GOOD ROADS EVERYWHERE:
A History of Road Building in Arizona

prepared for

Arizona Department of Transportation
Environmental Planning Group

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Cover Photograph

U.S. Highway 66 at Gold Road, circa 1930s
Norman Wallace, Photographer
(Courtesy of Arizona Department of Transportation)

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A HISTORY OF ROAD BUILDING IN ARIZONA

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FOREWORD

The fact that many Arizona roadways may be considered to be historic properties that warrant contemplation in planning is the primary reason why the Arizona Department of Transportation (ADOT), with funding provided by the Federal Highway Administration (FHWA), pursued a project to gather the history of road building in Arizona. The concern by both ADOT and FHWA about how to reasonably take the historic associations and characteristics of roadways into consideration in planning roadway construction, maintenance, and improvement projects remains even after the completion of this manuscript.

Since the initiation of this project, there has been an evolution of thinking by ADOT and the State Historic Preservation Office (SHPO) regarding what constitutes a reasonable approach to considering the historic preservation of in-use and abandoned historic roadways. At the outset, the approach was to carefully gather information and consider the possible historic associations of roadways in order to propose appropriate areas of significance for roadways. Once the areas of significance were identified for roadways, the characteristics worthy of preservation would have been identified and it would be possible to evaluate the integrity of road segments for specific projects. After areas of significance for roadways were proposed in early drafts of this roads history, it was immediately clear that there would be no agreement on the significance of roads among the authors, SHPO, ADOT, and the staff of other agencies and other researchers who reviewed the draft document. Without a consensus on the significance of roadways there would be no agreement on whether an individual segment retained integrity or whether the scope of a project would adversely impact a historic roadway.

The lack of a consensus on the significance of roadways did not mean that the value of a history of Arizona road building was not generally recognized. This history of road building revealed that roads can be considered "structures" as well as "networks" or "systems." With the approach of the fiftieth anniversary of the Interstate Highway System, the systemic character of state highways was recognized and with it a desire to divert focus away from evaluating individual segments and to considering possible cumulative impacts on a highway system. This change occurred in conjunction with the emphasis at the federal level to combine environmental streamlining with stewardship. Streamlining the consideration of historic roads in planning is now occurring with the development of a programmatic approach to roads as networks or systems. ADOT, FHWA, and SHPO are now working together to develop a programmatic approach that de-emphasizes the need for assessment of integrity for individual road segments.

This history of Arizona roads was written as our perceptions and considerations of roads changed. Despite shifts in the current thinking, approaches to evaluating specific road segments were retained in this volume in the event they may be integrated as a part of the programmatic approach to considering roadways.

Owen Lindauer
William S. Collins

PREFACE

This overview is the result of a project that was conducted under a contract with the Arizona Department of Transportation (ADOT) supported by Enhancement Funds from the Federal Highway Administration. The work began in 1996 under the direction of Richard M. Duarte, manager of the Environmental Planning Section; and Bettina H. Rosenberg, historic preservation coordinator; with Robert Gasser, historic preservation specialist managing the contract until he took another position within ADOT. Historic preservation specialist Owen Lindauer took the lead in working to complete the project, but he left ADOT for another job while revisions were still ongoing. By then Bettina had retired, and when Serelle Laine took over Bettina's job she worked to complete the study. Others who provided comments to ADOT on various drafts of this document include William Collins of the State Historic Preservation Office, consultants Lyle Stone and Pat Stein, and Michael Sullivan of the Tonto National Forest. The efforts of all the ADOT staff and other reviewers who helped shape and eventually complete this document are appreciated.

This overview is intended to relate the history of Arizona road building, particularly the state highway system, with the regulatory context of historic preservation. The original, optimistic goal was to write a historic context that would establish guidelines for consistently evaluating all historic vehicular roads throughout the state. That effort was to be completed in one year, and was to be followed by a Phase 2 inventory that would implement those procedures to identify, evaluate, and nominate many significant vehicular roads in Arizona to the National Register of Historic Places. As Phase 1 comes to a close some seven years later, that goal obviously was not achieved. There is some consolation in the recognition that it is not a simple task to develop a general consensus among the many parties interested in historic roads, and to date, no other state has had any significant degree of success.

Melissa Keane and J. Simon Bruder completed a draft of this document, with contributions by Kenneth M. Euge, in 1999. The draft document defined a series of historic contexts for evaluating the significance of roads in Arizona. The focus of the analysis was on the history of road building itself, rather than other historic themes to which roads may relate, such as roadside architecture, tourism, or development of agriculture and mining. The draft report concluded that many roads in the state have lost historic integrity because of the almost continual upgrading of the state's road network, and most others are undistinguished examples of a very common type—the two-lane bituminous highway. Agency reviewers concluded that the recommendations of the draft report, which emphasized preservation of only the "crown jewels" of Arizona's historic roads, were too narrow.

While ADOT staff contemplated what to do with the draft document, Ms. Keane and Ms. Bruder left URS, and completion of the document languished. ADOT arranged for an interagency meeting in 2001 to discuss historic roads. After the meeting, ADOT concluded that the draft report provided valuable historical perspective on road building in Arizona and the history of how the state highway system came to be built should be emphasized in a revised version of the report. ADOT acknowledged that future studies would have to take on the challenge of developing consensus among the various involved agencies about specific standards of practice for evaluating the National Register eligibility of Arizona's roads, and to work toward formal inventory and evaluation of historic-era roads managed by ADOT.

I then reorganized sections of the original draft and eliminated some sections that troubled reviewers. A revised draft was completed in June 2002 at a time when ADOT and the State Historic Preservation Office were forging a broader and more catholic strategy for addressing inventory, evaluation, and preservation of historic elements of the state highway network in compliance with Section 106 of the National Historic Preservation Act. That strategy is based on the blanket conclusion that the Arizona state highway system, writ large, is eligible for the National Register, but most routine maintenance and

minor upgrade project will not adversely affect the historic quality of the road system. Efforts to avoid or mitigate adverse effects will be highly focused on elements of the system deemed most significant. Although the details of that strategy are still being developed, the strategy simultaneously makes parts of this document obsolete and confirms the original conclusions about historic road preservation priorities.

Because Ms. Keane and Ms. Bruder completed the research and writing of the original draft report, with contributions by Kenneth Euge, it is appropriate to credit them as authors of this revised overview. Neither Melissa nor Simon will agree with every revision I made, and they should not be held responsible for my alterations of their original work.

A.E. (Gene) Rogge

ABSTRACT

The historic overview of road building was developed to provide background information for identifying roads in Arizona worthy of preservation. Chapter 1 describes the motivation of the Arizona Department of Transportation (ADOT) for commissioning this overview, and discusses the historic preservation regulations that framed the approach. Chapter 2 briefly summarizes the political history and funding of road development in the United States, from the founding of the nation through the mid-twentieth century. Chapter 3 discusses the evolution of road-building technology. The history of road building in Arizona is discussed in Chapter 4, within a framework focusing on each of the four criteria for listing in the National Register of Historic Places. Chapter 5 presents case studies based on field reconnaissance of selected segments of five roads scattered across the state. Chapter 6 identifies some of the challenges of evaluating the National Register eligibility of Arizona's roads. Conclusions and recommendations are presented in Chapter 7.

The general perspective of this study might be characterized as "bottom up" because it sought to develop guidelines for dealing with individual roads or even just road segments within the context of consultations required by Section 106 of the National Historic Preservation Act. Over the long time it took to complete the study, ADOT and the State Historic Preservation Office (SHPO) turned to a more "top down" approach addressing the state highway system as a whole. The *Interim Procedures for the Treatment of Historic Roads* that ADOT, SHPO, and the Federal Highways Administration adopted in November 2002 to begin to implement this more programmatic strategy are briefly described in Chapter 7.

A series of maps of the state highway system in 1914, 1924, 1935, 1941, and 1946 are attached as Appendix A. Three maps of the state highway system dating from 1912, circa 1925, and 1939 are included as pocket maps. Appendix B is an annotated bibliography of 17 key references related to the history of roads, and Appendix C lists the more than 70 roads currently included in the National Register. Only one of these, a multiple property documentation form that provides a context for listing rural segments, urban segments, abandoned segments, and traveler-related facilities related to Route 66, includes any Arizona roads.

CHAPTER 1
INTRODUCTION

> *When better roads are built, the Arizona highway department will build them* (Arizona Highways, December 1939:49).

The Arizona State Highway Department, now known as the Arizona Department of Transportation (ADOT), has been building roads across Arizona since territorial days. Counties, municipalities, and private developers also have constructed roads throughout the state. Today, Arizona is crossed by more than 6,000 miles of highways and most communities where Arizonans have made their homes or earned their livelihood for over 100 years are accessible by highways.

ADOT'S HISTORIC PRESERVATION CHALLENGES

The importance of roads to the functioning of American society can hardly be overemphasized. The primary mission of ADOT is to build and maintain an adequate and safe highway system that is a vital element of our modern lives in Arizona. A secondary, but important ADOT mission is to preserve important historic properties associated with the history of road building throughout the state. State and federal historic preservation laws stipulate that ADOT identify, evaluate, and appropriately manage significant historic roads, as well as other types of historic properties on lands managed or affected by ADOT projects and programs.

The ubiquity of roads and their long, linear nature make them difficult candidates for historic preservation. Roadways pose a challenge for historic preservation planning for the following reasons:

- Evaluating the significance and integrity of historic roads often can be challenging.
- Preserving historic roads can conflict with the need for modern, safe highways.
- Preserving historic roads often requires the cooperation of multiple jurisdictions and landowners.
- Defining boundaries and documenting characteristics of historic roads can be difficult within the confines of cultural resource management surveys that often encompass only limited segments of such roads.
- Evaluating the effects of proposed undertakings on historic roads may be difficult due to differing opinions of cumulative impacts.

ADOT has had to address all of these issues on numerous occasions. Indeed, they arise in connection with almost every proposal to improve existing roads. As an example, in the early 1990s ADOT struggled to cope with the discovery of remnants of the Reno Wagon Road late in the planning of upgrades to State Route 87. Was the old wagon road important and therefore eligible for the National Register of Historic Places (National Register)? If so, under what criteria was it eligible? Would the obliteration of short segments of the wagon road within the highway right-of-way be an adverse effect as defined by regulations implementing the National Historic Preservation Act, or an unacceptable "use" as defined by Section 4(f) of the National Transportation Act? Could the impacts be satisfactorily mitigated or were there prudent and feasible alternatives (such as costly redesign) that would have to be implemented to avoid impacts? In response to these experiences, ADOT decided to commission the development of this

historical study of road building in Arizona to provide background information for more consistent and less ad hoc evaluations of the significance and integrity of historic roads.

Actually, the original goals of this study were more ambitious, and—from the vantage of hindsight—more unrealistic. ADOT hoped to identify and achieve consensus with all involved regulatory and land-managing agencies about every National Register-eligible road in the state. The modified goal of writing a historic context that would establish perspectives, policies, and procedures for consistently evaluating historic roads throughout the state also was not fully achieved. There is some consolation in recognizing that it is not a simple task to develop a general consensus among the many parties interested in historic roads, and to date, no other state has had any significant degree of success. Lindauer (1998, 2001) discusses ADOT's perspective on this evolving study.

This overview is confined to a consideration of *built roads* and does not address trails or more generalized transportation routes. The word *trail* is used in this document to refer to pathways developed through use, be it foot traffic, the use of horses, mules, or oxen, or overland travel in wagons or motorized vehicles. Such trails were addressed in the previously prepared Arizona State Historic Preservation Office (SHPO) historic context study, *Historic Trails in Arizona from Coronado to 1940* (Stein 1994). The distinguishing characteristic of a *road,* as the term is used here, is that it was intentionally constructed for use by wheeled vehicles, including wagons, coaches, and carriages drawn by dray animals as well as mechanically-powered vehicles. Thus, a two-track "road" created and maintained entirely by being driven over is considered to be a trail. Only if it has been graded or otherwise improved in some fashion, is a route considered to be a road. Admittedly, the distinction between a road and a trail can be ambiguous and definitions may need to be adjusted to specific situations. Some improvements, such as cuts and fills or bridges, may have been built along trails in areas of difficult terrain, but the corridors remain essentially trails because they required no road construction where the going is easier. Conversely, some early roads involved little construction across flat, level terrain and these segments are essentially trails developed through use. Many roads were constructed along existing trails or were built to follow established transportation corridors or routes. Therefore it is not unusual to encounter mixed remnants of older trails or roads within the corridors of our modern roads.

Nomenclature, too, can be confusing. For example, the Camino del Diablo, commonly translated as "Devil's Road," originally was not a constructed road, but instead a set of trails between Caborca, Mexico, and Yuma, Arizona, developed through use over time.[1] During pre-Columbian times, some aboriginal societies *built* trails for foot traffic, such as the "roads" leading to Chaco Canyon in northwestern New Mexico, as well as trails and bridges the Incas built in South America (Trombold 1991). No such aboriginal "roads" have been documented in Arizona and they are not addressed in this overview.

As this study evolved, its focus narrowed from all roads to the history of highways designated by the territorial, state, and federal governments. Highway designation encompassed only a small percentage of all roads, but such designation reflected the government's perception of which roads were most important within a broad transportation network. In the early days of road development, designation of a road as a highway did not necessarily imply any particular standard about the quality of a road. Some stretches of the early territorial and state highways may, in fact, have been little more than marked trails until funds became available to grade the roadbeds and drainage ditches, and construct cross-drainage structures.

[1] A portion of the Camino del Diablo, defined as a 0.5-mile-wide corridor approximately 80 miles in length, was listed in the National Register in 1970. Today, there is a graded road within this transportation corridor, but whether the road is precisely coincident with the original trail or trails is undetermined.

Although some city streets were incorporated into these highway networks, urban streets have distinct developmental histories tied to individual communities, and they are not addressed in this overview.

Although the modern highways of Arizona may seem to be a coherent system resulting from thoroughly thought-out plans, they actually represent an amalgamated network of individual roads developed and modified for a variety of reasons over the years. This overview does not attempt to document the historic details of individual roads, but presents an overall perspective of how the principal roads of Arizona were developed and incorporated into a highway network. One observer has argued that once we learn to "read" the physical attributes of roads and the landscapes they cross, historic roads become great outdoor museums (Schlereth 1997). Certainly not every road in Arizona is historically significant or a museum to be preserved, but this overview is offered to promote broader appreciation of the historical development of Arizona highways and to promote consistency in fulfilling ADOT's cultural resource management regulatory responsibilities.

REGULATORY CONSIDERATIONS

Regulatory requirements that require ADOT to consider the historical values of roads (and other historic properties) stem principally from three pieces of federal legislation: (1) the National Historic Preservation Act of 1966 (NHPA), (2) Department of Transportation Act of 1966, and (3) National Environmental Policy Act of 1969 (NEPA). ADOT projects that involve funding or approval by the Federal Highway Administration (FHWA), or require right-of-way across federal land, are federal undertakings, and ADOT must work with FHWA, and any involved federal land-managing agencies, to comply with NEPA, Section 106 of NHPA, and Section 4(f) of the Department of Transportation (DOT) Act. An important scheduling consideration stems from FHWA policy that requires compliance with Section 4(f) and Section 106 be demonstrated prior to issuance of a decision notice under NEPA.

Section 106, National Historic Preservation Act

NHPA defines *historic properties* to include prehistoric and historic sites, buildings, structures, districts, and objects included in, or eligible for inclusion in, the National Register, as well as artifacts, records, and remains related to such properties (NHPA 301[5]). Section 106 of NHPA requires federal agencies to take into account the effects of their activities and programs on National Register-listed or eligible properties. ADOT receives funding from FHWA for many projects and this federal funding or any required federal approvals, permits, or rights-of-way entail compliance with Section 106. FHWA and other involved federal agencies expect ADOT to conduct studies and compile documentation to assist them in complying with Section 106.

Regulations for *Protection of Historic Properties* (Title 36, Code of Federal Regulations [CFR], Part 800) define the key regulatory requirements. These regulations define a process for federal agencies to consult with SHPOs, the federal Advisory Council on Historic Preservation (ACHP), and other interested parties to ensure that historic properties are duly considered as federal projects are planned and implemented. The steps in the Section 106 consultation process involve the following:

- identifying the area of potential effect of a proposed undertaking, developing an appropriate inventory strategy, and identifying potential interested parties in consultation with the SHPO

- identifying cultural properties that may be affected by a proposed undertaking and evaluating the eligibility of those properties for the National Register

- assessing the potential effects of the undertaking on properties determined to be eligible for the National Register

- consulting with the SHPO, ACHP, and other interested parties (such as local government officials, American Indian tribes, and project proponents) to determine ways to avoid or reduce any identified adverse effects

- if necessary, providing the ACHP a reasonable opportunity to comment on the proposed undertaking and effects on properties eligible for the National Register

- proceeding with the undertaking under the terms of a memorandum of agreement or programmatic agreement, or in consideration of ACHP comments, if required

To be determined eligible for inclusion in the National Register, properties must be important in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of the following four criteria:

Criterion A: are associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: are associated with the lives of persons significant in our past

Criterion C: 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 distinguishable entity whose components may lack individual distinction

Criterion D: have yielded, or may be likely to yield, information important in prehistory or history

To be eligible for National Register listing, a property must be at least 50 years old, unless it has exceptional significance, and meets one or more of the eligibility criteria, and also retains sufficient integrity to convey its historic significance. Therefore, the aspects of location, design, setting, materials, workmanship, feeling, and association that are considered essential to the historical identity of the property must be clearly specified. Not all aspects of integrity are equally important for every historic property, and determining which are important for a give property must be based on understanding why, where, and when the property was significant (National Park Service 1998:44-45). A sound determination of effect under Section 106 of NHPA must evaluate whether a proposed undertaking will diminish significant aspects of a property's integrity. For example, consider a historic road determined eligible for National Register listing because of the historic integrity of its important associations, location, setting, and feeling, but which does not retain original materials or aspects of workmanship. A proposed undertaking that would alter the fabric of the road (such as a road resurfacing project or installation of a buried utility line that cuts through the road surface) but not change the road's setting and feeling, would result in no adverse effect. Alternatively, construction of a nearby power line that visually intrudes into on an otherwise unaltered setting might result in an adverse effect on such a road.

A related issue of particular relevance to the evaluation of linear structures such as roads is the fact that simply by virtue of their length, many roads are composed of segments of varying integrity. They may have pristine stretches that exemplify their historic significance, but in other areas the road may have been upgraded and surrounded by modern developments. Thus, when evaluating the eligibility of a historic road and assessing potential project effects, it is important to identify and distinguish between those

segments that retain sufficient integrity to be regarded as historic character defining elements and those that do not. Such analyses have to consider specific factors related to individual roads.

Section 4(f), Department of Transportation Act

Section 4(f) of the DOT Act of 1966, recodified in 1983 as 49 United States Code, Section 303(c), established a federal government policy of making special efforts to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Section 4(f) stipulates that DOT may approve a program or project that uses land from any significant historic site only if two conditions are met. First, there must be no prudent and feasible alternative to the use of the land from the property. Second, the action must include all possible planning to minimize harm to the property resulting from such use.

DOT defines significant historic sites to include all prehistoric or historic sites, buildings, structures, objects, or districts that have been determined eligible for listing in the National Register unless the properties are valued only for their potential information, which can be recovered and does not require preservation in place. Properties eligible for the National Register only under Criterion D for their information potential are not considered Section 4(f) resources. If historic properties determined eligible for National Register listing under Criteria A, B, or C are subject to effect from a proposed DOT undertaking, considerable additional planning efforts may be required to prepare a Section 4(f) evaluation with attendant scheduling and cost implications (like those for the State Route 87 upgrades crossing the old Reno Wagon Road). At its discretion, DOT may apply Section 4(f) considerations to properties designated as historic by local officials having jurisdiction of those sites.

National Environmental Policy Act

NEPA (Section 101[b][4]) establishes a federal policy of encouraging preservation of not only the natural aspects, but also the historic and cultural aspects of our national heritage when federal undertakings are planned. Implementing regulations (40 CFR Part 1502.16[g]) issued by the Council on Environmental Quality stipulate that the consequences of federal undertakings on historic and cultural resources be considered. Ordinarily, a series of alternative means of accomplishing the proposed action are defined and studies are conducted to identify a preferred alternative. While the intent of the legislation is the preservation of our heritage, it does not mandate that all significant impacts be avoided. Instead, it requires that impacts be recognized, and if possible, minimized or mitigated.

