City by way of Las Vegas. The road was superseded in 1926 by U.S. Route 91 and subsequently by modern-day I-15, since it was developed during the 1910s prior to the establishment of the U.S. numbered highway system. Portions of the route in California and Las Vegas, such as Las Vegas Boulevard, are still referred to as the Arrowhead or the Arrow Highway.[161]

As the first great wave of transcontinental highway development came to a close in the post–World War II era, so did the power and prestige of automobile clubs and associations. Clearly automobiles were here to stay, and most of the road construction in the United States had fallen to state highway departments and the federal government. With the expansion of suburbs across the nation, city and county governments took control of local roads and carried out construction and maintenance.

The next phase in the history of the automobile centered on the creation of the California Division of Highways, building safe roads and highways, and addressing traffic congestion created by an ever-expanding population spurred by urban and suburban growth.

TRANSPORTATION AGENCIES AND HIGHWAY DEVELOPMENT

During the early 1900s, the formation of a state-administered highway system in California was a slow and arduous process that spanned several decades and required a great deal of lobbying to convince voters and politicians to trust state government, particularly when it came to road construction and improvements, which had been accomplished largely through private subscriptions in previous years. The creation of the California Division of Highways was also during a period of major technological and industrial change, reflected in the introduction of the automobile in the 1890s and coupled with increased commerce and trade and the burgeoning Good Roads Movement of the late nineteenth and early twentieth centuries. For the average American, roads and highways helped bridge the gap between the elite and the working class, by providing alternatives to the railroad monopolies and creating a new sense of freedom to move from place to place for work or leisure.

[159] *Reno Evening Gazette* (May 16, 1921), 6. Ironically, through Nevada and California, the Victory Highway was nearly the same route as that adopted by the Pikes Peak Ocean to Ocean Transcontinental Highway Association].

[160] Ibid.

[161] Nevada Division of Water Planning, "Arrowhead Trail, 1914–1924: Nevada Historical Marker 168," http://web.archive.org/web/20070310221052/http://dcnr.nv.gov/markers/mark_168.htm.

On March 27, 1895, the California legislature enacted Senate Bill 805, which created a new state agency called the Bureau of Highways. Prior to 1895, road construction in the state fell on local government or private parties, and the state's involvement was generally piecemeal and ineffective in developing a reliable system of roads.[162] The federal government's establishment of the Office of Road Inquiry in 1893, the Good Roads Movement, and the statewide conventions of 1893 and 1894 influenced the passage of California Senate Bill 805.[163] Another factor in the creation of the Bureau of Highways was the establishment of the state's first official highway in 1895, commonly referred to as the Placerville to Lake Tahoe Wagon Road.[164] While the early years of the bureau's authority were primarily investigative and advisory, it also launched a promotional campaign to encourage the construction and improvement of county roads.[165]

In May 1895, Bureau of Highways Commissioners Manson, Maude, and Irvine began preparations for a survey of California's existing road system (Figure 73). The three commissioners visited nearly every part of the state, covering more than 7,000 miles the first year and an additional 9,000 the second year. During their field investigations, the commissioners met with chambers of commerce, boards of supervisors, Good Roads clubs, scientific organizations, and civic organizations, in order to understand the needs of local communities regarding the future of transportation.[166]

Figure 73. *Bureau of Highways Surveyors R. C. Irvine (in the buckboard) and F. L. Maude (with the camera), Riverside County, 1896 (Caltrans Transportation Library, Sacramento).*

[162] Blaine P. Lamb, "Highways and Waterways: Two Episodes in California's Transportation History," *California History* 75, no. 1 (Spring 1996), 12; Norm Root, "A Century of Good Roads," Paper prepared for Caltrans Centennial Coordinating Committee (December 2, 1994).

[163] The enabling statute that created the U.S. Office of Road Inquiry read: "To enable the Secretary of Agriculture to make inquiries in regard to the systems of road management throughout the United States, to make investigations in regard to the best methods of road-making, and to enable him to assist the agricultural college and experiment stations in disseminating information on this subject" (FHWA, "General Roy Stone," www.fhwa.dot.gov/administrators/rstone.htm), accessed August 2015.

[164] Lamb, "Highways and Waterways," 12.

[165] Ibid., 13–14. In 1895, California Governor Budd appointed three commissioners, Marsden Manson, Joseph Lees Maude, and Richard Irvine, to organize the Bureau of Highways. One of the first tasks of the newly formed bureau was to establish a rock- (granite-) crushing plant at Folsom Prison for road base. The plant was in operation in 1895, and the stone was used in Sacramento, Stockton, Marysville, Vallejo, and other northern California towns.

[166] Ibid., 14.

On November 25, 1896, the commissioners submitted a report to the governor that recommended a system of highways in the state. The proposal included a route from the Oregon border southward, bisecting the entire state through to Tijuana; a coastal route; three additional northern California routes; three mountain routes from Humboldt County to Marysville; a series of lateral routes generally running east to west; a route through the Mother Lode region; and the Orange Belt or southern routes.[167]

Although the Bureau of Highways' statutory authority ended in 1897, its work was long from over, and that same year, the legislature replaced it with the Department of Highways, composed, once again, of three commissioners, but ultimately handled by one commissioner, Joseph Lees Maude.[168]

Between 1897 and 1898, California newspapers repeatedly commented on commissioners' visits to various local communities.[169] While there was little criticism of the members of the commission during their visits, the commissioners themselves were critical about the condition of local roads and the general lack of dependable ones. In January 1899, following two years of travel throughout California, the commissioners filed a report with the governor, outlining their impressions regarding the existing system of roads and highways in California. Their remarks were harsh, noting that the state's roads were abysmal, a result of "squandering road money on worthless projects."[170] As the *San Francisco Call* noted in September 1898, the only solution, they believed, was to establish a state-managed system of roads and highways:

> TO IMPROVE THE STATE HIGHWAYS
>
> The State Highway Commissioners have prepared a draft of a bill that will be submitted to the coming Legislature and which they think will result in good roads throughout California. The plan is to provide that one-half of all moneys collected in the counties for road improvements be placed in a separate fund, to be expended on roads indicated as State highways, the contracts for the work to be let by the Supervisors on plans and specifications to be approved by the Commissioners. The Legislature will also be urged to pass a bill to the effect that when any county completes five miles of road in accordance with the proposed amendment the same shall on petition to the Highway Commission and with the approval of the Governor be accepted by the State as a State highway and maintained as such. The Commissioners assert that the counties raise annually nearly two million dollars for road purposes and that under the proposed amendment and without increasing the present tax, from seven hundred and fifty thousand to one million dollars would be put into permanent improvements yearly, and that in the course of a few years every county would have many miles of good roads, which would be maintained by the State at no expense to the county.[171]

Not everyone was in favor of the appropriation of road money to the state. In February 1899, at a county supervisors' convention in Sacramento, virtually all the supervisors remarked that they were displeased with "any laws calculated to curtail the privileges heretofore enjoyed by supervisors in the handling of county road moneys."[172]

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[167] Kenneth C. Adams, ed, "Start of Highway System," *California Highway and Public Works: Centennial Edition* (September 9, 1950), 71-75.
[168] Lamb, "Highways and Waterways," 13. Maude became the sole commissioner in 1899.
[169] California Digital Newspaper Collection, http://cdnc.ucr.edu.
[170] *San Francisco Call* 85, no. 44 (January 13, 1899).
[171] *San Francisco Call* 84, no. 120 (September 28, 1898); Lamb, "Highways and Waterways," 14.
[172] *San Francisco Call* 85, no. 78 (February 16, 1899).

During the early 1900s, the federal government also began to take a more active approach towards improving the nation's road and highway system (Figure 74). In 1900, promoters of the Good Roads Movement urged Congress to appropriate $150,000 for the purpose of constructing "model highways" in various parts of the country. The idea was to stimulate road improvements using the latest engineering technology and to teach the methods of scientific road design and construction.[173] However, backers of the initiative commented that the intent was to shift the burden of road construction from the states and counties to the federal government.

Figure 74. *Typical unimproved dirt road or highway in southern California, ca. 1910s (Caltrans Transportation Library, Sacramento).*

In 1901, the California legislature's finance committee voted down appropriating money for state highway construction, following opposition by the assembly.[174] In 1902, full recognition of the state's role in highway development came with the enactment of a constitutional amendment creating the legislative authority to create a highway system.

In 1910, some 8 years later, California voters narrowly passed an $18-million bond issue to construct a state highway system. The passage of the 1910 bond issue meant decisions would have to be made regarding what routes to select for improvements. Ultimately, the routes that had been selected by Commissioners Manson, Maude, and Irvine a decade or more earlier were the ones chosen for improvements as part of the new state highway system.[175] In 1910, the proposed state highway system included north to south routes that connected San Diego with the Oregon border. The system components included an alignment along present-day State Route 99 through the Central Valley, a coastal alignment beginning in Ventura and following portions of present-day Highways 1 and 101, an eastern alignment through the Owens Valley northward towards Siskiyou County generally following the present-day route of Highway 395, and various lateral alignments running east to west connecting the coast with communities in the Central Valley and the Sierra Nevada foothills.

The state legislature designated all state highway routes and assigned route numbers. To the extent possible, the route numbers noted on guide signs were the same as the legislatively designated route numbers. Each route received a unique number for identification and each route was signed with distinctive numbered interstate, U.S. Route, or California State Route shields in order to guide public travel. Route numbers used in one system were not duplicated in another system. Routes were also numbered with post miles and freeways were numbered with exit numbers. In addition to the state-maintained roads and highways, those on public lands, such as national forests, adopted numbering systems that varied from national forest to national forest. National Forests had a general hierarchy of routes that included the first or highest level, known as a "Forest Highway," which was intended to be accessible to all vehicles.

[173] *San Francisco Call* 87, no. 12 (December 12, 1900).
[174] *San Francisco Call* 87, no. 74 (February 12, 1901).
[175] Lamb, "Highways and Waterways," 15.

A second tier of forest routes was maintained for low-clearance standards for passenger cars. These routes are often trunk routes for the forest highways. Finally, there are secondary roads that connect to still-smaller roads, which are "maintained" for high-clearance vehicles only. These generally lead from the trunk roads to various points within the public lands or forests.[176] Automobile associations, such as the ACSC and the CSAA, initially placed markers on highways. The CSAA was responsible for signage in the 45 counties of northern and central California from 1908 until 1969, and the ACSC erected signs in the state's 13 southern counties from 1906 until 1956. The Federal-Aid Highway Act of 1925 also created highway marking standards for highways in response to the confusion created by the more than 250 named routes, such as the Lincoln Highway and the Lake Tahoe Wagon Road, which were often identified only by names and colored bands on telephone poles. Instead, the new system proposed the use of uniform numbers and a universally recognizable, standardized shield. The most important change created by the act included the provision that state governments, rather than for-profit private road clubs such as AAA, administer the system.[177]

While the highway right-of-way was marked with concrete posts bearing a "C" (for California) impressed at their tops, the first highway markers appeared in January 1928. This was done at the expense of the membership of the automobile clubs. The first road to be marked was reportedly U.S. Route 40 from Berkeley to the Nevada state line. In southern California, the first route to be marked was 101 from Los Angeles to San Diego. Other routes marked in succeeding years included 48, 50, 66, 80, 91, 99, and 199. In 1934, the state began officially signing route numbers to highways in the state. In 1935, AASHO published the *Manual on Uniform Traffic Control Devices for Streets and Highways*. This manual created standards in the designation and positioning of U.S. Route markers.

In 1947, the California Division of Highways became responsible for all previous signage by automobile clubs in order to bring the signage into conformance with AASHO standards, however, the ACSC and CSAA continued to place signs in cities and counties through the late 1960s.[178]

In 1911, another important step was taken to ensure the construction of the state's roads, when a bill authored by Assemblyman W. F. Chandler passed the assembly, authorizing the expenditure of the $18 million in bonds passed in 1910 and the appointment of a state highway engineer and advisory staff to oversee the state's road system.[179] The enabling legislation established the forerunner of today's transportation commission. Prior to 1911, authority for choosing highway commissioners fell to local boards of supervisors under the provisions of the Savage Act of 1907.[180] Slowly, but surely, local control of roads was abrogated to state officials.

In 1911, the governor appointed Austin B. Fletcher of San Diego chief engineer of the California Highway Commission.[181] The commission also named W. R. Ellis of Berkeley as its first secretary and Burton A.

[176] California Highways, "Numbering Conventions: Forest Routes," http://www.cahighways.org/num-forest.html.
[177] Caltrans, "Timeline of Notable Events of the Interstate Highway System in California" (www.dot.ca.gov/interstate/timeline.htm).
[178] California Highways. "Numbering Conventions: Signing in California/Signing Standards," http://www.cahighways.org/num-signing.html.
[179] *San Francisco Call* 109, no. 92 (March 2, 1911).
[180] The Savage Act of 1907 permitted counties to bond their whole properties for road-improvement purposes (California Statutes 1907, *The Savage Act of* 1907, ch. 349, p. 666.
[181] Austin B. Fletcher, who was born in Cambridge, Massachusetts, was educated at Harvard University. Between 1893 and 1910, he was secretary and executive officer of the Massachusetts Highway Commission. In 1910, he was appointed secretary-engineer for the San Diego County Highway Commission. Fletcher served as head of the California State Highway Commission from 1911 through 1923, when he became the consulting engineer for the U.S. Bureau of Public Roads in Washington, DC. For more information on Fletcher, refer to C. C. Carlton, "Austin B. Fletcher."

Towne of Lodi as chairman. Towne stated that the State Highway Commission planned on writing boards of supervisors to ask for ideas as to what highway work should be done in their regions under the act providing for the expenditure of the bond issue.[182] Having the $18-million bond money available for local projects was a major enticement for local community organizations, civic groups, and the county highway commissions to lobby the State Highway Commission for project funding—a financing system that remains largely in place to this day. By February 1912, the newly appointed highway commission was holding meetings at its offices in Sacramento. Attending the hearing were the Old Placerville and Sacramento Pioneer Emigrant Road Club of El Dorado County, the Sacramento Chamber of Commerce, and the Placer County State Highway Commission.[183] In 1913, the California Highway Commission was again challenged when a bill was introduced in the legislature to abolish the commission and replace it with the state engineer and an elected official, along with an eleven-man advisory board that was appointed by the governor.[184]

The magnitude of roads and highways in California that needed improvement would require vastly more funding than the initial $18-million bond act approved by voters in 1910. By the late 1910s, it was apparent that costs of construction were much higher than predicted. In part to address increasing construction costs during an era when the use of motor vehicles was increasing rapidly and was changing the face of transportation in California, the state legislature put into effect a program that was intended to construct more highways at an expected savings while improving the character of selected prison inmates.

In 1915, Legislature Assemblyman B. B. Meek of Butte County introduced a bill now known as the Convict Labor Law, which authorized the employment of prison labor on state highways, provided good-time allowance for prisoners, and required penalties for interference with the prisoners (Figure 75). With the passage of the Convict Labor Law on August 8, 1915, the CHC was authorized to designate and supervise all roadwork and to supervise and maintain the camps.[185] Between 1915 and 1974, under the shared responsibility of the State Board of Prison Directors and the CHC, thousands of convicts who met stringent criteria, including good behavior, assisted in the construction and improvement of approximately 775 miles of highways throughout the state, such as State Route 1 and 299.[186]

In 1919, it was reported that "more highway bond issues were authorized in California than in any other state except Illinois, Texas, and Pennsylvania."[187] By 1920, the bonds included $40 million for state highways and $10 million in federal aid for highways, and bond issues had financed 1,798 miles of roads and highways in California.[188] Bonds continued to play a major role in highway funding into the 1920s; however, other fees were also needed, to help pay for the rising costs of road construction and maintenance. In 1919, with nearly 470,000 automobiles registered, the California Motor Vehicle Department collected $4.5 million in fees, compared to $24,397 in 1909.[189] Registration fees dramatically increased during the next decade, as more vehicles became registered with the state, providing additional funding for construction and maintenance.

[182] *Sausalito News* 27, no. 34 (August 19, 1911).
[183] *San Francisco Call* 111, no. 66 (February 4, 1912).
[184] *San Francisco Call* 113, no. 60 (January 29, 1913).
[185] In 1928, the Department of Prison Road Camps was moved into the construction division of the Department of Public Works. The reorganization of the department was aimed at standardizing maintenance, construction, and planning efforts.
[186] Caltrans, *A Historical Context and Archaeological Research Design for Work Camps in California*, http://www.dot.ca.gov/ser/guidance.htm#workcamp. See also Ben Blow, *California Highways: A Descriptive Record of Road Development by the State and by Such Counties as Have Paved Highways* (San Francisco: H. S. Crocker, 1920).
[187] *Pacific Rural Press* 99, no. 2 (January 10, 1920); additional transportation funding bond acts were passed in 1915 and again in 1918.
[188] U.S. Bureau of Public Roads, *Report of a Study of the California Highway System*, 170.
[189] Ibid.; *San Francisco Call* 107, no. 47 (January 16, 1910).

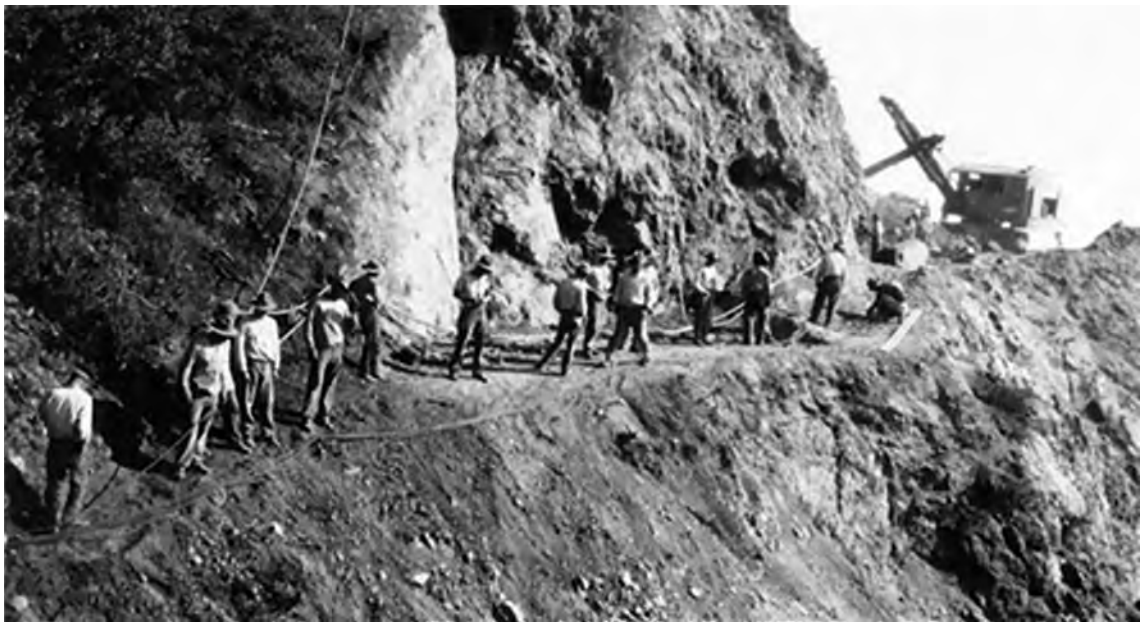

Figure 75. *Convict laborers constructing SR 1 in the late 1920s near San Simeon, San Luis Obispo County (Caltrans photograph courtesy of the Cambria Historical Society).*

The question of whether taxes should be levied on vehicles and gasoline was hotly debated in California during the early 1920s. In 1920, California State Senator E. P. Sample of San Diego County sponsored a bill to place a one-cent-per-gallon tax on gasoline and a per-barrel tax on fuel oil. It was anticipated that the money collected would help offset the highway bonds and pay teachers' salaries. The CSAA requested a compromise in the bill. Taxpayers as a whole were opposed to its provisions, particularly farmers who transported their products longer distances to regional markets.[190] The California State Highway Commission was clearly in favor of the gas tax, recommending its passage, largely because a net increase of $4.5 million per year would help to defray the outstanding highway bond and establish an ongoing funding mechanism for road improvements in the future.[191]

At the California Farm Bureau Federation executive meeting in December 1922, the conferees agreed that as a general policy, "the cost of maintenance and repair of the highways should be absorbed by the people using the highways." The bureau proposed the following measures:

1. Limit the load on highways to 22,000 pounds and embody rather strict speed regulations for heavily loaded trucks.
2. Impose a one-cent-per-gallon tax on gasoline.
3. Impose a nominal license fee for automobiles based somewhat on the weight of each car, and a graded license for trucks, increasing very rapidly as the weight of the truck increased.
4. Create a tax based on the percentage of the receipts of truck and bus lines operating as public utilities. In connection with the tax, this is based on the idea that the gas that is burned represents pretty accurately the mileage that the vehicle runs on the highways. Farmers operating stationary engines and tractors would be exempt from this tax.[192]

[190] *Pacific Rural Press* 101, no. 4 (January 22, 1921).
[191] *Pacific Rural Press* 101, no. 15 (April 9, 1921).
[192] *Pacific Rural Press* 104, no. 27 (December 30, 1922).

Figure 76. *Photograph of Charles H. Purcell during his tenure as state highway engineer and chief of the California Division of Highways (Caltrans Transportation Library, Sacramento).*

Through the California Farm Bureau Federation and other organizations, such as automobile associations, the concept of a user fee structure, or "pay-as-you-go" system, slowly emerged as one of the principal mechanisms for paying for the state's highway system.

As funding became available and road construction and maintenance expanded throughout the state, the need for a systematic and balanced organizational approach became more acute. The Statutes of 1927 (ch. 252) did just that, by amending the laws relating to the Department of Public Works, which was re-created and reorganized into four divisions, the Divisions of Highways, Engineering and Irrigation, Architecture, and Water Rights. Within the Department of Public Works, the restored California Division of Highways succeeded to the power and duties of the CHC, and Governor C. C. Young appointed Charles H. Purcell state highway engineer and chief of the California Division of Highways (Figure 76). The CHC was recreated as a five-member organization with more-limited powers, including the routing of highways, the funding of projects, the abandonment of routes, the inclusion of roads within the state highway system, and the condemnation of property. Within the California Division of Highways, the 10 geographical divisions were re-named "districts."[193] Today, there are 12 Districts in California (Figure 77).

Figure 77. *Caltrans District Map.*

In 1929, the California Toll Bridge Authority Act was adopted.[194] The act declared that the state policy (sec. 30001) was to acquire and own all toll bridges situated upon or along any of the highways of the state and, ultimately, to eliminate all toll charges. The authority was vested with the general power to construct "toll bridges or other highway crossings," to issue bonds to provide for the cost of construction, and to retire the bonds from bridge revenues.[195] By statutes approved in 1933, (ch. 5, p. 11), the legislature made appropriations to the State Department of Public Works from the state highway fund of annual sums up to an aggregate of $6.6 million for the acquisition and construction of approaches to the proposed San Francisco–Oakland Bay Bridge, which was begun in 1931. That same year, the San Francisco–Oakland Bay Bridge Division was established as a separate division in the Department of Public Works, with State Highway Engineer C. H. Purcell acting as the chief engineer of the division.

[193] Ibid.
[194] California State Legislature, California Toll Bridge Authority Act, Calif. Stats. 1929: 1489, and amendments, now Sts. & Hy. Code, secs. 30000–30506, Calif. Stats. 1947, ch. 176: 702.
[195] California State Legislature, Calif. Sts. & Hy. Code, secs. 30000–30506.

In 1932, the Bixby Creek Bridge in Monterey County was dedicated; it was the longest single-span, concrete-arch bridge of the time (Figure 78). In 1933, the legislature amended the State Highway Classification Act of 1927 with Chapter 767 of the 1933 statutes, commonly known as the Breed Act, adding 6,700 miles of county roads to the state highway system that were classified as secondary highways. Highway-construction funds were allocated equally between primary and secondary highways and the legislative barrier that prevented state highway funds from being used in urban areas was removed.[196] This transfer nearly doubled the mileage of the state highway system (Figure 79). It was also the first of a series of events that began shifting the state highway system's focus to secondary routes and densely populated urban areas of the state, such as Los Angeles and San Francisco. [197] The Breed Act had a profound effect upon the economies of rural counties, improving local and regional transportation and influencing new growth.

Figure 78. *Bixby Bridge along State Highway 1 (Roosevelt Highway) south of Carmel and north of San Simeon completed around 1938 (Caltrans Transportation Library, Sacramento).*

[196] California Highways, "Chronology of California Highways: Phase III," www.cahighways.org/chrphas3.html. This website provides a comprehensive list of routes that were included in the enabling legislation.

[197] Examples include SR 158, which became a part of the State Highway System in 1933, along with nine other route segments in Inyo and Mono Counties and SR 246 in Santa Barbara County, between Lompoc and Santa Ynez.

Figure 79. *California State Highway System map from the early 1930s (California Department of Public Works 1932).*

Between 1933 and 1934, the ten highway district offices were expanded to eleven. Newly formed, District 11 included San Diego, Riverside, and Imperial Counties, and the offices of Districts 3 and 10 were moved from Sacramento to Marysville and Stockton. In 1934, the state highway code was revised to allow the California Division of Highways to build state highways in cities. The new code also reapportioned gas-tax revenues to allow for the construction of urban highways, and a common system for numbering state routes was adopted, although automobile clubs continued to do most of the physical signing.

The late 1930s slowly witnessed an end to the Great Depression, as the nation began to accelerate its planning for U.S. participation in the war in Europe. As historian Marilyn M. Harper explained:

> the process of mobilizing the American economy for war began as early as 1939, picked up sharply in mid-1940 after the Germans overran Western Europe, expanded again after Pearl Harbor, but did not achieve real efficiency until 1943. The challenges were formidable and the difficulties numerous. Existing manufacturing facilities had to be converted to war production and often expanded, while new ones had to be built. Raw materials and supplies had to be acquired and then allocated and delivered efficiently, and production priorities and schedules had to be established for an often bewildering variety of war and consumer goods. There had to be sufficient manufacturing and agricultural production not just to meet the needs of the American military and home front but also to ship needed materials, munitions, and food to the Allies. Workers had to be found and matched to production needs, while the armed forces needed millions of soldiers, sailors, airmen, and marines to fight the war. Money had to be acquired to underwrite the enormous costs of mobilization.[198]

During the 1940s the state allocated approximately $67,000 for improvements on the Federal Aid Primary System, Federal Aid Secondary System, and Federal Aid Urban Highways. In 1944, the Right of Way unit was created within the California Division of Highways, Congress passed the Federal-Aid Highway Act, and the CHC recommended a major postwar construction program. Senator Randolph Collier, known as "the Father of the Freeways," successfully directed a bill commonly referred to as the Collier-Burns Act of 1947 (ch. 11), which consolidated county road-administration efforts. The act required that the state maintain highways in cities, increased the gasoline and diesel-fuel taxes from 3¢ to 4.5¢ per gallon, increased automobile-registration fees and weight taxes on trucks, created funds for all highways and excess motor taxes, revised the apportionment of revenues from fuel taxes, and divided state highway-construction funds between southern and northern California.[199] In the same year, the California Division of Highways was reorganized, with 13 headquarters divisions consolidated down to 7 that included the Divisions of Assistant State Highway Engineer (later Public Relations and Personnel), Accounting, Right of Way, Bridges, Operations, Administration, and Planning (Figure 80).