State Laws

The Arizona State Historic Preservation Act (Arizona Revised Statutes 41-862 to 41-864) directs state agencies, such as ADOT, to develop programs to inventory and nominate historic properties to the Arizona Register of Historic Places. The criteria for listing on the Arizona Register are identical to those for the National Register. The chief administrators of state agencies are designated as responsible for working to preserve historic properties under their control in accordance with standards recommended by the SHPO. More than any federal law, the State Historic Preservation Act directs ADOT to establish a proactive preservation program rather than just reviews in reaction to proposed projects, although the act also directs state agencies to seek SHPO review of any agency plans that may affect State Register-listed or eligible properties.

The Arizona Antiquities Act stipulates that excavation or removal of artifacts from archaeological sites on state land is illegal without a permit from the Director of the Arizona State Museum. Therefore, it is important for ADOT to ensure that any cultural resource studies undertaken on state lands are conducted under the terms of a duly authorized permit from the Arizona State Museum, and in accordance with standards and guidelines issued by the Museum. The Antiquities Act also directs anyone in charge of construction or other activities on lands owned or controlled by the State of Arizona to report discoveries of archaeological and historical resources to the Director of the Arizona State Museum. Amendments of the Antiquities Act enacted in 1990 specifically address treatment of human remains, associated funerary objects, sacred objects, and items of cultural patrimony found on state or private lands.

ORGANIZATION OF THE HISTORIC OVERVIEW

The purpose of this historic overview of road building is to provide background information for identifying roads in Arizona worthy of preservation. Not all old properties are important. Those that are not should be distinguished from those that are so that management efforts can be appropriately focused. Nor is it necessarily prudent public policy to preserve every historic property. This is especially true when in-use facilities such as roads are being considered. Priorities must be set to ensure that preservation efforts are balanced with other public benefits and do not place unreasonable restrictions on developments designed to improve highway safety and efficiency.

Chapter 2 briefly summarizes the political history and funding of road development in the United States from the founding of the nation through the mid-twentieth century. Chapter 3 summarizes the evolution of the technology of building roads in the United States. The history of road building in Arizona is discussed in Chapter 4, within a framework focusing on each of the four criteria for listing in the National Register.

Development of this document included limited field reconnaissance to explore some of the issues in evaluating the historic significance of roads. Chapter 5 presents five case studies based on field review of selected road segments across the state.

Chapter 6 explores the question of which historic roads in Arizona are worthy of preservation. This chapter identifies some of the challenges of evaluating the National Register eligibility of Arizona's roads, and then discusses application of the four National Register criteria of significance and issues related to assessing historical integrity.

Conclusions and recommendations are presented in Chapter 7. The general perspective of this study might be characterized as "bottom up" because it sought to develop a strategy for dealing with individual roads or even just road segments. Over the long time it took to complete the study, ADOT and the SHPO turned to a more "top down" approach of addressing the entire state highway system as a whole. That still developing change in strategy also is briefly discussed in the concluding chapter.

Appendix A includes a series of maps of the state highway system in 1914, 1924, 1935, 1941, and 1946. Three maps of the state highway system dating from 1912, circa 1925, and 1939 are included as pocket maps. Appendix B is an annotated bibliography of 17 key references related to the history of roads, and Appendix C lists the more than 70 roads currently included in the National Register. Only one of these listings includes properties in Arizona. It is a multiple property documentation form that provides a context for listing properties related to Route 66, including rural segments, urban segments, abandoned segments, and traveler-related facilities.

CHAPTER 2
POLITICS AND FUNDING OF AMERICAN ROAD BUILDING, 1776-1956

> *The miracle was not the automobile. The miracle of the early twentieth century was the construction of a vast network of highways that gave automobiles someplace to go* (Scott and Kelly 1988:3).

Roads are ubiquitous in our lives at the beginning of the twenty-first century, but roads have not always been here. A hundred years ago, the American landscape lacked today's familiar crisscrossing of all-weather roads, highways, and interstates. This chapter reviews the politics and funding of American road building from 1776 to 1956.

The original Pennsylvania Turnpike, a 62-mile-long dirt toll road from Philadelphia to Lancaster built in 1794, was one of the first major roads constructed in the United States. Sixty years later, the Pennsylvania Railroad purchased the abandoned road between Philadelphia and Lancaster and replaced the old turnpike with a railroad (FHWA 1977:13-15; Jordan and others 1987:276-277). The second Pennsylvania Turnpike opened in 1940 as the initial segment of what was to become the interstate highway system. The four-lane divided highway ran 160 miles from Harrisburg to Pittsburgh, using abandoned railroad tunnels in the same way that railroads had cannibalized roads a century before (Patton 1986:77-78).

As illustrated by this Pennsylvania example, American transportation routes have moved from turnpikes to railroads to highways over the last 200 years. The late eighteenth- and early nineteenth-century system of interconnecting roads and waterways gave way to railroads by the 1850s. In the twentieth century, the horsepower of the automobile and a new system of interconnecting roads superseded the "iron horse." To understand the sequence of road building in Arizona, it is important to understand the history of road building in the United States from the early days of wagon roads through the railroad years and into the automobile era.

TURNPIKES, RAILROADS, AND MILITARY ROADS

During colonial times in America, most commercial transporters followed water routes to move goods. Rivers and coastal waterways provided easier passage than the primitive roads that were little more than paths unsuitable for wagon travel. After the American Revolution, President Thomas Jefferson approved legislation in 1806 to build the Cumberland Road from the head of the Potomac River west to the Ohio River. Known as the "best road in the country," the Cumberland Road supported heavy traffic of stagecoaches, freight wagons, and livestock (FHWA 1977:21).

The building of the Cumberland Road sparked a bitter Congressional debate. The losing side of the debate felt that the federal government had no authority to build roads while the other side held that the general welfare clause of the Constitution granted such authority. Years later when Congress attempted to finance the maintenance of the Cumberland Road by authorizing the collection of tolls, the measure was defeated by Madison's veto, which established the federal position on highway financing that remains in effect today. Simply stated, the federal government has the power to make appropriations for public improvements, but it does not have the power to assume sovereignty over the land.

> "One of the most striking features of the American road system is that the federal government did not officially build it. Its money, delivered with numerous strings attached concerning location, standards, procedure, and policy, paid for the roads; but the states, counties, and cities built and own them" (Patton 1986:35-36).

The federal government built only a small number of roads in the nineteenth century. Both the federal government and the states issued charters to private turnpike companies to build roads (a practice also followed in territorial Arizona). The privately built roads connected with a system of more than 3,000 miles of publicly financed canals (Jordan and others 1987:200-201).

The success of the turnpike-canal system was cut short by the emergence of the railroad system, which provided a faster and cheaper mode of transporting goods and people. Although the mileage of railroad tracks matched the mileage of canals in 1840 (about 3,000 miles each), the industry built more than 30,000 miles of rail in the 1850s.[1] As traffic decreased on the turnpikes and canals, so did revenue, and turnpike owners could no longer afford to maintain the roadways. Some sold their roads to counties, and some simply abandoned them (FHWA 1977:36; Jordan and others 1987:203). Toll roads were used longer in the West and Arizona, where some were operated into the early twentieth century.

In addition to the abandoned turnpikes, local usage and programs established other trails or roads in rural areas, especially in the eastern states. In the Great Plains and in the West (including parts of Arizona), local roads often followed the section lines of the grid institutionalized in the Land Ordinance of 1785 and the Land Act of 1796 (Patton 1986:31-32). Throughout the nineteenth century, local property and poll taxes paid for most rural road construction and maintenance, with much of the labor provided by a system of compulsory road service that had been in place since the eighteenth century. Because all rural roads, both abandoned turnpikes and common-usage roads, were at best only ditched and graded, not hard surfaced, the years between 1850 and 1900 have been dubbed the "dark age of the rural road"[2] (FHWA 1977:3-7, 36-39; Jordan and others 1987:200-201). The darkness stemmed largely from lack of funding. During this era, government funding went toward building railroads throughout the nation rather than a network of highways (Goddard 1994).

In the nineteenth century, the federal government also sponsored the construction of military "roads," primarily in less settled parts of the new country. Military travelers, tradesmen, and settlers all traveled on these roads built by soldiers and hired labor. Between the construction of the Natchez Trace, the first federal military road in 1803, and 1880, the Army built more than 100 military wagon roads totaling over 21,000 miles. During the 1850s and 1860s, the Army marked and improved most of the wagon trails used by pioneers as well as military supply trains. Famous Southwestern examples include the Santa Fe Trail between Kansas City and Santa Fe, Cooke's Wagon Road from Santa Fe to San Diego built across southern Arizona in 1846, and the 1857 Beale Wagon Road from Fort Smith, Arkansas west across northern Arizona to the Colorado River. During the nineteenth century, these military roads represented essentially the only federal subsidies for road development (FHWA 1977:24-26). Given the rapidity with which these roads were "built," there could have been little more than identifying and marking with any construction efforts focused on facilitating passage through areas of difficult terrain. Along level sections, some vegetation or rocks may have been removed but they essentially remained trails. Some parts of these "roads" probably were even intended only for pack animals rather than wagons.

[1]After the Civil War, railroad companies extended the system of rails throughout the East, as well as into the topographically rugged and arid West where canals were impractical. In the single year 1887, nearly 13,000 miles of track were laid, and by 1900, approximately 260,000 miles of track crisscrossed the United States (FHWA 1977:34).

[2]The road picture in the cities differed markedly from the rural situation. Concentrations of population, business, and industry in cities provided the tax revenue to fund construction and maintenance of city streets as well as other municipal services such as sewer and water systems, schools, parks, and street lighting. Statistics from 1907 indicate that nearly half of the 47,000 miles of urban streets in cities with populations over 30,000 had been improved with pavement, macadam, asphalt, or gravel (FHWA 1977:41).

FROM BICYCLES TO FEDERAL AID

In 1893, workers in Ohio laid the first brick-surfaced rural road in the United States. That same year, Harvard University began laboratory testing of road materials, good roads boosters gathered in Washington, D.C. to found the National League for Good Roads, the Post Office Department began rural mail delivery, and Congress established the Office of Road Inquiry. Most significantly, J. Frank Duryea's gasoline buggy debuted on the streets of Springfield, Massachusetts (FHWA 1977:191, 265).

In the almost 30 years between 1893 and the passage of the Federal Highway Act of 1921, several forces combined to bring the issue of good roads into the national spotlight. Bicycle riders and advocates for rural mail delivery first supported road construction, but it was the explosion of automobile owners in the twentieth century and the myriad of good roads associations that precipitated federal action on a large scale. The president of the National Highways Association stated that "to have Good Roads everywhere throughout the United States will mean more to this nation than any other development since the Declaration of Independence" (State Engineer 1914:144).

Local county governments were the first entities to assume the work and expense of building and maintaining local roads across the rural landscape. The necessity of coordinating roads across county lines led to the consolidation of county road work under state highway departments. Later, the necessity of connecting routes across state lines contributed to bringing the federal government into the road-building business. When the conversations started in the 1890s, "good roads" meant graded dirt roads for wagons and bicycles, and by the time Congress passed the Federal Highway Act of 1921, the term had come to mean paved, all-weather roads for motorized vehicles.

BICYCLES AND MAIL

Bicyclists, not motorists, first worked to improve the road system. With the invention of the safety bicycle[3] and the pneumatic tire in the 1880s, a bicycle craze spread across the country in the 1890s, including Arizona (Pry 1990). Although most bicycling was confined to urban areas, some sporting types left the paved city streets and ventured into the country. These cyclists experienced the poor condition of rural roads, and began complaining. Because many of these cross-country cyclists were relatively wealthy and politically connected, their voices carried weight. First organized in 1880 as a group of bicycle clubs, the League of American Wheelmen transformed itself into a powerful political lobby for good roads. In 1892, the League began publishing the magazine *Good Roads*. The editor, a civil engineer, educated his readers on the civil engineering of good roads, highlighted existing good roads, and contrasted the poor state of American roads with the well-engineered roads in France. Such publicity helped to turn public opinion in favor of the taxes required to fund road construction (FHWA 1977:42-43).

Other organizations appeared in the 1890s and supported the League of American Wheelmen's push for road improvements. The first Good Roads Association was formed in Missouri in 1891. The National League for Good Roads, founded in 1893, held the first national road conference in 1894. The League urged states to create highway commissions, set up systems of state roads, and enact legislation to build good roads. It is important to remember that these 1890s organizations worked to improve rural roads to better support bicycle and wagon traffic and not motorized vehicles, which were only a curiosity before the turn of the century (FHWA 1977:43-44).

[3] A "safety bicycle" is one with similarly sized wheels, in contrast to the earlier bicycles with oversized front wheels.

Early federal attention to the poor condition of rural roads came from two sources—the Department of Agriculture and the Post Office Department. The Department of Agriculture was interested in the farmer's ability to transport goods to market and the nearest railway station, while the Post Office's interest was tied to the difficulties of rural mail delivery.[4] The Post Office Department was authorized to embark on a program of rural free delivery of mail in 1893, but only along good roads in fit condition for travel. This led to strong public pressure on local governments to improve roads even though the first rural mail delivery by automobile did not begin until 1915.

On a parallel track and also in 1893, Congress first designated funds for rural roads through the Agricultural Appropriation Act of 1893, and established the Office of Road Inquiry under the Department of Agriculture. With an annual budget of only $10,000, the staff of two made inquiries about the construction and management of road systems, but had neither the funds nor the authority to actually build roads (the duties, growth, and evolution of this office into the FHWA are discussed below).

In every session of Congress from 1903 to 1916, Congressmen introduced bills for direct federal aid to road construction, each unsuccessful. Among the 60 bills introduced in 1912 alone, the Post Office Appropriation Act of 1912 offered indirect federal aid for road construction, as it directed the Postmaster General to work with the Secretary of Agriculture on the improvement of about 50 miles of post roads within each state. The experiment was only partially successful, as only 13 states accepted the offer of federal money. Some states cited the required matching funds as their reason for refusing, some objected to the federal ban on using convict labor, and a few states disagreed with the federal requirement of an eight-hour work-day (FHWA 1977:84-86, 201; Hewes 1946:44). The more successful portion of the legislation set up a joint Congressional committee to investigate direct federal aid to highway construction, and the findings of the committee contributed to the Federal Highway Act of 1916, discussed below (FHWA 1977:80-82).

"THE ROADS WERE NO GOOD"

Americans respond to new inventions with enthusiasm. In our lifetimes, we understand how quickly the personal computer, the fax machine, and the microwave oven became necessities instead of novelties, and our grandparents and great-grandparents treated the automobile in the same fashion. As late as 1896, the Barnum and Bailey circus included an automobile "as its main curiosity, with top billing over Jumbo the Elephant, the giant, and the fat lady" (Bourne 1995:113). In 1900, only four years after the automobile made its appearance with the circus sideshow, about 4,000 cars were made in this country, and by 1910, annual production had risen to 187,000 automobiles per year (Figure 1). Census officials included auto manufacturing under the "miscellaneous" category in 1910, perhaps not understanding the potential size of the new industry.

The year 1907 saw the introduction of Henry Ford's popular Model T (Figure 2). One image of the new machine, at least as displayed humorously on the cover of the *Life Magazine* "Motor Car" issue that year, was as a menace (Figure 3). Initially, automobile ownership was predominantly an urban phenomenon. Although rural folks may not have thought of automobiles as a menace, rural adoption of the automobile

[4] John Wanamaker (1838-1922) served as Postmaster General from 1889 to 1893. He owned large department stores in New York and Philadelphia, and certainly recognized that better postal roads could open a vast rural mail-order market to businesses such as his.

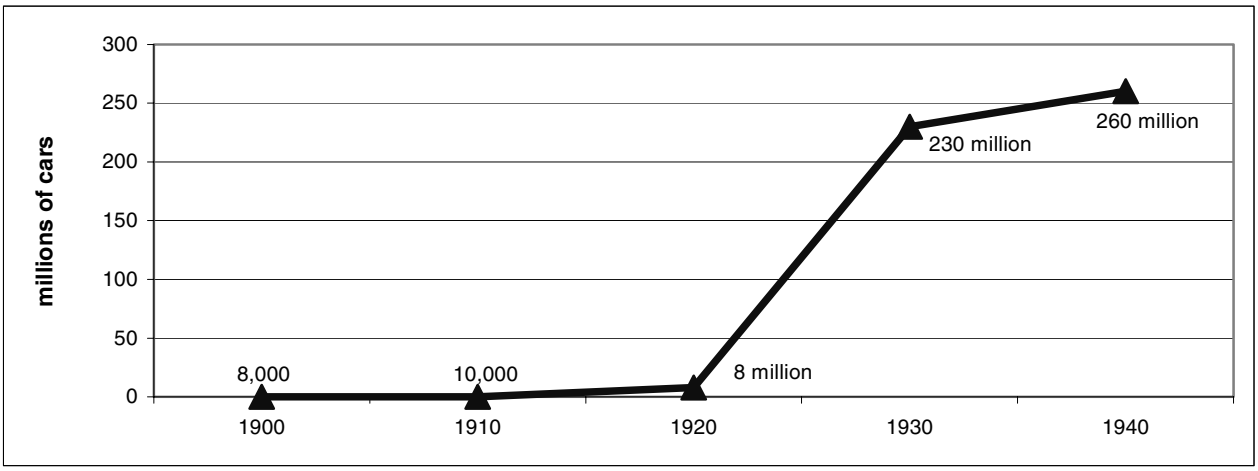

Figure 1. Growth of Automobile Ownership in the United States, 1900-1940

Figure 2. A Model T Ford in a Tucson Neighborhood, circa 1915

and by association, support for improved roads, was slow in coming until farmers became automobile owners and joined the campaign to "get the farmers out of the mud" (FHWA 1976:57). After Ford perfected full assembly line production in 1914, more than half a million automobiles were sold in 1916[5] (Bourne 1995:114-116). In the 1920s, the number of registered automobiles more than tripled, and by 1929, the authors of the well-known sociological portrait of America, *Middletown,* noted that automobile ownership had "reached the point of being an accepted, essential part of normal living" at all social levels (Bourne 1995:118; Liebs 1985:20). The editors of *Life Magazine* confirmed this trend in their cover illustration for the "Automobile Number" in January 1925. In a much smaller, and not at all menacing, automobile, a cartoon family heads for a picnic, gleefully crying out, "We've got one now!" (Figure 4).

[5]By 1920, one out of every two cars in the world was a Model T Ford, and between 1907 and 1927, more than 15 million Model Ts were built (Bourne 1995:116-7).

Figure 3. ***Life Magazine*****, 1907**

The citizens of Arizona also took to the new invention quickly. One source claims the first automobile in the Territory arrived in Tucson "at the turn of the century" (Federal Writers Project 1989:114). Another of the first commercially manufactured automobiles to come to Arizona arrived in Phoenix in 1900 as a prize in a publicity contest sponsored by a San Francisco newspaper. The local newspaper opined that the prize auto posed no threat to the horse. Only a year later, the local Phoenix newspaper suggested that the horse had become "an old-fashioned standby" to the 20 automobiles in the Arizona Territory (Rodda 1992:1).

By 1913, there were 17 automobile dealers in Phoenix and 646 cars registered in Maricopa County. Vehicle registration rose to 11,539 in 1920 and to more than 53,000 in 1929 (one automobile for every three people in the county) (Luckingham 1989:81). In 1910, the first traffic regulations in Phoenix and the first traffic policeman required the 382 registered automobiles to stay on the right side of the road and obey new speed limits (12 miles per hour [mph] in the central business district and 15 mph elsewhere). Several drivers received speeding citations for exceeding 20 and 30 mph, and residents complained of automobiles racing up and down north Central Avenue in the evenings "driving sober people off the streets" (Davis 1976:10; Luckingham 1989:52).

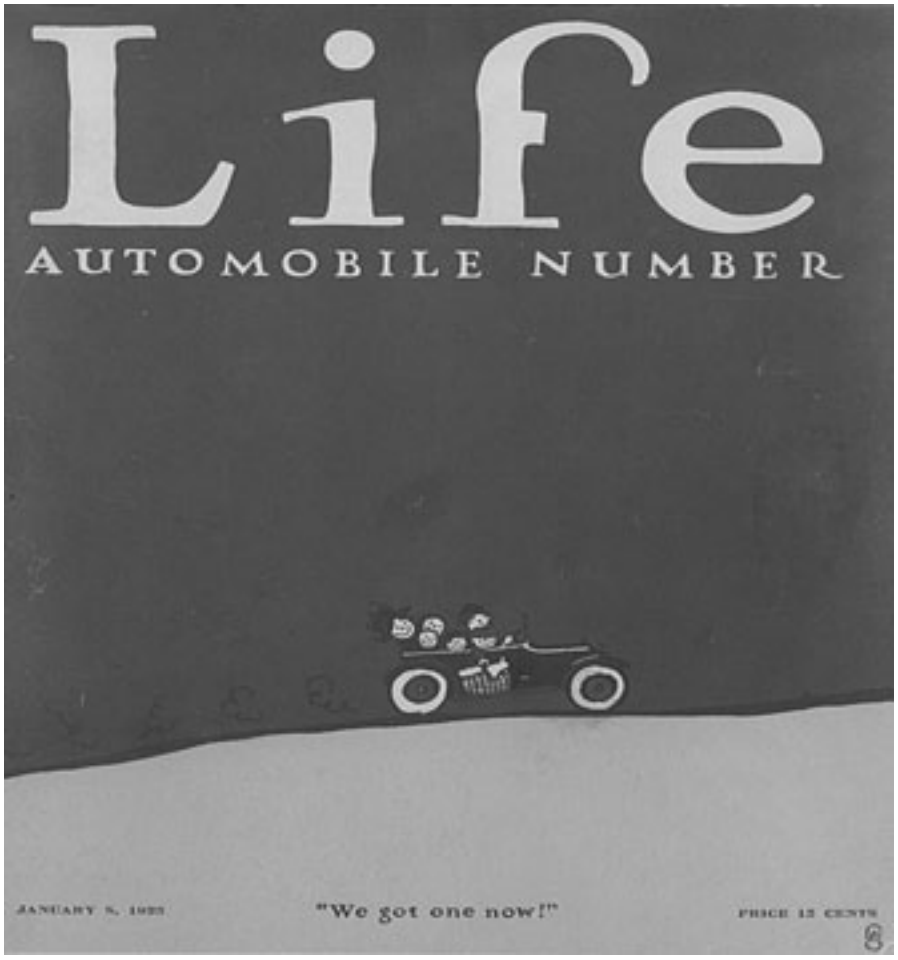

Figure 4. ***Life Magazine*****, 1925**

Henry Ford built cars, not roads. The rural roads in existence at the turn of the century had been built for wagon traffic, and the lack of good rural roads to carry their new machines stymied the increasing numbers of automobile enthusiasts. In 1903, the first duo to travel across the continent from San Francisco to New York by automobile found the best roads to be improved only with gravel surfacing.[6] Not only did Dr. H. Nelson Jackson and his chauffeur Sewell K. Crocker encounter poor roads, they accomplished the two-month cross-country journey without benefit of through routes, reliable road maps, road signs, route markers, and roadside services (FHWA 1977:60-61). Their experiences were similar to those of another early cross-country traveler. Henry Joy, president of the Packard Motor Company, received the following directions from a man in Nebraska, "Drive west from town until you reach a fence. Open the fence, drive through and close it. Do this several times." Eventually, the fences ran out and Mr. Joy looked out on "nothing but two ruts across the prairie" (Patton 1986:40).

The paucity of built roads that Mr. Joy encountered on the plains of Nebraska echoed the road situation in Arizona. A 1912 map of Arizona includes wagon roads and railroads, but only two "highways" (Pocket Map 1[7]). One of these highways extended from Douglas north through Tucson, Phoenix, Prescott, and

[6]The first coast-to-coast truck journey was made in 1911.

7 The *Arizona Highways Magazine* did not specify what sources were used to prepare this map in 1987. The contemporaneous 1912 *Rand-McNally New Commercial Atlas Map of Arizona* depicts topographic features and

Flagstaff, terminating at the Grand Canyon. The other extended east from Yuma through Phoenix and Globe, terminating at Clifton. The mileage of highways was far outnumbered by the mileage of wagon roads and despite their designation as official Territorial Highways, these roads were unpaved. A year later, the Arizona Good Roads Association published Arizona's first book of road maps and touring information. A photograph on the frontispiece of this little book shows an early automobile on a dirt road only inches wider than the axles of the auto. The caption reads, "Enroute to Castle Hot Springs Over Best Road in the Southwest," which was only a single-lane, graded dirt road.

Publicity has often contributed to social change in the United States. In 1904, just one year after the first automobile traveled across the country, the American Automobile Association (AAA) sponsored the "St. Louis World Fair Motor Caravan," a pilgrimage of autos traveling from East Coast cities to the Louisiana Purchase Centennial Exposition in St. Louis. The next year, AAA sponsored the first of six annual cross-country tours to highlight the difficulties of traveling long distances on rural roads (FHWA 1977:61-62). In 1916, two women suffragists successfully motored around the country for 10,700 miles in six months, using their car as a speaking platform. Poor roads caused them to get lost four nights in the deserts of Arizona and New Mexico (Scharff 1992:86-87). Simply put, in the words of one 80-years-old man's reminiscing about the early 1920s, "The roads were no good" (Scott and Kelly 1988:18).

THE U.S. OFFICE OF ROAD INQUIRY

Twentieth-century federal involvement in road building started out with a tinkle of coins in 1893. That year, the Agriculture Appropriation Act included $10,000 for "inquiries in regard to the systems of road management throughout the United States." This appropriation established the U.S. Office of Road Inquiry, an office that was designated as temporary but eventually evolved into the FHWA. The first "Special Agent and Engineer for Road Inquiry," General Roy Stone,[8] was one of the personalities that greatly contributed to the miracle of twentieth-century road building. Trained as a civil engineer and a well-known booster of good roads, Stone proposed as early as 1892 that Congress establish a National Highway Commission, and he founded the National League for Good Roads in 1893. Stone and his staff of one clerk used the small annual appropriations in innovative ways to gather and spread information from all the states and territories on road building materials and highway laws (Housley 1996:12).

In 1896, Stone created "object lesson" roads, an innovative idea with long-reaching influence. In order to educate both road builders and the public about good roads, Stone worked with agricultural college experiment stations to build short stretches of demonstration roads known as "object-lesson" roads. Ironically, the road-building teams often traveled by railroad from one location to another. Due to the Office of Road Inquiry's limited budget, Stone convinced road equipment manufacturers to donate equipment, and raised funds from local authorities and private individuals to finance the construction materials. After Stone left the Office of Public Inquiry in 1899 to accept the presidency of the National League for Good Roads, the Office continued to build object lesson roads (FHWA 1977:44-48). Stone's successor described their effect in 1904.

> The people desire instruction by the building of object lesson roads and are willing to bear the expense incident thereto . . . In practically every instance some measure of progress resulted from the object lesson. It would seem to be conservative to estimate that an average of at least 10 miles

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railroads, but no roads, indicating that cartographers did not think the roads were worthy of much attention.

[8]Originally from New York, General Stone served in the army in both the Civil War and the Spanish American War, taking a leave of absence from the Office of Road Inquiry for the latter engagement.

of improved highways are constructed as a result of the building of each of these roads (FHWA 1977:65).

In 1904, the Office of Public Road Inquiries conducted the first inventory of all roads in the United States outside cities, and the agency repeated this inquiry at five-year intervals. From the 60,000 questionnaires returned by county authorities, the Office tabulated road mileage according to surface type, and found that of the 2 million miles of rural public roads in the United States, only 7 percent were surfaced with gravel or stone. That is, 93 percent of the rural roads in the United States in 1904 were dirt roads. It is not surprising that Dr. Jackson and his chauffeur had encountered only a few gravel roads in their 1903 trek from San Francisco to New York (FHWA 1977:50, 88).

When the agency achieved permanent status in 1905 as the Office of Public Roads, one of the first road scientists in the United States assumed the directorship. An American trained at the French Laboratory of Bridges and Roads, Logan Waller Page had served as the director of the road materials laboratory at Harvard. As geologist for the Massachusetts State Highway Commission, Page had conducted the first extensive investigations of road building materials in this country. Page continued the public education work of the Office of Public Roads, publishing articles in rural papers, setting up exhibits at national expositions and fairs, and organizing additional Good Roads trains from 1911 to 1916. In 1912 alone, 27 lecturers from the Office of Public Roads spoke to more than 200,000 people in 37 states on the benefits of good roads (FHWA 1977:76).

Not only did the country lack good roads, it also lacked engineers trained in the building of roads. Engineers and surveyors experienced in railroad construction took up the work of road building. After about 1904, the Office of Public Roads sent its own staff of engineers across the country to advise counties on modernizing their road operations, and through the decade, the Office assisted 144 counties in 28 states (out of more than 3,000 counties in the nation). Director Page hired young civil engineering graduates as “students” within the Office to learn practical road building, and about half of these student engineers later worked for county and state road departments. Page also furnished advisors to the universities to help them set up courses in highway design and construction (FHWA 1977:73-75).

As one of his important contributions to road construction, Page initiated “stage construction,” that is, the initial improvement of a dirt road by grading, and when funds became available, subsequent use of the dirt road as “the best possible foundation for further improvements with a hard surface.” With his extensive background in the science of road surfacing materials, Page directed his staff to experiment with clay, oil, concrete, and paving brick, and the construction specifications published by his office became industry standards adopted by most state highway commissions (FHWA 1977:66, 76, 191).

A most influential personality in federal road administration was Thomas Harris MacDonald, who served as top highway administrator for 34 years under seven presidents from 1919 to 1953 (Table 1). When he assumed the position of Chief of the Bureau of Public Roads in 1919, there were about 2.5 million miles of rural roads in the country, largely unpaved and mostly unconnected. At his retirement in 1953, the country boasted 3.5 million miles of paved, connected interstate routes. MacDonald’s interest in roads began as early as college when he wrote his undergraduate thesis describing the highway needs of farmers, and one of his first jobs was his appointment as Iowa State Highway Commissioner in 1907 at the age of 26. During his years in Iowa, MacDonald worked closely with other state highway officials in the American Association of State Highway Officials (AASHO), an important organization described below. One of the hallmarks of his tenure as Chief was an emphasis on cooperation between the states and the federal government in road building.

TABLE 1
EVOLUTION OF THE OFFICE OF ROAD INQUIRY, 1893-1956

Year	Organizational Title	Department	Head Administrator
1893	Office of Road Inquiry*	Agriculture	General Roy Stone, *Special Agent and Engineer for Road Inquiry*
1899	Office of Public Road Inquiry*	Agriculture	Martin Dodge, *Director*
1905	Office of Public Roads	Agriculture	Logan Waller Page, *Director*
1915	Office of Public Roads and Rural Engineering	Agriculture	Logan Waller Page, *Director*
1919	Bureau of Public Roads	Agriculture	Thomas MacDonald, *Chief*
1939	Public Roads Administration	Federal Works Agency	Thomas MacDonald, *Commissioner*
1949	Bureau of Public Roads	Commerce	Thomas MacDonald, *Commissioner,* 1949-1953 Francis du Pont, *Commissioner,* 1953-1955 Charles Curtiss, *Commissioner,* 1956

* A temporary federal agency that was given permanent status in 1905.
Source: FHWA 1976:191-195, 213-214

GOOD ROADS AND HIGHWAY BOOSTERS

By 1910, more than 100 national and local organizations promoted good roads in the United States, including AAA, which had been founded by motorists in 1902. The most aggressive of the six national organizations was the National Good Roads Association. One year after its founding in 1900, this association had collected sufficient monetary and in-kind donations from civic groups, road machinery manufacturers, construction material suppliers, railroad companies, and individuals to assemble several "Good Roads Trains," each complete with road building machinery, road experts, and press representatives. From 1902 to 1903, these trains traveled to several parts of the country, using General Stone's object lesson roads to promote construction of good roads (FHWA 1977:48-50).

During the initial years of highway improvement, the railroads supported the Good Roads movement, reasoning that improved roads would increase railroad freight volumes by making it easier to get products to rail shipping points. In 1922, Bureau of Public Roads Chief MacDonald touted roads as "the links which, eventually united, will constitute a new means of transportation, no less important to the country as a whole than offered by the railroads" (FHWA 1977:113). By the late 1930s commercial truck traffic increased to the point of competing with the railroads for shipping revenues, and the railroads became critical of expenditures for highway construction (FHWA 1977:250; Goddard 1994).

The National Highways Association was a second powerful organization on the national scene that coordinated the work of state good roads associations and lobbied for a national system of highways. In its mission statement of 1912, the National Highways Association put forth lofty goals and aimed at no

less than the preservation of the Union. The membership of the National Highways Association convened to

> favor, foster, and further the development of National Highways and Good Roads everywhere in the length and breadth of these United States of America, and to secure the benefits—social, moral, commercial, industrial, material, educational, and personal—in the progress and uplift of the American people which follow in the train of easy intercommunication and transit between the great centers of population and distribution and the great rural productive areas of the Nation, and to bind the States together in a common brotherhood, and thus perpetuate and preserve the Union (Arizona Good Roads Association 1914).

A map published by the National Highways Association in 1914 proposed 50,000 miles of an interconnected, national system of highways. On this map, the 3,324-mile-long, coast-to-coast "Southern Highway" followed the route of the Territorial Highway across southern Arizona, through Douglas, Tucson, and Yuma. The 2,400-mile-long "Santa Fe Highway" in general followed the route of Beale's Wagon Road and the future U.S. Highway 66 across northern Arizona. The 1,800-mile-long "Missouri-Arizona Highway" branched from the Southern Highway at Phoenix and headed east through Globe, in general following the route of the future U.S. Highway 60. East of Globe, the highway headed due northeast to Albuquerque (Arizona Good Roads Association 1914).

After about 1910, road boosters formed highway associations that named and promoted specific long-distance highway routes. These boosters designated their routes with grandiose and nostalgic names such as the Old Spanish Trail, Pike's Peak Ocean to Ocean Highway, Jefferson Highway, and Parks to Parks Highway (Patton 1986:44; Kaszynski 2000:40-42).

The Lincoln Highway Association, the first and one of the most ambitious of these organizations, aimed to build a coast-to-coast paved highway from Washington, D.C. to San Francisco. Organized in 1913, the Association capitalized on American history and selected a route incorporating parts of historic roads and earlier trails such as the Cumberland Road and the Pony Express trail. By 1914, under the leadership of Henry Joy, president of the Packard Motor Company and the man who had found "nothing but two ruts across the prairie" on his cross-country trip years earlier, the Association adopted the slogan, "See America First." The Association raised funds to build the Lincoln Highway by donations from businesses, politicians, and organizations. Towns eager to be included on the route completed "seedling miles" to promote interest and donations, another use of General Stone's concept of object lesson roads (Liebs 1985:18; Patton 1986:39; Scott and Kelly 1988:6).

Each of these highway associations vigorously promoted their own routes, and motorist clubs often erected mileposts and primitive directional signage along the roads in their areas. By the middle of the 1920s, about 250 highways named and promoted by boosters crossed the United States and the jumble of non-connecting roads and non-standard signage confused travelers. Symbols marked some routes, such as the silhouette of Chief Pontiac's head that marked the Pontiac Trail, but most routes were marked simply with stripes of paint on a fence post at the edge of the road (Figure 5). In the words of William Rishel, a colorful highway advocate who worked for decades promoting good roads in Utah,

> Salt Lake City was perhaps blessed, or should I say cursed, with more highway associations than any other city in America. At one time, there were no less than fourteen highway and trail associations claiming State Street as their own particular route. The telephone and light poles looked like barber signposts with the associations' different identification bands painted in different colors (Rishel 1983:90).

Figure 5. Trail and Highway Markings, 1925

In the Southwest, an ersatz cowboy is sometimes described as "all hat and no cattle," and the booster highway associations can be summed up as "a lot of talk and not much road." These early attempts to develop long-distance highways rounded up public enthusiasm for long-distance routes, but the associations actually constructed only a few miles of road. Even the most famous of the long-distance highways begun by boosters reached completion only after the federal government provided financing, as the Bureau of Public Roads completed the Lincoln Highway in 1923 (Patton 1986:45).

In Arizona, the Office of Indian Affairs, not the highway association, built the steel girder bridge across the Colorado River at Yuma in 1914-1915. Built to provide a river crossing to the Yuma Indian population, the bridge also carried the Ocean-to-Ocean Highway across the Colorado River from California into Arizona. Emblazoned with bold white capital letters announcing "Ocean-to Ocean Highway, Yuma, Arizona," the two-lane bridge of steel girders was the only bridged crossing of the lower Colorado River at the time of its construction (American Planning Association 1997). In addition, the State Highway Engineer, not the highway association, built the road from Yuma to Springerville along the route designated as the "Ocean-to-Ocean Highway," primarily because Arizona had already designated the route as parts of two Territorial highways.

The historical significance of the booster highway associations lies in their pioneering work in assembling long-distance, cross-country routes and designating them as highways. The establishment of a national,

uniform numbering system for highways recognized their work, and often incorporated the named routes into the numbered system. In Arizona for example, the National Old Trails Highway became U.S. Highway 66 (compare Pocket Map 2 and Pocket Map 3).

COUNTY AND STATE DOLLARS

During the first decade of the twentieth century, county officials held direct responsibility for rural roads within their jurisdictions. These officials tended to build and improve roads to and from county seats with an eye to serving the most populous areas. These county roads created a distinctive pattern on the landscape.

> By the third quarter of the nineteenth century, rural roads were primarily used to transport goods between farm and market. As a result, each population center and rail shipping point became the hub of a star-like pattern of feeder roads that permitted the delivery of agricultural goods (Liebs 1985:16).

To be sure, these roads often followed section lines surveyed by the General Land Office, but county officials tended not to be concerned about connecting their county roads with other routes within the state. William Rishel described the situation in Utah, "They would spend taxes there, not giving a rap whether we could get over the county line into another county" (Rishel 1983:81).

In order to begin the process of connecting roads across county lines, county governments looked to the states for funding. As early as 1891, a New Jersey law extended at least some of the financial responsibility for road construction to the state, and by 1917, all states had followed New Jersey's example of providing some form of state funding for road construction (FHWA 1977:239). In 1919, the state of Oregon began taxing gasoline sales to pay for highway construction within the state, and the new tax quickly spread to all the other states. Arizona implemented a similar tax in 1921. In addition, states collected other fees relating to highway usage, such as registration fees. By the mid-1940s, these highway user revenues had become the primary state funding source for highway construction and maintenance, largely replacing the property taxes that had funded nineteenth century road construction and maintenance (Hewes 1946:46-47).

In conjunction with providing state dollars for road construction, many states established state highway departments. Massachusetts established the first state highway commission in 1893, and by the time Congress passed the 1916 Federal Aid Road Act requiring states to establish highway commissions, 32 states had already done so (FHWA 1977:43). A Territorial Engineer had been appointed in Arizona in 1909, and the first State Highway Engineer was appointed at statehood in 1912.

In 1910, the director of the federal Office of Public Roads, Logan Waller Page, invited representatives of good roads associations, state highway departments, and railroads to form a new national organization—the American Association for Highway Improvement (the named was shortened in 1912 to the American Highway Association). Although several state highway departments participated in the American Highway Association, state officials felt the need for "full and frank consideration of questions, particularly those of technical character untrammeled by commercialism or popular prejudices" (FHWA 1977:79). In December 1914, they organized as AASHO to "bring some sense to the every-which-way condition of highway construction" (Scott and Kelly 1988:13). From the first year of this organization, AASHO has worked to set standards for highway construction, develop administrative and engineering

principles, and recommend federal legislation.[9] Important AASHO contributions to highway improvement included the landmark 1921 Federal Highway Act, the standardization of road signage in the 1920s and 1930s, and national standards for road maintenance set in the 1940s.

FEDERAL AID AND THE SEVEN PERCENT SYSTEM

The concepts and details of federal financial responsibility for road construction have evolved considerably over the years (Table 2). The first substantial levels of federal funding date from 1916, but those appropriations pale in comparison to the tax revenues that the federal government provided for development of the interstate highway system in the mid-twentieth century.