PARKWAYS, FREEWAYS, AND REGIONAL TRANSPORTATION-PLANNING AGENCIES

The concept of transportation planning was largely a result of the development of the automobile and the congestion created by the wide variety of transportation modes found in the nation's cities. Urban transportation planning in the United States was conducted by state and local agencies, since highway and transit facilities and services are owned and operated largely by the states and local agencies. The role of

[198] Marilyn M. Harper, *World War II and the American Home Front: A National Historic Landmarks Theme Study*. Washington, DC: NPS, National Historic Landmarks Program, 2007.

[199] California Highways, "Chronology of California Highways: Phase IV," www.cahighways.org/chrphas4.html; David W. Jones Jr., *California's Freeway Era in Historical Perspective*. Institute of Transportation Studies, University of California, Berkeley, June 1989.

Figure 80. *Caltrans headquarters building, 1120 N. Street, Sacramento, just after completion of the new wing in the early 1960s, with the original 1930s-era building on the far right (Caltrans Transportation Library, Sacramento).*

the federal government has generally been to set national policy, provide financial aid, supply technical assistance and training, and conduct research.[200]

Over the past 50 years, the federal government has attached requirements to its financial aid. From a planning perspective, the most important has been the requirement that transportation projects in urban areas with populations of 50,000 or more follow an urban transportation-planning process. The requirement was incorporated into the Federal-Aid Highway Act of 1962, which created the federal mandate for urban transportation planning in the United States. The act was the capstone of two decades of experimentation and development of urban transportation planning and institutions, and was passed at a time when urban areas were planning interstate highways. The 1962 act, combined with the incentive of 90 percent federal funding for interstate-highway projects, expanded urban transportation planning throughout the United States and had a significant influence on urban transportation planning in other parts of the world.[201]

During the 1920s, the impetus for highway transportation planning resulted in the creation of regional transportation-planning agencies. The interest in regional and local transportation planning was a response to acute traffic-congestion problems in many metropolitan areas in the United States, in large part created by the lack of adequate planning and too many vehicles for the actual roadways to accommodate at any one time.

[200] Edward Weiner, *Urban Transportation Planning in the United States: An Historical Overview* (New York: Praeger, 1987).
[201] Ibid.

During the 1910s and 1920s, Los Angeles had one of the worst traffic problems in the United States. Automobiles first appeared on the streets of Los Angeles in the late 1890s, and by 1910, the city began to impose restrictions on their use. By 1920, there were more than 160,000 vehicles registered in Los Angeles.[202] Automobiles in Los Angeles competed with other commercial transportation services, particularly electric railcars. A similar situation existed in San Francisco, where trolleys, electric cars, and pedestrians competed for space on busy streets.

In 1922, according to the ACSC, there were 8,111 accidents in Los Angeles, an average of 95 per day. In total, 51 persons were killed in the Los Angeles Metropolitan Area, and 23 in the county. Approximately 16,118 persons were involved in the accidents, and 1,511 were injured, many seriously.[203] In order to address issues of traffic, accidents, and congestion, a regional planning commission was created in Los Angeles, one of the first in the United States. Although it had a meager staff, the commission found time to establish standards for details in design and widths of rights-of-way and to perform intersection studies. The standard of 90 feet for the widths of major highways, for example, was increased to 100 feet.[204]

Early regional planning models began by examining the existing transportation systems and considering the key elements to any future planning. However, early transportation models did not always take into account other development concerns, such as airports, railway terminals, buses, and other forms of transit. Early transportation planners believed that as parkways or freeways were developed to handle long-distance traffic, parallel highways or arterial streets would be relieved of traffic in order to care for an increasing load of shorter-distance drivers. The exploding growth in cities, such as Los Angeles, however, became the models for future transportation planners, as automobile sales increased and rail lines were dismantled in favor of highways and bus transportation.

The concept of a controlled-access highway, or a highway designed exclusively for high-speed vehicular traffic, with all traffic flow and ingress/egress regulated, actually evolved in the early 1900s. Controlled-access highways are known by various terms worldwide, including *autobahn*, *autopista*, *autoroute*, *autostrada*, *autosnelweg*, and, in the United States, *freeway*, *parkway*, *motorway*, *expressway*, or *turnpike*. The first in the United States, known as the Long Island "Vanderbilt" Motor Parkway, was built between 1906 and 1908. The parkway was actually a private toll road that eventually stretched for 45 miles from Queens to Lake Ronkonkoma and was one of the first concrete roads in the nation and the first highway to use bridges and overpasses to eliminate intersections.[205] The concept of a controlled access highway or expressway was expressed in futuristic designs featured at the 1939 New York World's Fair, where visitors lined up to see General Motors' "Futurama" (Figure 81), brought to life by industrial designer Bell Geddes and the Ford Motor Company exhibit "The Road of Tomorrow." The fair created an air of excitement among city and transportation planners, and while many of the ideas floated at the fair were unrealistic given the lack of financial muscle from Congress, they fostered the idea of a national transportation network of modern roads and highways.[206]

The concept of a *parkway* versus a *freeway* was not contradictory in regards to the basic premise of how each would function in the realm of transportation planning. In California, the term "freeway" appears to have evolved from meetings in 1933 among professional planners who were describing a type of "parkway."[207]

[202] Bruce Henstell, *Sunshine and Wealth: Los Angeles in the Twenties and Thirties* (San Francisco: Chronicle Books, 1984), 24–25.
[203] *Sausalito News*, 38, no. 14 (April 8, 1922).
[204] Los Angeles County Regional Planning Commission, *The Plan and Its Preparation,* Vol. 1, *A Comprehensive Report on the Master Plan of Highways for the Los Angeles County Regional Planning District* (Los Angeles: Los Angeles County Regional Planning Commission, 1941), 51–52; Los Angeles County Regional Planning Commission, *Freeways for the Region* (Los Angeles: Los Angeles County Regional Planning Commission, 1943).
[205] NYCroads.com, "Long Island Vanderbilt Motor Parkway: Historic Overview," www.nycroads.com/history/motor/.
[206] Earl Swift, *The Big Roads: The Untold Story of the Engineers, Visionaries, and Trailblazers Who Created the American Superhighways* (Boston: Houghton Mifflin Harcourt, 2011).
[207] Ibid., 8.

Figure 81. *Detail of the Futurama exhibit at the New York World's Fair 1939–40, showing a street intersection in the City of Tomorrow (from Norman Bel Geddes, Magic Motorways, 1940).*

Parkways and freeways generally had the following characteristics:

- a channel exclusively for the movement of motor vehicles;
- separation from adjoining properties by physical barriers;
- ingress and egress prohibited, except for specific entrances and exits;
- provision for uninterrupted traffic flow by the division of opposing, parallel traffic streams; and
- separation of cross traffic with properly designated entrances and exits at reasonably spaced intervals.[208]

A parkway differs from a freeway only in the sense that it generally included scenic or recreational values, such as park-like strips of generous width, bike paths, hiking trails, and other non-vehicular characteristics.[209] While parkways appealed to suburban transportation planners, freeways were to form the backbone of dense urban centers, particularly Los Angeles. A key component of a parkway or freeway was a grade separation or the division of the roadway, which often included a central raised barrier planted or otherwise to separate the traffic flowing in opposite directions. In 1923, the Los Angeles Regional Planning Commission recommended development of certain highway routes as parkways divided by planting strips. The commission emphasized a park-like character, including the retention of aesthetic values, although the argument of increased safety was also advanced.

[208] Los Angeles County Regional Planning Commission, *Freeways for the Region*, 4.

[209] Ibid; see also Timothy Davis, "The American Parkway as Colonial Revival Landscape." Davis posited that the Colonial Revival Movement of the 1920s–30s inspired the creation of parkways through rural sections of the United States as a reminder of our rural agrarian roots and as a countermovement to suburbanization and traffic congestion.

Beginning in the early 1920s, the Los Angeles Regional Planning Commission and the Board of Supervisors began the development of a preliminary plan for a comprehensive network of through highways. Many miles of right-of-way, varying from 80 and 100 feet in width, were secured without cost to the public through dedication along the line of planned thoroughfares, in connection with new subdivisions. Additional right-of-way was acquired without cost by outright deed, where no subdivisions were involved.[210]

On May 15, 1931, California Assembly Concurrent Resolution No. 34 was filed with the Secretary of State (Statutes 1931, ch. 85), at which time a report was submitted that included a plan for the beautification of the state's highways. The resolution, which was prepared by the California Division of Highways in cooperation with the Division of Beaches and Parks and the San Francisco Regional Office of the U.S. Bureau of Public Roads, noted that "the matter of roadside beautification is coming to be a subject of discussion by the United States Bureau of Public Roads in its relation to the United States Highway System."[211] While the report did not single out parkways or freeways, its implications were recognized by transportation planners in the early 1930s. The plan took into consideration limiting features, such as social development; industry/commerce and recreation; classification of highways, highway development, right-of-way, status of improvements related to location and construction design; traffic—local and through; geographic conditions; and physical conditions, including soil, moisture and temperature (Figures 82 and 83). [212] Although the study reflected a wide range of roads and highways, it focused on the concept of parkways and freeways.

Figure 82. *Route 36 under construction, San Bernardino County, ca. 1931 (Caltrans Transportation Library, Sacramento).*

Figure 83. *Route 66 improvements an Bernardino County, ca. 1960s (CaltransTransportation Library, Sacramento).*

[210] Los Angeles County Regional Planning Commission, *Freeways for the Region*, IX.
[211] California Division of Highways, *California Highway Roadside Beautification Survey: Progress Report*, 15.
[212] Ibid., 19.

Figure 84. *Postcard of the Arroyo-Seco Parkway, Pasadena, ca. 1940 (Courtesy Loyola Marymount University Department of Archives and Special Collections, William H. Hannon Library, Werner Von Boltenstern Postcard Collection).*

The first organized effort to procure state funding from the legislature to establish parkways or freeways was introduced in 1934 at the California Planner's Institute meeting, and in September 1934 Pasadena and South Pasadena approved plans for the Arroyo Seco Parkway, also referred to as the Pasadena Freeway[213] (Figure 84).

After 1935, most transportation studies included the principle of divided traffic. The Arroyo Seco Parkway or Freeway was designed to help relieve traffic congestion between downtown and the suburban community of Pasadena, the City of Los Angeles. The parkway or freeway (Figure 85), which incorporated the concept of an expressway into the new high-speed roadway, was opened to traffic in 1940, and shortly after that, the Cahuenga Pass Freeway, later called the Hollywood Freeway, connecting Los Angeles with the San Fernando Valley was also completed. While new freeway construction was underway in the late 1930s, the total number of parkways or freeways was still unimpressive in comparison to the vast existing mileage of the ordinary highway or standard freeway type of development.[214]

[213] Abbott, "A Super-Highway;" "The Arroyo Seco Parkway connects Los Angeles with Pasadena and runs along the Arroyo Seco canyon, a riverbed that remains dry most of the year. In 1927, a parkway was proposed running alongside the Arroyo Seco, extending 10.5 miles from a point slightly north of the Rose Bowl to the Los Angeles River. However, due to lack of funding during the Great Depression and controversy over building a roadway through park land, construction was delayed until the 1930s. The first segment opened on January 4, 1939, and the entire parkway opened on December 30, 1940, earning it the title of the first freeway in the West. Construction continued for the next 13 years on another segment extending to the south, which included converting the Figueroa Street bypass roadway to a freeway where it passes through Elysian Park. The freeway was later renamed the Pasadena Freeway, and then California SR 110. During the 1940s, the tunnels were brought up to freeway standards and made part of the Pasadena Freeway, sometimes called the Arroyo Seco Parkway" ("Arroyo Seco Parkway," http://digitalcollections.lmu.edu/cdm/ref/collection/chgface/id/376).

[214] Ibid., 61.

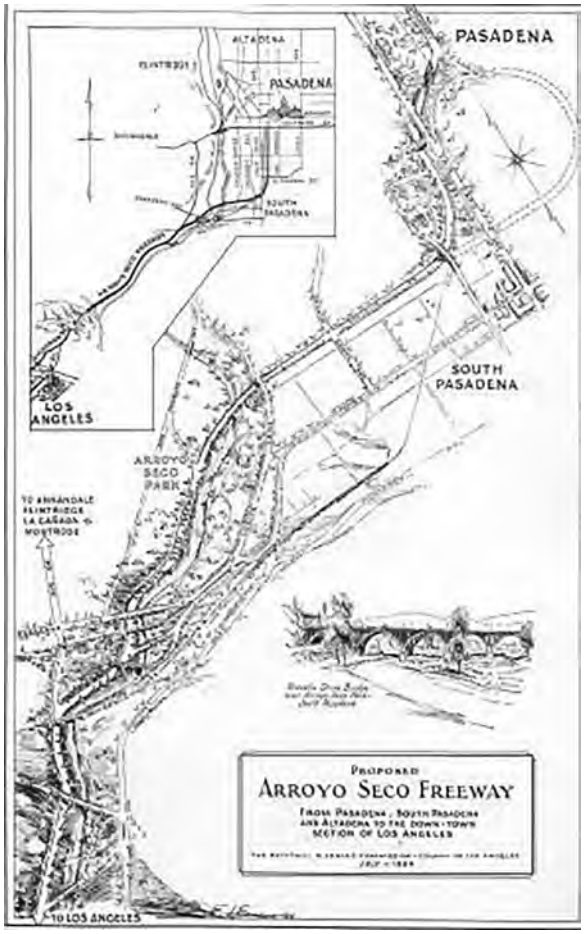

Figure 85. *Arroyo Seco Parkway in South Pasadena, 1942. Note the grade separation between the freeway and the existing local road, a technique that was tested during the late 1930s and early 1940s as the state's freeway system was being developed (California Transportation Library, Sacramento).*

In 1937, the California legislature amended the California Planning Act, Statutes 1937, ch. 665, as an act "to provide for the establishment of master and official plans in cities, counties, and for the creation of regional planning districts . . . ." The act required that "every city and county would adopt and establish a master plan of said city and county . . . to conserve and promote the public health, safety and general welfare."[215] Section 2.2 of the Planning Act established state-coordinated regional planning, including regional-planning districts. According to the Planning Act, the districts included natural physiographic regions containing complete watersheds of major stream systems, together with the land upon which the waters of such watersheds are put to beneficial use, and areas having mutual social and commercial interests, as exemplified by radiating and connecting routes of transportation, by trade, and by common use of recreation areas within the region (Figure 86). On October 21, 1939, the State Planning Board established the County of Los Angeles as one such regional-planning district, which helped solidify transportation planning as an integral part of regional planning.[216]

By 1939, Los Angeles reported that 1,081,031 automobiles had been registered in the county, which, according to the commission report, would have required roughly 9,189 lane miles of highway pavement.[217] One result was increased traffic on the major streets. In Los Angeles County in 1941, state highways totaled 880 miles; major streets, 3,000 miles; local streets, 5,000 miles; and unimproved streets, 4,000 miles. That year, the Los Angeles City Planning Commission completed a proposed parkway system for the region. Simultaneous with the Los Angeles regional parkway study was the National Interregional Highway Committee report to the president of the United States in January 1944. The report outlined a proposed "national system of highways," 33,920 miles in length, linking together all cities with populations of 300,000 or more.[218]

The basic characteristics or definition of an automobile freeway were further expanded in the 1940s, and included:

- All intersections and cross-traffic are eliminated by grade separations and overcrossings.
- Opposing lanes of traffic are separated by a wide median (often well landscaped) or a substantial median barrier, so that vehicles passing slower cars do not have to enter the lanes of oncoming cars. The hazardous left turn across lanes of oncoming traffic is eliminated.

[215] California State Legislature, "Streets and Highway Plan," Statutes 1937, ch. 665, *California Planning Act*.
[216] Los Angeles County Regional Planning Commission, *The Plan and Its Preparation*, VIII.
[217] Ibid., 20.
[218] Ibid., 6.

Figure 86. *By the 1950s, downtown Los Angeles freeway construction had resulted in the loss of entire old commercial and residential neighborhoods (courtesy of the Los Angeles Public Library photograph* ***collectio****n, Delmar Watson Photography).*

- Access to the roadway and exits from it are permitted only at designated locations. Cars entering the motorway by way of on-ramps do it on the move, merging smoothly into the flow of traffic. Cars exiting the roadway by off-ramps are quickly separated from the flow of traffic and are allowed to decelerate gradually, eliminating a sudden stop at the side of the road to make a hard right turn.

- Property owners adjoining the right-of-way do not have rights of direct access to the freeway, and access to their property is provided by frontage roads.

- All foot traffic and non-motorized conveyances (or low-powered motor vehicles) are forbidden on the roadway or along the sides of the freeway, except for emergency situations.

During the early 1940s, the Los Angeles parkway plan was expanded. In 1944, the plan was ratified by the Los Angeles County Regional Planning Commission and in the same year the Los Angeles Metropolitan Parkway Engineering Committee was formed, composed of city and county planning engineers.[219] The plan created a blueprint for transportation growth in the greater Los Angeles region, focusing on parkways and mass transit.

One important component of the proposed parkways or freeways in Los Angeles County was their adoption as thoroughfares for the transit busses that replaced the electric rail lines in the region. The list of proposed key parkways chosen by the committee members included the San Fernando Parkway and portions of the Riverside and Angeles River Parkways; the Ramona, Ventura (Riverside), Hollywood, and Santa Ana Parkways; and portions of the Santa Monica Parkway.[220] Ironically, nearly every one of the proposed parkways, in whole or in part, later became a part of the Los Angeles freeway system.

Beginning in the 1940s, and perhaps earlier, transportation planners in the Los Angeles Basin began to explore other options for addressing the growing traffic-congestion problems in the region, including a monorail system in conjunction with expanded parkways or freeways (Figure 87). The Pacific Monorail System, Inc. was organized in 1946 to explore the transportation problems in Los Angeles and to prepare the basic engineering design for an overhead-monorail system consisting of lightweight cars, each resembling an airplane fuselage, suspended from a single rail with individual electric drives from a power line. At the same time, an underground or subway system was also proposed as a solution to the traffic problem in the Los Angeles region. Because of costs, the monorail system was dropped, and the subway

Figure 87. *Traffic at San Fernando Road and Fletcher Drive, Glendale, 1936 (courtesy of the ACSC Archives).*

[219] Los Angeles Metropolitan Parkway Engineering Committee, *Interregional, Regional, Metropolitan Parkways Presenting Plans and Factual Data in Support of a System of Parkways for the Los Angeles Metropolitan Area.* (Los Angeles: Los Angeles Metropolitan Parkway Engineering Committee, 1946). http://libraryarchives.metro.net/DPGTL/trafficplans/1946_interregional_regional_metropolitan_parkways.pdf.

[220] Ibid.

system and overhead-rail system was later adopted, albeit decades after the proposal was presented to the state legislature and after the dismantling of most of the region's electric rail service.[221]

Chambers of commerce played an important role in pressuring local, regional, and state governments to pursue improvements to their respective transportation systems. In Los Angeles, it was the Rapid Transit Action Group (RTAG), formed in the 1940s, that acted as a lobbying group to pressure the governor and the Los Angeles contingent of the state legislature to adopt enabling legislation for the creation of a metropolitan transportation district. In 1948, the RTAG released a printed brochure entitled "Rail Rapid Transit."[222]

San Diego also experienced the same frustration in dealing with traffic congestion as Los Angeles. By the late 1930s, traffic traveling northward along existing streets to get from downtown to Mission Valley and the burgeoning communities on Kearney Mesa was routinely clogged with slow-moving cars. Plans for a freeway through part of Balboa Park were laid out for the right-of-way, and in 1941, voters approved the taking of parkland for the new highway. Construction was started on two overcrossings in the Hillcrest neighborhood north of the park in 1942, but wartime restrictions on building materials halted work on the rest of the freeway. Within six months after the Japanese surrender in 1945, construction resumed, and in February 1948 the Cabrillo Freeway was opened to traffic.[223]

The Arroyo Seco, Cahuenga Pass, and Cabrillo freeways reflect the design ideas of the first generation of parkways and freeways. While they possess the characteristics of modern highway or parkway design, they also suggest that early transportation planners did not understand how fast their respective communities were going to expand from the unprecedented economic and population growth that would occur after World War II.

The post–World War II "baby-boom" population explosion in southern California overwhelmed local and regional transportation agencies, and plans constantly shifted, as did priorities. In 1948, Chief Right of Way Agent for the California Division of Highways Frank C. Balfour strongly believed that the prosperity of the state depended upon new freeway construction. Balfour's comments, presented at a conference in Yosemite National Park in 1948 and in 1950 at the Commonwealth Club of San Francisco, suggested that the state was still attempting to make a concerted effort to explain to the public the advantages of limited access on the state's highways and freeways. Balfour provided several examples of situations where highways were diverted, thus bypassing downtown commercial districts, such as Vacaville, where the community witnessed a marked benefit due to decreased traffic and congestion.[224]

Not everyone was convinced that limited-access highways and freeways were the answer to addressing the state's problems associated with accident rates and congestion. Limited-access highways and freeways also precipitated migration out of the inner city and into the suburbs. New freeway construction also disproportionately affected the poor, whose neighborhoods were often destroyed or bifurcated (Figure 88).

[221] California State Assembly, *Rapid Transit for Metropolitan Areas and Related Problems*, Preliminary and Supplemental Report No. 2. (Sacramento, CA: California State Assembly Fact-Finding Committee on Highways, Streets and Bridges, 1950), 16–19.
[222] Ibid., 10–11.
[223] Frank Lortie, *Road and Highway History Notes* (Sacramento, CA: Caltrans, 2002).
[224] Balfour, Frank C. *Effect of Limited Access Highways and Freeways on Adjoining Property Values* (Sacramento, CA: California Division of Highways, 1948); see also Frank C. Balfour, Talk [on the history and background of freeways, parkways, and expressways]: Given Before Commonwealth Club Planning Section, San Francisco, September 12, 1950, (Copy on file California State Library, Sacramento, CA.)

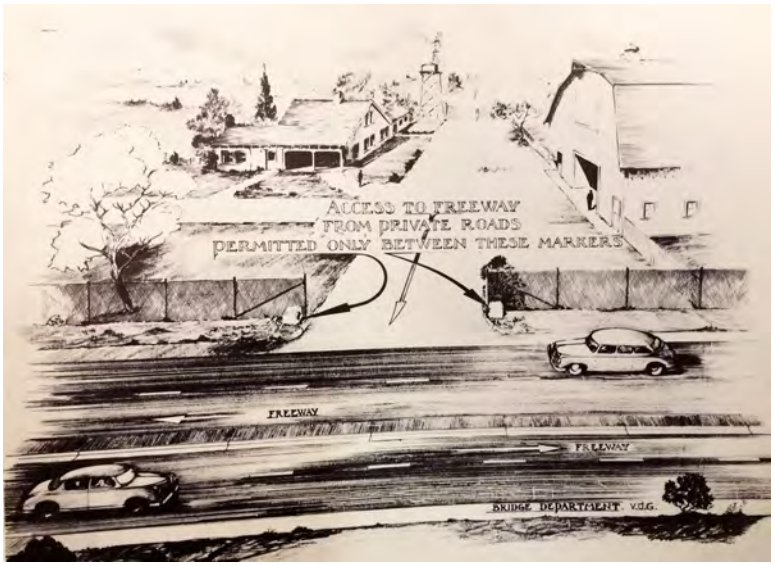

Figure 88. *Illustration of a southern California freeway separation and the juxtaposition of city streets and the freeway, showing limited access, ca. 1945 (Dorothy Duras, "How Will You Ride to Work After the War"; copy available at the California State Archives, California Division of Highways, Sacramento).*

Figure 89. *Construction of the Santa Monica Freeway divided neighborhoods and displaced residents. Here, work continues on the freeway southwest of downtown Los Angeles in the 1960s (California Division of Highways, Sacramento. Date: 6-22-61; neg. no: 8201-5; district: VII; county: Los Angeles; route: 173).*

As historian Raymond A. Mohl explained, Department of Highway promoters and builders envisioned the new interstate expressways as a means of clearing slum housing and blighted urban areas. These plans actually date to the late 1930s, but they were not fully implemented until the late 1950s and 1960s. Massive amounts of urban housing was destroyed in the process of building the interurban freeways (Figure 89). By the 1960s, federal highway construction was demolishing 37,000 urban housing units each year; urban renewal and redevelopment programs were destroying an equal number of mostly low-income housing units annually.[225]

The San Francisco Bay Area and Peninsula and the Santa Clara Valley witnessed unprecedented growth during the late 1940s through the 1950s. New freeway construction encouraged "leapfrogging" type development, as depicted in Figure 90, showing a newly constructed cloverleaf providing access to residential development along the East Shore Freeway, Alameda County.

[225] Raymond A. Mohl, *The Interstates and the Cities: Highways, Housing, and the Freeway Revolt*, Research report (Washington, DC: Poverty and Race Research Action Council, 2002), 2.

Figure 90. *East Shore freeway cloverleaf, mid-1950s (California Division of Highways, The California Freeway System, 19).*

By 1955, there was roughly one automobile for every 2.7 people in Los Angeles County, and in 1956, the population of Los Angeles was estimated to be over 5.9 million, compared to 2.3 million in 1930.[226] As suburbanization increased in southern California, one result was the creation of new freeways (Figure 91; see Figure 90).

During the 1950s and 1960s, regional transportation agencies and the California Division of Highways remained busy designing and developing the freeway and expressway system. The opening of new freeways was widely publicized and ribbon-cutting ceremonies often included dignitaries, as was the case when Ano Saueressing and Shirley Saueressing, and assistant State Engineer Paul Harding cut the ribbon for the opening of State Route 175 in Los Angeles County on March 20, 1953 (Figure 92). In addition, periodic statewide traffic surveys helped develop new models for forecasting new or expanded transportation systems.

Figure 91. *Traffic on the newly built Hollywood Freeway, 1953 (Caltrans Transportation Library, Sacramento).*

[226] Citizens Traffic and Transportation Committee, *Transportation in the Los Angeles Area: Final Report of the Citizens Traffic and Transportation Committee for the Extended Los Angeles Area* (Los Angeles: Citizens Traffic and Transportation Committee, July 1957), http://libraryarchives.metro.net/DPGTL/trafficplans/1957_transportation_in_the_los_angeles_area.pdf, 4–6.

Figure 92. *Ano Saueressing, Shirley Saueressing, and Assistant State Engineer Paul O. Harding at ribbon-cutting ceremony for the opening of Artesia Street (State Route 175), March 20, 1953 (Caltrans Transportation Library, Sacramento).*

In 1960, Governor Brown convened a conference in Sacramento focusing on urban planning and transportation. Brown's comments at the conference reflected his desire to move toward a "multi-modal" system of transportation in the state.[227] Multi-modal transportation planning, however, did not grab hold until the 1970s.

At the local and county levels of planning, several reports prepared in the 1950s set the stage for recommendations regarding financing and statewide planning efforts. Despite these types of efforts most statewide planning efforts still occurred in isolation.[228] The 1950s and 1960 freeway expansion period created demand for more progressive planning and additional trained engineers, particularly those whose skills focused on bridge design.

[227] Brown, "Statewide Transportation Planning in California," 26.
[228] Ibid., 27.

While gender bias remained a part of the Division of Highways through the close of World War II, by the 1960 women trained as engineers began to enter the workforce, such as Marilyn Reece who became the first woman to serve as associated highway engineer for Caltrans (Figure 93).

By the 1960s and 1970s, many cities in the United States, including San Francisco and Los Angeles, were experiencing widespread freeway and expressway revolts. There was also significant political opposition against new freeway construction. In addition, the 1973 oil embargo dramatically raised fuel prices and helped propel forms of mass transit to the forefront of transportation planning, although avenues for funding were still limited.[229]

Both San Francisco and Los Angeles became hot button locations for opposition to new freeway expansion. In 1948, freeways had been planned crisscrossing virtually all of San Francisco (Figure 94). In 1953, construction began on the Embarcadero freeway, which was meant to connect the Bay Bridge to Oakland with the Golden Gate Bridge to Marin County. It was the Embarcadero freeway that garnered the most intense local opposition. Ironically, it took until 1989 following the Loma Prieta Earthquake before it was demolished (Figure 95).

Figure 93. *Marilyn Reece (left) with fellow civil engineer Carol Schumacher (1965) at the 10-405 interchange, which Reece designed in the 1960s (Courtesy of the Los Angeles Times Photographic Archive, Department of Special Collections, Charles E. Young Research Library, UCLA).*

[229] Oliver Gillham, *The Limitless City A Primer on the Urban Sprawl Debate* (Washington, DC: Island Press, 2002).

Figure 94. *1948 plan for expanding freeways in San Francisco. The Enbarcadero Freeway is clearly visible at the far right of the illustration leading to the Bay Bridge (http://www.preservenet.com/freeways/FreewaysEmbarcadero.html, accessed October 8, 2015).*

Figure 95. *Panoramic view of the controversial Embarcadero Freeway taken in June 1960. The freeway cut a large swath through the waterfront area of San Francisco. (Caltrans Transportation Library, Sacramento).*

By the 1960s the freeway system in Los Angeles was impressive. Figure 96 illustrates the expansive nature of the freeway system within the Los Angeles Basin. Despite the increasing demand for new freeways in the Los Angeles Basin during the 1950s and 1960s, opposition to freeway expansion did little to prevent new construction which cut large swaths to many of the inner city's oldest and poorest neighborhoods.

In summary, from the early 1900s through the third quarter of the twentieth century, one of the greatest obstacles facing local transportation-planning agencies and districts was how to finance their respective projects. For most of the nineteenth century, funding of transportation systems was through private financing or tolls. During the twentieth century, the government intervened, collecting revenue through taxes on gasoline and user fees, such as vehicle-registration and licensing fees. In the 1940s, the federal government provided matching funds for highway improvements and supported regional mass-transportation districts that were formed to supplement federal and state funding. Despite all these measures, transportation planning remained fragmented, with various competing interests and a dependence upon gasoline taxes to fund highway projects. Despite the

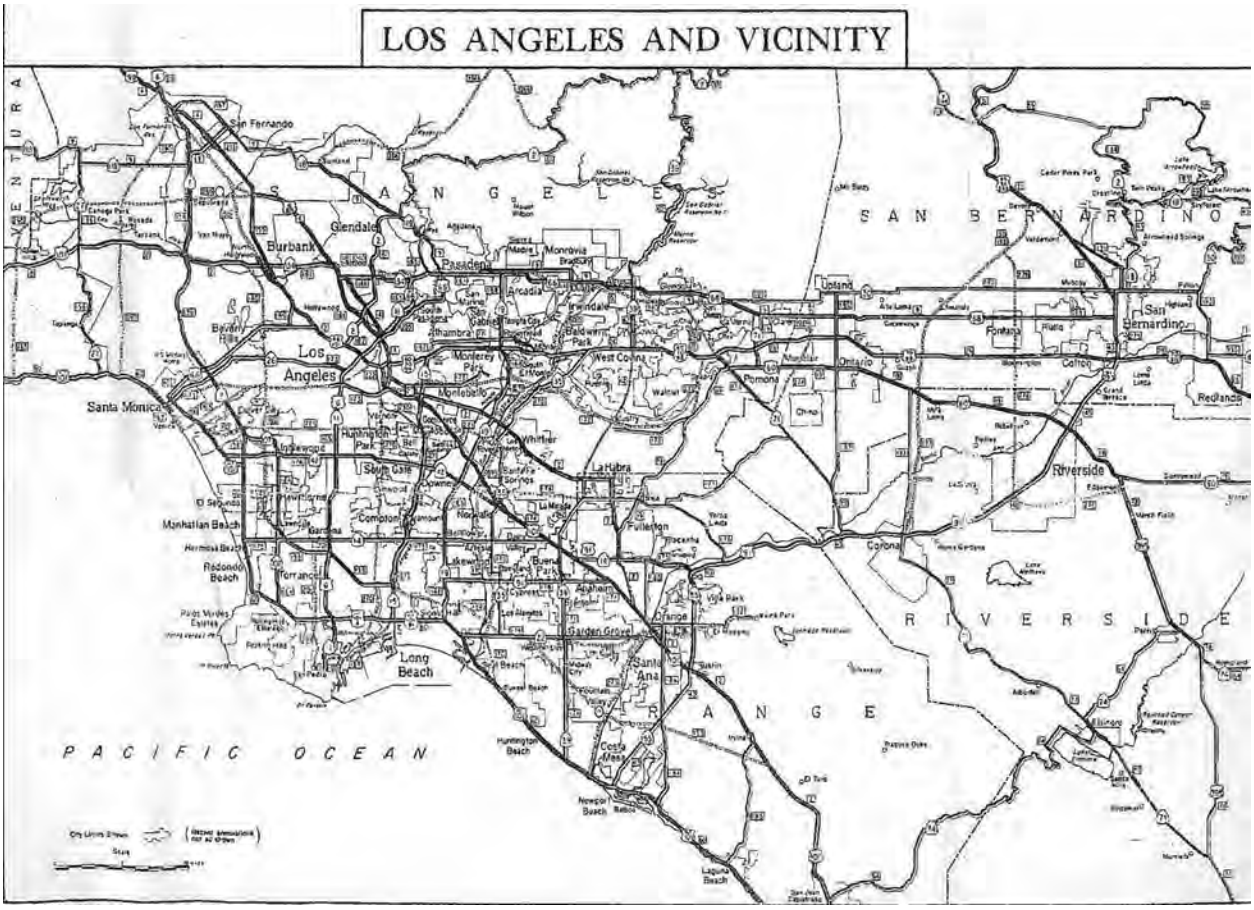

Figure 96. *Southern California freeway system, 1963. As depicted in this map, the number of freeways in Southern California doubled during the 1960s (Caltrans map).*

complex nature of regional transportation planning in California, by the 1960s an interconnected network of freeways had been built liking metropolitan areas to the suburbs. The benefits and disadvantages of such as system are still debated to this day as Caltrans and other transportation agencies grapple with transportation issues in the twenty-first century.

THE INTERSTATE HIGHWAY SYSTEM

The Federal-Aid Highway Act of 1956 was the enabling legislation that created the interstate highway system in America. The interstate highway system transformed the nation with its more than 46,500 miles of interconnected highways (Figures 97, 98, and 99). The distribution of virtually all goods and services and much of the nation's business and recreation ultimately relied upon the interstate highways at some point.[230] Lester A. Hoel and Andrew J. Short (2006) provided a detailed account of the interstate highway system in "Celebrating the Interstate's 50th Anniversary: The Engineering of the Interstate Highway System; A 50-Year Retrospective of Advances and Contributions."

[230] Caltrans, "California Celebrates 50 Years of the Interstate Highway System: The Interstate Highway System Turns 50," www.dot.ca.gov/interstate/.

Figure 97. *Aerial view north of the Interstate 80/580 split in Alameda County, November 14, 1956 (Negative 5209, Caltrans Transportation Library, Sacramento).*

Good roads, particularly paved roads, were not common as America entered the twentieth century, and they often failed to connect to other roads, especially between different states. Likewise, road systems did not employ consistent signage, and motorists often found themselves lost in trying to travel from town to town. As a young soldier, Dwight D. Eisenhower experienced the difficulties firsthand when traversing the nation in 1919. Following the route of the Lincoln Highway (later U.S. 40), he, along with his military brigade, took 62 days to cross the United States and often broke down or met with delays caused by poor or inadequate roads. While the expedition was largely to establish whether motorized military convoys could transverse long-distances, in later years that experience largely influenced his understanding of, and desire for, a workable national highway system.

Planning for a system of new highways actually began in the late 1930s. However, it was not until 1944 that the National Highway Committee, appointed by President Franklin D. Roosevelt, developed plans for a national system of expressways. The expressways, which were ultimately approved by Congress, became known as the 40,000-mile National System of Interstate Highways. Figure 98 illustrates the

Figure 98. *Proposed Interstate highways in California, 1950s.*

proposed interstate or U.S. highway system in California in the early 1950s, while Figure 99 displays the Interstate Highway system in 1976. Ultimately, U.S. 99 and 40 became the principal interstate highway in California. Portions of U.S. 99 were eventually absorbed in Interstate 5 and portions of U.S. 40 became part of Interstate 80.

Funding did not come until 1952, however, when President Harry S. Truman signed the Federal-Aid Highway Act, which offered a down payment of $25 million for the interstate highways. Sufficient funding to build the nation's interstate highway system finally came under President Eisenhower, who led the campaign.[231] In 1956, Eisenhower authorized the Federal-Aid Highway Act, also known as the National Interstate and Defense Highways Act.[232] The act unified the nation's transportation system, but it also helped address issues the country faced during the Cold War as a means to evacuate metropolitan areas in case of an atomic war.

From a cultural standpoint, the interstate highway system transformed America and, to a large degree, liberated the driving public by providing direct access to nearly every metropolitan area in the United States.

[231] Ibid.
[232] Ibid.

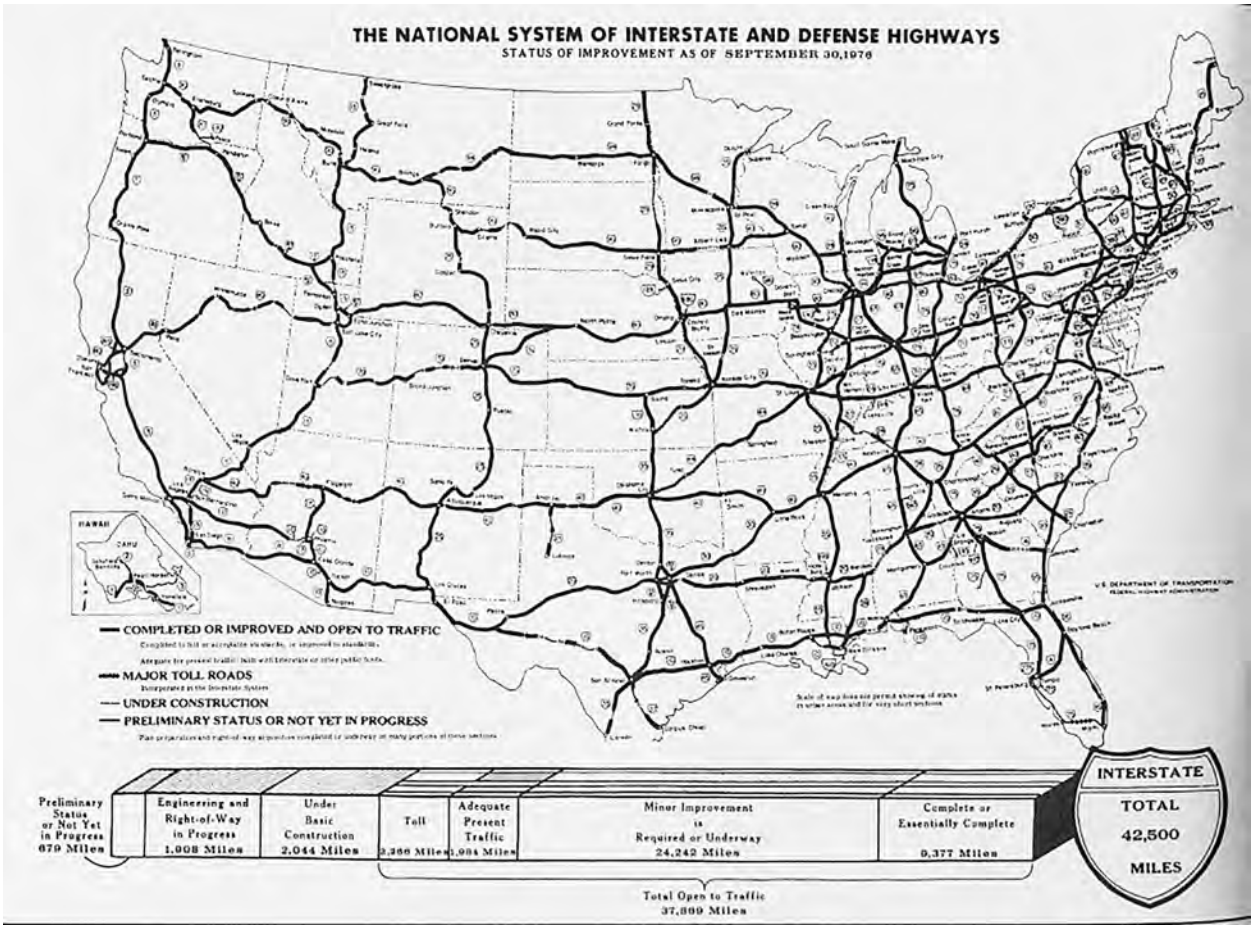

Figure 99. *Map of the proposed interstate highway system, 1976 (interstate highway status map, Federal Highway Administration, 1976).*

With increased mobility, automobile sales rose during the 1950s, and individuals and families were able to exchange greater distances for a similar amount of time spent traveling. By the 1960s, the interstate highway emerged as a symbol of "individuality, freedom and opportunities."[233] Interstate freeways expanded commerce and trade in the nation and propelled California's post-World War II to new heights. The development of the interstate highway system also led to the expansion of suburbanization in the United States, even though the system was originally designed to service inter-metropolitan transportation. Many interstate highways either bypassed or ringed major metropolitan areas. The emergence of suburbs ringing metropolitan areas symbolized many of the same values expressed by interstate-highway proponents, particularly freedom of travel, home ownership, neighborhood schools, and local shopping plazas. As geography professor Dr. Jean-Paul Rodrigue noted, "this permitted a significant accumulation of wealth in the form of individually and privately owned equity; the pillar of America's middle class."[234]

Currently more than 46,800 miles compose the interstate highway system, officially known as the Dwight D. Eisenhower National System of Interstate and Defense Highways, which features more than 14,700 interchanges, 55,500 bridges, and 82 tunnels. The highest point in the system is 11,158 feet at the Eisenhower Memorial Tunnel in the Rocky Mountains of Colorado and the lowest is 52 feet below sea level along I-8

[233] Jean-Paul Rodrigue, *The Geography of Transport Systems*, Hofstra University, http://people.hofstra.edu/geotrans/eng/ch3en/conc3en/map_interstatesystem.htmlhttp://people.hofstra.edu/geotrans/eng/ch3en/conc3en/map_interstatesystem.html.
[234] Ibid.

in El Centro, near the Mexican border.[235] California contains parts of three of the four longest interstate routes in the United States. I-80 begins in San Francisco and stretches 2,899.54 miles to Teaneck, New Jersey, ranking second among the nation's longest interstate routes, behind I-90. I-40 begins in Barstow, California; stretches 2,555.40 miles to Wilmington, North Carolina; and ranks third. The fourth-longest interstate route, I-10, begins in Los Angeles and stretches 2,460.34 miles to Jacksonville, Florida. In addition, California ranks second, behind Texas, in the number of interstate miles, with 2,455.74 miles, and second, behind New York, in the number of interstate routes, with 25 different routes. While I-90 and I-95 traverse the most states, at 16 and 13 respectively, I-80 travels through the third-greatest number of states, including California. Likewise, I-10 ranks fifth; it traverses eight states, including California.[236]

ROAD AND HIGHWAY CONSTRUCTION, ENGINEERING, AND DESIGN

As previously discussed, road and highway planning was largely a practice that began in the twentieth century. Road and highway construction, however, has occurred for hundreds of years, regardless of any concerted planning efforts. Beginning with Spanish trails and roads and through the period of wagon, stage, and toll road construction during the late nineteenth century, engineering grew in importance, as did new technologies (Figure 100). California's varied topography, climate, and soils posed enumerable challenges for road builders and engineers.

Figure 100. *Typical Sierra Nevada wagon/stage road with a compacted-dirt surface, Cisco Grove, Nevada County, ca. mid-1860s (photograph courtesy of the Lawrence and Houseworth Collection, Library of Congress, Prints and Photographs Division, Washington, DC).*

[235] Caltrans, "The Interstate Highway System Turns 50," www.dot.ca.gov/interstate/, accessed August 2015.
[236] Ibid.

Trail, road, and, later, highway construction and design prior to the late nineteenth century relied on natural topography and simple engineering tools. Trails and roads generally followed the least-circuitous paths and relied upon hand-tools to remove obstacles until black powder and, later, dynamite were invented. Even then, road building was labor-intensive and often relied on insufficient data to predict potential hazards, such as floods, slides, and soil instability.

During the late eighteenth and nineteenth centuries, various techniques of road surfacing were attempted throughout the United States, including in California. Paving with bricks and cobblestones was the most common, although both methods broke down quickly after heavy use. Cobblestone paving can still be found in a number of California cities, including San Francisco, Sacramento, and Los Angeles. Another method used in a number of mid-nineteenth-century California towns was paving streets with wooden planks, as was done in Grass Valley (Figure 101).

At the close of the nineteenth century, planning for the state's road and highway system was as challenging as finding funding for its construction. While the advent of the automobile in the late 1890s increased the demand for better roads throughout the state, new technologies evolved slowly, as road engineers tested new products. In California, road building in the early 1900s was accomplished through funds provided by the state and federal governments, automobile associations, and organizations like the National League of Good Roads.

In 1897, the legislature dissolved the Bureau of Highways, replacing it with the Department of Highways. Initially, the Department of Highways treated every road it proposed to build as a separate entity requiring separate legislative approval and funding. However, in 1902, the state adopted a constitutional amendment empowering the legislature to create a single highway system funded and administered as a whole, and the state constitution was amended to give the state legislature the power to establish a system of state highways and to pass the laws necessary for highway construction. It also permitted state aid to be provided to counties for road construction. In 1907, the legislature dissolved the Department of Highways and created the Department of Engineering, the forerunner of the Department of Public Works. Highway funding was provided by the legislature through "special appropriations." This was at a minimum funding level,

Figure 101. *Grass Valley, ca. 1866. View to the south looking down Mill Street from Main Street at the wide board planking used to surface the street (courtesy of the Lawrence and Houseworth Collection, Library of Congress, Prints and Photographs Division, Washington, DC) and, to the right, a cobblestone street, San Francisco, Chinatown, early 1900s (courtesy of the Bancroft Library, Chinese in California Virtual Collection, BAC PIC 1905, 17500-ALB, vol. 21.99).*

Figure 102. *The first shovel of earth on "Contract Number One" financed by the first state highway bond measure is moved by the new State Highway Commission's Chairman Towne in San Mateo County, between South San Francisco and Burlingame, on the coast highway leading from San Francisco to Los Angeles in 1912 (Caltrans Transportation Library, Sacramento).*

and most funds were devoted to maintenance, such as clearing storm debris and the construction of retaining walls and culverts.[237] During the 1910s, bond acts supplemented the meager funds that were available for road projects, and later, gas taxes added another important source of revenue.

The first official state highway project in California involved improvements to the Placerville–Lake Tahoe Wagon Road, a route that roughly followed present-day U.S. 50 between Placerville, in western El Dorado County, to the Nevada state line, in present-day South Lake Tahoe. The act of 1895 authorized "the state of California to secure the title to and right-of-way for that certain wagon-road . . . commencing a short distance easterly from the village of Smith's Flat . . . and running thence to Lake Tahoe . . . ." (March 26, 1895, ch. 128). Beginning in 1897, and extending through 1915, the 1895 act was succeeded by a string of similar legislation designed to construct and improve the route. The later legislation included an "act to make an appropriation for the purpose of purchasing additional rights of way, and land and trees on and along the course of the Lake Tahoe wagon road" (ch. 762, repealed in 1935).[238] Highway projects often took years to build, or even decades, as evidenced by the construction of the Placerville–Lake Tahoe Wagon Road, which began in the 1890s and continued in spurts and stops through the 1940s.

In 1910, California voters approved the Road Bonds Act of 1909, which provided $18 million for road construction statewide and established the California Highway Commission (CHC). In 1911, the CHC, a precursor to the California Division of Highways, now Caltrans, effectively established the state, and not the county, as the primary agency in highway development.

In the early 1900s, California's highway system was in abysmal condition, although many notable public officials sought to change that. On August 7, 1912, Chairman Towne of the State Highway Commission turned the first shovelful of earth on State Highway Contract No. 1 to start construction of asphalt-concrete pavement on a section of the Coast Route between South San Francisco and Burlingame, in San Mateo County (Figure 102).[239]

On February 21, 1912, the CHC held a public conference at its offices in San Francisco. The conference was intended to address comments from civic organizations and road and highway associations related to the expenditure of money appropriated under the 18 million dollar bond issue of 1909.[240]

[237] For information on culvert design, refer to California Division of Highways, *California Culvert Practice*, 1944.
[238] California Highways, "Chronology of California Highways: Phase I," www.cahighways.org/chrphas1.html.
[239] Adams, ed., *California Highways and Public Works*, 78
[240] *San Francisco Call* 111, no. 66 (February 4, 1912).

In 1915, George B. Harrison, Chief of Right of Ways for the CHC, commented on the condition of California's highway system:

> California is in the midst of a period of reconstruction,—that is evident in all lines of activity,—and a fundamental phase of it is the work of rebuilding and modernizing her principal highways. A State with 130,000 motor vehicles; with a thousand and one remarkable sights for tourists scattered over 1000 miles on level stretches and 3000 miles along the ocean and over the mountains; with a climate that makes life indoors almost immodest at any time of the year; with Yosemite, the Lassen Volcano, the Big Trees, the Mission sites and traditions, the Seventeen-mile Drive, and one hundred and one Ramona's marriage places; and with room and resource for a nation's population—such a state would not be meeting her twentieth century responsibilities without a modern and adequate system of highways.[241]

Harrison's description in 1915 emphasized the importance of the automobile to California's growing tourist industry. By the 1920s, federal, state, and local road construction projects had emerged as one of the largest employers of workers in the United States.[242]

Roads and highways required more than just road bases and surfacing. They also required bridges over stream crossings, cuts, fills, drains, curbs, gutters, encroachments, berms, retaining walls, culverts, signs, monuments, and rest areas (Figure 103). While bridges have been addressed in a number of studies prepared by Caltrans beginning in the 1980s, for the purposes of this study, they are treated as features, along with other engineering characteristics identified within a specific road or highway segment.[243]

One of the most important engineering features of any road or highway is its surface and subgrade. The history of surfacing roads or travel corridors dates at least to the Roman Empire. The use of "broken stone" is credited to J. L. MacAdam (1756–1836), a Scottish inventor. MacAdam applied broken or

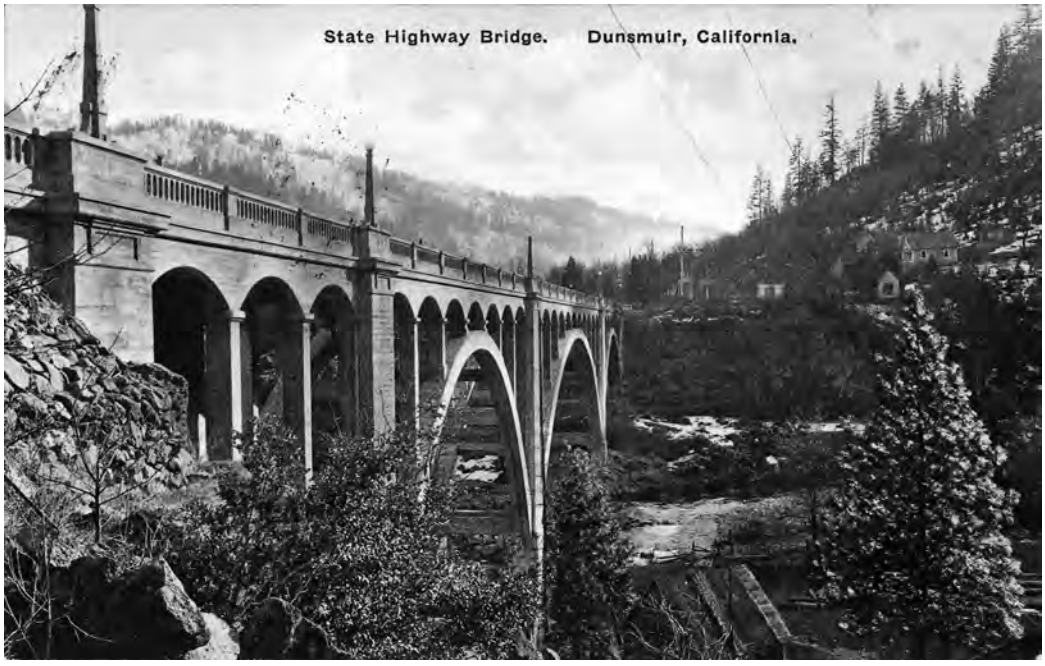

Figure 103. *Dunsmuir reinforced concrete arched bridge following completion in late 1910s (Bedford Collection, Caltrans Transportation Library, Sacramento).*

[241] George B. Harrison, "Roads and Highways of California," *California Magazine* 1, no. 1 (1915): 227.
[242] *Sausalito News* 38, no. 19 (May 13, 1922).
[243] Stephen D. Mikesell. *Historic Highway Bridges of California*. California Department of Transportation: Sacramento, 1990.

Figure 104. *Screening a gravel road surface using hand-equipment, San Diego, 1913 (Caltrans Transportation Library, Sacramento).*

crushed stone over a packed road surface to form a solid bed for the transport of people and materials. In later years his technique was improved with the use of oil or other bonding agents to form an asphalt-like road surface. In the late 1700s and 1800s, the macadam process consisted of placing crushed stones or cobbles (macadam) on a prepared, dry-earth roadbed. Heavy equipment rolled over the crushed stones in order to compress the surface (Figure 104). In 1823, the first American macadam road was reportedly created along the Boonsboro Turnpike, between Hagerstown and Boonsboro, Maryland. A similar macadam surface was used the same year along the National Pike or Cumberland Road.[244] During the late nineteenth century, machinery was invented for pulverizing stones. One of the inventors was a local man named Samuel N. Knight, who ran a foundry in Sutter Creek, Amador County, California. The "Knight Macadamizing" machine not only broke down the rock that would be used for surfacing but also spread the prepared road with the crushed rock to the desired width and thickness.[245]

By the early 1900s, compressed-gravel or macadam-surfaced roadbeds were often covered with a layer of asphalt, tar, or water, or sometimes, a fine aggregate was rolled on top of this coating, which did not penetrate the entire base (see Figure 104).[246] The use of bituminous binder helped seal the macadam together and prevented cracking or damage to the roadbed from sustained vehicular use. Severe weather conditions, particularly snow and ice, however, resulted in a more rapid decline in the surface of a bituminous macadam roadbed.