TABLE 2
IMPORTANT FEDERAL ROAD LEGISLATION, 1893-1956

Year	Title	Dollars	Important Provisions
1893	Agricultural Appropriation Act	$10,000	Set up and directed temporary Office of Road Inquiry to make inquiries about the construction and management of road systems, and to publicize findings
1912	Post Office Appropriation Act	$500,000	Required 66 percent matching funds from states, directed counties to work with Secretary of Agriculture, banned use of prison labor in building roads; only 13 states accepted the federal money
1916	Federal Aid Road Act	$5 million in 1917 increasing to $25 million in 1921	For construction and maintenance of rural post roads; first to set up multi-year funding plan; Section 8 = $10 million for forest roads, 1917-1926; required State Highway Departments and 50 percent matching funds from states
1921	Federal Highway Act	$75 million	Established "seven percent system;" required federally funded roads to connect across state lines; 50 percent matching funds from states
1933	National Industrial Recovery Act	$400 million	Extended federal funds beyond the "seven percent system" to secondary and urban roads; required no state matching funds; required 30-hour limit on work week and banned use of prison labor
1934	Hayden-Cartwright Act	$200 million	Re-established requirement of state matching funds; set aside funds for highway planning
1935	Emergency Relief Appropriation Act	$200 million	Required state matching funds; provided additional $200 million to improve railroad crossings that did not require matching funds
1944	Federal-Aid Highway Act	$1.5 billion	Designated National System of Interstate highways
1956	Federal-Aid Highway Act	$27 billion	Set up Highway Trust Fund to provide long-term funding for interstate highway system from federal excise and gasoline taxes; required only 10 percent state matching funds

Source: FHWA 1976

During January 1916, the chairman of the newly formed House Committee on Roads drew upon lessons from the past to establish policies for the future in his road bill. With enthusiastic support from AASHO, the Secretary of Agriculture, Postmaster General, and Office of Public Roads, the landmark legislation was passed as the Federal Aid Road Act of 1916. The act established a long-term approach to building roads and provided annual appropriations of $5 to $25 million.

In a similar provision to the 1912 post road program, the 1916 Act restricted a portion of the annual federal allocations to those roads used to transport the mail. However, remembering the difficulties of the

[9]The organization is known today as the American Association of State Highway and Transportation Officials (AASHTO), and remains a powerful policy-making and lobbying organization.

1912 post road program, the bill required states to establish state highway departments to work with federal officials, eliminating direct federal contact with counties. The act also ear marked funds for building roads in national forests. Reflecting the presidential vetoes of Jackson and Madison a century earlier, the 1916 Act appropriated federal money to build roads but allowed ownership and maintenance of these roads to remain with the states, counties, and local governments, and allowed state highway departments to initiate and manage road projects.

In addition, the 1916 Act prohibited the use of federal road aid funds in cities with a population of more than 5,000 because urban streets were regarded as a local responsibility. This restriction remained in effect until 1936. Temporarily ending a long-term Congressional debate, the Act required that "all roads constructed under the provision of this Act shall be free from tolls of all kinds" (FHWA 1977:241; Seely 1997:13).

The 1916 Federal Aid Road Act had a great impact on road building across the country, but created challenges for state highway departments. In 1919, the president of AASHO expressed some of the difficulties encountered in its implementation.

> They are expecting the States which had no highway organizations three or even two years ago, which had done no preliminary work and in some of which hardly a mile of modern rural highway had ever been built, to create an organization full sprung from the earth . . . and to build instantly hundreds of miles of modern roads costing millions upon millions of dollars. In the older States in the highway game, better prepared with organizations and contractors, and with some knowledge of materials and construction conditions, they are asking us to double, triple, or quadruple our annual output of roads (FHWA 1977:104).

In 1921, the Executive Committee of AASHO met to draft a bill that would continue the principles of the 1916 Act but correct its weaknesses, and that piece of federal legislation is the most significant legislation for road construction in the first half of the twentieth century. The Federal Highway Act of 1921 systemized highway construction by requiring each state to designate a state highway system comprising not more than 7 percent of all rural roads within the state, and allocated federal dollars only to that 7 percent system. Further, the 1921 law required the chosen roads to connect with other federally funded roads across state and county lines. The state highway departments, not the Bureau of Public Roads, selected the routes to be included in the seven percent of state roads to be federally funded. In the opinion of one Bureau of Public Roads official, "It is a credit to the State highway departments of twenty-five years ago that their selection . . . was prompt, intelligent, and sound. Their original seven percent system today is the fundamental framework for the nation's highways" (Hewes 1946:45).

In contrast to the maximum $25 million annual appropriation under the 1916 act, the 1921 Act carried a first year annual appropriation of $75 million that was renewed annually through 1932, and required states to match federal funds in a one-to-one ratio, thus providing 50 percent of the funding. In recognition of the greater distances and greater acreage of federal lands in western states, the Act increased the proportion of federal matching funds in states with large sections of federal land. In addition, federal highway dollars were also appropriated for the National Park Service, Forest Service, and Bureau of Indian Affairs to build roads on federal lands managed by those agencies[10] (FHWA 1977:247).

[10] In 1912, Congress stipulated that 10 percent of the revenue from national forests be used to build roads in the forests. The Chief Forester turned to the Office of Public Roads for technical assistance, and at about the same time the Department of the Interior also asked for technical assistance in planning and building roads in the national parks. To address these requests, the Director of the Office of Public Roads organized a Division of National Park and Forest Roads (FHWA 1977:75). Because so much land in Arizona is federal, the road construction programs of

The task of coordinating the "7 percent system" selected by the 48 state highway departments fell to the Bureau of Public Roads. In 1923, the Bureau published a national map of the Federal-Aid Highway System of just less than 170,000 miles of highway, estimating that 90 percent of the population of the country lived within 10 miles of one of the roads in the system. By 1925, over a quarter of the miles in the federal aid highway system had been improved (FHWA 1977:108-109).

NUMBERING THE HIGHWAYS

In 1924, the same year that inaugurated the *Rand-McNally Road Atlas,* AASHO initiated an important innovation in twentieth-century road policy. At their tenth annual meeting in November that year, the Association petitioned the Secretary of Agriculture to undertake

> the selection and designation of a comprehensive system of through interstate routes, and to devise a comprehensive and uniform scheme for designating such routes in such a manner as to give them a conspicuous place among the highways of the country as roads of interstate and national significance (Scott and Kelly 1988:13).

That is, AASHO asked the federal government to eliminate the nationwide jumble of private highway signs and multi-striped poles and to replace the confusion with a uniform numbering system similar to systems that had already been adopted in Wisconsin and Oklahoma. In response, the Secretary of Agriculture appointed a joint board consisting of three engineers from the Bureau of Public Roads (including Chief MacDonald) and 21 state highway engineers. The Secretary charged the joint board to designate a national system of highways using existing roads, formulate a uniform numbering system, and adopt a standardized system of signs and markers for the new highways.

The first task, selecting existing roads to create a national system of highways, was perhaps the most difficult for the engineers. The joint board chose to make their deliberations on this topic away from the clamoring of the private highway associations and the local communities. The board held no public hearings.

As their second task, the joint board assigned even numbers to east-west highways, and multiples of 10 to long-distance routes (for example, 60, 70, 80). North-south highways received odd numbers, and the major north-south routes received numbers ending in one and five (FHWA 1977:408; Liebs 1985:19).

The third task of the joint board, that of adopting standardized signage, combined earlier investigations and decisions. In 1922, three state highway officials from Wisconsin, Minnesota, and Indiana had made a fact-finding trip through several states to look at highway markings and traffic control signage. Their report presented to the annual meeting of AASHO in 1924 established distinctive geometric shapes for signs, such as the octagon for stop signs, the circle for railroad crossing signs, and the diamond for cautionary signs. Each of these traffic signs was to be white, with black lettering and a black border. The report also suggested that each state design and mark state routes with distinctive route markers.[11] Also in

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these agencies is an important element of history of road building in the state, but is beyond the scope of this overview.

[11]A 1930s photograph album of state highway signs displays several images still familiar to the traveler of today. The Wyoming highway sign carried the cowboy on a bucking bronco that remains on the Wyoming license plate, while the Louisiana sign included the familiar pelican and the Pennsylvania sign was in the "keystone" shape (Phillips and others 1996:plate 79).

1924, another interested group, the National Conference on Street and Highway Safety, had recommended the use of color on traffic signs: red for "stop," green for "proceed," and yellow for "caution." The joint board combined the recommendations of these two groups, and added the now-familiar shield-shaped sign to mark the newly designated U.S. routes. The Secretary of Agriculture approved the joint board's recommendations in 1925, and asked AASHO to put the plan into operation in each of their states.

In 1927, AASHO published the first national manual detailing traffic control signs and markings for rural roads, the *Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs.* Three years later, the National Conference on Street and Highway Safety published a similar manual, incorporating most (but not all) of the AASHO recommendations and adding information on urban signs and markings. It was not until 1935 that a joint committee of AASHO and the National Conference on Street and Highway Safety wrote a single manual for both urban and rural applications. Approved by the Secretary of Agriculture, the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) was revised in 1939, 1948, and 1955. The 1955 version established the white letters on a red octagon of today's stop sign, and the black letters on a yellow triangle of todays yield sign.

HIGHWAY APPROPRIATIONS DURING THE GREAT DEPRESSION

In the 1920s, federal policy had focused on improving the American road system. In contrast, federal policy in the 1930s focused on putting people to work, and many went to work on road construction projects. Although American industries suffered greatly during the years of the Great Depression, the road-building industry was one of the industries least affected by the Depression due to more than a billion dollars of federal support in the 1930s. The employment benefits of road work extended beyond the actual job site. A 1932 Bureau of Public Roads study determined that for every person working on a road construction job, "seven others were indirectly employed making cement, aggregates, and [road building] machinery and in transporting these products" (FHWA 1977:124).

By 1929, after more than a decade of federal support of highway construction, just over 90 percent of the 7 percent system of highways (also known as "federal-aid highways") had been improved, but three-quarters of the total highway mileage in the United States remained unsurfaced. From the passage of the Federal Highway Act of 1921 until the new Roosevelt administration assumed office in 1933, Congress continued to approve annual appropriations of about $75 million in federal aid to rural road construction. These federal appropriations required matching state funds and, after 1932, also required minimum wage standards for highway workers.

When President Franklin D. Roosevelt took office in March 1933, these semi-automatic $75 million annual highway appropriations ceased because the administration began an extensive program of emergency public works. One of the first and most important pieces of Depression-era legislation, the National Industrial Recovery Act of 1933, granted $400 million to the states for road construction, more than four times the annual appropriation of the previous dozen years. In contrast to earlier appropriations, this legislation eliminated the requirement of state matching funds, and allowed the states to use the federal money both on secondary roads and on urban streets that were extensions of federal-aid highways. Recognizing that most of the federal-aid highway system established in 1921 had been improved, the 1933 appropriation allowed federal aid to be used on most of the rest of the rural roads in America that remained unimproved. In order to spread the work over the greatest number of individuals, the 1933 Act limited employment to 30 hours per week per worker, gave employment preference to veterans, and prohibited convict labor.

Congress followed up the 1933 legislation with smaller appropriations in the next two years, but each still larger than a typical appropriation of the 1920s. Arizona Senator Carl Hayden, a long-time proponent of

federal aid for road construction, co-authored the Hayden-Cartwright Act of 1934, which provided $200 million for roads. The 1934 Act also reinstituted the practice of requiring state matching funds, a requirement that had been suspended in the 1933 appropriation. In addition, the Hayden-Cartwright Act permanently extended federal aid to secondary roads and urban streets connected to federal-aid highways, and abolished the formerly mandated "dollars per mile" funding ratio (FHWA 1977:125, 490).

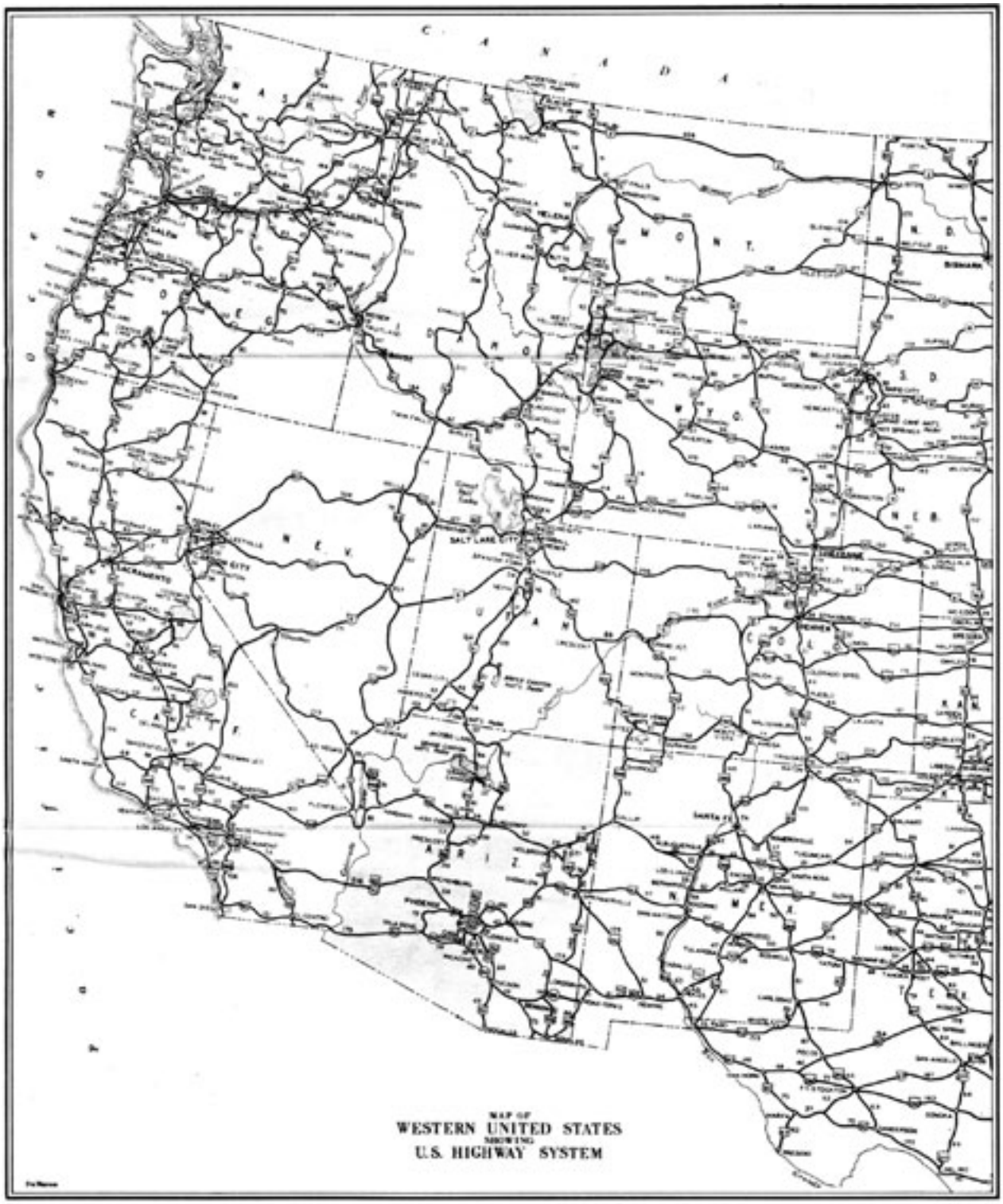
The Emergency Relief Appropriation Act of 1935 provided another $200 million for highways. A significant component of this act was an additional $200 million to improve the dangerous intersections where roads crossed paths with railroads (known as railroad grade crossings), and these "safety funds" did not require state matching funds. The following year, the 1936 appropriation required that railroad grade crossings be eliminated or adequately protected on *all* future projects financed by federal aid, and Congress voted an additional $190 million each year for the next five years (1937 to 1942) to improve railroad grade crossings (FHWA 1977:124-125, 130). Arizona examples, all built in 1936, include the Highway 80 underpass in Douglas, Stone Avenue underpass in Tucson, and Winslow underpass.[12]

The 1934 Hayden-Cartwright Act contained a provision that profoundly affected the future of highways in the United States. A clause set aside 1.5 percent of federal highway construction expenditures to fund the cost of planning future highways. The Bureau of Public Roads first used the Hayden-Cartwright dollars to survey the nation's roads in three phases, beginning in 1935. The first phase, a national road inventory, assembled information on the type, width, and condition of rural highways; the geometry of curves, grades, and sight distances; and the location of the schools, hospitals, farms, residences, businesses, and industries served by the rural highways. The second phase, a traffic survey, collected national data on traffic volume, vehicle types, origin and destination of travel, as well as a sampling of commercial vehicles detailing their weight and cargo. The information collected in the first two phases was tabulated and recorded on a variety of maps. The third phase, a national record of revenues and expenses for highways from all sources, included financial information from all levels of government, road-use studies, and examinations of the expected life span of the roads themselves (FHWA 1977:269-270).

The national planning survey had been envisioned and designed by a staff member of the Bureau of Public Roads. Herbert S. Fairbank, described as "a brilliant man, a man of broad vision . . . an engineer and a scholar, yet a practical man," graduated from Cornell University with a civil engineering degree in 1910 and entered the Office of Public Roads as one of its earliest "student" civil engineers. From trainee to Deputy Commissioner for Research, Fairbank worked four decades in the Bureau of Public Roads. In those years, he lectured on road improvement trains, built object lesson roads, directed practical research, and foresaw the future importance of planning. Fairbank made his most important contributions to highway development in his often-anonymous writing about highway planning. In addition to writing and editing *Public Roads: The Journal of Highway Research,* Fairbank authored two important policy papers, *Toll Roads And Free Roads* (1939) and *Interregional Highways* (1944), discussed in further detail below (FHWA 1977:269).

By 1939, the work of county and state governments, private highway and good roads associations, and more than a billion dollars of federal money had produced significant results. All the primary and most of the secondary arteries of travel in the United States had been established, numbered, and paved (Figure 6; Pocket Map 3).

[12] Each of these structures has been determined to be eligible for the National Register (Fraserdesign 1987).



Source: Arizona Highway Department

Figure 6. Western U.S. Highway System, 1939

WAR TRAFFIC

The Army first tested motorized trucks for field and supply purposes in 1912. Although World War I was fought in Europe, the difficulties of transporting personnel and military goods within our own borders contributed to the nationwide interest in an interconnected system of highways. In 1922, the War Department produced the "Pershing Map," which carried the general's flamboyant signature across the map's legend. This map illustrated routes of military importance, many of which coincided with the routes of the 7 percent federal aid system set up a year earlier by the states working with the Bureau of Public Roads. These military routes identified in the early 1920s became the basis for a strategic network of roads in World War II (FHWA 1977:267).

American mobilization for World War II began with defense appropriations in 1939, by which time most of the system of federal-aid roads had been built. The experience of one trucking firm illustrates the movement of people and products around the country to support the war effort.

> We had a tremendous increase in business from hauling war supplies for government contractors, and in shipping engines to the West Coast, ammunition from McAlester, Oklahoma, ordnance from Kansas City and outside St. Louis, and we'd bring empty steel shell casings there to be loaded and shipped out. The war really made LeeWay Motor Freight (Scott and Kelly 1988:77).

The war's heavy loads and heavy traffic damaged the pavement on the nation's rural roads and highways, much of which had been built for lesser volumes of lighter automobiles. Throughout World War II, road construction and maintenance crews faced shortages of material, personnel, and road user revenues. The federal government responded by paying in full for roads to military bases and essential industrial plants, and the Bureau of Public Roads worked with the states to obtain sufficient materials to maintain the roads deemed strategically important.

In contrast, non-war-related traffic decreased during the war years, due to gasoline rationing, the scarcity of tires for civilian use, and the cessation of automobile production during the war years. Traffic in 1943 and 1944 dropped to about one half of the 1941 pre-war volume (FHWA 1977:275-277; Liebs 1985:28).

THE ROAD TO THE INTERSTATE HIGHWAY SYSTEM

Because the Federal-Aid Highway Act of 1956 funded the interstate system of highways, President Eisenhower is often named as the creator of the system. There is even a bit of folklore incorporating his Army experiences into the inspiration for the interstate system. In 1919, as a young Captain at the end of World War I, Eisenhower battled the inadequate roads, persistent mud, and endless potholes of a 56-day cross-country trip made by a convoy of 79 military vehicles from Washington, D.C. to San Francisco. At the end of the World War II, Eisenhower examined the Autobahn system of highways that had been built in Germany in the 1930s. As a result of these experiences, Eisenhower has been credited with the creation of the interstate system (FHWA 1977:241; Patton 1986:81-82).