[244] Margaret Stewart-Zimmerman, "Ohio Migration Trails" (map), http://homepages.rootsweb.ancestry.com/~maggieoh/Gwen/migration.htm; Curbstone Corporation, *Curbstone Presents: The American Road; 1823: First American Macadam Road*, http://curbstone.com/_macadam.htm; John Loudon McAdam, *Remarks on the Present System of Road Making with Observations, Deduced from Practice and* Experience, 8th ed. (London: Longman, Hurst, Rees, Orme, Brown, and Green, 1824), available from Google as an electronic book, http://books.google.com/books?id=a9RMAAAAYAAJ.

[245] *Amador Ledger* April 27, 1894 and April 6, 1894; Knight Foundry, http://knightfoundry.org/; American Society of Mechanical Engineers (ASME), "Historic Knight Foundry: A National Historic Mechanical Engineering Landmark (1995)," ASME, http://files.asme.org/ASMEORG/Communities/History/Landmarks/5584.pdf; ASME, "Knight Foundry and Machine Shop, Landmark 182," ASME Landmarks, https://www.asme.org/about-asme/who-we-are/engineering-history/landmarks/182-knight-foundry-and-machine-shop.

[246] Kornelis Smit, *Means Illustrated Construction Dictionary* (Kingston, MA: R. S. Means, 1985), 311.

The use of bitumen or oil-based surfacing for roads likely began in the nineteenth century. Oil-based products were used as binders for thousands of years. One of the earliest recorded uses of bitumen dates to roughly 6000 b.c., when it was used as waterproof surfacing for ships.[247] The exact mixture of bitumen varied from one project to another, depending upon technology, cost, and surface conditions. Bituminous or bitulithic mixtures were given various trade names over the years, including asphalt and concrete asphalt, but all were oil- or petroleum-based products (Figures 105 and 106).

Figure 105. *Bituminous asphalt surface in Riverside County (California Division of Highways 1958, 20).*

Figure 106. *Interurban oil-based and compacted, divided road surface near San Francisco, 1930s. Note the interurban railroad grade in the center of the roadway (California Division of Highways 1932).*

[247] Refined Bitumen Association, "Bitumen History," http://www.bitumenuk.com/bitumen.asp; see also A. H. Hinkle, "Bituminous Retread Pavements," *Highway Engineer and Contractor* (June 1, 1931), 49–54.

One of the most important objectives of improving California's roads and highways was to construct good surfaces, particularly those that were suitable for automobile use. Prior to 1900, virtually all road or highway surfaces were packed dirt or macadam. The exceptions were plank roads built throughout the state in order to cross areas with unstable soils or, in the case of Imperial Valley, sand dunes. While there were sporadic attempts at laying down a bituminous surface and watering roads to prevent dust, most nineteenth-century roads were minimally suitable for automobiles. At first, road improvements were a joint effort between state and federal agencies, with the brunt of maintenance falling on the state. Beginning in 1913, the California owners of all motor vehicles paid registration fees, part of the revenue from which was divided between the county of registration and the CHC, for road maintenance.[248]

Figure 107. *State Highway 101, with typical asphalt or asphalt-concrete paving, near the turnoff to Tiburon, 1931 (courtesy of the Lucretia Little History Room, Mill Valley Public Library).*

In California, at least during the first quarter of the twentieth century, the California Division of Highways supported at least eight road surfaces. They included a simple graded surface, an oiled surface, a single-course gravel road surface, a double-course gravel road surface, an asphalt or Topeka macadam surface, a Portland cement–concrete base, a reinforced-concrete base, and an asphalt-concrete base.[249]

An oiled surface was often labeled "bitumen" or "bituminous," referring to a natural or synthetically rendered mixture of hydrocarbons extracted from coal or petroleum.[250] The terms are often used in a more general way to describe any bituminous material, including tar or asphalt-concrete paving (Figure 107). Early-1900s-era road construction standards specified that the material needed to be heated between 300° and 400° F, after which it was applied to a prepared road surface. However, application could only occur during the daytime, when temperatures were above 65° F.[251] When a bituminous surface was combined with a broken or crushed-stone or compacted-gravel bed, the surface was referred to as a "bituminous macadam surface."

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[248] Kenneth Adams, "Start of Highway System," *California Highway and Public Works: Centennial Edition* September 9 (1950): 77–79.

[249] California Highway Commission, *Biennial Report of the California Highway Commission* (Sacramento, CA: California State Printing Office 1922), 27. In 1824, Joseph Aspdin, a bricklayer and mason in Leeds, England, took out a patent on a hydraulic cement that he called Portland cement because its color resembled the stone quarried on the Isle of Portland, off the British coast. Aspdin's method involved the careful proportioning of limestone and clay, pulverizing them, and burning the mixture into clinker, which was then ground into finished cement (William Buckley, "Traditional Mortars: A History of Cement," online reprint, Buckley Rumford Fireplaces, with permission from the Portland Cement Association, http://www.rumford.com/articlemortar.html).

[250] National Association of Women in Construction, *Construction Dictionary* (Phoenix: National Association of Women in Construction, Greater Phoenix Area Chapter No. 98, 1991), 59; Smit, *Means Illustrated Construction Dictionary*, 51.

[251] The National Asphalt Pavement Association has provided a rather detailed account of the early development of asphaltic paving materials in *History of Asphalt*, http://www.asphaltpavement.org/index.php?option=com_content&view=article&id=21&Itemid=41; see also Pavement Interactive, "Pavement History," *Pavement*, Pavement Interactive, http://www.pavementinteractive.org/article/pavement-history/. The site provides a brief discussion of the technical aspects of paving design and includes illustrations.

A report in the *Pacific Rural Press* in 1921 noted the need for wider road surfaces and the fact that the California State Automobile Association (CSAA) and the ACSC were still major players in the planning and engineering of the state's roads and highways:

> Greater width of State highway pavements is of extreme importance as reported by the engineers of the California Automobile Association and the Auto Club of Southern California after their recent exhaustive study of the highways of California. Modern motor trucks with eight-foot bodies cannot pass on 15-foot pavements without inviting collision. The width of all double-track, highways should never be less than 18 feet [on straight lines] they should be wider on curves and grades. Future traffic demands a width of 20 feet for every important road. Wherever traffic is heavily congested, pavement widths should be not less than 24 feet. In the case of wider roads and rock or gravel shoulders, the moisture content of the pavement foundation soils had to be more uniform, the shoulders would be subjected only to turn-out traffic, and a longer span of life under proper maintenance could be expected, because varying moisture of sub grade permits cracking and breakage at weak points and narrow pavements with no hard shoulders get bad jolts when loaded trucks turn off and on to them.[252]

Asphalt is another term that is used to describe a road surface, as opposed to the technically correct term *asphaltic*, as in "asphaltic macadam."[253] In the 1920s, asphaltic concrete was a surface characterized by a crude asphaltic petroleum applied onto a prepared dirt surface.[254] Generally, *asphalt* is used to describe a mixture of an asphaltic substance combined with an aggregate, which, while hot, would then be spread onto a prepared roadbed and rolled from two to four inches thick, commonly called "blacktop."[255] Since it is premixed, the asphaltic coating on the aggregate has a homogenous appearance throughout the thickness of the material.

Concrete produced with Portland cement is largely a product of the twentieth century and is a more-durable, longer-lasting material than nineteenth-century concrete. A reinforced-concrete base consists of concrete with wire mesh (for regular use) or steel plates (for heavy truck use) that is laid into the mixture either prior to pouring or when the concrete is laid down.[256]

Experimentation with concrete occurred in the 1910s in various parts of the United States. In 1922, the CHC noted that "while the prevailing type of road constructed in California has been of the cement concrete base type, the Commission is strongly of the opinion that there is not one universal type of road."[257] The commission went on to state that the "type of improvement to be selected for any road depends upon the "subgrade, the probable traffic along that road, and the amount of money available" (Figure 108).[258]

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[252] *Pacific Rural Press* 101, no. 7 (February 12, 1921).

[253] Smit, *Means Illustrated Construction Dictionary*, 28.

[254] National Asphalt Paving Association, *History of Asphalt*; Pavement Interactive, "Pavement History," http://www.pavementinteractive.org/article/pavement-history/.

[255] Ibid; California Division of Highways, "Roadside Rests: 250 Units Will Be Built within Next Seven Years," *California Highways and Public Works* (September–October 1964," 58.

[256] Pavement Interactive, "Pavement History, http://www.pavementinteractive.org/article/pavement-history/, accessed August 2015;" Earl Withycombe, "Record for 1925 shows Remarkable Increase in Strength of California Pavement," *California Highways* 3, no. 3 (March 1926): 3–4.

[257] California Highway Commission, *Part II Report of the California Highway Commission*, *a Subdivision of the Department of Public Works of the State of California, to Accompany the First Biennial Report of That Department, November 1, 1922* (Sacramento, CA: California State Printing Office, 1923), 27.

[258] Ibid.

Figure 108. *Concrete highway, Orangevale, Sacramento County, 1917 (Caltrans Transportation Library, Sacramento).*

Equally important as road surfacing, were the structures built to retain and stabilize the actual roadway. One of the oldest and most common roadway structure was the retaining wall. Retaining walls are structures built to hold back the lateral pressure of rock or soil behind them.[259] During the nineteenth century, most of the retaining walls built in the United States were dry-laid-fieldstone and, later, cement-mortared retaining walls. Both dry-laid-fieldstone and mortared-fieldstone retaining walls have been recorded along Sierra Nevada highways, including U.S. 50 east of Placerville and Interstate 80 (old U.S. 40) near Donner Summit.

Between 1858 and 1907, along abandoned alignments of U.S. 50, can be found dry-laid-fieldstone and mortared walls.[260] The post-1907 sections of rock walls also included terra-cotta-pipe culverts likely manufactured by Gladding McBean Company in Lincoln, Placer County, California.[261] These walls and other highway engineering features, such as granite-faced culverts, are ubiquitous in mountainous regions and were used when no other economically feasible solution could be found.[262]

[259] Smit, *Means Illustrated Construction Dictionary*, 415.

[260] Steven D. Mikesell, *Historic Overview of Old U.S. 50*, *1895–1940, P.M. 30.7/67.8, EA 03-910076* (Sacramento, CA: Caltrans, 1990), 22–23.

[261] Lortie, *Drainage and Runoff System at Old U.S. 50*, *in the Double Bridge Segment, El Dorado County, 03-ELD-50, P.M. 44.7, EA 0A4401* (Sacramento, CA: Caltrans, 1997), 6–7. A culvert is a structure that allows water to flow under a road, highway, trail, or similar transportation feature. Typically embedded so as to be surrounded by soil or rock, a culvert may be made from iron, steel, aluminum, clay pipe, reinforced concrete, or, more recently, plastic. Culverts may also be used to form a bridge-like structure to carry traffic. Culverts may be round, elliptical, flat-bottomed, pear-shaped, or of a box-like configuration. Open-bottom corrugated-steel structures are often built on concrete footings.

[262] Michael V. Speer, *Historical Report on Rock Retaining Walls*, *01-DN-199, P.M. 2.5/31.3, EA 01-199220* (Sacramento, CA: Caltrans, 1983).

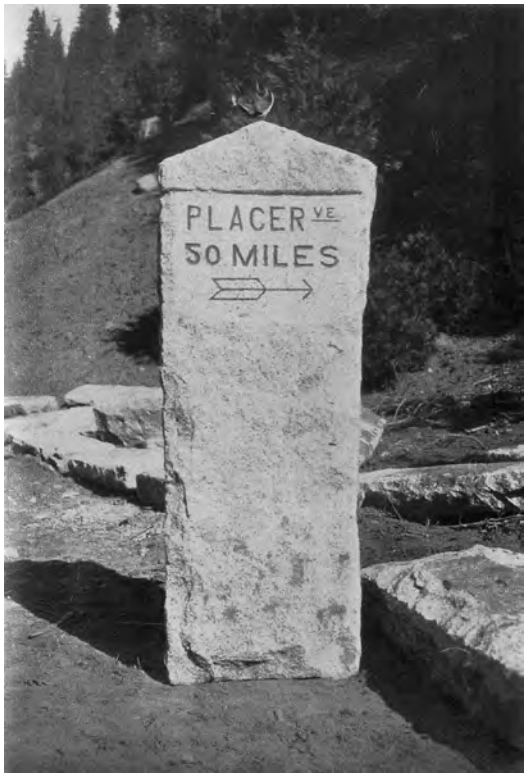

Figure 109. *Concrete milestone marker along old U.S. 50, east of Placerville, ca. 1900, before placement. The markers date to ca. 1907 and were made by inmates at Folsom Prison from local granite obtained near the prison grounds (Caltrans Cultural Studies Office, Sacramento).*

Figure 110. *Typical cut-and-fill and culvert construction along San Diego 200 (SR 94), 1934. Note the concrete-masonry headwall that was common through the 1910s–1930s (Caltrans Transportation Library, Sacramento).*

Figure 111. *Concrete headwall on a highway culvert in Mendocino County, 1950 (Caltrans Transportation Library, Sacramento).*

During the early 1900s, the route between Placerville and Lake Tahoe was marked with hand-split and -chiseled granite markers denoting the mileage between the two locations. Prisoners incarcerated at Folsom Prison fabricated the granite stones. (Figure 109).

During the 1910s, the California Division of Highways developed a concrete box culvert that became the standard by the 1920s.[263] By 1933, this type of concrete culvert, along with L-shaped-headwall culverts, were used on many state highways through the 1950s. (Figure 110).[264] By the 1940s and 1950s, concrete headwalls on culverts became common (Figure 111). After 1950, culverts were generally built of ferrous (galvanized-metal) corrugated pipe.

[263] Frank Lortie and Thad Van Bueren et al., *Highway Rehabilitation of State Route 49*, 16.
[264] Ibid.

Figure 112. *Highway "C" post marker, Wildwood Glen Lane, near Exit 40, I-8, California 79, San Diego County, old U.S. 80, 1926–70 (courtesy of Joel Windmiller, LHA, California Chapter).*

A ubiquitous highway monument designed by the California Division of Highways is a concrete block that measures 1 m (3½ feet) high and 15-cm- (6-inch-) wide posts, each with a "C" recessed on one face and a copper wire set into the center top. Between 1914 and 1934, the CHC and the California Division of Highways used the concrete "C" markers, which were partially buried, to mark the right-of-way boundaries between lands managed by the division and lands owned by private parties, companies, or other agencies (Figures 112 and 113).[265]

Besides materials, road and highway design was also important in addressing safety and traffic flow. During the late 1920s, the design of the road prism evolved depending upon the circumstances of the roadway and the surrounding built environment, including a standard 160–170-foot right-of-way.

Figure 113. *Highway "C" post markers being prepared for installation in 1914 (Caltrans Transportation Library, Sacramento).*

[265] The California Highway Commission was created in 1911. C markers can still be found along many of the state's older highways. Springs Museum: History, Art, and Community. "Wonders and Marvels." http://springsmuseum.org/wonders-and-marvels/, accessed July 2015.

Features usually associated with early freeway design include a designed landscape; a comparatively narrow roadway and right-of-way, usually with four lanes and room for expansion; narrow shoulders; and a wide, landscaped center median. Other design characteristics include a tight curve radius alongside on- and off-ramps, comparatively short off-ramps, on-ramps that are each generally one lane wide, and short approach ramps for traffic entering the freeway. Engineering included "T"-type overcrossings on portals for tunnels, a few of which were embellished or ornamented in the period architecture of the time, such as Art Deco or Art Moderne.[266]

Changes in freeway design occurred quickly in California, as highway planners frantically tried to keep up with the tremendous expansion in the popularity of the automobile and freeway driving in the 1950s and 1960s (Figure 114). There was a considerable amount of pressure to build freeways as rapidly as possible, to handle the tremendous growth of suburban housing and commercial developments around the state's three major metropolitan areas: the San Francisco Bay Area, Los Angeles, and San Diego.

Figure 114. *Built in 1953, the iconic concrete ribbon known as the "Stack" binds the 101 and 110 freeways in Los Angeles (Caltrans Transportation Library, Sacramento).*

[266] Lortie. *Road and Highway History Notes*. Sacramento, CA: Caltrans, 2002.

An engineering feature of modern freeway design, first introduced in Los Angeles, was a four-level interchange, commonly known as "the Stack," which came to symbolize the vision of the sterile and intimidating, concrete-and-steel freeway landscape (see Figure 114).[267]

One of the first causalities of accelerated freeway development was beautification in the form of landscaping and ornamental architecture. During the early decades of automobile travel, highway planners sought to build attractive roadways to enhance the cause of pleasure driving. Much of the early "auto touring" emphasized the benefits of sightseeing and appreciating rural landscapes and grand vistas. Enjoying the drive to the destination was considered almost as important as the satisfaction of arriving at one's destination in a safe and expeditious manner.

Engineers and highway planners used the term "parkway" and "freeway" interchangeably during the 1930s. When traffic volumes increased substantially from the late 1940s, however, there was new focus on constructing limited-access, "no-frills" motorways in the most efficient and economical way feasible.[268] These conflicting motives came to the forefront during the planning of the Arroyo Seco Parkway (or Freeway) in Pasadena (Figure 115). A compromise was reached, in that the residents around Arroyo Seco received a designed landscaped roadway in the arroyo, and the civic leaders of Los Angeles got their high-speed expressway that could efficiently move large numbers traffic around the metropolitan area south of the arroyo, nearer to downtown.[269]

Figure 115. *Arroyo Seco (Pasadena) Freeway, offramp not long after its completion, 1940s. Note the decorative lamp posts, and bridge railing detail (Caltrans Transportation Library, Sacramento).*

[267] Ibid.
[268] Ibid.
[269] Ibid.

Architectural beautification along the Merritt Parkway in Connecticut featured dozens of Art Deco overcrossings designed by New York architect George Dunkelberger, and the Pennsylvania Turnpike incorporated Modernistic designs into portal headwalls, tunnels, and ventilation buildings, as well as overcrossings. Renderings of the overcrossings on both the Arroyo Seco and Cahuenga Pass Freeways reflect the same concern for artistic enhancement of the roadway.

When the Cabrillo Freeway was completed in early 1948, a minimalist approach was taken to freeway infrastructure and design. However, careful attention was paid to the landscaping along the freeway, particularly within Balboa Park (Figure 116). Along the route leading to Mission Valley hundreds of species of native and exotic trees, shrubs, and ground cover were planted. One reason for the attention to landscaping was to address public criticism minimizing blight so close to the park. Moreover, San Diego had always taken pride in its mild, Mediterranean climate. So, the Cabrillo Freeway would be landscaped to showcase the region's natural beauty. Residential development of Linda Vista, on Kearney Mesa, expanded after World War II, enhanced by expansion of the naval air station. New growth resulted in traffic congestion, which influenced freeway planners to focus on building convenient and safe motorways suitable for large volumes of traffic, with little concern for aesthetics in areas where the lack of beautification would not be a potential public-relations problem.[270] At the time of the construction of the Cabrillo Freeway, road-building equipment had advanced technologically and large earthmoving machines could cut through or fill up almost any natural obstacle in the path of construction. As a result of the growth in the postwar economy and population freeway rights-of-way expanded to address traffic volume.[271]

Figure 116. *Cabrillo Freeway section of a new freeway through Balboa Park in San Diego, February 1948 (Caltrans Transportation Library, Sacramento).*

[270] Ibid.
[271] Ibid.

Associated Trail and Roadside Resources

Roadside resources vary dramatically from one trail, road, or highway to another. Associated roadside resources include those built for and designed by local, state, or federal agencies and those built or designed by the private sector for commerce, trade, and recreation. Roadside resources are not limited just to roads and highways, but also include trails. Trade routes, emigrant trails, and, later, recreation trails included way stations or hostelries (Figure 117), toll stations, and other improvements that serviced the trail itself or the users of the trail.

Urban roads and highways include a wider variety of privately financed and operated roadside resources than rural highways, such as those in the mountainous regions of the state or the desert that required public-agency funding and participation. Roadside resources built by the private sector include service stations, inns, restaurants, motels, automobile camps, campgrounds, and picnic areas. Agency-built roadside resources, not to be confused with the actual road surface itself or other features located in the actual road prism, are generally part of the larger infrastructure of the road system, such as maintenance stations, signage, sidewalks, lighting, water fountains, scenic overlooks and vistas, and other forms of landscaping.

Figure 117. *Freight wagons fully loaded for the Comstock mines at Webster's Station (south of Kyburz near U.S. 50) along the Ogilby Toll Road, ca. 1866 (Courtesy of the Lawrence & Houseworth Collection, Library of Congress, Prints and Photograph Division, LC-USZ62-27509).*

Roadside resources often referred to as roadside "attractions," date to the very beginning of road and highway construction in the United States. During the eighteenth century, inns or hostelries were built alongside trails, roads, or highways, providing meals, provisions, and overnight lodging. This trend continued unabated through the twentieth century, as inns grew much larger and attempted to accommodate the evolving users of the roads, including motorists by the early 1900s.

ROADSIDE INNS, HOSTELRIES, AND TOURIST AND AUTOMOBILE CAMPS

The ubiquitous roadside inn or hostelry evolved during the eighteenth century from largely functional features into aesthetic attractions whose designs reflected the culture of a roadway and the types of users along the course of a road. While the concept of tourist cabins and courts date to the late nineteenth century, it was after 1900 that this form of roadside feature gained popularity, in response to new road and highway construction and the development of the automobile. [272]

Providing services beyond sleeping quarters, most eighteenth and nineteenth-century hostelries and inns offered the basic necessities such as food and drink. In 1859, U.S. Treasury Agent J. Ross Browne described accommodations he experienced while traveling in the Sierra near Strawberry Station east of Placerville:

> *Owing to repeated stoppages on the way, night overtook us at a place called "Dirty Mike's." Here we found a ruinously dilapidated frame shanty, the bar, of course, being the main feature. Next to the bar was the public bedroom, in which there was every accommodation except beds, bedding, chairs, tables, and washstands; that is to say, there was a piece of looking-glass nailed against the window-frame, and the general comb and tooth-brush hanging by strings from a neighboring post. A very good supper of pork and beans, fried potatoes, and coffee, was served up for us on very dirty plates, by Mike's cook; and after doing it ample justice, we turned in on our blankets and slept soundly till morning. It was much in favor of our landlord that he charged us only double the customary price. I would cheerfully give him a recommendation if he would only wash his face and his plates once or twice a week.*[273]

In circa 1866, Thomas Houseworth photographed the Strawberry House along the Placerville–Virginia City Toll Road (present-day U.S. 50) that featured a unique pass-through, free from rain and snow, where hay and feed could be transported to and from stages and freight wagons passing underneath (Figure 118).

During the early 1900s, as stages and wagons gave way to automobiles and auto-stages, older inns and hostelries transitioned into tourist resorts and automobile camps. As the old roadside inns decayed newer accommodations were notably different, offering amenities desired by motorists.

Motor or tourist cabins, camps, and courts built during the first four decades of the twentieth century were often located away from the center of town and adjacent to the road or highway. Camp spots, cabins, or courts were oriented in a manner to allow automobiles to park adjacent to their respective rental

[272] For additional information on tourist and automobile camps, refer to Tina Werbizky, "How Many Tourist Camps and Courts Were There" *SCA News Journal* 12, no. 2 (Winter 1992); John Margolies, *Home Away from Home: Motels in America* (New York: Little, Brown, 1995); Warren James Belasco, *Americans on the Road:From Auto Camps to Motels, 1910–1945* (Cambridge, MA: MIT Press, 1979).

[273] Browne, "A Peep at Washoe," 11.

Figure 118. *Strawberry Valley Station/Strawberry House, along the Placerville–Virginia City Wagon Road, ca. 1866 (courtesy of the Lawrence and Houseworth Collection, Library of Congress, Prints and Photographs Division, Washington, DC, LC-USZ62-26899).*

units, and many had attached carports. Many of the early tourist camps had communal bathroom facilities, as opposed to motels, where each unit generally had its own bathroom facility.[274]

Many of the tourist cabins, camps, and courts were family-owned businesses, rather than franchises, which were common throughout the motel industry in later years. As John Margolies noted, "the auto court represents more than a different mode of accommodation. It stands as a new way of life in tourism - a way that combines convenience, inexpensiveness and informality" (Figures 119 and 120).[275]

Perhaps the most visually notable aspect of motor courts, and later motels, is the creative signage employed to draw tourists to the businesses. The sign also became a symbol for the motorist and one of the first signals upon entering a community or locale providing specific services, such as overnight accommodations.[276]

[274] Margolies, 9; Ralph Edward Newlan and Laura Caffrey, *Historic-Age Motels in Texas: from the 1950s to the 1970s: An Annotated Guide to Selected Studies.* Historical Studies Report No. 2011-11 (Austin, TX: Texas Department of Transportation, Environmental Affairs Division, Historical Studies Branch, March 2011).

[275] Margolies, 9.

[276] Ibid, 10–13.

Figure 119. *Karnes & Clotfelter Cottages "auto camp," Kern County, ca. 1920s (Kern County Local History photograph collection, Kern County Library, Bakersfield, California).*

Figure 120. *Perry Auto Camp, Live Oak, Sutter County, ca. 1930s (courtesy of the Sutter County Library, Sutter County Local History Photograph Collection).*

DRIVE-INS, SUPERMARKETS, SHOPPING PLAZAS, FOOD COURTS, AND RESTAURANTS

During the first three decades of the twentieth century, growing demand along the nation's roads and highways led to the creation of restaurants and food courts. In southern California, the iconography emulated popular culture of the time and included giant hot dogs, chickens, hamburgers, dogs, and fruit. By the 1940s and 1950s "space age" design was adopted to food courts and restaurants (Figure 121).

Figure 121. *Tiny's Drive-In in San Jose, its rounded architecture is typical of the 1950s (courtesy of Arnold Del Carlo, Sourisseau Academy for State and Local History, San Jose State University).*

The drive-in market became a ubiquitous roadside feature across California, driven by the sale of automobiles and the convenience of parking in front of the marketplace.

Another form of roadside attraction was the ubiquitous truck stop. Truck stops were largely a product of the post-1930s, when diesel engines became more common, and truck manufacturing and transport increased. Another factor was weight, and as bridges and roads became more suitable for truck transportation, entrepreneurs followed by building roadside stops that offered drivers fuel, food, and often overnight accommodations, including bathrooms and showers. Truck stops also required ample room to maneuver the large vehicles and for vertical clearance when fueling, and earned a reputation for cheap, paltry food, many staying open 24 hours (Figure 122).