Although Eisenhower can be legitimately credited with the first major step in funding the interstate system, the connection between presidential vision and the creation of the interstate highway system began two decades earlier and centers on President Franklin D. Roosevelt. Just over a year after Fairbank's national planning survey began in late 1935 and before the reams of data had been analyzed, Roosevelt drew six lines across a map of the United States, three extending from east to west and three from north to south. Handing the annotated map to Bureau of Public Roads Chief MacDonald, President Roosevelt instructed the Bureau to investigate a system of toll highways for

long distance travel (FHWA 1977:272). The engineering staff of the Bureau of Public Roads took the lead in designing the system of interstate highways, and "[f]ederal engineers dominated most aspects of the nation's highway policy for several decades, relying on an unchallenged reputation for superior technical expertise and savvy political administration that stressed cooperation [with the states] over dictation" (Seely 1997:13).

Chief MacDonald passed the responsibility to Herbert Fairbank, and Fairbank used an initial analysis of the information gleaned in the nationwide survey to make projections about toll roads. In his publication *Toll Roads and Free Roads*, Fairbank (1939) projected that the low volume of transcontinental traffic could not pay for an interstate highway system through the collection of tolls, and stated that the financial responsibility for building roads lay with local, state, and federal governments. Fairbank touted "the construction of a special, tentatively defined system of direct interregional highways, with all necessary connections through and around cities, designed to meet the requirements of the national defense in time of war and the needs of a growing peacetime traffic of longer range" (FHWA 1977:272). Thus, despite Roosevelt's request for a transcontinental system of toll roads, the Bureau recommended that public funds finance the construction of the system.

The same year Fairbank wrote *Toll Roads and Free Roads*, Americans were able to get a first glance at the world of future highways at the General Motors "Highways and Horizons" exhibit at the 1939 World's Fair in New York. This was the most popular and most expensive attraction at the Fair, and people waited two hours to take the 15-minute ride into designer Norman Bel Geddes' vision of 1960. Over the course of the Fair, 2 million people visited the $6 million installation demonstrating 10-lane "super" highways (Patton 1986:120).

Two years later in 1941, President Roosevelt appointed the seven-member National Interregional Highway Committee. MacDonald served as chair, Fairbank served as secretary, and the committee included federal and state highway administrators and engineers, city planners, and the incoming president of AASHO. After more than two years of work, the committee published their findings in January 1944 in a document titled *Interregional Highways,* which outlined a system of interregional highways based on economic and social needs. The committee focused on population centers, agricultural production, timber and mining interests, manufacturing locations, and military bases in choosing routes. Additionally, the planners stressed coordination of the highway system with other modes of transportation, and coordination in road construction among all levels of government. Fairbank's written summary of the committee's work "remains the most significant document in the history of highways in the United States" (FHWA 1977:274).

Congress followed the recommendations of *Interregional Highways* in passing the Federal-Aid Highway Act of 1944, which authorized the designation of the national system of interstate highways. The Act apportioned $1.5 billion dollars over a three-year period to begin at the end of the war. The act also set up a ratio to divide federal funds among the primary highway system (45 percent), the secondary system (30 percent), and urban routes (25 percent), a division that remained in use for almost 30 years. Many of the provisions of the landmark 1944 Act came directly from the highway planning efforts advocated by Fairbank and MacDonald (FHWA 1977:276-277).

"NO BOUNDARIES"

By 1948, traffic volumes on the nation's highways had rebounded to the pre-war 1941 level. In addition, many Americans resettled in new cities, sometimes to take new jobs and sometimes to take advantage of a different climate. Many moved to the West. After the war, more than 8 million people moved west across the Mississippi, and 3.5 million moved into California alone (Scott and Kelly 1988:148). As a former soldier remembered,

> After the war, there was a traffic jam. One of the things every GI had fought for in World War II was to protect his rights as an American. And one of those rights was to be able to get in his car, turn the key, and go anywhere he wanted to. There are no boundaries here; the highways are not closed in the dark, or at state borders. As long as he had the money for a car, he could go anywhere he wanted (Scott and Kelly 1988:148).

In the late 1940s, four eastern states built high-speed, controlled access highways and charged tolls for their use. These modern highways in Pennsylvania, New Jersey, Massachusetts, and New Hampshire "set a high standard of excellence . . . and whetted the public appetite for better free roads" (FHWA 1977:168).

Post-war Congressional appropriations for highway construction followed the lead of the 1944 Federal-Aid Highway Act, and did not begin to appropriate money specifically earmarked for an interstate system of free roads until 1952. From 1946 through 1951, Congress voted $500 million per year for road construction. The 1952 appropriation increased annual funding to $550 million for two years, and the 1954 Federal-aid Highway Act raised the amount to $875 million (FHWA 1977:166). The 1952 legislation was the first to earmark funds for the interstate system, setting aside $25 million per year with a 50-50 federal-state matching ratio. The 1954 act jumped the interstate funds up to $175 million per year for two years and changed the federal-state match ratio to 60-40.

The Federal-Aid Highway Act of 1956, signed by President Eisenhower, authorized significant funding for the construction of the 41,000-mile system by setting up a Highway Trust Fund from the collection of federal excise taxes and an increase in the gasoline tax. In contrast to the traditional two-year funding bill, the 1956 act provided long-term financing for the interstate highway system, authorizing $27 billion, based on a federal-state 90-10 matching ratio (FHWA 1977:254-255). As of 1999, 42,795 miles had been designated for development with interstate construction funds and American taxpayers had spent $129 billion to build this system (FHWA 2001). The system, now officially designated as the Dwight D. Eisenhower System of Interstate and Defense Highways, continues to expand. More than 3,600 additional miles have been added as Alaska, Hawaii, and Puerto Rico have been included and new corridors continue to be developed in the continental United States.

In reviewing his long tenure as chief administrator for American roads, Thomas MacDonald summed up the relationship between the post-war expansion of highways and the post-war expansion of the economy.

> We were not a wealthy nation when we began improving our highways . . . but the roads themselves helped us create a new wealth, in business and industry and land values. . . . So it was not our wealth that made our highways possible. Rather it was our highways that made our wealth possible (FHWA 1977:257).

The federal-aid system of financing America's highways began with the 1921 Federal Highway Act appropriating $75 million and continued through the $27 billion Federal-Aid Highway Act of 1956. The system has been a success because of consistent Congressional appropriations, strong state highway organizations, and the contributions of the Bureau of Public Roads. Beginning as a rural post road improvement program, the program has expanded to fund thousands of miles of American highway.

CHAPTER 3
THE TECHNOLOGY OF AMERICAN ROAD BUILDING, 1776-1956

Road construction technology has evolved substantially during the last century. From about 1900 until 1920, motorists drove on wagon roads, and between about 1920 and 1930, motorists traveled on wagon roads that had been adapted for the automobile, largely by the addition of surfacing to fight the problem of dust. It was not until the 1930s that the new science of road engineering created roads designed specifically for motor vehicle traffic, and the invention of new road machinery facilitated their construction. After about 1940, the science of road engineering turned to designing freeways. Our grandparents may have thought of a team of horses and a scraper as road building equipment. The phrase "road construction" now brings to mind the sights and sounds of noisy heavy equipment chuffing diesel smoke, orange warning flags snapping in the dusty breeze, and the acrid smell of hot, fresh asphalt.

TRADITIONAL ROAD BUILDING METHODS

To understand twentieth century road construction, it is helpful to take a quick look back at the most widely used ancient and historic road building methods. The four big names in pre-twentieth century road construction—Rome, Tresaguet, Telford, and MacAdam—each used stones to pave roads for wagons.

Two thousand years ago, Roman workers built the Appian Way by placing large blocks of lava in a foundation of cement that ranged from 13 to 17 feet wide. The Romans "crowned" their roads, that is, they built the center of the road higher than the edges in order to drain water off the roadways, a technique still used today. Europeans of the Middle Ages continued to use the Roman roads, and many remain in existence today (Theisen 1937:10-11).

The name of the Director General of French Roads, J.P.M. Tresaguet (1775-1785), has been attached to his improvements on the ancient Roman method of road building. Tresaguet pioneered what is now known as the "Tresaguet method," which added several layers of stone broken into small pieces over a foundation of larger stones. Tresaguet also added ditches alongside the crowned roadway to drain water from the roads. His roads were about 18 feet wide, not including the side ditches. Perhaps the Frenchman's most important contribution to road building was his insistence on constant maintenance of roads by well-trained and well-paid workers (FHWA 1977:12-13).

In the early 1800s, Englishman Thomas Telford filled cracks between large road foundation stones with dirt, and covered the foundation stones with smaller stones. He used fine gravel as a finishing layer on 18-foot-wide roads, and put drains across the road at 100-yard intervals. Between 1802 and 1820, Telford oversaw the construction of 920 miles of roads and 1,200 bridges in England (Theisen 1937:10-11).

Also in the first decades of the nineteenth century, J.L. MacAdam initiated the use of a single layer of small, broken granite pebbles to build roads without a foundation of large stone blocks. The Scotsman believed the foundation courses of large stones were inefficient and unnecessary because the soil alone supported the road, and he directed the building of roads using small stones packed into a dense mass and set with water. MacAdam published his guidelines in an 1816 pamphlet, *Remarks (Or Observations) on the Present System of Road Making*. Roads built with his technique are now termed "macadam roads." MacAdam also laid the first road made of concrete in 1865 (Theisen 1937:10-11).

In nineteenth-century America, road construction often involved little more than removing large boulders, chopping vegetation, and leveling the worst irregularities of the ground surface to allow the passage of wagons in single file. The best roads of the time were

> 12 to 15 feet wide, a width that was adequate for two loaded wagons to pass each other with the horses at a walk. To shed water quickly, these roads were crowned on both the straight sections and the curves, and the crown, 6 to 8 inches higher in the center, was steep enough to make driving at the sides uncomfortable. Consequently all traffic ran in the middle, taking to the right hand side of the road only to pass other vehicles (FHWA 1977:381).

Simple roads through the countryside became mud in the spring thaws and after rains, a problem partially solved by various methods of surfacing dirt roads. Some of the state-chartered turnpikes of the early 1800s were simply graded and ditched, and some were surfaced with wooden planks, a technique introduced in this country from Canada in 1846. The best were surfaced with gravel or hand-pounded[1] stone in the Tresaguet or MacAdam methods. Road construction did not often include bridge construction, so travelers forded smaller streams in their wagons or were ferried across the larger rivers.

THE NEW SCIENCE OF ROAD CONSTRUCTION

The century-old wagon road techniques of Telford, MacAdam, and Tresaguet failed under the increased traffic, weight, and speeds of automobiles and trucks, and the new motor vehicles spurred the invention of new road construction technology. Just as Henry Ford and his cohorts invented variations on the automobile every year, Chief Thomas MacDonald and research crews at the Bureau of Public Roads, state highway departments, manufacturers, and several American universities invented the new science of road construction.

In the early twentieth century, the science both incorporated and rejected features of wagon roads and railroads, and added new practices. First, the new road engineers faced the challenge of improving the road surfaces. Second, they addressed safety and beautification issues. A third set of innovations of the new science focused on the development of modern road building machinery. Peripheral to road science but integral to road history is the development of roadside businesses to serve the traveling motorists.

Asphalt and Concrete

The first problem to be solved was dust. Wagons traveled along rural roads at less than 10 miles per hour. As faster and heavier motor vehicles took to the roads in greater numbers after the turn of the century, their wheels broke down the macadam surfaces and created clouds of dust marking their passage. In 1908, a Brown University professor enumerated for the American Society of Civil Engineers the myriad of attempts to control dust,

> Among the methods used in the United States to alleviate the dust nuisance [are] sprinkling the surface with fresh water, salt water, a solution of calcium chloride, oils with a paraffin base, oils with an asphaltic base, oil of tar, oil emulsion, Westrumite, Dustoline, Asphaltoline, Tarracolio, and deliquescent salts (Rose 1976:84).

Almost from its inception and continuing to the present, the Office of Public Roads (now FHWA) has conducted research to test soils and paving mixtures, and has published their findings as guidelines for road construction. The most successful methods to combat dust have been asphalt and concrete paving. Urban road builders introduced asphalt paving in New York City and Philadelphia in 1871, and concrete in Bellefontaine, Ohio in 1891, but both asphalt and concrete were considered too costly to use on rural

[1]The first machine to crush stone was not invented until 1858.

roads in the nineteenth century. The influx of federal money in the twentieth century overcame this objection (FHWA 1977:39, 67-68).

As in other parts of the country, initial efforts to surface roadways began in urban areas. In 1910 Phoenix, as in other Arizona towns, most road surfaces were simply graded dirt, but some had a layer of gravel and some had been oiled to combat dust. Nineteen blocks, chiefly on Washington Street and Central Avenue, were the first streets to be paved in January 1912, and in February, paving with a concrete base overlain with asphalt began on all streets between Fourth Street and Fourth Avenue. A year later, in March 1913, the city authorized the paving of all the remaining streets in the original Phoenix townsite, and by 1915, a total of 7 miles of Phoenix streets had been paved. Five years later, that number had increased more than threefold to 25 miles and all the streets in the original town site were paved. By 1929, the extent of paving more than tripled again and 86 miles had been paved (David 1976:11-13; Luckingham 1989:52-53). These efforts spread into the surrounding rural areas, and the local newspaper boasted in May 1924, "Through the Salt River Valley, radiating from Phoenix in all directions like spokes of a great wheel, are paved roads. No farmhouse is over two miles from a paved road" (Luckingham 1989:82). The newspaper failed to mention that these paved roads radiating from Phoenix represented most of the paved roads in the state at the time (see Pocket Map 2).

As early as 1904, the Office of Public Roads had surveyed American roads and found only 7 percent of the more than 2 million miles of rural highways surfaced in any way (Theisen 1937:11). It was not until 1909 that the first mile of rural public road was paved with concrete in Wayne County, Michigan, on the route from Detroit to the state fairgrounds (Rose 1976:95)[2]. Four years later, a new 24-mile stretch of 9-foot-wide concrete road outside of Pine Bluff, Arkansas became a tourist attraction because the smoothness of the surface allowed cars "to reach up to 45 mph, if the driver gives it full throttle. And it is said that many motorists actually brought their cars by railroad on a flat car to Pine Bluff where they rode up and down this road for two or three days" (Ray 1984:4-5).

After the influx of federal money into road construction in the 1920s, 23 percent of the highways in the United States had been surfaced by 1930. However, most of the surfacing was macadam or gravel, and only 3 percent of the total mileage had been surfaced with concrete, asphalt, or brick (Scott and Kelly 1988:26).[3] While the 1920s witnessed road construction and route consolidation, the 1930s brought both asphalt and concrete to America's roads. As a typical example, the route of U.S. Highway 66 had been determined by 1926, but the last 4-mile stretch did not receive asphalt paving until 1937 (Housley 1996:44, 68).

Safety

In solving the first problem of dust, road engineers inadvertently helped to create the second problem, traffic accidents. Dustless road surfaces allowed drivers to travel in greater numbers at greater speeds on roads designed for wagons, and the number of accidents grew at a rate alarming to an American public unused to such grisly statistics.[4] By 1927, the number of lives lost on the roads equaled the number of American lives lost in World War I, and by 1934, the state of Arizona claimed the unhappy distinction of being second in the nation in highway deaths per capita (Housley 1996:77; Rodda 1992:16).

[2] The first concrete city street had been poured 16 years earlier in Ohio; the essentially unaltered segment is now listed in the National Register (Appendix E).

[3] Although more rural roads were surfaced with concrete than asphalt between about 1920 and 1932, gravel, asphalt, and concrete all have been used to surface roads since 1920.

[4] The inefficient brakes and weak lights of early automobiles also contributed to highway mortality.

In 1919, an engineer from the Bureau of Public Roads described the current state of road design.

> During the past ten years, the transition from horse-drawn to motor traffic has been so nearly complete that horse-drawn traffic can no longer be considered a controlling factor in highway design; yet practically all of the basic principles of highway construction were evolved for horse-drawn traffic (FHWA 1977:120).

The basic principles of highway design in 1919 lacked safety elements such as guardrails, passing lanes, and shoulders. After about 1930, road engineers designed new safety features including increasing sight lines on curves and at intersections, adding shoulders, and widening the roads. Designing for safety also included eliminating certain road elements such as steep road grades, roadside signs and utility poles at the edges of the narrow roads, and hazardous railroad crossings. Later, road designers incorporated additional lanes and the concepts of limited access and divided roadways to lower the accident rate.

The innovative road commissioner of Wayne County, Michigan painted a white line down the center of road curves and bridges in 1911, and later added a white center line to all his county highways. In 1924, the National Conference on Street and Highway Safety recommended that "rural highways should be marked with a white center line on curves, at and near hill crests, at irregular intersections, and at any other point where safety requires that motorists keep strictly to the right" (FHWA 1977:406). The Arizona Highway Department adopted highway striping the same year. The conference further recommended that "objects near the roadway, such as curbs, poles, fences, and rock surfaces, should be painted white. Obstructions such as columns and curbs, at the centers of underpasses, should be striped diagonally black and white" (FHWA 1977:406).

The first standards of practice adopted by AASHO in 1928 recommended 10-foot-wide lanes, pavements at least 6 inches thick with a 1-inch crown in the middle, and 8-foot-wide shoulders when practicable. By 1940, AASHO recommended 16-foot to 24-foot widths for two-lane roads, and shoulders 8 to 10 feet wide free of all obstructions such as utility poles and signs (FHWA 1977:388, 393).

Between 1938 and 1944, AASHO cooperated with the Bureau of Public Roads to publish a series of seven important design policy brochures, "the fundamental structure upon which all subsequent geometric design policy for highways has been based" (FHWA 1977:390). The seven brochures dealt with: (1) highway classification by traffic volume, character of traffic, and speed; (2) required sight distances for hills, curves, and passing; (3) marking and signing no-passing zones; (4) highway types by number of lanes; (5) measurements for various types of intersections; (6) policies on rotary intersections; and (7) grade separations and ramps. These policies have been continually upgraded and re-published, and many remain in use today.

Machinery

Central to the history of road building is the history of road building machinery. Ironically, much of the building of early automobile roads was done with draft animals (Figure 7). Horses and mules, not machines, pulled road-grading equipment in the 1910s and into the 1920s (Scott and Kelly 1988:30). After World War I, the Army delivered more than $200 million of surplus "trucks, some crawler tractors, compressors, and early-day power shovels," as well as the explosive TNT to the Bureau of Public Roads and state highway departments (FHWA 1977:105-106; Gray 1995d:16). Despite the donation of surplus military machinery, many road builders in the early 1920s continued to use horses and mules, with the big switch from animal power to motorized machinery occurring in the late 1920s and into the 1930s (Bowden 1995). A similar migration of machinery took place in Arizona after the completion of Hoover

Dam. The dam contractor auctioned off much of the dam construction equipment, and the bulldozers and tractor-drawn scrapers began to be used for highway construction in the 1930s (Gray 1995d:17).

Figure 7. Mules in Arizona Road Construction, circa 1920

More and better machinery made earthwork (that is, the process of making "cuts" and "fills" to even out the roadbed) easier and cheaper. Wagon roads had grades of no more than about 4 to 6 percent, resulting "in rather crooked locations carefully selected to avoid steep grades, closely fitted to the terrain, with small cuts and fills to save grading costs" (FHWA 1977:382). The builder of a wagon road often had to sacrifice a straight alignment in favor of avoiding steep climbs and drops. With enough labor, cuts and fills could have been made through more rugged terrain, as demonstrated by contemporaneous railroad construction, but the expense was not justified. The new machinery made it economically feasible for road builders to construct straighter roads with gentler grades "of a type that had heretofore existed only in the fanciful minds of design engineers" (FHWA 1977:394).

In addition to straightening wagon roads, the new machinery improved the grades of early automobile roads. Encouraged by the greater power of automobiles to climb hills and daunted by the expense of animal-powered earthwork, early builders constructed automobile roads with grades of up to 9 percent. The surplus World War I compressors (for drilling machines) and the TNT donated by the Army facilitated cuts, and by the 1930s, bulldozers and other new road grading equipment facilitated the hauling of dirt from road cuts to fills, making earthwork less costly (Gray 1995d:17). In addition, the increased public awareness of safety issues contributed to lowering road grades back down to about 6 percent.

Highway engineers of the 1920s and 1930s agreed with the Delaware State Highway Engineer who reminded them that the straight line is the shortest distance between two points and "ideally aligned commercial roads are those that are laid in absolutely straight lines" (FHWA 1977:126). This philosophy, which owed much to the railroad tradition of long, straight tangents, gentle curves, and easy grades, left "a legacy of thousands of miles of absolutely straight monotonous highway" (FHWA 1977:126).

More and better machinery also led to increased use of concrete and asphalt. Invention of a bituminous distributor in 1919 facilitated the application of asphalt, and invention of the traveling concrete mixer in 1923 replaced the time-consuming wheelbarrow delivery of wet concrete to the road site. Other important

inventions included the addition of powerful diesel engines to tractors and graders in 1931, and the addition of large pneumatic tires to dump trucks and scrapers by 1934 (FHWA 1977:453-454).

Comfort

Early motorists found no roadside accommodations for oil or gasoline, tire repair, engine parts, meals, overnight stays, or even public rest rooms, and an automobile trek often resembled a safari.

> Poor roads and the absence of roadside services outside of population centers made early auto travel a grand adventure for those with fortitude. Most automobilists reveled in overcoming wretched road conditions and welcomed the isolation of camping along a picturesque roadside at the end of a dusty, jarring ride. Drivers loaded their vehicles with supplies of all kinds, including food, camping gear, tires, and extra gasoline (Rodda 1992:6).

The proliferation of roadside accommodations followed the pattern of federal road dollars—very few before 1920, a significant number in the 1920s, and a large increase during the 1930s. Tourist camps began as free campgrounds on the fringes of cities, but these first simple overnight rest stops were banned in the 1930s for health reasons. The only traces of them today may be stands of shade trees. The first tourist camp in the United States to offer accommodations in cabins was opened in Douglas, Arizona in 1913, on U.S. Highway 80 (Rodda 1992:13).

To aid both tourists and residents, the state of Arizona began publishing road maps on an annual basis in 1926.[5] At first, the maps were simple one- or two-color printing jobs, on only one side of the page. By 1932, the State Highway Department used the reverse of the map to promote tourist attractions with a montage of 21 black-and-white photographs titled "Scenes Portraying a Few of the Interesting Features within Arizona." Perhaps due to the self-interest of the department publishing the map, fully one-third of the photographs are illustrations of roads. Mingled with photographs of such attractions as the Arizona desert, Grand Canyon, State Capitol, prehistoric cliff dwellings, and Mission San Xavier del Bac are photographs depicting a "Paved Highway Crossing Queen Creek," and the "Concrete Pavement Near Buckeye." Photographs of the curves of the Apache Trail rounding Fish Creek Hill, the single-lane road up the San Francisco Peaks, and a view looking out from the Claypool Tunnel demonstrate the continuing existence of dirt roads. The summary of traffic laws on the maps states that the speed limit for passenger cars on "open country highway" is 35 miles per hour (Arizona State Highway Department 1932).

A sufficient number of tourist camps had appeared by the side of Arizona roads in 1925 that the Arizona State Board of Health started a tourist camp inspection program to check on sanitary conditions and published their findings in a AAA brochure for travelers (Housley 1996:51-52). By 1939, the more than 2 million visitors each year had made tourism the state's largest and fastest growing industry worth $70 million a year (Rodda 1992:20). In 1940, researchers claimed the federal highways across Arizona (U.S. Highways 60, 66, 70, and 80) carried one half of the nation's east-west transcontinental traffic (Arizona State Highway Commission and others 1941). Businesses catering to the road population included tourist camps, tourist courts (or motor hotels), filling stations, and diners. These "Arizona Roadside Property Types" have been previously described in the historical context, *Automotive Transportation in Arizona 1900-1940* (Rodda 1992).

[5]The Arizona Government Documents section of the Hayden Library, Arizona State University includes a full set of the Arizona State Highway Department road maps from 1926 to 1974, as well as a set of Drivers License Manuals from the 1950s to 1974. In 1974, the Arizona State Highway Department merged with the Arizona Department of Aeronautics to form the new ADOT.

CHAPTER 4
BUILDING ROADS IN ARIZONA, 1846-1956

This historic overview was prepared to facilitate evaluations of the eligibility of roads in Arizona for inclusion in the National Register. With that goal in mind, this chapter discusses the history of road building in Arizona, from wagon roads to state highways, in four parts—each focusing on one of the four criteria of significance established by the National Register.

The first part of this chapter, *Arteries of Travel, 1846-1956*, addresses events and patterns of development of Arizona's automobile roads that are relevant for determinations of National Register eligibility under Criterion A. Certainly, the discussion is not exhaustive and other important themes may be applicable for evaluation of specific roads.

The second section, *Policies and Politics: People Behind Arizona's Road System, 1909-1956*, presents short biographies of several individuals who have been instrumental in Arizona road policy. Associations with these individuals important in the development of Arizona's road system may make some roads eligible for the National Register under Criterion B. Again, the discussion is not intended to be exhaustive and other individuals certainly could be identified by research into specific roads.

The third section, *Outstanding Road Engineering and Construction, 1909-1956,* describes several examples of Arizona roads important for engineering and design. The evolution of road construction techniques also is discussed and provides information that may lead to a determination of National Register eligibility under Criterion C.

The fourth section *What's Left? The Archaeology of Arizona Roads*, describes types of historical archaeological sites that may be associated with historic roads in Arizona. This discussion focuses on evaluating the information potential of historic Arizona roads that may be eligible for the National Register under Criterion D.

ARTERIES OF TRAVEL, 1846-1956

National Register Criterion A states that a historic property may have significance if it is associated with events that have made a significant contribution to the broad patterns of our history. A major stimulus for road building in Arizona has been the passage of federal laws that provided funding for construction of roads. The intersection of federal dollars and Arizona roads is used to organize this historical overview.

During the centuries of occupation by American Indians, Spanish, and Mexicans, travelers followed footpaths and horse trails from water source to water source across the arid lands of Arizona. American Indians, as well as newcomers such as missionaries, conquistadors, mountain men, prospectors, and cavalrymen, traveled on routes and trails marked on the land only by years of usage. Although some of their routes eventually became highways due to their favorable terrain, vegetation was not cleared and rocks were not hauled to make these trails more permanent roads. One road historian described these paths and trails as "All wild trail—not an honest-to-goodness road in the lot" (Smith 1941:27).

The construction of roads in nineteenth-century Arizona depended on, and contributed to, migrations across and into the Territory. In order to move men and materials to California to fight the Mexican War in 1846, United States soldiers built the first constructed road in Arizona, a road that generally followed the pathway of the Gila Trail on an east-west path across southern Arizona. Thousands of gold seekers migrated to California on the new road after 1849, and the resulting California population boom clamored

for mail, stage, and railroad services, a clamor that expanded the number of routes across Arizona. The discovery of gold in Arizona in 1863 reversed the westward migration and brought California miners into Arizona to search throughout the Territory for metallic riches. The prospecting newcomers clashed with the Native American residents, and American soldiers were dispatched to settle the disputes, building wagon roads to connect the new military forts. In addition, Mormon migration into Arizona agricultural colonies established new routes into the Territory on north-south corridors. Although development of these wagon roads has been characterized as road building, most segments of these roads continued to be little more than marked trails.

Today, we consider roads as being universally available to both automobile and truck traffic, accommodating small automobiles as well as 18-wheelers. When considering nineteenth-century wagon roads, we must understand the distinction between stagecoach routes and wagon roads. The existence of a dotted line on a map labeled "road" may indicate no more than a marked route accommodating travelers on horseback, or stagecoaches carrying passengers, mail, and light freight. Some of these roads passed over grades too steep for the "18-wheelers of the nineteenth century," that is, the heavy freight wagons pulled by as many as a dozen or more horses, mules, or oxen. As an example, when the property of the Territorial government had to be moved from Prescott to the new capital at Phoenix in 1889, the furniture, records, and supplies were sent to Phoenix via the railroad because the Black Canyon stage road to Phoenix was impassable for freight. Despite the vestigial glamour of stagecoaches, every segment of the Arizona Territory depended on freight wagons and wagon roads to deliver goods and food. The Goldwaters, Haydens, Ochoas, and other famous families in Arizona history began their businesses by freighting goods along Territorial wagon roads.

Another important point to keep in mind when considering Territorial roads is the dominance of the other type of road throughout Arizona—the railroad. Railroads hauled ores from Arizona's mines, shipped the produce from Arizona's agricultural fields, brought in building supplies, and delivered tourists and new residents. As in the rest of the country, roads often were built only to connect the traveler with the closest railroad depot, or in the case of western Arizona, with river landings along the lower Colorado River.

Dirt Tracks: Arizona Wagon Roads, 1846-1909

Beginning with the first wagon road built in Arizona and continuing until the appointment of the Territorial Engineer, the period from 1846 to 1909 encompassed numerous road builders with a myriad of agendas. During the period, no territorial department oversaw road construction in Arizona, which was administered primarily by the counties. However, the military, the Mormons, private toll road companies, and the territorial government itself also built some roads in Arizona. All these roads were built for wagon traffic, not automobiles; all were dirt, graded, or graveled roads at best, and probably little more than marked trails when crossing level terrain. Many did not connect with other roads to form through routes.

The Army built three important wagon trails across Arizona—Cooke's Wagon Road, Beale Wagon Road, and Crook Trail. The first road built across Arizona, Cooke's Wagon Road, was constructed for the passage of troops and became one of the most important immigrant routes in the West. During the Mexican War, Kearny's Army of the West traveled from St. Louis to California through the Arizona Territory along the well-known Gila Trail adjacent to the Gila River from the New Mexico border to Yuma, and produced the first map of the famous horse trail. A few months later, Captain Philip St. George Cooke led the Mormon Battalion along Kearny's path in 1846-1847, constructing a wagon road to accommodate their supply wagons. Soon known as Cooke's Wagon Road, the new road diverted from Kearney's mountainous path along the upper Gila River in eastern Arizona and headed south to find gentler terrain for wagons. The battalion built their road north from the Arizona-Mexico border along the San Pedro River, west to the Santa Cruz River and the settlement of Tucson, north along the Santa Cruz to

the Pima Villages on the Gila River, then west along the Gila River to the Colorado River (Figure 8). Before the paperwork ending the Mexican War had been signed, miners discovered the first gold in California, and the military wagon road constructed by the Mormon Battalion became an immigrant trail for "Forty-niners" headed for the goldfields. In the twentieth century, the east-west Territorial Highway, portions of the Ocean-to-Ocean Highway, U.S. Highways 80 and 84, and Interstates 8 and 10 all followed the general path of Cooke's Wagon Road.

The second important Arizona road built by the military is the Beale Wagon Road. Only a few years after the construction of Cooke's Wagon Road, Lt. A. W. Whipple surveyed northern Arizona in 1853 to locate a route for a transcontinental railroad. In the winter of 1857-1858, Lt. Edward Fitzgerald Beale again surveyed the Territory from east to west along the 35th parallel, this time in anticipation of building a wagon road from Fort Smith, Arkansas to the Colorado River, a distance of more than 1,000 miles. Lt. Beale returned in 1859 with a crew of men and 22 camels to carry road construction supplies and tools, and completed a 10-foot-wide simple wagon road by removing rocks and vegetation from the roadbed to the edge of the new road (refer to Figure 8). Beale's Wagon Road also served as an important immigrant trail across northern Arizona until the completion of the railroad along the same route in 1883. During the twentieth century, the National Old Trails Highway, National Park to Park Highway, and later, U.S. Highway 66 and Interstate 40 all followed the general path of Beale's Wagon Road.

A third important Arizona military road was one of many wagon roads that connected the more than a dozen military forts in Arizona after the Civil War (refer to Figure 8). In the early 1870s, an Army officer sent to the Territory to deal with Indians also became a leader in improving the daily lives of his Arizona soldiers. General George W. Crook, lauded as "Brave, Generous, and True" upon his departure from Arizona in 1875, "broke up military camps which had been hotbeds of fever and pestilence and constructed first class wagon roads to connect all the Arizona posts" (Wagoner 1970:141-142). One of the wagon roads hacked through the forests of central Arizona under Crook's direction became known as "Crook's Trail."[1] We can thank an articulate officer's wife, Martha Summerhayes, for a description of her journey in the first group of military wagons and ambulances to use the new wagon road (which appears to have been mostly a simple trail rather than a built road).

> The traveling was very difficult and rough, and both men and animals were worn out by night. . . The roads had now become so difficult that our wagon-train could not move as fast as the lighter vehicles or the troops. Sometimes at a critical place in the road, where the ascent was not only dangerous, but doubtful, or there was, perhaps, a sharp turn, the ambulances waited to see the wagons safely over the pass . . . It did not surprise us to learn that ours was the first wagon-train to pass over Crook's Trail. For miles and miles the so-called road was nothing but a clearing, and we were pitched and jerked from side of side of the ambulance, as we struck large rocks or tree-stumps; in some steep places, logs were chained to the rear of the ambulance, to keep it from pitching forward onto the backs of the mules. At such places, I got out and picked my way down the rocky declivity (Summerhayes 1979:66-69).

Roads connected all the nineteenth-century forts in Arizona, but only a few became as important to non-military traffic as those built by Cooke, Beale, and Crook. For example, military use of the Reno Road from Camp McDowell to Camp Reno lasted only two years from 1868, when Camp Reno was established, to 1870, when it was abandoned. However, miners, settlers, and stagecoaches used the road as the only route between Globe and Phoenix to communities such as Payson until the Roosevelt-Mesa Road (Apache Trail) was completed in 1904.

[1] Cook's predecessor, General George Stoneman, initiated construction of Crook's Trail, Reno Road, and Stoneman Grade, but his command of the Department of Arizona was short (1870-1871) because Arizonans thought he was too soft on the "Indian issue"(Wagoner 1979:124-126).

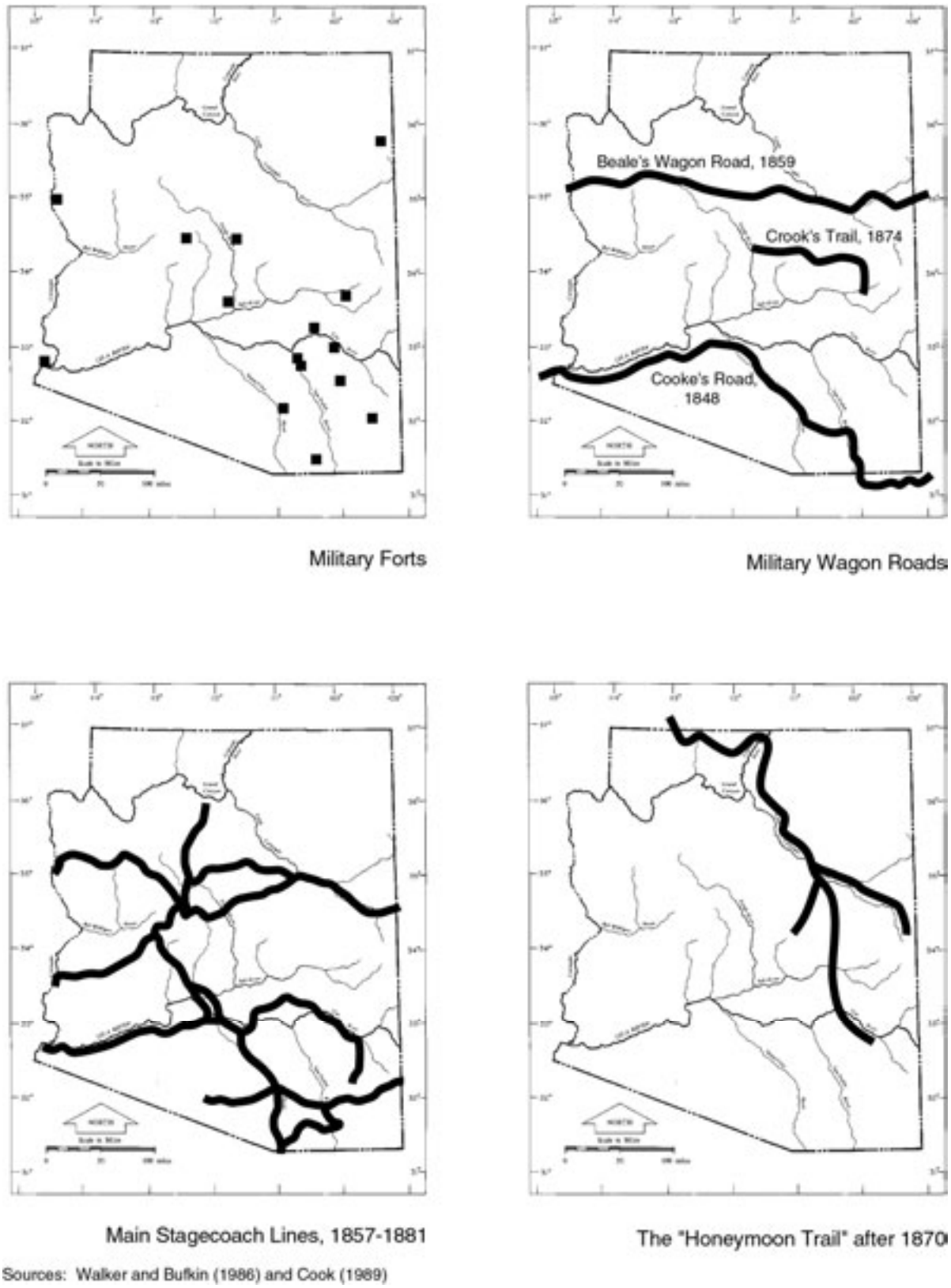


Figure 8: Major Arizona Wagon Roads

Mail service on horseback followed earlier trails and added new routes as new mining and agricultural settlements appeared in the Territory. Stage lines operated between mining boomtowns and supply points (refer to Figure 8). All nineteenth-century Arizona roads were susceptible to highwaymen. In a letter to the House of Representatives in 1871, Territorial Governor A.P.K. Safford expressed concern over the raids on highway travelers and station keepers by Mexican and Apache bands. "Dangerous and insecure as is nearly every highway in the Territory on account of the Apache Indians, I consider none more so than the Gila road . . .[which was] infested with Mexican robbers" (Wagoner 1970:105).[2]

Moving south to settle the agricultural lands of Arizona, Utah pioneers followed north-south roads, most often using Lee's Ferry to cross the Colorado River. The most famous of the Mormon roads became known as the Honeymoon Trail, because couples traveled from settlements in Arizona to be married in the temple in Salt Lake City (refer to Figure 8). Arizona historian Will C. Barnes once accompanied a wagon train on the Honeymoon Trail and described the efforts expended to cross a rain-swollen wash.

> Where hill and mountains were in its way, [the trail] simply either went up and over them, or else dodged them by going miles around. When washes were running belly deep to a horse and as swift as a horse could run, the wagons went into camp and waited, sometimes days, for the water to stop running. Often, when it did stop, there were two or three feet of soft, sticky mud which necessitated hitching three or four teams of horses, aided by long ropes pulled by the men and women, to get the heavily loaded wagons through and across (Cook 1989:66).

The Arizona Territory was separated from New Mexico in 1863 and the first Territorial Assembly, meeting in 1864, followed the lead of the federal government in authorizing private companies to build toll roads. Similar to the system that had built turnpikes in the eastern states in the early nineteenth century, the toll road system in the Arizona Territory allowed roadwork to take place without financial support from the Territory. In fact, the Territory charged a 2 percent tax from private toll road companies, and the proceeds went into the general school fund. In addition to allowing the construction of toll roads in Arizona, the First Territorial Assembly recognized several existing roads as free routes.

Acts of incorporation for the toll road companies required the roads to be completed within a specified period of time, and for the roads to be maintained and passable. The only required roadside amenities were water wells and watering facilities for people and horses. In that first legislative session, six toll road companies received franchises from the Territorial Legislature, and not surprisingly, most of the authorized roads traveled to and from Prescott, the Territorial capital (Table 3).

Two years later in 1866, in order to shift the burden of road building to the county level, the Territorial government empowered Arizona county boards of supervisors to establish road districts, issue road bonds, and levy property taxes to pay for road construction. The counties also were empowered to tax each able-bodied man in the county 6 dollars, or two days of roadwork, each year (Arizona State Highway Department 1939:3-4). In 1871, the Territorial Legislature also shifted the responsibility of incorporating toll road companies to the counties (Arizona State Highway Department 1939:2-4).

In 1877, the ninth session of the Territorial Legislature authorized Maricopa County to issue $15,000 in bonds to finance the construction of four wagon roads. Two of these roads were planned to connect Phoenix to Prescott, one by way of Wickenburg and the second by way of the Black Canyon. The third road connected Phoenix to Globe, and the fourth connected Phoenix to Yuma.