Figure 122. *Sam Bens and Noah Booher, drivers for Associated Transport Company, having dinner with a textile-mill truck driver at a highway truck stop along U.S. Highway 11, near Wytheville, Virginia (courtesy of the Library of Congress, Prints and Photographs Division, Washington, DC, Farm Security Administration - Office of War Information Photograph Collection, LC-USW3-020370-D).*

Richard Longstreth, in his book, *The Drive-In, the Supermarket, and the Transformation of Commercial Space in Los Angeles, 1914–41*, made a compelling argument that the development and improvement of roads and highways was instrumental in shaping both urban and suburban culture in Los Angeles. As Longstreth pointed out, "the drive-in market helped create a new relationship between motorist and store, with the forecourt serving as an entry."[277]

This relationship between the vehicle and the store evolved into new configurations for drive-in markets, as well as other types of roadside commercial structures (Figure 123). Ultimately, the vehicle, rather than the pedestrian, garnered favor, and vehicular access became a critical component of building design and site planning. In turn, road and highway planners recognized the importance of roadside businesses and began to re-examine circulation patterns, shoulders, curbs, sidewalks, and parking.

GAS OR SERVICE STATIONS

Walter Dorwin Teague is credited as one of America's first designers of the "modern" standardized service or gas station.[278] While Teague was the progenitor of standardized gas or service stations, the idea of structures designed to support vehicles, whether providing gas or mechanical services, dates to the early 1900s.[279]

Prior to 1910 gasoline was generally dispensed from barrels, and car owners often carried excess gasoline in canisters mounted to the bodies of their cars. Underground gasoline tanks were not commonplace until the 1910s.[280] During the 1910s, specialized service stations began to appear selling gasoline and lubricants, and offering drivers service directly off the street (Figure 124).

[277] Richard Longstreth, *The Drive-in, the Supermarket, and the Transformation of Commercial Space in Los Angeles, 1914–1941* (Cambridge, MA: MIT Press, 1999), 46.
[278] Olson, "Walter Dorwin Teague and the Texas Company."
[279] Parker, "Fill 'Er Up"; Jakle, "The American Gasoline Station."
[280] Partridge, *Fifty Years of Motoring*, 151–52; Shuman, *The Petroleum Industry*, 128–29.

Figure 123. *PW Market along Alum Rock Avenue, San Jose, California, ca. 1950 (courtesy of Arnold Del Carlo, Sourisseau Academy for State and Local History, San Jose State University).*

Figure 124. *Jennings Service Station, Loma Linda, California, 1930s (courtesy of the California Room, San Bernardino Public Library, San Bernardino, California).*

Prior to 1920, most gas stations provided gasoline and lubricants and, in some cases, repairs. There were exceptions, where mom-and-pop rural businesses were combined to sell merchandise and gasoline. By 1930, there were reportedly 121,513 filling stations in the United States, at least those primarily engaged in the sale of gasoline and petroleum products.[281]

As automobile use expanded so did the need for gas or service stations. Gas or service stations became some of the most ubiquitous roadside features in California. By the early 1920s, gasoline stations dotted the greater Los Angeles Basin.[282] By the late 1920s and early 1930s, nearly every town had a gasoline or service station. Early-day gasoline stations served a variety of needs and were often run by semiprofessional mechanics and service providers (Figure 125).

The development of the gas or service station revolutionized the automobile industry and paved the way for expanded car ownership. Many of the early-day gas or service stations also provided other services, including the sale of foodstuffs, produce, and automobile parts. The trend continued through the present day. In California, the days of service assistants at "full-service" gas stations, pumping gas, checking the oil, and cleaning the windows, came to an end in the 1970s (Figure 126).

Figure 125. *Long and Pyle Mobilgas service station, Porterville, California, 1940 (courtesy of the San Joaquin Valley Digitization Project, Porterville City Public Library).*

Figure 126. *Flying A Service station, San Jose, 1956 (courtesy of Arnold Del Carlo, Sourisseau Academy for State and Local History, San Jose State University).*

[281] U.S. Census Bureau, *Retail Trade*, 25.06; Beckman, "Brief History of the Gasoline Service Station."
[282] Longstreth, *The Drive-In, the Supermarket*, 3–4, 14.

Several states, such as New Jersey and Oregon, still require full-service stations, prohibiting private individuals from pumping gas.[283]

ROADSIDE REST AREAS AND OTHER RELATED IMPROVEMENTS

During the late nineteenth and early twentieth centuries, besides the trail, road, or highway itself, there were other transportation-related improvements that flanked a travel corridor, some created by the users themselves, while others were built by private owners whose lands had been bisected. Later, roadside rest areas were often designed and built by local, state, and federal governments.

Early trail or roadside improvements included developed springs, turnouts, and unofficial rest areas. Designed improvements included traffic signs or signals, drinking fountains, rest areas, and scenic turnouts (Figures 127 and 128).

Domestic and vehicular water sources were critical for the motoring public, particularly in mountainous or desert terrain. Early-day vehicles required water to address overheating of engines in regions of the state that were either hot or required climbing steep hills or mountains. Along many highways, springs provided piped water.

Figure 127. *Grotto drinking fountain on Crest Drive, near Mormon Slide, in San Bernardino County, January 1, 1934 (Caltrans Transportation Library, Sacramento).*

Figure 128. *A primitive roadside spring from the 1930s. Note the iron pipe with a continuous outflow of spring water and bucket to supply water for passing motorists (California Division of Highways, California Highway Roadside Beautification Survey: Progress Report, 1932).*

[283] For an example of a service station that was evaluated as an archaeological resource, refer to Karen Swope, *Archaeological Survey and Historic Resources Evaluation Report for Joint Port of Entry* (San Bernardino: Caltrans). For a statewide typological study of gas stations, refer to W. Dwayne Jones, *A Field Guide to Gas Stations in Texas,* Historical Societies Report No. 2003-03, series ed. Bruce Jensen (Texas Department of Transportation, Environmental Affairs Division, Historical Studies Branch, Buda, TX: Knight & Associates, October 2003), http://ftp.dot.state.tx.us/pub/txdot-info/env/toolkit/420-05-gui.pdf.

Nineteenth- and early-twentieth-century roads and highways required turnouts to allow through traffic to pass. In the Sierra Nevada, freighters and stagecoach drivers hung bells from the wagons or coaches to alert approaching vehicles of their presence, in order to avoid collisions. During the twentieth century, passing lanes were built, and roads were expanded to four lanes, some with grade separations, in order to avoid collisions.

Figure 129. *Rural highway in San Luis Obispo County under construction, 1923 (California Division of Highways, San Luis Obispo County (SLO) 56A, Contract 331).*

As tourism grew in California, the motoring public sought turnouts along the state's roads and highways, to picnic or simply rest during the course of their trip. Some of these locations developed into official roadside rest stops with developed picnic areas and campgrounds. In the United States and California, roadside signage and, later, signalization were originally developed by automobile clubs and local governments. In later years, the California Division of Highways was authorized to oversee these types of improvements and to develop design standards.

Roadside beautification came to fruition in California in the late 1920s and 1930s and included development of scenic vistas, such as along State Route 1 or the Coastal Highway. Construction began on State Route 1 between Carmel and San Simeon in 1922, with the assistance of convict labor crews. The highway finally opened in 1937, 15 years later.[284] The highway was one of the most challenging constructed in the United States at the time, because of its proximity to the ocean, steep cliffs, erodible soils, and extremely poor access (Figures 129 and 130).

Figure 130. *Roadside scenic vista on Highway 1, along Big Sur coast, 1930s (California Division of Highways 1932).*

[284] Robert C. Pavlik, "Historical Overview of the Carmel to San Simeon Highway" In *Historic Resource Evaluation Report on the Rock Retaining Walls, Parapets, Culvert Headwalls and Drinking Fountains along the Carmel to San Simeon Highway*. San Luis Obispo, CA: California Department of Transportation, November 1996.

Automobile travel and recreation played an important role in the daily lives of thousands of Americans, and "motor tourism" gained popularity throughout the United States, particularly in California, because of its mild climate. The California Division of Highways was responsible for building the recreational scenic roadways desired by many travelers. Subsequently, safe areas for motorists to pull over and stretch their legs, eat their lunches, and plan their routes grew in importance.

Prior to any formalized rest area program, motorists would simply pull to the side of the road, potentially creating pedestrian- and motorist-safety issues. Consequently, three major highway programs were instituted over three decades to curb roadside-safety issues as well as develop beautiful transportation routes throughout California - the 1931 Highway Roadside Beautification Program, the 1957 Division of Beaches and Parks pilot roadside rest area program, and the 1963 Safety Roadside Rest Area (SRRA) Program.

Prior to these programs, various women's clubs and other civic organizations attempted to beautify areas adjacent to state and county highways by planting trees, building parks, and constructing historic monuments, which served as roadside rest areas. Since the efforts were not widespread and depended on the whims of small organizations, the need for a statewide beautification program was detailed in 1931 Assembly Concurrent Resolution No. 34.[285] The resolution requested that the California Division of Highways and Beaches and Parks coordinate to develop a plan in which they would institute "small roadside parking and recreation areas."

In accordance with the resolution, the California Division of Highways, with help from the Division of Beaches and Parks and the U.S. Bureau of Public Roads, submitted a report to California Governor James Rolph, Jr., in November 1932. The report, entitled, "California Highway Roadside Beautification Survey, Progress Report 1932," detailed the development plan for roadside parking and recreational areas, which included roadside fountains, parks, and lookout points (Figure 131).

Figure 131. *Parking area off SR 20 at Blue Lake, in Lake County, July 1939. Note the granite-rock piers and metal chain railing. This railing type was used during the 1930s along many scenic highways (Caltrans Transportation Library, Sacramento).*

[285] California State Legislature, "Final Calendar of Legislative Business," 49th Session, 1931.

The report mapped preexisting recreational areas, including 15 highway parks, 20 lookouts, and 18 drinking fountains, as well as 50 proposed highway parks, 60 proposed lookouts, and 65 proposed drinking fountains throughout California.[286]

Highway beautification projects can be traced to the Great Depression relief program known as the Work Projects Administration (WPA). Using WPA funding, the California Division of Highways provided day-labor jobs to unskilled workers who contributed to highway construction and who likely built many of the fountains and lookout points.

By the 1950s, there were at least 89 roadside fountains, 111 historic-monument turnouts, and 150 lookout points among the works completed by the California Division of Highways, WPA-funded projects, and local civic organizations (Figure 132).[287] Since World War II many of these early roadside rest areas have been demolished.[288]

Figure 132. *Desert Oasis SRRA east of Barstow, in San Bernardino County, January 15, 1958. Built by the Division of Beaches and Parks in the typical design, with the pull-out and a ramada covering a few picnic benches (Caltrans Transportation Library, Sacramento).*

In June 1962, the Senate Fact Finding Committee on Transportation and Public Utilities requested that the Department of Public Works, California Division of Highways, produce a master plan for roadside rest areas throughout California. In October 1962, the report, entitled, "Master Plan and Estimate for a System of Roadside Rests in California," was finalized and forwarded to the Senate. The 1962 master plan outlined the criteria for site selection, rest-stop design, and recommended construction of 257 additional rest areas.

The master plan established criteria for the location of rest areas, mainly following the Division of Beaches and Parks recommendations. The plan also called for building rest areas in combination with other commercial facilities at half-hour intervals, at entrances to large metropolitan areas, on either side of high-volume highways of four or more lanes, and along smaller highways. According to the criteria, SRRAs "should be located in areas of scenic attraction . . . [or] in conjunction with points of scenic or historic interest."[289] Furthermore, vista points with small parking areas and trash receptacles adopted similar standards and criteria.

The 1962 master plan did not extensively outline the landscape or architectural design criteria of SRRAs, but stated that "materials which add a more natural appearance to the area should be used."[290]

[286] California Division of Highways, *California Highway Roadside Beautification Survey*, 33–53.
[287] Ralph L. Carhart, "Safety Roadside Rest Areas," Report, October 6, 1988 (on file, Caltrans Transportation Library, Sacramento), 1.
[288] Caltrans, "History of Rest Areas in California," http://www.dot.ca.gov/hq/LandArch/srra/index.htm.
[289] California Division of Highways, Memorandum, "Division of Highways Circular Letter No. 63-248" (Sacramento, CA: California Division of Highways, August 30, 1963), 2.
[290] Ibid.

For example, SRRA sketches display the use of log bumpers instead of precast concrete curbs. The master plan focused mainly on outlining the criteria to determine the size needed for a particular rest area. For example, small SRRAs were best suited for low-traffic-volume highways and provided two picnic tables and parking facilities for six cars. Medium SRRAs were designed for less-traveled, recreational routes and provided four picnic tables and parking for thirteen to eighteen cars and one to two trucks. Restroom facilities for small and medium-sized SRRAs were optional. Lastly, large SRRAs were proposed for heavy-traffic interstates or highways, and were designed with six to eight picnic tables and parking for twenty to thirty cars and four to six trucks. Restrooms were mandatory.

Foremost, SRRAs were for day and short-term use only. Extended visits were discouraged. It was recommended that lighting and electricity not be provided unless necessary, and cooking areas were prohibited.

In April 1965, the design policy was updated to include a more landscape and architectural design-oriented approach to SRRA design. It maintained that SRRA design should be simple and informal but also that "standardization is not desirable" (Figure 133).[291]

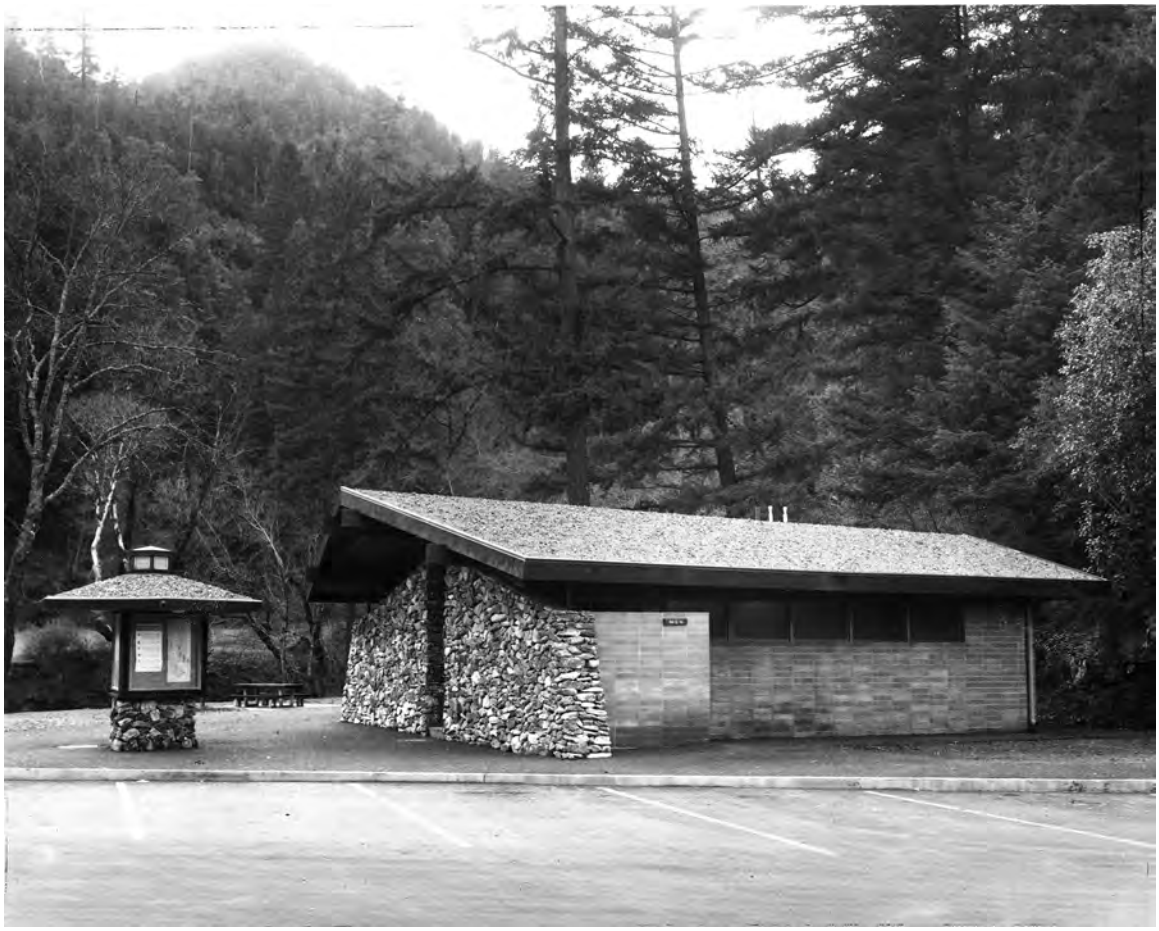

Figure 133. *SRRA in Mendocino County on Highway 101, January 17, 1969. Note the concrete-block walls, rock veneer, and matching information kiosk (Caltrans Transportation Library, Sacramento).*

[291] California Division of Highways, Memorandum, "Division of Highways Circular Letter No. 65-99" (Sacramento, CA: California Division of Highways, April 13, 1965), History files, Caltrans Transportation Library, Sacramento, 3.

In September 1963, the California legislature enacted Senate Bill No. 173 authorizing the construction of SRRAs on state highways, and construction began soon after. Table 3 lists the number of SRRAs built between 1963 and 1988. By October 1964, 16 SRRAs were open (11 of which were the original Division of Beaches and Parks rest areas), and 13 were under construction. The goal was to complete 25 SRRAs a year until all 258 planned facilities were completed.[292] Early SRRAs completed included four along I-15 between Baker and the Nevada state line and 1 on I-8 near Midway Wells. Other SRRAs under construction in 1964 included Donner Summit on I-80, I-5 between Red Bluff and Los Angeles, between Barstow and Baker on I-15, along the I-10 in Riverside County, and several east of Indio between Redlands and Beaumont.[293]

Table 3. Number of SRRAs Built, by Year*

1963	1	1968	13	1973	2	1978	2
1964	2	1969	6	1974	3	1979	2
1965	3	1970	8	1975	2	1980	5
1966	6	1971	4	1976	4	1981	5
1967	11	1972	10	1977	2	1988	1

*Includes extant and not-extant SRRAs. This information was compiled using the Caltrans Bridge Inspection Records Information System database.

In July 1965, nine SRRAs were under construction, and 26 were open for use, but by June 1966, only 31 were open for use, 11 of those were the original Division of Beaches and Parks rest areas.[294] At this point completing 25 units a year for approximately 10 years was an ambitious goal. Regardless, the California Division of Highways expanded the original plan to include 278 facilities. The adjustment was mostly in response to the Highway Beautification Act of 1965, also referred to as "Lady Bird's Bill," in reference to President Johnson's wife, which directed states to provide rest areas on federal-aid highways. In 1967, California House Resolution 570 urged the division to expand the system and to include convenience and advertising kiosks.[295]

A total of 13 SRRAs were built in California in 1968, the most ever completed in one year, but a sharp 50 percent construction decline in 1969 marked a 40 percent increase in construction costs. In response to the cost increase, the California Division of Highways limited construction to only along the interstate system. By 1969, 59 SRRAs were open, but by 1974, the Master Plan decreased SRRA construction and projected a need for only 162 facilities, at greater intervals apart. By May 1976, there were 89 SRRAs, and by 1980, there were 92.[296] In 2014, the 87 operating SRRAs in California was a far cry from the original 258 outlined in the 1962 master plan. Furthermore, many of the original SRRAs have been expanded, altered, or replaced or are in danger of replacement.

However, before SRRA construction declined, the California Division of Highways displayed a matured sense of SRRA planning and design in the revised 1968 master plan, and many of the SRRAs built in the 1970s were arguably the most innovative in terms of landscape and architectural design. SRRA planning

[292] *American Highways,* "California Speeds up Roadside Rest Area Program."
[293] California Division of Highways, "Roadside Rests."
[294] G. A. Hill, "Safety Roadside Rests," *California Highways and Public Works* (July–August 1965), 8–10.
[295] Carhart, "Safety Roadside Rest Areas," 2–3.
[296] Ibid., 2–5.

and design was transferred from the Roadside Development Department to the Design and Landscape Architecture Departments.

The architectural design of SRRAs throughout the United States varies from state to state and, like landscape design, is an "essential element in developing the context of a site."[297] For SRRAs built between 1950 and 1970, general design classifications include basic traditional, modern, regional, rustic or regional modern, combined forms, free form, and 1970s funk/revival. California's SRRA design includes mainly regional modern and 1970s funk/revival styles (Figure 134).[298]

Figure 134. *Randolph Collier SRRA, October 10, 1970. Example of a funk/revival SRRA (Caltrans Transportation Library, Sacramento).*

Regional modern SRRA design was prominent during the early and mid-1960s. The design aesthetic focused on blending buildings and structures with the surrounding landscape instead of contrasting the built and natural environments. That was accomplished using modest forms, natural materials, and paint schemes. Regional modern SRRAs are usually found in mountainous and desert regions and entail "low-rising, horizontally oriented buildings with shallow-pitched or flat roof lines," with rock, stone, wood, tile, or concrete-block detailing.[299] The regional modern design aesthetic was a prominent requirement in the early versions of the master plan.

The 1970s "funk-revival" style designs were distinguished by their modernist and exaggerated roof forms. The term funk-revival was coined by historian Joanna Dowling and directly references other "funk" genres of the 1960s and 1970s, such as funk art and music. The term also refers to the unofficial "funkiness" of certain architectural-design types that exhibit elements of colonial revivalism.[300] Much of funk-revival architecture is characterized by modern renditions of classical styles, such as the mansard and reverse-mansard roof.[301] Character defining features of funk-revival at SRRAs include rectangular buildings with exaggerated revival-style roof forms and common building materials, such as, "brick, wood and concrete with shingled roofs that give them a rustic appearance."[302]

[297] Joanna Dowling, restareahistory.org, http://www.restareahistory.org/. accessed October 8, 2015.

[298] Joanna Dowling, "Safety on the Interstate: The Architecture of Rest Areas" *SCA Journal* 26, no. 1 (Spring 2008): 22; restareahistory.org, http://www.restareahistory.org/.

[299] restareahistory.org, http://www.restareahistory.org/.

[300] Joanna Dowling specializes in nineteenth- and twentieth-century architectural history, cultural landscapes, and the built environment, as well as the history and program development of interstate safety rest areas. Dowling created restareahistory.org, a website dedicated to the documentation of rest area history and architectural form.

[301] restareahistory.org, http://www.restareahistory.org/, accessed October 8, 2015.

[302] Ibid.

Notwithstanding the differences in architectural style applied to various SRRAs, most were designed around a central theme established by the main restroom building and reflected in additional structures, including picnic shelters, kiosks, and map displays. Materials or textures, such as rock veneer, concrete, or brick, were duplicated in additional elements, such as garbage cans and benches. The restroom building is the architectural centerpiece, and the picnic shelters are elements of primary significance that generate visual interest.[303]

The evolution of roadside rest areas rested on legislation, funding, and practical design that reflected popular trends in architecture and landscape design from the 1930s through the 1970s. Today, SRRAs are fundamental improvements along many of the state's highways, and their popularity and use appear to be increasing as the state's population increases.

[303] Dowling, "Safety on the Interstate."

Important Trail, Road, and Highway Themes

The development of contexts or themes is a critical element of the creation of this or any other historic context. As described by the NPS:

> Historic contexts are those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history or prehistory is made clear. Historians, architectural historians, folklorists, archeologists, and anthropologists use different words to describe this phenomenon, such as trend, pattern, theme, or cultural affiliation, but ultimately the concept is the same.[304]

For the purposes of this study, the term *theme* has been chosen to describe those phenomena that best reflect the evolution of transportation properties in California. This thematic approach also helps establish a rationale for determining the significance of a resource or group of resources. Three broad or overarching themes were selected for this study: (1) Roads and Highways as Reflections of Culture, (2) Roads and Highways as Symbols of Commerce and Trade, and (3) Roads and Highways as Symbols of Engineering Achievement.

THEME 1: ROADS AND HIGHWAYS AS REFLECTIONS OF CULTURE

While virtually every trail, road, and highway in California reflects some degree of cultural affiliation, whether it helped foster or support a single individual, family, community, or a region, certain trails, roads, and highways deserve special recognition for their association with events of significance that changed the cultural history of a community, the state, and, in some cases, the nation.[305]

Trails, roads, and highways are also symbolic of the freedoms afforded Americans to move or travel at will. Conditions, such as tolls, were imposed as roads and highways developed as commercial enterprises or required funding for maintenance and improvement. During the late nineteenth century and the first half of the twentieth century, itinerant workers relied upon California's roads and highways to access places of employment. Their stories are chronicled in published works and music. While working as an investigator for the California Commission of Immigration and Housing in 1914, Frederick C. Mills followed the paths of itinerant laborers throughout California, chronicling in his journal the challenges they faced while moving from job to job.[306] During the 1930s, Woody Guthrie garnered a following as he wrote songs about his experiences on the road, meeting with the unemployed during the Great Depression.[307]

[304] NPS, "Understanding Historic Contexts," Sec. 5, pt. 1, *How to Apply the National Register Criteria for Evaluation*, National Register Bulletin 15 (Washington, DC: NPS, 2001). http://www.nps.gov/nr/publications/bulletins/nrb15/nrb15_5.htm.

[305] In terms of highways, four such transportation corridors in California stand out as having statewide importance: Routes 1, 66, 99, and 101. All four highways shaped the culture of California, each shared a great deal of popularity, and they have been the subject of books, articles, films, and government reports.

[306] Gregory Woirol, *In the Floating Army: F. C. Mills on Itinerant Life in California, 1914* (Chicago: University of Illinois Press, 1992).

[307] Ed Cray, *Ramblin' Man: The Life and Times of Woody Guthrie* (New York: Norton, 2006).

In recent years, Jack Kerouac described his experience as part of the 1950s Beat Generation in his acclaimed book, *On the Road*. Documenting a trail or road's history is essential to establishing its historic context and, ultimately, its significance, including its association with a cultural group or pop culture. All trails, roads, and highways have stories to tell and linkage that reach outward, well beyond the features themselves (Figures 135 and 136).[308]

Figure 135. *Dust Bowl migrants fixing a flat tire along State Highway 99, 1937 (Library of Congress, Prints and Photographs Division, Washington, DC, Farm Security Administration - Office of War Information Photograph Collection, LC-USF34-016444-E).*

With the passage of time, trails, roads, and highways can often attain a distinct cultural affiliation. For example, during the eighteenth century, the El Camino Real served as the main transportation link between Upper and Lower California, and later, during the late nineteenth and early twentieth centuries, the route garnered public attention for its romantic link with the California missions. To the east, in the foothills and mountains of the Sierra Nevada, the Placerville–Virginia City Wagon Road gained a reputation for daring stagecoach rides, under the tutelage of the famous stage driver Hank Monk during the 1860s, and was one of the main out-migration routes to the Nevada Territory.[309] Route 66, portions having been previously developed as the National Old Trails Highway, inspired songs, movies, and pop-culture icons; during its heyday in the 1930s, it had an association with the Dust Bowl migrants, and later, it was associated

[308] David L. Ames, Eric Gollannek, and Sarah Rector, *A Manual For Nominating Roads to the Delaware Scenic and Historic Highway Program* (Newark, DE: Center for Historic Architecture and Design, University of Delaware, 2006).
[309] J.A. Yerington, "Stories of Hank Monk" *Sunset* 12 (November 24–28, 1903), reprint, *Nevada Observer* (December 15, 2010).