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[2]Despite the governor's rhetoric, one can assume that not all robbers were Mexicans or American Indians, for in 1877, the Territorial Legislature authorized the governor to reward the captors of two highwaymen with Anglo names—M.V. Alexander and Thomas Berry, who had robbed the stage in Skull Valley (Wagoner 1970:113).

TABLE 3 TOLL ROAD COMPANIES AUTHORIZED BY THE FIRST ARIZONA TERRITORIAL LEGISLATURE, 1864	
Toll Road Company	**Roads**
Santa Maria Wagon Road Company	Prescott to the Colorado River
Tucson, Poso Verde and Libertad Road Company	three roads from Tucson to mines in southern Arizona
Arizona-Central Road Company	Prescott to La Paz (on the Colorado River)
Mohave and Prescott Toll Road Company	Prescott to Mohave (on the Colorado River)
Prescott, Walnut Grove, and Pima Road Company (King Woolsey, Jack Swilling, and others)	first north-south highway to Prescott
Prescott and Fort Wingate Road Company	Prescott to Fort Wingate, New Mexico
Source: Wagoner 1970:54-55	

In his address to the legislature in 1879, new Governor John C. Fremont requested the authorization of "half a million dollars for the construction of good roads," as he understood "that the development of potential resources depended upon the improvement of transportation" (Wagoner 1970:169). The participants of the Tenth Legislature did not share Fremont's sweeping vision for roads or were more realistic about funding limitations and refused to consider his request. Editorial writers of the *Tucson Citizen* suggested that Fremont might have received a better response if he had selected specific road projects to fund rather than speaking in such general, and expensive, terms (Wagoner 1970:171).

In fact, the Territorial Legislature authorized money for road construction on only a few occasions. Between 1877 and 1881, the Legislature issued a total of $70,000 in road construction bonds. Tucked in among the almost $300,000 appropriated by the 1885 "Thieving Thirteenth" Territorial Legislature were $15,000 for a bridge across the Gila River and $12,000 for an "Apache wagon road." Territorial Governor Zulick complained that the road and bridge expenses should be county responsibilities, not territorial government expenses, and that the huge budget resulted from "wanton misappropriation of public funds" (Wagoner 1970:239). In response, Congress passed the Harrison Act to restrict indebtedness by all Territories, and the next Arizona legislature restricted its financial obligations to less than $50,000, with no provision for roads, and earned the moniker, the "Measly Fourteenth." The Gila River bridge at Florence required repairs 20 years later, and in 1905, the Territorial Legislature issued a $19,000 bond to fix the structure (Arizona State Highway Department 1939:4).

Across the United States before about 1910, more than 95 percent of rural roads were under county jurisdiction.[3] County responsibility for road building had led to disparate and mismatched road construction, and the roads built by one county sometimes did not connect to the roads built by adjacent counties—a pattern that occurred all across the United States. In 1913, the young Congressman Carl Hayden expressed the frustration of the American public in his defense of the highway bill he introduced that year, one of the many unsuccessful road finance bills introduced before the passage of the 1916 Federal Aid Road Act. Representative Hayden opened his remarks stating,

> The advocates of national highways . . . insist that a system of roads should be built that will be the main arteries of interstate travel connecting the State capitols and larger centers of population. They believe in roads that begin somewhere and end somewhere (U.S. Congress 1913:2).

To help address this problem, the Territorial Assembly voted in 1909 to create the office of Territorial Engineer, and Governor Richard E. Sloan appointed J. B. Girand as the first, and only, Territorial Engineer. The Territorial Highway Department consisted of Girand, a clerk, and a draftsman. The

[3] Today, about 55 percent of the 3 million miles of rural roads in the country are under county jurisdiction (FHWA 2002).

Assembly also established a small Territorial Road Fund, to be used "where the greatest immediate benefit may be secured" (Rodda 1992:4). In 1909, the Territory and counties together spent a total of only about $20,000 on roads, a dollar figure that would increase significantly over the next decade.

Gravel Highways: Early Automobile Roads in Arizona, 1909-1927

Beginning with the appointment of the Territorial Engineer and ending with the establishment of the Arizona State Highway Department, the period from 1909 to 1927 represented a significant period of road development and consolidation in Arizona. Although county governments continued to be responsible for roads in their jurisdictions, the Territorial Engineer assumed the responsibility of creating roads to connect counties and county seats across the state. This work to create connected, long-distance routes was also taken up by highway booster associations as they promoted cross-country routes through the state. The work continued with the 1921 Federal Highway Act, which required federally funded roads in Arizona to be connected with federally funded roads in neighboring states. In addition to route consolidation, the new Territorial Engineer faced the task of improving roads that had been built for wagons, not automobiles, and were often little more than two-track dirt trails through the forests and deserts (Figures 9 and 10). There was much roadwork to be done across the Territory.

Figure 9: Early Two-Track Trail Through the Pines near Flagstaff, circa 1910

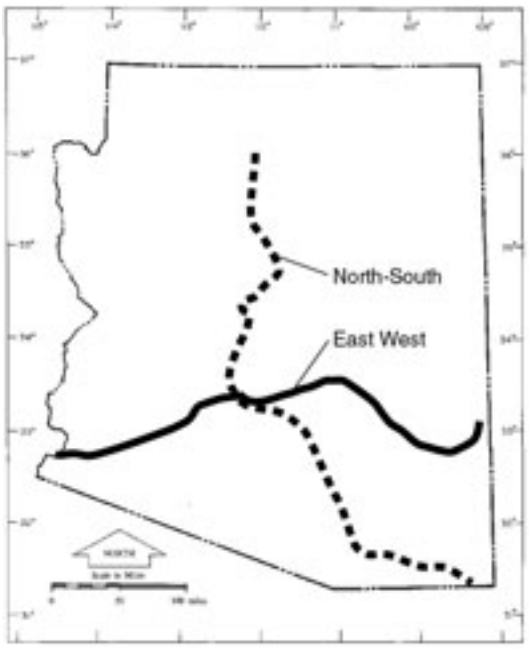
Figure 10: Early Two-Track Trail Through the Desert, circa 1910

In shifting the discussion from nineteenth-century wagon roads to twentieth-century automobile roads, it must be noted that for many years and many miles in the early 1900s, Arizona automobiles traveled along two-track dirt trails, graded dirt roads, and graveled roads. Concrete and asphalt roads did not become commonplace until the road improvement projects of the 1930s. In addition, the dominance of rail transportation continued into the 1950s. For example, families in Morenci in the 1920s visited doctors and bought goods in El Paso, Texas because it was more convenient to travel to El Paso via the Southern Pacific Railroad than to drive to Phoenix or Tucson via highways, and many did not own cars.

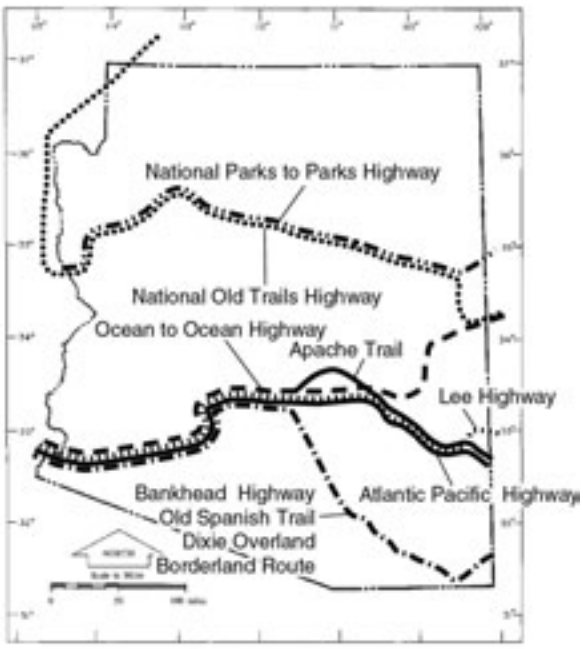
Public Funds

In the 1910 census, Arizona ranked forty-sixth in both population and mileage of public roads (Arizona Good Roads Association 1914:8). Territorial Engineer J. B. Girand envisioned an inter-connected system of Arizona highways as one of his first goals after his appointment in 1909. He drew up a plan to transform existing wagon roads, county roads, and trails into two great highways connecting 10 of the 14 Arizona county seats with about 1,000 miles of road. The proposed east-west Territorial Highway connected Yuma to Clifton via Phoenix, Globe and Solomonsville (county seat of Graham County at the time), and the proposed north-south road connected Douglas to the Grand Canyon via Tombstone, Tucson, Florence, Phoenix, Prescott, and Flagstaff (Figure 11; refer to Pocket Map 1).

By the time of statehood three years later, Girand had personally supervised the improvement of 243 miles of highway, and anticipated the improvement of an additional 740 miles (Table 4) (Fraserdesign 1987:4-5). Road construction sometimes employed convicts, especially on larger jobs, a practice that continued from 1909 when Girand used prison labor to build a replacement bridge over the Gila River at Florence until the 1933 Federal Aid Act prohibited the use of convict labor on federal-aid roads.

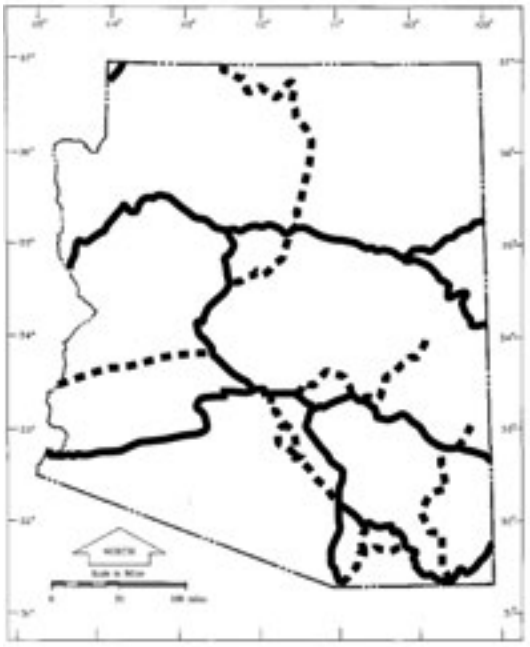


Proposed Territorial Highways,1909

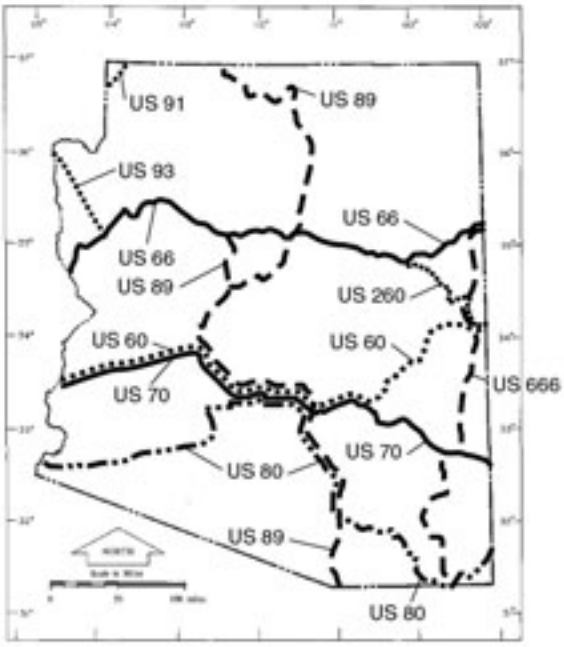


Private Highways, c. 1925

(see pocket maps for detail)



Federal "Seven Percent System" and
State Highways, 1927



U.S. Highways, 1939

Figure 11: Major Arizona Highways

TABLE 4 MILEAGE OF STATE HIGHWAYS IN ARIZONA, 1921-1995	
Year	**Mileage of Constructed Highways**
1912	243 miles (740 additional miles projected)
1921	1,498 miles designated as "seven percent system"
1927	1,968 miles
1929	2,134 miles
1939	3,623 miles
1995	about 6,000 (1,100 miles = interstate highways)
Sources: Arizona State Highway Department 1939:15; Fraserdesign 1987"4-5; Gray 1995b, 1995c;	

In 1911, the "self-educated, unpolished" George W.P. Hunt successfully sought the office of governor of the new state, and knew enough about Arizona politics to include a call for better roads in his platform (Wagoner 1970:483-484). After statehood in February 1912, Hunt appointed Lamar Cobb as State Highway Engineer, replacing Territorial Engineer J. B. Girand. Unlike Girand, Cobb did not personally oversee road construction and depended instead on contractors to perform the work. Although most of Cobb's budget paid for horseshoes, hack rental, harness repairing, and veterinary medicine, the department bought its first motor vehicle in 1914, a Ford automobile.

Also in 1912, the State Legislature passed the first state road law, which directed the new State Highway Engineer to designate 1,500 miles of roads and highways as a system of state highways. The new system was planned to supplement the two Territorial highways and connect principal towns across Arizona (Figure 12). Also, the Legislature allocated $250,000 to the counties for roads (Gray 1995a:4).

Figure 12: On the State Highway near Prescott, after 1912

After the Arizona State Legislature authorized the State Engineer to enter into cooperative contracts with the federal government and pledged state funds to matching the offered federal dollars in March 1917, the

money authorized by the 1916 Federal Aid Road Act began to flow into Arizona. Almost $10 million became available for road construction projects over the ensuing 10 years (State Highway Engineer 1926:31). The State Engineer chose a $56,000 repair to the vital Gila River Bridge near Florence as "Federal Aid Project No. 1," and most of the 90 projects undertaken with federal money between 1916 and 1926 cost less than $100,000. Nineteen topped the $100,000 mark, and the nine most expensive projects (all more than $150,000) are listed in Table 5.

TABLE 5
LARGEST FEDERAL AID PROJECTS IN ARIZONA, 1916-1926

Federal Aid No.	Name of Project	Federal-Aid Received
46	Phoenix-Yuma	$502,230
16	Superior-Miami	$422,349
59	Phoenix-Wickenburg	$210,169
62	Prescott-Ash Fork	$186,302
71	Phoenix-Yuma	$185,424
55	Yuma-Phoenix	$180,144
72-B	Prescott-Phoenix	$180,006
18	Benson-Vail	$156,712
48	Glendale-Marinette	$150,263

Source: State Highway Engineer 1926:30-31

By 1920, with the infusion of federal money from the 1916 Federal Aid Road Act, the Arizona Highway Department "employed more personnel than all other state agencies combined" (Fraserdesign 1987:15). The department hired more engineers than any other employer in the state, maintained the state's largest fleet of trucks, and purchased more explosives than any other entity in the state.

Booster Highways

At about the same time Arizona became a state, booster highway associations worked across the nation to promote connected cross-country routes. By the early 1920s, booster organizations named and promoted 10 of these highways across Arizona, often incorporating the same roads (refer to Figure 11). Four highways–Borderland Route, Dixie Overland Highway, Old Spanish Trail, and Bankhead Highway[4]–used the east-west Territorial highway across southern Arizona from Yuma to Phoenix, and the north-south Territorial Highway from Phoenix to Douglas. The Lee Highway and Atlantic Pacific Highway followed the east-west Territorial Highway from Yuma to Safford; east of Safford, the Lee Highway headed north to Clifton and the Atlantic Pacific went southeast to Duncan (east of Globe, a second segment of the Atlantic Pacific Highway branched north to Springerville). The Ocean-to-Ocean Highway followed the Territorial Highway from Yuma to Globe, and then joined the branch of the Atlantic Pacific heading north to Springerville (Figure 13). The Apache Trail ran from Lordsburg, New Mexico to Phoenix, following the east-west Territorial Highway west of Solomonsville (Figure 14). The National Old Trails Highway and National Park to Park Highway extended from Topock, Arizona on the Colorado River across the state eastward to St. Johns. At St. Johns, the Park to Park Highway turned north to Zuni, New Mexico, while the Old Trails Highway branched south to Springerville (refer to Pocket Map 2).

[4] Alabama Representative John H. Bankhead father of actress Tallulah Bankhead (1903-1968), actively supported Congressional funding for highway construction and sponsored the 1916 Federal Aid Road Act.

Figure 13. Ocean-to-Ocean Highway, circa 1912

Figure 14. On the Apache Trail below Roosevelt Dam

In July 1914, the Arizona Good Roads Association called a statewide meeting at the Yavapai County Courthouse in Prescott to discuss the possibility of a state bond issue to finance road construction. Although the state bond issue never came to fruition, the invitation to the meeting reveals the wide interest in good roads. The list of officers of the Arizona Good Roads Association included many prominent Arizona names, including the State Highway Engineer Lamar Cobb, Dwight B. Heard and Lin B. Orme of Phoenix, Gustav Becker of Springerville, T.A. Riordan of Flagstaff, and Harold Steinfeld and Hiram Corbett of Tucson. The meeting invitation list included county boards of supervisors, county road superintendents, directors of the Arizona Good Roads Association, and representatives from Arizona cities and towns. The day following the meeting, the Arizona Automobile Association held its first official meeting, and no doubt many of the same people attended that gathering.

It is interesting to note that the decision makers of the Arizona Good Roads Association scheduled this serious meeting of Arizona highway boosters to coincide with the opening day of the Frontier Days rodeo in Prescott. Also as part of the festivities, the Prescott Auto Club sponsored an auto race around the "Prescott New Outer Loop," a road from Prescott to Chino Valley maintained by the club for automobile races. The drivers raced around the loop twice for a total of 88 miles, and the first place finisher received a winning purse of $1,000 (Arizona Good Roads Association 1914:4).

The Seven Percent System in Arizona

As described above, the Federal Highway Act of 1921 had two significant provisions. First, federal dollars would be allocated to match state dollars to construct or improve 7 percent of the highways in each state, with the requirement that these federally funded roads connect at state boundaries with other federally funded roads. Second, in recognition of the greater distances and greater acreage of federal lands in the western states, the act allowed for a sliding scale for the state matching funds requirement. The Act

> did not increase the allocation of Federal money [for Western states], but it did diminish markedly the required State-matching money. It decreased it by adding to the fundamental 50 percent contribution by the Federal government an amount equal to one-half the percentage of the State's area held by the Federal Government in public land, Indian reservations, etc. The percentage of Federal Aid paid in Arizona thus is 71.06 percent [as opposed to 50 percent] (Hewes 1946:46).

Arizona proposed a total of 1,498 miles of roads to be included in the 7 percent system, a network reminiscent of both the Territorial Highway system and the highways named and promoted by booster organizations (refer to Figure 11). The Yuma-Phoenix-Tucson-Douglas-New Mexico highway followed a route common to several booster highways as well as both Territorial Highways, and subsequently was designated U.S. Highway 80 (Figure 15). The Florence Junction-Globe-Safford-Duncan highway followed the route of the Lee Highway, the Atlantic Pacific Highway, and the portion of the old Territorial Highway route from Globe to Solomonsville. The northernmost route followed the National Old Trails Highway from the Colorado River to the New Mexico border east of Springerville, and added a new section heading northeast from Holbrook to Gallup, New Mexico (the route of U.S. Highway 66). The Tucson-Nogales Highway was a new route, as was the Phoenix-Wickenburg-Prescott-Ash Fork Highway, although all these "new" highways improved existing county roads.

Approximately 1,100 miles of the 7 percent system had been improved by December 1926 (890 miles with federal funds and the remainder with state and county funds). Just less than 800 miles of the highway system had been graveled, and 100 miles had been graded and drained. Less than 20 percent of the federally funded system had been hard paved (130 miles of concrete pavement and 70 miles of asphalt) (State Highway Engineer 1926). Paving would occur over the next 15 years.