Figure 136. *Young family, penniless, hitchhiking on U.S. Highway 99, California. The father, 24, and the mother, 17, came from Winston-Salem, North Carolina, early in 1935. Their baby was born in the Imperial Valley, California, where they were working as field laborers (Library of Congress, Prints and Photographs Division, Washington, DC, Farm Security Administration, Office of War Information Photograph Collection, LC-USF34-016102-C).*

with motorists of the 1950s and 1960s who traveled between the desert Southwest and California. Along the California coast, State Route 1 became an inspiration for writers, poets, and tourists.[310]

In 1990, Congress passed Public Law 102-400, the Route 66 Study Act of 1990, recognizing that U.S. Highway 66, popularly known as ‘‘Route 66,’’ is significant as the nation’s first highway linking Chicago with Los Angeles . . . ‘‘and symbolized freedom and mobility for every citizen who could afford to own and operate a car.’’[311] As prescribed by the law, the NPS conducted the Route 66 Special Resource Study to evaluate the significance of Route 66 and to identify options for its preservation, interpretation, and use. That study led to the enactment of Public Law 106-45 in order to preserve the cultural resources of the Route 66 corridor and to authorize the Secretary of the Interior to provide assistance. The law authorized the creation of the NPS Route 66 Corridor Preservation Program, which provides financial and technical assistance to individuals; nonprofits; local, state, tribal, and federal agencies; and others, to facilitate preservation of the most significant and representative historic resources along the route.[312] In 2008, the significance of Route 66 and its long-term preservation were again recognized when the World Monuments Fund listed Route 66 on the Watch List of 100 Most Endangered Sites.

[310] Hollywood has often glorified or romanticized the state’s highways, with television series such as “Route 66” and Bobby Troup’s song, “Get Your Kicks on Route 66.” For an interesting cultural history of Route 66, refer to Peter Dedek, *Hip to the Trip: A Cultural History of Route 66* (Albuquerque, NM: University of New Mexico Press, 2007).

[311] U.S. House, U.S. Route 66, 105th Congress, 2nd Session, Senate Report 105-399, October 2, 1998.

[312] NPS, “Route 66 Overview,” *Route 66: Discover Our Shared Heritage Travel Itinerary*. http://www.nps.gov/nr/travel/route66/Route66_overview.html; NPS, *Special Resource Study: Route 66*, *Illinois, Kansas, Missouri, Oklahoma, Texas, New Mexico, Arizona, and California* (Santa Fe, NM: Route 66 Corridor Preservation Program, National Trails Intermountain Region, NPS), http://www.nps.gov/rt66/SpecialResourceStudy.pdf.

SR 99 shares a common identity with Route 66, but only recently has its cultural importance as the gateway to California's Great Central Valley and its importance to migrant laborers and agriculture been recognized.

Roads and highways traveled by "baby boomers" of the 1950s reflect a period of increased travel and leisure that involved crisscrossing this nation's highways en route to popular destinations. The experience was also enhanced at automobile or tourist camps, motels, inns, eateries, and other roadside attractions, some crossing the line between science and art, such as the Mystery Tree and Confusion Hill along U.S. 101, south of Garberville.

Finally, roads and highways linked metropolitan areas with suburbs that led to the proliferation of middle-class housing developments, shopping malls, and various forms of leisure activities, such as parks, amusement parks, and golf courses. This trend has changed slightly in the last few decades as people move back to the inner city in search of employment and housing.

THEME 2: ROADS AND HIGHWAYS AS SYMBOLS OF COMMERCE AND TRADE

Trails, roads, and highways not only provided access to communities, they also expanded commerce and trade by opening up new markets. Moving people, goods, and services was the primary motivation for the development of trails, roads, and, later, highways throughout the nation. Virtually every trail, road, and highway built since the eighteenth century in California fostered trade and commerce (Figure 137). That was particularly true for the El Camino Real, the Spanish Trail, and later wagon/freight roads and highways, such as the Butterfield Stage Road, Donner Summit Road, Placerville–Virginia City Wagon

Figure 137. *1960 aerial photograph of downtown Beaumont before the construction of the I-10 Freeway. The junction of the 60 and 99 highways can be seen in the upper right section of the photograph (courtesy of Beaumont Library District, ID. CBAN-325).*

Road, and Nobles Trail. At the local level, even simple road improvements connecting ranches and small rural communities achieved a level of importance. Trail, road, and highway improvements led to increased tourism within the state's mountains and deserts and along the coast. Improved transportation also led to increased commerce and trade reflected in expanding commercial downtowns and subdivisions (Figure 138).

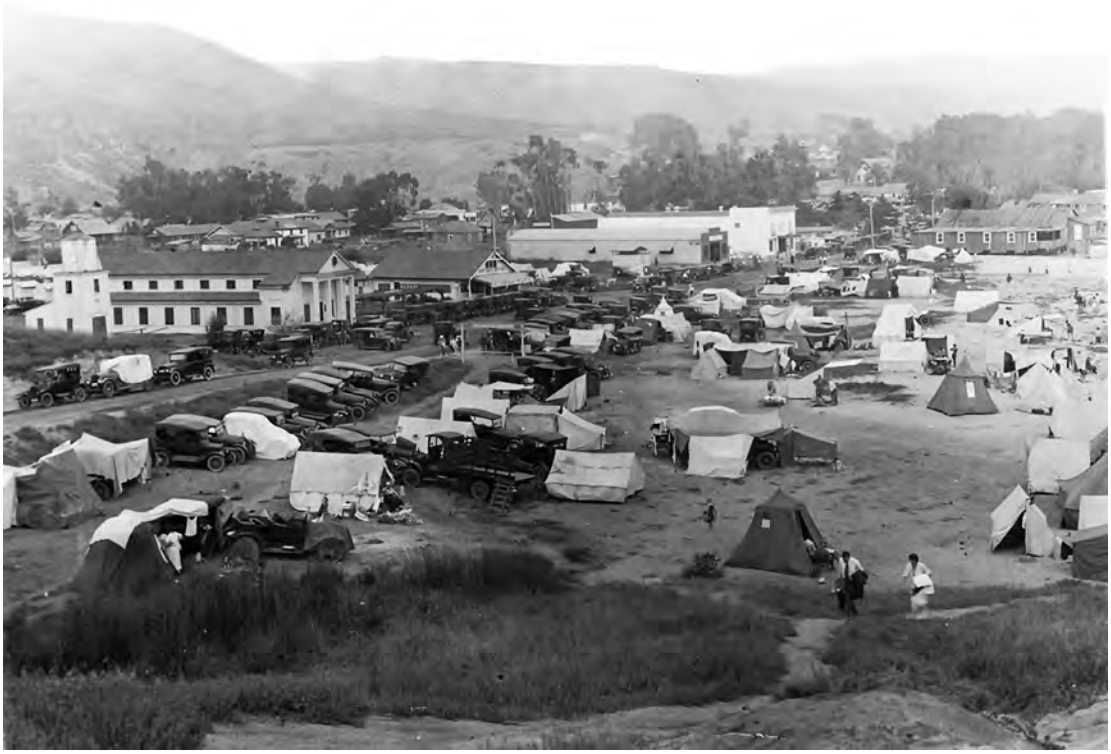

Figure 138. *Coast Highway 1 and Broadway in Laguna Beach, 1920. The large white building on the left is the Pomona College Marine Laboratory. To the right are automobile and tent campers parked along Highway 1 (courtesy of the Orange County Public Library, Local History collection).*

THEME 3: ROADS AND HIGHWAYS AS SYMBOLS OF ENGINEERING ACHIEVEMENT

Roads not only reflect culture and helped foster trade and commerce, but they also represent important examples of engineering achievements (Figure 139). The history of roads as engineering features dates to the eighth century, but Roman Empire road construction garnered a special place in all aspects of society, with significant advances in road technology. Modern roads and highways symbolize the evolution of America's industrial revolution and the nation's quest for Manifest Destiny, as evidenced by the ever-expanding western frontier.

Spearheaded by local governments and private entrepreneurs, roads and highways evolved from simple macadam surfaces, along with logs, boards, and planks, to sophisticated amalgams of bituminous products enhanced through new technologies. During the late nineteenth century, due to improvements using Portland cement, roads and highways became more stable and were able to support heavier loads. Improvements in concrete also began to replace steel and iron in bridges and culverts.

Figure 139. *Construction of San Bernardino SR 40, 1931 (Contract No. 28CS1). Note the use of both animals and mechanical equipment in the grading and preparation of the road surface (Caltrans Transportation Library, Sacramento).*

During the twentieth century, many new advances occurred in the engineering and design of roads and bridges. In 1910, a process for manufacturing asphalt from oil-refining by-products was developed, and three years later, the first U.S. highway was paved with Portland cement. In 1920, yellow traffic lights were added to the signalization of streets, which had previously included only red and green lights. In 1930, air-entrained concrete was invented, providing for expansion when the water freezes and thus reducing damage to the concrete surface, and 9 years later, the first slip-form concrete was introduced (Figure 140). In California, the first experiment using slip-form concrete occurred in 1959 along a small section of the Los Angeles River channel. Slip-form machines were faster and more reliable then laying concrete by hand, reportedly reducing labor from 100 workers to 25. During the early 1960s experiments using slip-form concrete were attempted in Yolo, Fresno, and Madera Counties.[313] Reflective paint for marking highways was also developed during the 1960s, as were "Bott dots," raised pavement markers to alert drivers when they crossed the centerline of a highway (Figure 141).[314]

Figure 140. *Slip-form concrete base being laid near Winters, California, along SR 205 (Caltrans Transportation Library, Sacramento).*

[313] Leigh S. Spickelmire, "Slipform Paving Hailed as a Major Advance in Construction Practice," *California Highways and Public Works* 39, nos. 1–2 (January–February 1960), 20–28."

[314] National Academy of Engineering, "Highways Timeline," *Greatest Engineering Achievements of the 20th Century*, http://www.greatachievements.org/?id=3786 http://www.greatachievements.org/?id=3786.

Figure 141. *"Bott dots" applied to the centerline of a California highway in 1965 (Caltrans Transportation Library, Sacramento).*

America's interstate highway system is ranked among the top engineering projects and as the world's largest public-works project in history. Since the beginning of construction in 1956, the interstate system has had a monumental effect upon the lives of virtually every American. The interstate system has returned more than "$6 in economic productivity for each $1 it cost to construct, reducing the traffic fatality rate, and changing urban/suburban development and commuting patterns."[315]

During the post–World War II era, engineering become more complex as new technologies were applied to highway transportation projects. During the 1960s, Los Angeles witnessed a boom in highway construction that often involved complicated interchanges and overpasses (Figure 142). Many of these structures were tested during the San Fernando earthquake of 1971, which resulted in severe damage to infrastructure, including highways and bridges. One consequence of the quake was the creation of the Caltrans seismic retrofit program, which was again updated after the 1989 Loma Prieta earthquake.

Figure 142. *East Los Angeles interchange, 1960 (Caltrans Transportation Library, Sacramento).*

[315] FHWA, "Top 10 Construction Achievements of the 20th Century," *Public Roads* 63, no. 1 (July–August 1999), FHWA online archive, http://www.fhwa.dot.gov/publications/publicroads/99julaug/topten.cfm.

CHAPTER 8
Historic Trails, Roads, and Highways

Methodology and Evaluation Framework

INTRODUCTION

The methodological approach in this document draws from a number of recently published studies in addition to NRHP-eligibility criteria.[316] This approach does not supersede the Advisory Council on Historic Preservation's regulations (*Code of Federal Regulations*, Title 36, Part 800 [36 CFR 800]) or, in California, the *First Amended Programmatic Agreement among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as It Pertains to the Administration of the Federal-Aid Highway Program in California* (2014). Nor does the methodological approach supersede the *Memorandum of Understanding between the California Department of Transportation and the California State Historic Preservation Officer Regarding Compliance with Public Resources Code Section 5024 and Governor's Executive Order W-26-92* (2015).

Rather, this approach supplements the CALTRANS FHWA 2014 Programmatic Agreement (2014 PA) and the 2015 Memorandum of Understanding (2015 MOU) and augments the existing guidance in *Cultural Resources*, vol. 2 of the *Caltrans Standard Environmental Reference, Environmental Handbook* (SERv2), particularly Chapter 7's guidance for linear resources.[317] Foremost, this expanded guidance is intended to create consistency when transportation-related properties are encountered in the field and to assist in developing more defensible arguments for determinations of eligibility.

The 2014 PA stipulates that Section 106 regulations require a "reasonable and good faith effort" to identify historic properties (36 CFR 800.4[b][1]). In addition, the procedures in Attachment 4 of the PA (Properties Exempt from Evaluation) and SERv2 "enable Caltrans Professionally Qualified Staff (PQS) to exempt certain isolated or fragmentary highway and roadside features in order "to concentrate their efforts on properties that have the potential to be historic properties by identifying categories of properties that have no potential to be a historic property."[318] Similar language is found in the 2015 MOU under Attachment 4: State-Owned Cultural Resources Exempt From Evaluation.

[316] Refer to Chapter 2 (Literature Regarding Trails, Roads, and Highways). NRHP Criteria A–D form the basis for evaluating trails, roads, and highways; however, recent studies have suggested that a more nomothetic or analytic approach may improve the rationale for defining eligibility and create a more defensible argument for identifying significant properties. Caltrans applied a somewhat similar analytic approach to historic California bridges in the late 1980s. The bridge analysis used a rating system to distinguish and compare character-defining features (CDFs) of the bridges and the relative significance of each. The final report was published in a volume entitled *Historic Highway Bridges of California* (Caltrans 1990).

[317] Caltrans, "Cultural Resources, Vol. 2", *Caltrans Standard Environmental Reference, Environmental Handbook* (Sacramento, CA: Caltrans, 2015), http://www.dot.ca.gov/ser/vol2/vol2.htm

[318] FHWA, *First Amended Programmatic Agreement*, *among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act, as It Pertains to the Administration of the Federal-Aid Highway Program in California*. Washington, DC: FHWA, January 2014, Attachment 4, p. 1.

The 2014 PA Attachment 4 and SERv2 Chapter 7 both state that "properties should be evaluated only if Caltrans PQS or appropriately qualified consultants reasonably determine that the property has potential for historic significance." The 2015 MOU Attachment 4 provides additional guidance.[319]

While the NRHP and California Register of Historic Resources (CRHR) criteria provide the basis for determinations of eligibility and the thresholds for significance, the voices of stakeholders or interested parties must also be taken into consideration. Attachment 4 of the 2014 PA and MOA defines categories of properties that do not warrant evaluation. However, it also includes the caveat that exempted properties "may be documented, if documentation is warranted, at a level commensurate with the nature of the property" and that "professional judgment should be used as to the level of identification and recordation." This exemption process does not include archaeological sites or other cultural remains or features that may qualify as contributing elements of districts.

Attachment 4 of the 2014 PA and Attachment 4 of the 2015 MOU for state-owned properties, lists exempted properties often associated with trails, roads, and highways, identified in the following list:

- vista points and rest stops
- toll booths
- truck scales and truck-inspection stations
- city streets, alleys, and park strips
- sidewalks, curbs, berms, and gutters
- bike paths, off-road-vehicle trails, equestrian trails, and hiking trails
- isolated segments of bypassed or abandoned roads
- retaining walls
- curbs, gutters, and walkways
- highway fencing, sound walls, guardrails, and barriers
- drains and culverts, excluding culverts assigned Caltrans bridge numbers
- cattle-crossing guards
- roadside, median, and interchange landscaping and associated irrigation systems
- street furniture and decorations
- signs and reflectors
- parking meters
- street lighting and controls
- traffic lights and controls
- highway operation control, maintenance, and monitoring equipment
- telecommunications services, including towers, poles, dishes, antennas, boxes, lines, cables, transformers, and transmission facilities

[319] *Memorandum of Understanding Between the California Department of Transportation and the California State Historic Preservation Officer Regarding Compliance with Public Resources Code Section 5024 and Governor's Executive Order W-26-92*, January 2015 (MOU 2015).

- utility services, including towers, poles, boxes, pipes, lines, cables, and transformers
- oil and gas pipelines and associated control devices
- fences, walls, gates, and gateposts
- isolated rock walls and stone fences
- call boxes, mailboxes, newspaper receptacles, and fire hydrants
- markers, monuments, signs, and billboards
- fragments of bypassed or demolished bridges
- temporary roadside structures, such as seasonal vendors' stands
- pastures, fields, crops, and orchards
- corrals, animal pens, and dog runs
- open space, including parks and recreational facilities
- building and structure ruins and foundations less than 50 years old

Attachment 4 of the 2015 MOU listed exempted properties often associated with trails, roads, and highways, which include the following:

Recent State-Owned Transportation or Pedestrian Facilities:

- railroad grades converted to other uses, such as roads, levees, or bike paths
- light rail systems, including shelters, benches, and platforms
- bus shelters and benches
- vista points and rest stops
- toll booths
- truck scales and inspection stations
- city streets, alleys, and park strips
- sidewalks, curbs, berms, and gutters
- bike paths, off-road vehicle trails, equestrian trails, and hiking trails
- parking lots and driveways

State-Owned Highway and Roadside Features:

- isolated segments of bypassed or abandoned roads
- retaining walls
- curbs, gutters, and walkways
- highway fencing, soundwalls, guard rails, and barriers
- drains and culverts, excluding culverts assigned a Caltrans bridge number
- cattle crossing guards
- roadside, median, and interchange landscaping and associated irrigation systems

- street furniture and decorations
- signs and reflectors
- parking meters
- street lighting and controls
- traffic lights and controls
- highway operation control, maintenance, and monitoring equipment
- telecommunications services, including towers, poles, dishes, antennas, boxes, lines, cables, transformers, and transmission facilities
- utility services, including towers, poles, boxes, pipes, lines, cables, and transformers
- oil and gas pipelines and associated control devices

Adjacent State-Owned Features:

- fences, walls, gates, and gateposts
- isolated rock walls and stone fences
- telephone booths, call boxes, mailboxes, and newspaper receptacles
- fire hydrants and alarms
- markers, monuments, signs, and billboards
- fragments of bypassed or demolished bridges
- temporary roadside structures, such as seasonal vendors' stands
- pastures, fields, crops, and orchards
- corrals, animal pens, and dog runs
- open space, including parks and recreational facilities
- building and structure ruins and foundations[320]

While the 2014 PA and MOA, and SERv2 provide general guidance, the aforementioned property types should be viewed as categories of properties that *may* be exempted rather than properties that will always be exempted. This study provides more specific guidance for making informed decisions as to whether transportation properties may be exempted or will require additional study to determine significance, in terms of the CRHR and NRHP.

Several of the recent historic road and highway transportation studies have focused upon design and management issues.[321] The methodology for this study concentrates on the broad historical trends that led to the development of trails, roads, and highways in California and the physical characteristics that define each property type. In general, most trails, roads, and highways had value in providing important links among homes, communities, regions, the state, and the nation and particular importance if they

[320] *Memorandum of Understanding Between the California Department of Transportation and the California State Historic Preservation Officer Regarding Compliance with Public Resources Code Section 5024 and Governor's Executive Order W-26-92* (2015). See Attachment 4.

[321] KSK Architects Planners Historians, Inc., et al., *New Jersey Historic Roadway Study*; KSK Architects Planners Historians, Inc., et al., *New Jersey Historic Roadway Design Guidelines*.

represented significant engineering or design accomplishments and/or have had a marked change upon the lives of people, whether cultural or economic. This methodological approach also considers the relationships between individual routes and their environmental and cultural settings, whether designed or vernacular, as well as the factors that have influenced their use and, ultimately, their importance.

Trails, roads, and highways may be considered individually eligible or eligible as part of a larger system, corridor, or landscape. Even though a transportation project's area of potential effects (APE) may be narrow, examination of the transportation property in its entirety may be appropriate.[322] The level of effort should be determined in concert with the guidance in SERv2 and the stipulations outlined in the 2014 PA. The project manager and the PQS or qualified consultant, after considering the APE, will then look at efficiency of scale and the historic context of the transportation property, to determine the scope of the study and analysis. At a minimum, the transportation property should be described in terms of its beginning and end-points, whether it is part of a much larger linear corridor, and how well the segment in the APE reflects the linear resource as a whole.

Besides review of the historic context presented in this study, project-specific research may include a review of published and unpublished transportation histories, construction contracts and plans, as-built drawings, professional journals, newspapers, local histories, and historical maps and photographs.

For the purposes of this study, five broad periods capture or chronicle the history of California's transportation systems:

- Native American, Spanish, Mexican, Emigrant, and Recreation Trails (10,000 b.p–a.d . 1910)
- Nineteenth-Century Wagon, Stage, and Toll Roads (1830–1900)
- Early-day Automobile Roads and Highways (1900–40)
- Modern Parkways and Highways (1940–56)
- Interstate Freeways (1956–70)

These chronological periods form the basis of the historic context and assist in determining the significance of trails, roads, and highways in California. The five chronological periods are represented by one or more of the three principal historical themes: (1) Roads and Highways as Reflections of Culture; (2) Roads and Highways as Symbols of Commerce and Trade; and (3) Roads and Highways as Symbols of Engineering Achievement. There are often specific subthemes for each transportation corridor, property, and feature, and properties may also have dual themes, if warranted by the historical and physical evidence. In order to determine the value of any transportation property, it is essential to first identify its character-defining features (CDFs).

CHARACTER-DEFINING FEATURES OF TRANSPORTATION PROPERTIES

CDFs, also known as "essential physical features" or "contributing elements," physically convey why and when a historic property was significant, and all historic properties must have them. CDFs may be as simple as trail traces or as complex as the designed or engineered components of a highway overpass. For transportation properties, the CDFs may include the physical features that compose the actual trail, road, or highway and the surrounding features associated with the property. For example, CDFs

[322] Caltrans, *Cultural Resources*, ch. 4, contains guidance on delineating APEs.

associated with roads and highways may include bridges, culverts, railings, cuts and fills, curves, dirt and paved surfaces, and, in certain instances, vista points, automobile camps, rest areas, motels, and restaurants. A CDF, however, must have a direct association with the transportation property being evaluated, not a tangential association.

The Caltrans guidance in SERv2, Exhibit 7.1, "Ranking Character-Defining Features," is based on the NPS publication, *Preservation Brief 17: Architectural Character—Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving Their Character*. The guidance is also grounded in the guidance in National Register Bulletin 15, also an NPS (2001) publication. While previous guidance focused generally upon buildings, the same basic principles apply to transportation properties. Simply put, CDFs are those elements that give a property its "historic" sense of place or identity. Ranking or assigning values to a transportation property's CDFs are addressed in the following discussion.

EVALUATION METHODOLOGY

The development of specific criteria for evaluating the significance of historic trails, roads, and highways in California first takes into consideration the NRHP-eligibility criteria. These criteria define historical significance as "the importance of a property to the history, architecture, archaeology, engineering, or culture of a community, state, or the nation."[323] The NRHP criteria of evaluation when defining the significance of a property include the following:

- Criterion A: properties that are associated with events that have made a significant contribution to the broad patterns of our history.
- Criterion B: properties that are associated with the lives of persons significant in our past.
- Criterion C: properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: properties that have yielded, or may be likely to yield, information important in prehistory or history.
- Criteria Consideration (g): properties that are less than 50 years of age and have "exceptional significance."

As described by the NRHP, besides the 50-year age rule, Criteria Consideration (g) "may apply to a property that continues to achieve significance into a period of less than 50 years of age, a property that has noncontiguous periods of significance, and a property that is more than 50 years old but had no significance until a period of less than 50 years prior to its evaluation."[324]

In certain instances, a transportation property may also be considered or assessed as a TCP. The litmus test for determining whether a property warrants consideration as a TCP is discussed in detail in NPS

[323] National Park Service. "National Register Bulletin: Researching a Historic Property." http://www.nps.gov/nr/publications/bulletins/nrb39/nrb39_ii.HTM, accessed April 2015.

[324] National Park Service, "How to Apply the National Register Criteria for Evaluation." National Register Bulletin 15. Washington, DC: U.S. Department of Interior, National Park Service, 1990, revised for internet 2002. http://www.nps.gov/nr/publications/bulletins/pdfs/nrb15.pdf. Accessed April 2015.

Bulletin 38, revised in 1998.[325] Certain transportation properties may qualify as TCPs if they can be demonstrated through rigorous historical inquiry that they have traditions of continuous use and that the use was historically or culturally significant.

Some general considerations to supplement the NRHP-eligibility criteria and guide the assessment of significance of historic trails, roads, and highways in California are as follows:

- A trail, road, or highway must be evaluated within its appropriate historic, geographical, or spatial context, whether local, regional, statewide, or national.
- A trail, road, or highway should have contributed to the broad patterns associated with local, state, regional, or national history and, in doing so, made a *significant* contribution in regard to culture, economics, politics, or technology.
- Historic trails should provide important linkages for the purposes of migration, trade, commerce, and recreation.
- Native American trails should link or connect with cultural manifestations that may be tangible markers of cultural value or intangible places; in certain situations, they may qualify as TCPs.
- As a general rule automobile highways, and particularly freeways, should have more than just local significance and the roadways must have either regional or national importance.[326]
- An important highway should link major population or political centers or destination points either within or outside the geopolitical borders of California.
- A trail, road, or highway may represent a significant type of technology. The technology should still be evident, even if the route or segment of the route has been abandoned, which may be the case for bypassed sections of highway or wagon roads that included engineered design, such as dry-laid, stacked rock walls, culverts, and certain types of grades.
- Many, if not most, of California's roads and highways were built piecemeal over a period of years, using various contractors. Technologies may have changed, or at minimum, specifications may have changed during the course of a roadway's construction or period of significance. Therefore, an innovation in roadway-construction technology or engineering is generally not in and of itself sufficient to confer significance to an entire roadway, unless the roadway itself, or as a whole, exhibits a specific technology or technologies of significance.
- Specific design or engineering features of a trail, road, or highway may be evaluated individually and/or collectively within the appropriate historic context. In some cases, bridges may not be individually eligible but may be contributing features of a road or highway.
- A trail, road, or highway associated with the lives of person(s) determined significant in the past must have a clear and specific linkage, rather than a casual association to be considered significant. Having been "built under the direction of" would not in and of itself, be sufficient to confer significance to the property.[327] A trail, road, or highway rarely would be eligible for its association with a

[325] Patricia L. Parker and Thomas F. King. "Guidelines for Evaluating and Nominating Traditional Cultural Properties." *National Register Bulletin 38*. National Park Service, 1998.

[326] Interstate freeways are exempt from Section 106 and Section 4(f) compliance, except for certain already-identified elements, but are not exempt from state cultural resource laws and regulations. See Caltrans, *Cultural Resources*, ch. 2, sec. 2.2.7, for more information.

[327] See KSK Architects Planners Historians, Inc., et al., *New Jersey Historic Roadway Study*, 4-6; 42–44.

significant person (NRHP Criterion B) but is more likely to be eligible as a product of a person's design or engineering (NRHP Criterion C).

In addition to the above-mentioned considerations, a property must retain adequate "integrity" to reflect the values for which it is significant.

IDENTIFYING RELEVANT ASPECTS OF INTEGRITY

For a trail, road, or highway to be considered eligible for listing in the NRHP, the property must not only be shown to be potentially significant under NRHP criteria and associated with one or more of the historic themes discussed in previous chapters, as well as meet the aforementioned considerations, but it also must have integrity. Because trails, roads, and highways are linear, the transportation property must be of sufficient length to convey why and when it became significant. Each transportation property or feature requires an individual assessment to determine sufficient length, which includes variables such as chronology, association, engineering, topography, and setting. The visual quality of a transportation property, particularly an abandoned property, is at least in part represented by its length. The general rule of thumb regarding length, as expressed in a number of road-related NRHP-listed Multiple Property Survey documents, is that "specified lengths cannot be reasonably set for this requirement, but an ideal would be an uninterrupted view down the road to the horizon, with the exception of roads and highways in urban or even suburban settings."[328]

The NRHP has defined seven aspects or qualities that, in various combinations, constitute integrity:

Location. *Location is the place where the historic property was constructed or the place where the historic event occurred* (NPS 2001). Integrity of location means that a trail, road, or highway remains largely within or follows its original alignment. This aspect of integrity relates directly to the property's spatial position or placement. Topography, natural resources, and property lines frequently dictated trail or roadway locations. Some roads may have evolved from portions of preexisting trails, such that the locations shifted. In other cases, highways have been enlarged to become freeways. With the exception of abandoned transportation properties, properties that have been moved or realigned from their original locations and outside their respective periods of significance are generally not considered eligible for listing in the NRHP. For example, if a property's period of significance spanned several decades, such as 1930–50, and the road was realigned during those decades, the property may still retain integrity of location. However, if it was realigned after 1950, it would likely not retain integrity of location. In essence, location and its degree of importance to conveying significance must be considered along with other aspects of integrity and must be based on why and when a property achieved significance.

Design. *Design is the combination of elements that create the form, plan, space, structure, and style of a property* (NPS 2001). Integrity of design refers to the retention of the CDFs or characteristics that were chosen during the creation or planning and construction of the transportation property. Design features common to trails and roadways include the width and prism of the transportation property, compacted or non-compacted surfaces, surface materials, grades, culverts, retaining walls, and bridges. A road or highway may include a median, curbs, gutters, and sidewalks. However, many trails and pre-1900 roads were not the result of conscious design but, instead, followed local topography, property lines, and "lines of sight" to link nearby destinations and to cover longer distances.

[328] This would be the integrity requirement. Discussion of segment length is typically found under the *setting* or *location* aspect of integrity.

Designed or engineered roads became more common in the mid- to late nineteenth century, as companies or corporations engaged in road construction as a profitable enterprise. Later, with the advent of automobiles, road surfaces were re-engineered to accommodate heavier vehicles, particularly those with rubber tires.

Setting. *Setting is the physical environment of a historic property* (NPS 2001). The setting of the transportation property should reflect the same general character that was present during the property's period of significance, with minimal intrusions. While specific CDFs or features—for example, culverts, bridges, turnouts, and vista points—may be directly associated with the function of a transportation property, other CDFs or features may be associated with the property, but not directly related to its function or operation, such as inns, campgrounds, gas stations, etc. In either case, a majority of CDFs that composed the transportation property during its period of significance should be present and must retain integrity. The fact that a transportation property has few CDFs does not necessarily reduce its potential to be a significant resource. Setting becomes critical for rural transportation properties or those in urban areas that were created as parkways. That is particularly true for segments of roads lined by mature trees planted as part of the physical landscape that defined the road prism. Setting generally also includes the surrounding landscape. A "landscape" may be defined as the road prism itself, the near view, and the far view. In essence, a transportation property's historic landscape may include the trail or road corridor itself or the non-operational portion of the roadway evidenced by features alongside the road, such as residential homes, commercial buildings, farms, rivers, mountains, hills, chaparral, and trees. Some form of analysis is helpful to define each of these elements. Values may be assigned to landscape features depending upon the importance or relevance of the feature in relationship to the transportation property.

The setting should reflect the same general character of the historical period in which the property gained significance, with minimal intrusive elements.[329] For example, in arid or flat, treeless regions of California, the horizon could be at a distance of 20 or more miles, whereas in densely treed areas, the horizon could be less than a mile away. In either case, it depends on why the transportation property is significant and what CDFs have been identified. It is the researcher's responsibility to justify on a case-by-case basis which CDFs are significant, and why the proposed transportation property in its entirety, or as a segment, conveys significance.

Materials. *Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property* (NPS 2001). Certain materials may be defined as CDFs if they were integral to the function and use of the transportation property. Materials common to roadways of the nineteenth century include packed earth, macadam, wood planks, stone, brick, and logs (corduroy), although stone, brick, and log or plank roads have become quite rare because of either removal or decomposition. Surviving examples in California include stone surfacing in old Sacramento and an abandoned segment of corduroy road in the Imperial Valley. By the early twentieth century, oils, bituminous asphalt, and concrete had become the materials of choice for most roadways in California. Roadway surfacing is inherently fragile and routinely replaced, much like the replacement of roofing materials on a historic building, and it is not necessarily a prerequisite that a roadway retain its original surfacing in order to have integrity. Contemporary road surfacing, however, should retain some of the basic elements of the original surface. If the surface was stone and is now concrete, integrity of materials would be compromised.

[329] Rebecca Conard, "The Lincoln Highway in Greene County, Iowa," National Register of Historic Places Multiple Property Documentation Form, (PHR Associates, July 15, 1992), sec. F, p. 3.

If the historical road surface was a bituminous asphalt and the current surface is a more-modern asphalt type of product, that change may not rise to a level of significance, and the roadway materials may still retain adequate integrity. While some degree of alteration of materials is not always detrimental to a road's integrity, incompatible changes outside the period of significance, such as an oil surface that is now concrete, will diminish integrity of materials. An exception would be the Arroyo Seco Parkway in Pasadena, of which one lane was deliberately paved in dark asphaltic concrete, and the remaining lanes were paved in Portland cement concrete. That differentiation in pavement is part of the parkway's significance.

In addressing trails, a more flexible approach is needed, since most trails were never engineered or designed. It is important to identify the trail itself, but the residue of a trail's historical use is equally important, such as objects or materials discarded along its course. In essence, discarded objects or artifacts have the ability to authenticate a historic transportation property or feature, particularly when the feature may no longer be present or may be damaged through natural causes, such as erosion. Those objects or artifacts may include a lithic scatter or rock cairn left by Native Americans along the route of a trail, refuse scatters left by emigrant parties traveling west through California, motorists traveling along a scenic highway, or recreationists hiking in the state's mountain or desert environments.

Workmanship. *Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory* (NPS 2001). Workmanship includes the labor, skill, and craft expressed within the trail or roadway or its component parts. For transportation properties, workmanship can be expressed by CDFs or individual features, or holistically, as the entire property. Workmanship, as applied to transportation properties, varied dramatically from the nineteenth century through the twentieth century, with a direct relationship to the development of new technologies. Common examples of workmanship associated with nineteenth-century transportation properties include rock alignments that defined the course of an early trail or road, but provided little physical support, dry-laid stone retaining walls that supported the bed of a trail or road, culverts that allowed for the free flow of water underneath a trail or road, bridges that provided safe passage over bodies of water, and packed-earth surfaces that supported the movement of humans, animals, or vehicles. During the twentieth century, workmanship was defined by engineering skill and new technology, particularly after 1940 in concert with freeway construction. Integrity of workmanship is very important for properties that required a high level of engineering design and skill but not as important for properties that followed natural topography, such as Native American, Spanish, Mexican, emigrant, and recreation trails.

Feeling. *Feeling is a property's expression of the aesthetic or historic sense of a particular period of time* (NPS 2001). Integrity of feeling is closely related to setting and usually results from the presence of physical features that convey the property's historic character, including its landscape. As with setting, a property's feeling may be described quantitatively or qualitatively, depending upon the variable selected. Feeling may also be expressed in terms of a property's retention of certain elements that convey its significance, such as the road prism itself, which may include sharp curves, or the surrounding landscape, which may be heavily treed or, in the desert, devoid of any trees. Retention of feeling alone is generally not sufficient to support the eligibility of a property for listing in the NRHP.

Association. *Association is the direct link between an important historic event or person and a historic property* (NPS 2001). Integrity of association is the direct link between an important historic

event or person and the historic property and requires the presence of physical features to convey historic character. A trail or roadway should contain physical components that convey the property's historic character. These features should date from the trail or roadway's period of significance. Association as an aspect of integrity by itself is not enough for NRHP eligibility, but its importance remains high for roads that have strong cultural affiliations, such as Routes 66, 99, and 101 and Highway 1. As stated in National Register Bulletin 15, published by the National Park Service in 2001, "because feeling and association depend on individual perception, their retention *alone* is never sufficient to support eligibility of a property for the National Register."[330] The seven aspects of integrity must be considered along with the significant themes and more specific criteria considerations. Each of the seven aspects of integrity could be less or more important (on a sliding scale), depending on why a property is eligible for listing in the NRHP. For instance, integrity of location, setting, and association might be more important for a property that is significant because of an event than integrity of design, workmanship, and materials. But for a property significant for its design or engineering, the most important aspects of integrity might be design, workmanship, and materials.

National Register Bulletin 15 sets the parameters of identifying relevant aspects of integrity under the four eligibility criteria.

Criteria A and B

A property important for association with an event, historical pattern, or person(s) ideally might retain some features of all seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. Integrity of design and workmanship, however, might not be as important to the significance and would not be relevant if the property were a site. A basic integrity test for a property associated with an important event or person is whether a historical contemporary would recognize the property as it exists today. Properties whose association lies largely in its naming, such as an honorific designation, would not in itself signify significance. Other factors should be considered that are rooted in the property's historic context and relationship to other events of broader consequence.

For archeological sites that are eligible under Criteria A and B, the seven aspects of integrity can be applied in much the same way as they are to buildings, structures, or objects. It is important to note, however, that a site must have demonstrated its ability to convey its significance, as opposed to sites eligible under Criterion D, for which only the potential to yield information is required.

Criterion C

A property significant under Criterion C must retain the physical features that characterize the type, period, or method of construction that the property represents. Retention of design, workmanship, and materials will usually be more important than location, setting, feeling, and association. For archeological sites that are eligible under Criterion C, the seven aspects of integrity can be applied in much the same way as they are to buildings, structures, or objects. It is important to note, however, that a site must have demonstrated its ability to convey its significance, as opposed to sites eligible under Criterion D, for which only the potential to yield information is required

[330] National Park Service. Bulletin 15, "How to Apply the National Register Criteria for Evaluation," U.S. Department of Interior, National Park Service, 44-48, http://www.nps.gov/nr/publications/bulletins/pdfs/nrb15.pdf.

Criterion D

For properties eligible under Criterion D, setting and feeling may not have direct bearing on the property's ability to yield important information. Evaluation of integrity should focus primarily on the property's association, location, design, materials, and, perhaps, workmanship. As a general rule, most transportation properties will fall under Criteria A, B, and C. However, Native American, emigrant, and trade trails may best represent properties that would qualify under Criterion D. Wagon, stagecoach, and automobile roads may qualify under Criterion D, but only if there are substantial data present that could yield important information not otherwise found in documentary or oral history. It is also plausible that these types of properties may be eligible under multiple criteria, including Criterion D.

Criteria Considera tion (G)

For a transportation property to be eligible under Criteria Consideration (g), it must be demonstrated that the property is less than 50 years of age and conveys "exceptional" significance. Properties in this category are rare; however, engineering and, perhaps, cultural properties less than 50 years of age should be carefully considered for eligibility under this criterion if it can be demonstrated that they represent the work of a master or a cutting-edge technology or that they have had an "exceptionally" significant influence on modern transportation development and/or culture.

Matrix for Est ablishing the Significance of a Transpor tation Proper ty

Three separate tables (Tables 4–6) were designed to assist the researcher in establishing the significance of a transportation property. The tables provide flexibility in rating a transportation property, and not every property will fit neatly into each table. It is up to the researcher to use his or her judgment to determine which table is most applicable and to apply the criteria in the table to fit the property being evaluated. The integrity thresholds are intended as a guide, and the relative importance of the integrity thresholds will be verified on a case-by-case basis. In this study, the term "threshold" is used to imply "the point that must be exceeded to begin producing a given effect or result."[331] In essence, establishing significance requires reaching a certain threshold or level of integrity commensurate with the resource being evaluated. This may be accomplished by assessing the quality, quantity, and value of a property's CDF. The quantity or number of CDFs may be of lesser importance than the quality and integrity of each CDF (see the Character-Defining Features Summary form for the Rim of the World Highway).

Table 4 provides a simple comparison between property types and themes. The purpose of the table is to illustrate which property types are most applicable to a specific theme or themes. For example, parkways or freeways would be most applicable to the theme, Roads and Highways as Reflections of Culture and/or Roads and Highways as Symbols of Engineering Achievement. Most parkways and freeways are collectively important for trade and commerce, but when examined independently, they may not be significant. Exceptions, however, may exist, such as a parkway that provided important linkages that never existed before between villages or tourist destinations. The Arroyo Seco Parkway in Pasadena, for example, was found to be significant as the first freeway in the west, representative of a transitional time in history when parkways became freeways, and for its engineering.

Table 5 assigns levels of integrity to trails, roads, and highways, using NRHP Criteria A–D, by theme. Three values are assigned for each theme and aspect of integrity: high, medium, and low. In general, significant properties should have high or medium integrity values. For example, a highway, such as Route 66, whose theme reflects a significant cultural event or events should retain, at a minimum, high

[331] KSK Architects Planners Historians, Inc., et al., *New Jersey Historic Roadway Design Guidelines*, 5–6.

Table 4. Property Types Compared to Significant Themes

Property Types	Trails, Roads, and Highways as Reflections of Culture	Trails, Roads, and Highways as Symbols of Commerce and Trade	Roads and Highways as Symbols of Engineering Achievement
Native American trails	x	x	
Spanish trails	x	x	
Recreation trails	x		
Emigrant trails	x		
Wagon roads	x	x	x
Stage roads	x	x	x
Toll roads	x	x	x
Early automobile roads	x	x	x
Modern parkways or freeways	x	x	x
Interstate freeways	x	x	x

Table 5. Integrity-Levels Matrix Based on NRHP Criteria and Themes

NRHP Criteria A–D	Association	Location	Design	Setting	Materials	Workmanship	Feeling
Theme: Trails, Roads, and Highways as Reflections of Culture							
A	high	high	medium	medium	low	low	high
B	high	high	low	high	low	low	medium
C	medium	medium	high	medium	high	high	low
D	high	high	low	low	high	low	low
Theme: Trails, Roads, and Highways as Symbols of Commerce and Trade							
A	high	medium	low	medium	medium	low	medium
B	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C	medium	medium	high	medium	high	high	low
D	high	high	low	low	high	low	low
Theme" Trails, Roads, and Highways as Symbols of Engineering Achievement							
A	medium	high	medium	medium	medium	medium	medium
B	high	n/a	n/a	n/a	n/a	n/a	n/a
C	medium	high	high	medium	high	high	low
D	high	high	low	medium	high	high	low

Table 6. Property Types Based Upon Chronology Compared to Aspects of Integrity

Chronological Period	Association	Location	Design	Setting	Materials	Workmanship	Feeling
Native American, Spanish, Emigrant, and Recreation Trails (10,000 b.p–a.d. 1910)	high	high	low	medium	low	low	medium
Nineteenth-Century Wagon, Stage, and Toll Roads (1830–1900)	high	high	medium-high	medium	low	medium	medium
Early-day Automobile Roads and Highways (1900–40)	high	high	high	medium	medium	medium	medium
Modern Parkways and Highways (1940–56)	high	high	high	medium	medium	high	medium
Interstate Freeways (1956–70) *for compliance only with state and local cultural resource laws*	high	medium	medium	medium	low	low	medium

levels of integrity of association, location, and feeling and medium levels of integrity of design and setting. Materials and workmanship may be lower, because emphasis of a transportation property's significance for its cultural values is more esoteric than emphasis of a property's significance for its engineering or its influence on commerce and trade. That does not preclude the significance of culturally significant transportation properties under other themes, if indeed they represent important engineering design or may have been instrumental in the development of commerce and trade.

Table 6 assigns levels of importance to trails, roads, and highways based on chronology, compared to the seven aspects of integrity. For example, an early-day automobile road and highway (1900–1940) should have, at a minimum, a high level of association, a high level of location, a high level of design, a medium level of setting, a medium level of materials, a medium level of workmanship, and a medium level of feeling. Using SR 99 as an example, in order to be considered significant, a segment of the original highway should have a high level of association, such that the segment is clearly identifiable as a ca.-1930s-era highway, the highway segment is in its original location or alignment, and its design elements are largely intact. The segment, however, may have some degree of diminished integrity of setting, materials, workmanship, and feeling, to a medium level. Unless roads and highways are in rural, largely undeveloped settings, some degree of infill can be expected, particularly on the peripheries of cities where suburban growth has occurred.

Integrity Thresholds

Integrity thresholds vary from one property to another, depending upon a variety of factors, including the property type and its age, condition, function, theme, and period of significance. As stated in SERv2 (ch. 7, sec. 7.9.5), "there are cases in which setting is an important CDF of a property, rather than just one aspect of integrity." Setting that conveys the significance of a historic property does not necessarily

have to be confined within the boundaries of the historic property. In such an instance, the setting becomes a contributing element, and the researcher must define, as explicitly as possible, how the visual, auditory, and atmospheric elements of setting are essential physical features of the historic property and how the setting conveys significance. Each setting, however, will vary, depending upon the degree of change that has occurred since the terminus date for the property's period of significance. In urban areas that have undergone a great deal of expansion and change, the standards for setting are not as rigid, except for the road prism and primary corridor—that is, the right-of-way flanking each side of the property.

Each transportation property must have a discussion of the integrity thresholds that have been established for the particular theme or period of significance for which it may be eligible. For trails, roads, or highways that have been determined significant for multiple themes or periods, the property can only be considered eligible for listing in the NRHP for the period or periods in which it attained significance and for which it still retains an adequate level of integrity to convey that significance.

Assigning Levels of Importance to Transportation Properties

In addition to describing and ranking a property's CDFs or specific features and applying the integrity matrix outlined in Tables 5 and 6, levels of integrity have been scaled from 1, at the highest level, to 6 at the lowest level. As part of the holistic assessment, these levels are described below within the five broad chronological periods that characterize the full range of transportation properties that may be encountered in California.

Level 1 properties, as a general rule, are either listed properties or properties that are excellent candidates for NRHP listing. Level 2 properties are good candidates for NRHP listing. Level 3 properties are marginal candidates for NRHP listing. Level 4 properties are poor candidates for NRHP listing. Level 5 and 6 properties have little or no possibility of being listed in the NRHP.

NATIVE AMERICAN, MEXICAN, SPANISH, EMIGRANT, AND RECREATION TRAILS (10,000 b.p–a.d. 1910)

Level 1. The trail remains intact or nearly intact with no significant alterations apparent. The trail or trail trace retains physical, historical, or ethnographic evidence that connects its period of use with its context. In regards to Native American and early Spanish trails, the trail trace may include cultural artifacts, sites, or features that are spread over a large, linear landscape or corridor, rather than an actual physical trail. Those physical remains may be noncontiguous, but association through context and setting of the property or feature should remain high (Figure 143).[332] The concept of a noncontiguous transportation property is particularly true in regards to Native American trails, where various features or points of reference may be interconnected in both time and space, though lacking any visible trail trace.

Level 2. The trail remains relatively intact, with minor alterations created through natural erosion or other forms of land use inconsistent with the character or context of the property or feature. Minor alterations may include drainage cuts, erosion, and small bisections by modern vehicles or equipment.

Level 3. The trail retains a fair amount of integrity. A moderate degree of change or alteration has occurred to the property or feature, but the changes are not so extreme that the resource cannot be

[332] For emigrant trails, refer also to OCTA's trail-classification system. See Attachment I for a copy of the criteria from OCTA's *Mapping Emigrant Trails Manual*, pt. A, see online at https://www.octa-trails.org/media/dynamic/files/581_2%20Part%20A%20Inv%20Procedures.pdf. The manual was developed in cooperation with the NPS.

identified properly or that its setting has been seriously compromised.

Level 4. The integrity of the trail has been compromised by natural erosion and/or alteration through modern use. The setting of the property or feature has also been compromised by landform changes due to natural and human-caused events, such as floods, sedimentation, landslides, erosion, and urbanization.

Level 5. Most of the integrity of the trail has been lost through major alterations. Physical evidence of the trail is sparse, and the setting does not reflect its context during the period in which it was in use or gained significance.

Level 6. The integrity of the trail is entirely lost, through complete obliteration of its historic components and/or significant alteration to its setting.

Figure 143. *Level 1 prehistoric trail (CA-IMP-11,674) in the Colorado Desert (courtesy of Stephen Byrne [Byrne 2011]).*

NINETEENTH-CENTURY WAGON, STAGE, AND TOLL ROADS (1830–1900)

Level 1. The wagon, stage, or toll road is intact or nearly intact, with no significant alterations apparent. The road retains physical evidence that connects its period of use with its historic context. Those physical remains may be noncontiguous, but association through context and setting of the property or feature remains high (Figure 144).

Level 2. The wagon, stage, or toll road is relatively intact, with minor alterations created through natural erosion or other forms of land use inconsistent with the character or context of the property or feature (Figure 145).

Level 3. The wagon, stage, or toll road retains a fair amount of integrity. A moderate degree of change or alteration has occurred to the property or feature, but the changes are not so extreme that the resource cannot be identified properly or that its setting has been seriously compromised.

Level 4. The integrity of the wagon, stage, or toll road has been compromised by natural erosion and/or alteration through modern use. The setting of the property or feature has also been compromised by landform changes due to natural and human-caused events, such as floods, sedimentation, landslides, erosion, vehicular use, and urbanization.

Figure 144. *Level 1 segment of the Placerville–Lake Tahoe Wagon Road paralleling U.S. 50 east of Pollock Pines, ca 1860–1930. This segment retains very good integrity, including the original road prism and dry-laid rock walls (Caltrans photograph).*

Figure 145. *If the tree canopy (setting) had not been altered by construction of the Folsom Lake Reservoir in the 1960s, the Salmon Falls, El Dorado County, wagon road (ca. 1850s–1930) revealed during lower water in Folsom Lake, December 2014, might be considered a Level 1 property (Caltrans photograph).*

Level 5. Most of the integrity of the wagon, stage, or toll road has been lost through major alterations. Physical evidence of the road is sparse, and the setting does not reflect its context during the period in which it was in use or gained significance.

Level 6. The integrity of the wagon, stage, or toll road is entirely lost, through complete obliteration of its historic components and/or significant alteration to its setting.

EARLY-DAY AUTOMOBILE ROADS AND HIGHWAYS (1900–40)

Level 1. The early-day automobile road and/or highway is intact or nearly intact, with no significant alterations apparent. The road retains physical evidence that connects its period of use with its historic context and period of significance. Those physical remains may be noncontiguous, but association through context and setting of the property or feature remains high (Figure 146).

Figure 146. *Level 1 segment of Old U.S. 40 near Yuba Gap along present-day U.S. 80. Note the original road prism and retention of the old macadam surfacing (Caltrans photograph).*

Level 2. The early-day automobile road and/or highway remains relatively intact, with minor alterations created through natural erosion or other forms of land use inconsistent with the character or context of the property or feature.

Level 3. The early-day automobile road and/or highway retains a fair amount of integrity. A moderate degree of change or alteration has occurred to the road or highway, but the changes are not so extreme that the resource cannot be identified properly or that its setting has been seriously compromised.

Level 4. The early-day automobile road and/or highway has been compromised by natural erosion and alteration through modern use. The setting of the property or feature has also been compromised by landform changes due to natural and human-caused events.

Level 5. The early-day automobile road and/or highway has lost most of its integrity through major alterations. Physical evidence of the road or highway is minimal, and the setting does not reflect its context during the period in which it was in use or gained significance.

Level 6. The integrity of the early-day automobile road and/or highway is entirely lost, through complete obliteration and/or significant alteration to its setting.

MODERN PARKWAYS AND HIGHWAYS (1940–56)

Level 1. The modern parkway and/or highway remains intact or nearly intact, with no significant alterations apparent. The parkway retains physical evidence that connects its period of use with its historic context. Those physical remains may be noncontiguous, but association through context and setting of the property or feature remains high. In essence, the key design elements of the parkway, including any associated landscaping, remain largely intact (Figure 147).

Figure 147. *Cabrillo Freeway, 1954 (Caltrans Transportation Library, Sacramento).*

Level 2. The modern parkway and/or highway remains relatively intact, with minor alterations and little change to the character or context of the property or feature.

Level 3. The modern parkway and/or highway retains a fair amount of integrity. A moderate degree of change or alteration has occurred to the road or highway, but the changes are not so extreme that the resource cannot be identified properly or that its setting has been seriously compromised.

Level 4. The modern parkway and/or highway has been compromised by modern upgrading with elimination of some of its key CDFs. The setting of the property has also been compromised and is not reflective of the historic context/theme because of landform changes due to natural and/or human-caused events.

Level 5. The modern parkway and/or highway has lost most of its integrity through major alterations. Physical evidence of the parkway is minimal, and the setting does not reflect its context during the period in which it was in use or gained significance.

Level 6. The integrity of the modern parkway and/or highway is entirely lost, through complete obliteration, including significant alteration to its setting.

INTERSTATE HIGHWAYS/FREEWAYS (1956–70)

The interstate highway system has been exempted from compliance with National Historic Preservation Act, Section 106, and U.S. Department of Transportation Act, Section 4(f), with a few exceptions, but it is not exempt from state cultural resource laws (see SERv2, ch. 2, sec. 2.2.7, for more information). The following information is provided when considering whether an interstate freeway system within the State of California would meet NRHP, California Historical Landmark, or CRHR eligibility criteria under the California Environmental Quality Act or, for state-owned components of the interstate, California Public Resources Code, Section 5024.

Level 1. The interstate freeway remains intact or nearly intact, with no significant alterations apparent. The interstate freeway retains physical evidence that connects its period of use with its historic context (Figure 148).

Level 2. The interstate highway or freeway remains relatively intact, with minor alterations and little change to its overall historic character or its historic context.

Level 3. The interstate freeway retains a fair amount of integrity. A moderate degree of change or alteration has occurred to the freeway, but the changes are not extreme; the physical characteristics of the freeway remain largely intact.

Level 4. The interstate freeway has been compromised by upgrading, with elimination of some of its key CDFs.

Level 5. The interstate freeway has lost most of its integrity through major alterations, such as rerouting.

Level 6. The integrity of the interstate freeway is entirely lost, through reconstruction or elimination of all or most of its CDFs.

Figure 148. *View of Interstate 5, Stanislaus County (Caltrans Photograph, 2000, Herb Holman Photograph, 00-10220-d10.jpg). The photo represents both the interstate highway and adjacent to it the California Aqueduct itself a historic part of the west side Central Valley's cultural landscape.*

CHARACTER-DEFINING FEATURES SUMMARY FORM

Caltrans uses the Character-Defining Features Summary forms to assist in the field in identifying CDFs of trails, roads, and highways and to document the CDFs importance in conveying significance.[333] The forms are flexible enough to be used for any property type and are used to rank and document CDFs. Completing these summary forms will assist both the researcher and the reviewer in determining the rationale for the property's significance or lack of significance, particularly for complex transportation properties. The following is an example of a district Character-Defining Features Summary form for the Rim of the World Highway. In this case, the property was determined eligible for listing in the NRHP, under Criteria A and C, at the local level of significance.

[333] Caltrans Character-Defining Features Summary forms for individually eligible properties, districts, and contributors to districts can be downloaded from the templates page, http://www.dot.ca.gov/hq/env/cultural/index.htm#template. The forms were previously referred to as Condition Assessment Reports.

State of California Department of Transportation — Business, Transportation and Housing Agency

CONDITION ASSESSMENT REPORT

Historic District Character-Defining Features Cover Sheet

Rim of the World Highway Historic District

Name of District	Rim of the World Highway Historic District, Route 18 San Bernardino County	**Date Listed/Determined Eligible**	Determined eligible October 5, 2001
Criteria	A and C	**Period of Significance**	1928-1936
Significance Level	Local	**# of Contributing Properties**	N/A
# of Contributors	16	**# of Non Contributors**	N/A
# of Caltrans Contributors	N/A		
Summary of Significance. The highway	Criterion A: recreation, tourism, and transportation in San Bernardino Mountains/Southern California. Criterion C: Outstanding Depression-era example of road design designed to be compatible with the scenic and rustic character of mountainous landscape.		
District Boundaries	Length of State Route 18 segment from PM 17.9 to PM 21.7		

Caltrans Owned Contributing Elements
All contributing elements listed below are owned by Caltrans, with the exception of the mountainous landscape setting outside the right-of-way.

DISTRICT CHARACTER-DEFINING FEATURES

Ranking	CDF #	Feature Number and Description	A	B	C	D	E	Total points
M	1	• Mountainous landscape of irregular granitic rock outcroppings, higher elevation yellow pine forest and other native vegetation.	3	3	3	3	3	15
M	2	• Limited road width, curvilinear alignment, adjacent slopes and scenic overlooks (turn outs)	2	3	3	3	2	13
		ROCK PIER-AND-CHAIN GUARDRAILS AND LOW ROCK WALLS						
M	3	• Rubble masonry parapet wall turnout with landscaping and seating area, south side, P.M. 18.3	3	3	3	3	3	15
M	4	• Rubble masonry pier-and-chain guardrail, obstructed by recent metal beam guardrail, south side P.M. 18.33	3	3	3	1	3	13
M	5	• Rubble masonry pier-and-chain guardrail, south side, P.M. 18.77	3	3	3	3	3	15
M	6	• Rubble masonry pier-and-chain guardrail and stone retaining wall, south side, P.M. 18.92	3	3	3	3	3	15
S	7	• Rubble masonry pier-and-chain guardrail, partially obstructed by recent "Jersey" barrier, south side, P.M. 19.19	3	3	3	1	3	13
M	8	• Rubble masonry pier-and-chain guardrail, south side, P.M. 19.41	3	3	3	3	3	15
S	9	• Rubble masonry pier-and-chain guardrail, partially obstructed by weathered guardrails, south side, P.M. 19.57	3	3	3	1	3	13
M	10	• Rubble masonry pier-and-chain guardrail with masonry curb and drain, south side, P.M. 19.98	3	3	3	3	3	15
S	11	• Rubble masonry pier-and-chain guardrail, obscured by built-up asphalt drain and pipe, south side, P.M. 20.10	3	2	3	1	1	10

M = Most Significant **S** = Significant L = Less Significant

Recorded By: Stephen Mikesell and David Lemon, ICF International **Date Recorded:** 02/06/13

Character Defining Features Form

State of California Department of Transportation — Business, Transportation and Housing Agency

CONDITION ASSESSMENT REPORT

Historic District Character-Defining Features Cover Sheet

Rim of the World Highway Historic District

Ranking	CDF #	Feature Number and Description	A	B	C	D	E	Total points
S	12	• Rubble masonry pier-and-chain guardrail, mostly buried under fill and slanted downhill, P.M. 20.33	3	2	3	1	1	10
M	13	• Rubble masonry pier-and-chain guardrail, south side, P.M. 20.45	3	3	3	3	3	15
M	14	• Rubble masonry parapet wall constructed of Saragossa quartzite (Donald S. Wieman Memorial Vista Point), south side, P.M. 21.45	3	3	3	3	3	15
		OTHER FEATURES						
S	15	• Rock-and-chain pillars and rubble walls along length of highway in various locations within the postmiles of the historic district	2	2	2	1	2	9
L	16	• All original curbs within the postmiles in the historic district	2	2	2	1	1	

Non-contributing features within the historic district include the 1960s-2000s metal beam guardrails, two retaining walls (PM 18.3, 20.7), asphalt curbs and Baylis Park roadside picnic area. However, removal or replacement of these features may affect the historic district character if not done compatibly, with attention paid to the historic character of the Rim of the World Highway Historic District as a whole.

M = Most Significant S = Significant L = Less Significant

Recorded By: Stephen Mikesell and David Lemon, ICF International **Date Recorded:** 02/06/13

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Character Defining Features Form

State of California Department of Transportation — Business, Transportation and Housing Agency

CONDITION ASSESSMENT REPORT

Historic District Character-Defining Features Cover Sheet

Rim of the World Highway Historic District

CRITERIA MATRIX FOR RANKING FEATURES			
	HIGH = 3 POINTS	MEDIUM = 2 POINTS	LOW = 1 POINT
A. Craftsmanship	High artistic value, craftsmanship, design, materials	Expected feature linked to contributing architectural style or method of construction	Standard historic fabric *(commonly found during period of significance)*
B. Conveying Significance	Quintessential & Indispensable *(without it the significance is lost)*	Important *(without it significance is diminished)*	Low *(adverse effects could be cumulative)*
C. Public Benefit	High	Medium	Low *(mostly private spaces)*
D. Visibility and transparency	Primary, salient feature *(something you can see from the street or public space)*	Secondary, somewhat obscured *(something you can see through doors and windows)*	Tertiary/obscured
E. Integrity	Intact as designed/original	Somewhat altered	Substantially altered
Total points in each category	15 points	10 points	5 points
Ranking			
13 – 15 points =	Most significant	*Strongly* conveys sense of time and place	
9 – 12 points =	Significant	Conveys sense of time and place	
5 – 8 points =	Less significant	Still conveys sense of time and place, but to lesser degree	
< 5 points =		Historic fabric; not character-defining feature	

Explanation of Abbreviations on District and Building Character-Defining Features Forms:

Character Defining Features Box = MS (Most Significant) S (Significant), L (Least Significant).
(See point range in Criteria Matrix for ranking features.)

Historic Fabric Box = If box is checked, it is historic fabric, if not, it is not historic fabric.

Altered/Gone Box = A(ltered), G(one)

M = Most Significant **S** = Significant **L** = Less Significant

Recorded By: Stephen Mikesell and David Lemon, ICF International **Date Recorded:** 02/08/13

Character Defining Features Form

State of California Department of Transportation — Business, Transportation and Housing Agency

CONDITION ASSESSMENT REPORT

Historic District Character-Defining Features Cover Sheet

Rim of the World Highway Historic District

PHOTOGRAPHS

Rubble masonry parapet walls at Strawberry Scenic Overlook, constructed of Saragossa quartzite. View to the west at P.M. 21.5.

Rubble masonry "pier-and-chain" guardrails atop rock retaining wall, view west at P.M. 21.

M = Most Significant **S** = Significant **L** = Less Significant

Recorded By: Stephen Mikesell and David Lemon, ICF International **Date Recorded:** 02/06/13

Character Defining Features Form

State of California Department of Transportation — Business, Transportation and Housing Agency

CONDITION ASSESSMENT REPORT

Historic District Character-Defining Features Cover Sheet

Rim of the World Highway Historic District

PHOTOGRAPHS

Inundated rubble masonry "pier-and-chain" guardrails atop rock retaining wall, inundated by slide fill. View west at P.M. 18.85.

Detail of rubble masonry "pier-and-chain" guardrail, View west at P.M. 20.04.

M = Most Significant **S** = Significant **L** = Less Significant

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Character Defining Features Form

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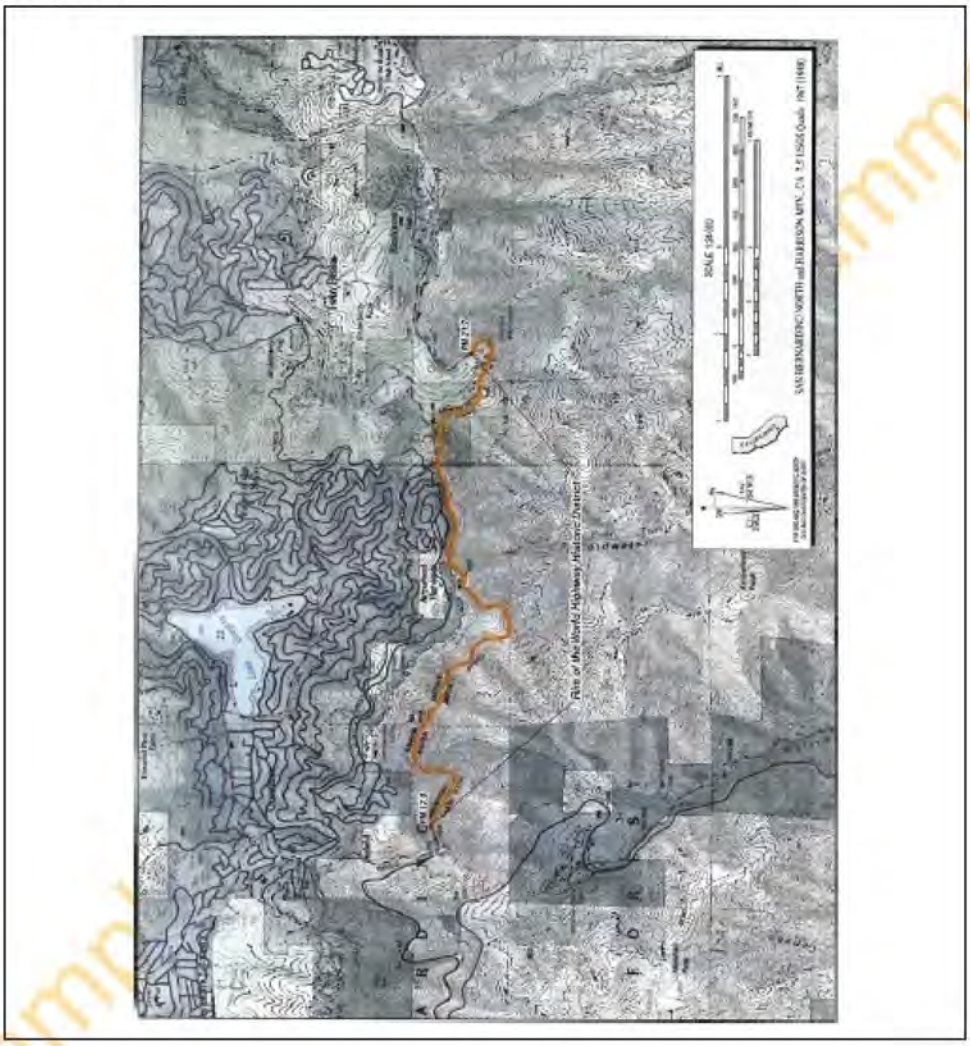
Historic District Character-Defining Features Cover Sheet

Rim of the World Highway Historic District

DISTRICT MAP[1]



[1] Figure 1, Location of the Rim of the World Highway Historic District, found in: October 2001. Applied Earthworks, Inc. *Cultural Resources monitoring of Emergency Road Restoration within the Rim of the World Highway Historic District, State Route 18, (Post Mile 17.9/21.7), San Bernardino County, California.* Prepared for the California Department of Transportation, District 8. Task Order No. 009, Contract No. 08A0713; EA OE9601.

M = Most Significant **S** = Significant **L** = Less Significant

Recorded By: Stephen Mikesell and David Lemon, ICF International **Date Recorded:** 02/06/13

Character Defining Features Form

A Short Guide to Using this Study

This guide shall assist in the implementation of the methodological approach outlined in Chapter 8 of this study. The intent of the methodology is to help define the CDFs of trails, roads, and highways; standardize and simplify the process of determining the significance of transportation properties; and provide more-defensible arguments for their eligibility or ineligibility.

STEP 1: IDENTIFICATION

Identification is an essential part of developing an argument for a property's significance. It is important to be able to properly identify the key characteristics or CDFs of a transportation property, including its:

- shape or morphology,
- length (beginning and ending points),
- physical features, and
- associated components.

Define the Property

All transportation properties have certain identifiable traits. A road or highway may be straight, while others are curvilinear and may be divided with a center medium and shoulders. In order to properly interpret a transportation property it is essential to define the prism or the trail, road, or highway edge, along with the near and distant landscapes or views. In doing so, one has captured the broad range of CDFs that have the potential to aid in interpretation of the transportation property and that can convey its significance. In many cases, the focus may be solely upon the CDFs within the prism, which, in the case of state highways, usually encompasses the road right-of-way. In other situations, particularly in urban environments, the CDFs may correspond directly to the adjacent landscape, which may consist of sidewalks, curbs, gutters, street trees, lamps, and commercial or residential buildings.

Some important questions to ask include the following:

- Do the property's CDFs fall within the its period of significance or period of original construction, or were they added at a later date?
- Are the associated features of primary importance to the transportation property, or are they secondary? Features may include road surfacing, center mediums, overheads, through-cuts, raised beds, retaining walls, tree rows, culverts, drainage ditches, and guardrails.

Determining whether a property is a built-environment resource vs. an archaeological resource depends upon the age, function, and disposition of its CDFs. Is the transportation property still functioning and in use, and if so, is it still in its historical use? For example, a wagon road that is now a jeep road may still reflect its historical use, vs. a wagon road that has been converted to a modern highway. Does the property have well-defined engineering features? For example, a wagon road that is abandoned yet retains an engineered grade and rock retaining walls that remain standing may be considered a built-environment

resource vs. an archaeological resource. However, an abandoned wagon road that has degraded walls and a non-engineered roadbed and lacks a strong "structural" presence may be classified more appropriately as an archaeological property and recorded as such. In other situations, a linear engineering property, such as an abandoned road, may have associated archaeological features along its prism and/or corridor, such as refuse scatters or the remains of cabins, hostelries, etc. In either case, a Department of Parks and Recreation Primary Record (DPR 523A) and Linear Feature Record (DPR 523E) forms should be common to both scenarios, and if archaeological resources are present, an archaeological record may accompany the built-environment recording forms. A Department of Parks and Recreation Building, Structure, Object record (DPR 523B) is required when a property is formally evaluated.

In order to document a linear transportation property, it is critical to first establish its beginning and end points. Do the property's beginning and end points span local, regional, and/or national jurisdictional or geographical boundaries? Is it part of a larger system of transportation properties or features? Does it connect a metropolitan area with other metropolitan areas? Does it connect towns or villages? Is the topography surrounding it valley, mountains, or desert? Does it include bridges or overpasses?

Besides the physical survey, various tools can be used to interpret virtually all transportation properties: photographs, Caltrans as-built drawings, historical maps, internal web-based sites, published and unpublished documents, and the Caltrans Cultural Resources Database, to name just a few sources.

STEP 2: APPLY THE HISTORIC CONTEXT

The historic context found in Chapters 3–7 provides an overarching discussion of each category or property type, including trails, roads, highways or parkways, and interstate highways. The following broad chronological periods encompass virtually any potential historic transportation property encountered in California. Specific transportation properties will likely have more narrowly bracketed periods of use or significance that need to be defined through property-specific research.

- Native American, Spanish, Mexican, Emigrant, and Recreation Trails (10,000 b.p–a.d . 1910)
- Nineteenth-Century Wagon, Stage, and Toll Roads (1830–1900)
- Early-day Automobile Roads and Highways (1900–40)
- Modern Parkways and Highways (1940–56)
- Interstate Freeways (1956–70)

A transportation property may have been more than one period of significance, and those periods do not have to be continuous.

The following are the important themes that have been identified:

- Roads and Highways as Reflections of Culture
- Roads and Highways as Symbols of Commerce and Trade
- Roads and Highways as Symbols of Engineering Achievement

A transportation property can reflect more than one theme.

Many transportation properties reflect dual themes, such as Cultural and Engineering, and dual periods of significance that span years or even decades. Once the appropriate historic context and period of significance has been established, the resource can be properly evaluated and its integrity assessed.

STEP 3: APPLY THE INTEGRITY ASSESSMENT

Few, if any, roads or highways that are operational and are over 50 years of age, remain as when they were originally built. Most have been altered with new surfaces, drainage systems, grade changes, and/or safety features since their original construction. Others have been widened or had bridges replaced or their alignments altered. In addition, the surrounding buildings or landscape may have changed, as might the intensity and types of surrounding land uses. Generally, historic roads with the greatest integrity are those that have been decommissioned, abandoned, or bypassed.

A transportation property may still be significant, even though it has been bifurcated and is not continuous.

A transportation property does not have to meet all seven aspects of integrity, but it must reflect its historical period of significance. In certain cases, association may trump engineering, and a transportation property may have a high degree of cultural significance despite alterations to its design or materials. Tables 4–6 in Chapter 8 are designed to assist in correlating a transportation property with its historic context and integrity. At this stage, each property should have distinct CDFs that guide the final assessment of integrity (see the Character-Defining Features Summary form in Chapter 8).

The following are the seven aspects of integrity and how they may be applied to a transportation property:

- *Association*: whether the transportation property or feature has a direct link with a historic event, place, or person. While association is important and strengthens integrity, retention of association alone does not confer NRHP eligibility.
- *Location*: whether the transportation property or feature follows its historical alignment. This is an important but not always essential aspect.
- *Design*: whether the transportation property or feature retains its original grade, cross slope, and other geometric elements. This aspect of integrity becomes less important as the age of the property or feature increases, because many nineteenth-century roads were not engineered or designed.
- *Setting*: whether the original surrounding land use and landscape are still present. The importance of the setting increases if adjacent historic elements remain intact.
- *Materials*: whether the materials of the transportation property or its features are still present. It is assumed that road materials have changed over time. Original materials strengthen the overall historic integrity of the property but are not always necessary to assume significance.
- *Workmanship*: whether the quality of craftsmanship is consistent with the historic property. This is not important by itself, but it strengthens the overall historic integrity of the property.
- *Feeling*: whether a sense of history, in an aesthetic sense, is present. This is not important by itself, but it strengthens the overall historic integrity of the property.

STEP 4: DETERMINING HISTORICAL SIGNIFICANCE

Now that the property has been properly identified, its period of significance established, and its CDFs defined, along with its respective level of integrity, these data can be combined to make an informed recommendation about its eligibility. For the most part, eligibility is a subjective decision based upon

factual and comparative data. By using the protocols in this methodology, subjective decision-making can ultimately become more objective and defensible, in regard to the final outcome of the significance analysis. The rating system described in Chapter 8 is intended as a general guide, not as a final outcome of analysis. Application of the NRHP criteria specifically tailored to transportation properties, combined with the numerical rating scheme, together assist in making more-scholarly eligibility determinations.

As previously noted, virtually all transportation properties played an important role in conveying goods and people, whether at the local, regional, or national level. While transportation properties that crossed interstate boundaries have a greater range of potential significance, state and local transportation properties may have had equal significance. Whether a property is linked locally, regionally, or nationally, historical evidence must be clearly articulated to convey that range of significance and tie the physical property to a significant theme or themes. Finally, careful consideration should be given to what the historic property looked like during its period of significance and how it appears today, keeping in mind that transportation properties require routine maintenance to ensure their longevity.

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APPENDIX A
Acronyms/Abbreviations List

36 CFR 800	*Code of Federal Regulations*, Title 36, Part 800
AAA	American Automobile Association
AASHTO	American Association of State Highway and Transportation Officials
ACC	Automobile Club of California
ACSC	Automobile Club of Southern California
ADOT	Arizona Department of Transportation
APE	area of potential effects
Caltrans	California Department of Transportation
CDF	character-defining features
CHC	California Highway Commission
CRHR	California Register of Historical Resources
CSAA	California State Automobile Association
EHv2	*Cultural Resources*, vol. 2 of the *Caltrans Standard Environmental Reference, Environmental Handbook*
FHWA	U.S. Department of Transportation Federal Highway Administration
GIS	geographic information system
I-	U.S. Interstate [*with number*; e.g., I-40]
LHA	Lincoln Highway Association
NCHRP	National Cooperative Highway Research Program
NDOR	Nebraska Department of Roads
NJDOT	New Jersey Department of Transportation
NPS	U.S. Department of the Interior National Park Service
NRHP	National Register of Historic Places
NTFHR	National Task Force for Historic Routes
OCTA	Oregon-California Trails Association
PA	programmatic agreement
PQS	Professionally Qualified Staff
RTAG	Rapid Transit Action Group
SHPO	State Historic Preservation Office
SR	State Route
SRRA	Safety Roadside Rest Area
TCA	Transportation Corridor Agency
TCP	Traditional Cultural Property
WPA	Work Projects Administration

APPENDIX B
Glossary of Construction and Highway Terms

Aesthetic Routes	Roadways designed for a specific interaction with the natural or built environment. These routes incorporate the surrounding scenery into their design.
Alignment	The vertical and horizontal layout of a highway make up the alignment. The design of the alignment depends of the design speed selected for the highway. The least costly alignment is one that takes the form of the natural topography. It is important that both horizontal and vertical alignments be designed to complement each other.
Amiesite	A patented type of bituminous concrete requiring a fluxed bituminous binder and hydrated lime placed cold on any type of base other than concrete. The City of Denver experimented with this material on a block of Speer Boulevard in 1910.
Arterial	A road providing the principal high-volume and high-speed linkages within a community and between communities.
Bituminous Concrete	A pavement made up of aggregates, such as crushed stone, gravel, or slag, combined with a bituminous binder that is used instead of cement.
Capacity	The maximum rate of flow in vehicles per hour that can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic and control conditions, usually expressed as vehicles per hour or persons per hour.
Cement	A powder that hardens when mixed with water; an ingredient used in concrete.
Cement Mortar	A mixture of four parts sand to one part cement with enough water added to make it plastic.
Coating	A material that provides a continuous film over surface; a film formed by the material.
Concrete	A mixture of aggregate, water, and a binder – usually Portland cement – that hardens to a stone-like mass.
Crown of the Roadway	The vertical dimension describing the total amount of the surface that is convex or raised from gutter to centerline; this is sometimes termed the cross fall of the roadway.
Cultural Routes	Roads that have evolved over time. Roads for which there is no recognized date of beginning.
Curb	A short barrier paralleling the outside edge of the roadway to guide the movement of vehicle wheels and safeguard constructions and pedestrian traffic existing outside the roadway limit from collision with vehicles and their loads.

Density	The number of vehicles occupying a given length of lane or roadway averaged over time, usually expressed vehicles per mile or vehicles per mile per lane.
Design Speed	Design speed is defined as the "maximum safe speed that can be maintained over a specified section of highway when conditions are favorable such that the design features of the highway govern." Design speed depends on the type of highway, the topography of the area in which the highway is located, and the land use of the adjacent areas.
Embankment	A bank of earth constructed above the natural ground surface to carry a road or to prevent water from passing beyond desirable limits; also known as bank.
Engineered Routes	Roads designed for the movement of people and goods. Roads for which the purpose of traffic movement is the principal underlying force behind their design.
Grade	The degree of rise or descent of a sloping surface on a highway or railroad.
Guardrail	A structural element designed to redirect an errant vehicle onto the roadway (guiderail).
Hot Mix Asphalt (HMA)	Asphalt pavement is any paved road surfaced with asphalt. Hot Mix Asphalt is a combination of approximately 95 per cent stone, sand and gravel bound together by asphalt cement, a product of crude oil. There are 2.27 million miles of paved roads in the United States and 94 percent is surfaced with asphalt, including 65 percent of the Interstate system.
Johnson Wall	An angled concrete barrier that will deflect a vehicle striking it back onto the road. Also known as "Jersey Barrier."
Joint	In stone masonry, the space between individual stone; in concrete, a division in continuity of the concrete; in a truss, the point at which members of a truss frame are joined.
Macadam	Uniformly sized stones rolled to form a road. Sometimes mixed with tar before application.
Materials	The elements originally combined to make the structure.
Median	A central space, usually planted, with divided opposite travel lanes.
Overpass	A bridge structure where the major thoroughfare is the upper roadway; see *Plain Concrete*.
Plain Concrete	Concrete with no structural reinforcement except light steel to reduce shrinkage and temperature-related cracking.
Precast Concrete	Concrete members that are cast and curled before being placed into their final position on a construction site.
Prestressed Concrete	Concrete in which cracking and tensile forces are greatly reduced by compressing it with tensioned cables or bars.

Realignment	The repositioning of a road.
Reinforced Concrete	Concrete with steel reinforcing bars bonded within it to supply increased tensile strength and durability.
Right-of-Way	Right-of-Way is the total land area acquired for construction of a transportation facility. Its width should be able to accommodate all the elements of the cross-section, any planned future expansion and planned future expansion.
Roadway	The portion of the road intended for the use of vehicular traffic.
Shoulder	A stabilized level area adjacent and parallel to the road. Shoulders provided a recovery space for an errant vehicle or a safe space for a disabled vehicle.
Standards	The legally adopted policies directing the design and construction of roads.
Superelevation	The banking or sloping of a road curve to allow vehicles to maintain a speed consistent with the overall speed of the roadway.
Terrain	Terrain is a portion of land, especially considered with regard to its topography and natural features. For transportation design, topography is generally classified into three groups: level terrain, rolling terrain, and mountainous terrain. Level terrain is relatively flat and horizontal and vertical sight distances are generally long or can be achieved without much construction difficulty or major expense. Rolling terrain has natural slopes that often rise above and fall below the grade, with occasional steep slopes that restrict the normal vertical and horizontal alignments. Mountainous terrain has sudden changes in ground elevation in both the longitudinal and transverse directions, thereby, requiring frequent hillside excavations to achieve acceptable horizontal and vertical alignments.
Underpass	A bridge structure where the principal, or subject, transportation facility is the lower roadway; see *Overpass*.
Vertical Alignment	The vertical alignment of a highway consists of straight sections of the highway known as grades, or tangents connected by vertical curves. The topography of an area through which the road traverses has significant influence on the design of the vertical alignment.
Viaduct	A series of spans carried on piers at short intervals.
Volume	The number of persons or vehicles passing a point on lane, roadway, or other trafficway during some time interval (often one hour) expressed in vehicles.

Prepared by
The California Department of Transportation
Sacramento, California
2016