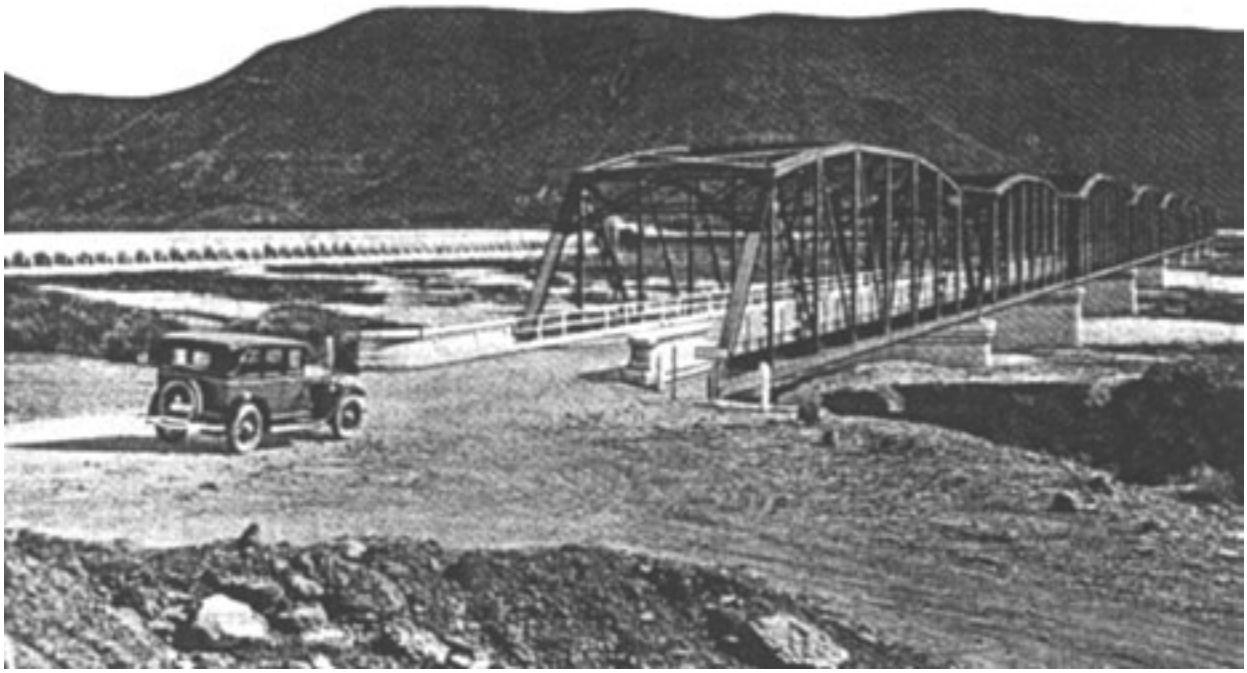


Figure 15. Gila River Bridge on U.S. Highway 80, circa 1927

The 1920s ushered in other events not directly related to road construction but of interest to automobile history. In 1920, the State Engineer appointed the first maintenance engineer to oversee road maintenance (Arizona State Highway Department 1939:23). In 1921, Arizona passed its first law taxing gasoline, at the rate of 1 cent per gallon, and the monies were earmarked for highway construction. The legislature raised the gas tax to 4 cents a gallon in 1927 (Arizona State Highway Department 1939:29-30). In 1925, the state of Arizona issued driving licenses for the first time. Applicants simply mailed in a form, passed no tests, and women did not have to state their exact ages ("over 18" sufficed). The state did not require driving tests before granting a license until 1935 (Rodda 1992:17). In 1926, Arizona produced the first in an annually updated series of state road maps, published by the Arizona State Highway Department.

Federal dollars from the 1916 Act had prompted a flurry of road-building projects across the state, but a 1923 investigation into the work of the State Engineer revealed that some of the federal road money had been used on projects other than road construction (Housley 1996:30). The misdirection of federal highway funds was not unique to Arizona, as many states were unequipped to control the flow of new money.

The 1927 state law that abolished the office of State Engineer and established both the Arizona State Highway Department and Arizona State Highway Commission also set up the Department of Motor Vehicles. This law "was the first systematic highway code for the administration of all matters and affairs directly affecting the highways of the State," and opened a new era for highways in Arizona (Arizona State Highway Department 1939:4).

Asphalt and Concrete: Arizona's Highway System, 1927-1956

Although the 30 years from 1927 to 1956 encompassed several significant eras in American and Arizona history, the period was a simpler one for Arizona's roads. The paving of roads in the state was the primary theme of the period, which began with the establishment of the Arizona State Highway Department in 1927 and ended with the passage of federal legislation funding an interstate highway system in 1956. Federal dollars from several sources funded hundreds of road improvement projects during the 1930s, including bridges and overpasses to separate railroad grades after passage of the 1935 Emergency Relief Appropriation Act. World War II brought a temporary halt to highway construction and maintenance, with the exception of roads to access new military installations. Other major construction projects, such as the construction of Hoover Dam, also prompted the construction of access roads. In the late 1940s and during the first half of the 1950s, the Arizona State Highway Department continued the process of paving and improving highways across the state.

Federal Dollars for the State Highway System

One of the first acts of the new Arizona State Highway Department was to approve the selection of routes for the state highway system, which was, in effect, a "rubber stamp" of the work conducted by the Territorial and State Engineers. Less than a month after its creation in August 1927, the new Arizona State Highway Department approved 1,954 miles as a part of the state highway system (Table 6). All of the roads that had been paved with concrete or asphalt were part of the federal "7 percent" system. All state routes in 1927, a total of almost 900 miles, were graded, graveled, or unimproved (Arizona State Highway Department 1939:20).

TABLE 6
MILEAGE OF THE STATE HIGHWAY SYSTEM, 1927

Route[1]	Description of Route	Miles
U.S. Highway 66	Topock-Kingman-Ash Fork-Flagstaff-Holbrook-New Mexico state line	385.2
U.S. Highway 70	Florence Junction-Globe-Safford-New Mexico state line	179.2
U.S. Highway 80	Yuma-Phoenix-Florence-Tucson-Benson	499.5
U.S. Highway 60/260	Holbrook-Concho-St. Johns-Springerville-New Mexico state line	107.5
U.S. Highway 89	Ash Fork-Phoenix	165.1
U.S. Highway 89	Tucson-Nogales	64.2
U.S. Highway 91	Utah state line-Littlefield-Nevada state line	17.0
State Route 73	San Carlos-McNary	89.1
State Route 79	Jerome-junction with US 89 northeast of Prescott	25.7
State Route 81	Douglas-Cochise	62.6
State Route 81	Bowie Junction-Safford	34.3
State Route 81	Solomonsville-Clifton	25.8
State Route 82	Nogales-junction US 80	68.2
State Route 83	Sonoita-Mt. View (junction US 80)	27.8
State Route 84	Casa Grande-Tucson	62.8
State Route 87	Chandler-Picacho	47.1
State Route 88	Apache Junction-Globe	78.6
State Route 187	Sacaton-Casa Grande	14.4
	Total	**1,954.1**

[1] U.S. Highway designation indicates roads in the "7 percent system" of the 1921 Federal Highway Act
Source: Arizona State Highway Department 1939:15-17

Nearly $40 million of federal aid money paid for most of the road improvements in Arizona from 1917 through 1939 (Table 7). In addition to the federal aid from 1917 into 1939, the state gathered road construction dollars from gasoline taxes ($26 million, after 1921), motor vehicle licensing fees ($13 million, after 1913), Arizona property taxes ($5 million, until 1934), and appropriations from the general fund ($4 million). Although the Territory did issue a few bonds for road construction, and the Arizona Good Roads Association called for the same type of funding from the state, the state of Arizona has always been reluctant to issue bonds to finance road construction (Arizona State Highway Department 1939:33-34).[5]

TABLE 7
FUNDING OF ARIZONA HIGHWAY PROJECTS, 1917-1939

Year	Class of Funds	Federal Funds	State Matching	Total
1917-1933	Federal-aid	$20,824,848	$ 9,708,380	$30,533,228
1934	Public Works	5,211,960	799,915	6,011,875
1935	Public Works	2,635,785	392,910	3,028,695
1936	Works Program Highway	2,569,656	601,903	3,171,559
1936	WPA Grade Crossing	1,232,050	84,658	1,316,708
1936-1939	Federal-aid	5,354,198	2,098,532	7,452,730
1938	Federal-aid Grade Crossing	4,718	- 0 -	4,718
1938-1939	Federal-aid Secondary Roads	251,114	144,791	395,905
	Federal Lands funds[1]	1,363,940	40,429	1,404,369
	Totals	**$39,448,271**	**$13,871,518**	**$53,319,789**

[1] Includes road construction funds from the Forest Service, Bureau of Indian Affairs, and others.

By the end of 1938, the state highway system had grown from approximately 2,000 miles to 3,624 miles (Figures 16 through 20). The more significant statistic is the increase in the use of asphalt to pave Arizona's highways. In 1927, before the introduction of "low-cost mixed bituminous" pavement, only about 80 miles of Arizona state highways had any sort of asphalt paving (Table 8). Portland cement concrete covered 141 miles, while 869 miles of roads were gravel surfaced. Almost half of the highways had only been graded (758 miles) or remained unimproved (142 miles). After a decade of experience with asphalt paving, more than half of the state highways had been paved with mixed bituminous (1,680 miles) or bituminous surface treatment (362 miles) in 1938. Mileage in concrete decreased to 125 miles apparently because some concrete roads were paved over with asphalt. The mileage of gravel roads also declined from a high of 912 miles in 1926 to 518 miles in 1938 as roads were paved. Mileage of graded roads decreased from a high of 1,147 miles in 1929 to 597 miles in 1938. In 1939, slightly more than 200 miles of the state highway system remained unimproved (Arizona State Highway Department 1939).

The 1912 to 1939 system of state highways is detailed in the 1939 report by the Arizona State Highway Department, *History of the Arizona State Highway Department* (Table 9). The designation "U.S." indicates those miles of the state highway system also included in the federal 7 percent system as of 1922. Characteristics of these early state highways include a graded, graveled, or paved surface with a grade of no more than about 6 percent (with exceptions, including State Route 88). In general, paved roads built before 1930 are no more than 18 feet wide, roads built between 1930 and 1937 are no more than 20 feet wide, and roads built after 1937 were at least 22 feet wide (State Engineer 1939:22).

[5] The State Transportation Board has been authorized to issue bonds for certain purposes but these are not considered a legal debt of the State. In 1984, the State was authorized to issue Grant Application Notes, which are essentially borrowings against future payments of the federal share of projects that have been used to accelerate construction of some projects (ADOT 2002). Local communities participate in paying the interest costs.

Figure 16. Claypool Tunnel on U.S. Highway 60, circa 1932

Figure 17. U.S. Highway 80 near Yuma, circa 1930s

Figure 18. U.S. Highway 66 at Goldroad, circa 1930s

Figure 19. U.S. Highway 89 near Cameron, 1936

Figure 20. U.S. Highway 60 near Wickenburg, 1939

TABLE 8
DEFINITIONS OF ROAD TYPES

Road Type	Definition
Unimproved road	A road composed wholly, or with minor local exceptions, of the natural ground of the region traversed, which may or may not have been bladed, which does not conform in respect to alignment, grade and drainage, at least to the definition of a "graded and drained earth road," and on which the only work that has been done by public authority is that required to maintain a condition of bare passability for horse-drawn or motor vehicles.
Graded and drained earth road	A road of natural earth, aligned and graded to permit reasonably convenient use by motor vehicles, and drained by longitudinal and transverse drainage systems, natural or artificial, sufficiently to prevent serious impairment of the road by surface water.
Gravel or stone road	A graded and drained road, the wearing surface of which consists of gravel, broken stone, slag, chert, caliche, iron ore, shale, chat, disintegrated rock or granite, or other similar fragmental material (coarser than sand).
Bituminous surface-treated road	A graded and drained earth road, a soil-surfaced road, or a gravel or stone road, to which has been added by any process a surface mat of bituminous material and mineral aggregate less than 1 inch in compacted thickness.
Mixed bituminous road	A graded and drained road, the wearing surface of which is one inch or more in compacted thickness, composed of gravel, stone, sand or similar material, mixed with bituminous material under partial control as to grading and proportions.
Bituminous penetration road	A graded and drained gravel or stone road, consisting of a base course and a wearing course one inch or more in compacted thickness.
Bituminous concrete or sheet asphalt road	A graded and drained road, the wearing surface of which consists of gravel, stone or sand, mixed with bituminous material in accordance with precise specifications defining graduation of the mineral aggregate and proportions of aggregate and bituminous cement 1 inch or more in compacted thickness, and laid on a base course of either rigid or non-rigid type.
Portland cement concrete road	A graded and drained road, the wearing surface of which consists of Portland cement concrete, with or without a bituminous mat less than 1 inch in compacted thickness.
Dual-type road	A graded and drained road, the wearing surface of which consists of two individual types, each of which has an aggregate width of at least 8 feet which may be in divided strips, both individual types being of such depth as to be classed logically as a part of the traffic-bearing road surface, rather than as surfaced shoulders.
Source: Arizona State Highway Department 1944a:ii	

TABLE 9 STATE HIGHWAY SYSTEM, 1939		
Route	**Description of Route**	**Miles**
U.S. Highway 60 U.S. Highway 260	Holbrook-Springerville-New Mexico; junction U.S. Highway 70 near Globe-junction U.S. Highway 260 near Springerville; California-junction U.S. Highway 89 in Wickenburg; Alpine-New Mexico	357.0
U.S. Highway 66	Topock-Kingman-Flagstaff-Holbrook-New Mexico	385.2
U.S. Highway 70	Florence Junction-Globe-Safford-New Mexico	179.2
U.S. Highway 80	Yuma-Phoenix-Tucson-Benson-Bisbee-Douglas-New Mexico; Bisbee-Naco	500.3
U.S. Highway 89	Utah-junction U.S. Highway 66 near Flagstaff; Ash Fork-Phoenix; Tucson-Nogales	423.0
U.S. Highway 91	Utah-Nevada	17.0
State Route 61	junction U.S. Highway 60 at Ortega-junction U.S. Highway 260 at Concho; Witchwell-New Mexico	33.4
State Route 62 U.S. Highway 466	junction U.S. Highway 66 at Kingman-Boulder Dam (including Chloride spur)	75.6
State Route 64	Grand Canyon Park boundary-junction U.S. Highway 66 near Williams; Grand Canyon Park boundary-junction U.S. Highway 89 near Cameron	80.4
State Route 65	junction U.S. Highway 66 in Winslow-Coconino National Forest boundary	27.5
State Route 69	junction U.S. Highway 89 near Prescott-junction U.S. Highway 89 near Phoenix	97.9
State Route 71	Aguila-Congress Junction	25.7
State Route 72	Parker-Bouse-junction U.S. Highway 60 near Hope	49.5
State Route 73	San Carlos-McNary-Springerville (63.0 miles from junction U.S. Highway 70 near Cutter-Ft. Apache junction abandoned 1937)	128.5
State Route 75	Clifton-Duncan	30.4
State Route 77	Holbrook-Show Low-McNary junction; junction U.S. Highway 70 west of Cutter-Oracle Junction	150.4
State Route 79	junction U.S. Highway 89 northeast of Prescott-Jerome-Oak Creek Canyon-junction U.S. Highway 66 in Flagstaff	85.3
State Route 179	two miles north of Dewey on State Route 69-State Route 79 (Dewey cut-off)	8.5
State Route 81	Douglas-Safford; Solomonsville-Clifton-Springerville-Sanders; St. Johns-New Mexico	344.8
State Route 181	junction State Route 81-boundary Chiricahua National Monument	28.4
State Route 82	junction U.S. Highway 80 north of Tombstone-Nogales	68.2
State Route 83	junction U.S. Highway 80-Sonoita	27.8
State Route 84	junction U.S. Highway 80 near Gila Bend-Casa Grande-Tucson	121.6
State Route 85	Ajo-junction U.S. Highway 80 at Gila Bend	43.3
State Route 86	junction U.S. Highway 80 in Benson-junction State Route 81 in Cochise; Bowie Junction-New Mexico	64.2
State Route 87	Picacho-junction U.S. Highway 80 in Mesa	58.7
State Route 187	Sacaton-Casa Grande	14.4
State Route 287	junction U.S. Highway 80 at Florence-junction State Route 87 at Casa Grande Ruins National Monument	9.0
State Route 88	Apache Junction-Globe	78.6
State Route 92	junction U.S. Highway 80 near Lowell-east boundary Ft. Huachuca; junction State Route 82-north boundary Ft. Huachuca	42.7
State Route 95	San Luis-junction U.S. Highway 80 in Yuma-junction State Route 72 at Bouse	137.6

[1] U.S. Highway designation indicates roads in the "7 percent system" of the 1921 Federal Highway Act
Source: State Engineer 1939

The first of these road projects widened the "Cashion Highway" from two to four lanes (from 22 feet wide to 44 feet wide), beginning at 19th Avenue in Phoenix and heading west almost 15 miles to the Agua Fria Bridge. The second project improved State Highway 79 from Clarkdale up the hill into Jerome, a distance of 5.7 miles. Workers improved the curves, eliminated steep inclines, and built a masonry wall to act as guardrail on the first curve entering Hull's Canyon. [In the project photographs, this masonry appears similar to the work on Highway 66 between Kingman and Gold Road, and if it remains intact today, it may be National Register-eligible.] The third project improved and realigned the road between Ray and Superior, widening it from 14 feet to 20 feet (CWA-FERA ca. 1935).

Although the majority of Depression-era road projects improved existing roads, some involved the construction of new roads. Two important examples of new roads built with Depression-era dollars are U.S. Highway 60 from Globe to Show Low through the Salt River Canyon, and the Bush Highway from the Salt River Valley to Jake's Corner (Felton), where it joined Forest Highway 9 that ran from Roosevelt Dam to Payson and beyond (replacing the nineteenth-century Reno Road).

The 1916 Federal Aid Road Act included money to build roads in National Forests, but it was not until 1933 that funds were allocated through the Bureau of Indian Affairs to build roads on Indian reservations (FHWA 1977:247). The National Industrial Recovery Act of 1933, which allocated $400 million for public highway construction, included $50 million for roads through National Forests, National Parks, and Indian reservations (Collins 1999:144-145). By 1944, almost 9,800 miles of roads had been built on National Forests, National Parks, military reservations, and Indian reservations in Arizona. Only about 230 of these miles had been paved, and 520 miles were surfaced with gravel. Approximately 20 percent of the built roads were only graded and drained, and more than 70 percent remained unimproved (Table 10).

TABLE 10
ROAD MILEAGE IN ARIZONA, 1944

	Type of Road				
	Unimproved	Graded and Drained[1]	Gravel or Stone	Paved[2]	Total
State and Federal Aid Highways	163.4	475.5	279.8	2,906.2	3,824.9
County Rural Roads	10,000.1	2,699.9	1,654.4	1,085.9	15,440.3
National Forest Roads	1,913.8	1,300.0	163.5	0.0	3,377.3
National Park Roads	91.5	27.9	19.6	128.9	267.9
Indian Reservation Roads	4,954.2	663.0	332.6	57.5	6,007.3
Military Reservation Roads	45.7	39.5	3.4	44.9	133.5
City, State, and Alleys	219.8	242.1	197.1	386.1	1,045.1
State and City Park Roads	45.5	11.1	16.0	0.8	0.0
Totals	**17,434.0**	**5,459.0**	**2,666.4**	**4,610.3**	**30,169.7**

[1] includes soil-surfaced roads
[2] includes bituminous surface treated, mixed bituminous, bituminous penetration, bituminous concrete, Portland cement concrete, and dual-type roads
Source: Arizona State Highway Department 1944b

War and Recovery

The number of vehicles with out-of-state license plates traveling through Arizona, both tourists and migrants, increased more than 40 percent from 1930 to 1938 (Housley 1996:62). Although the Depression did not decrease traffic in Arizona, the tire and gasoline rationing during World War II slowed the flow of traffic and "military transportation largely replaced tourism as the mainstay of traffic" (Housley 1996:86). Routine highway construction and maintenance activities also slowed during the war years, and the federal funds that came to Arizona more often came in the form of military investment in contrast to the

make-work projects of the 1930s. During the war years in the American West, "the federal government spent about $40 billion on goods, military equipment, and a network of defense installations" (Housley 1996:87). Some of the military bases required construction of new roads, while existing bases required improved access roads. An example is the 6-mile-long State Route 92 connecting the Fort Huachuca Military Reservation with State Route 82, an upgrade completed by WPA in 1941 (*Arizona Highways* November 1941:47).

After the war, the end to rationing and an increase in prosperity brought Americans out on the highways in great numbers, and Arizonans followed the national trend. The post-war boom also increased the costs of road construction and maintenance, and the rising prices peaked and stabilized in approximately 1948 at about twice the pre-war cost (FHWA 1977:244). After limiting road construction dollars to roads strategic for the war effort in the Defense Highway Acts of 1941 and 1942, Congress returned to appropriating money to modernize and recondition the nation's highways in 1943 and following years. Looking at the state's highways in 1946, an engineer for the Public Roads Administrations gave a good report.

> On the whole, a critical examination of the Arizona State highway system discloses a healthy condition. The Federal-aid highway system of about 2500 miles has had almost complete first- or second-stage improvement. It shows, as it should for the average traffic, a large percentage of construction with intermediate types of bituminous surfacing. In the future, particularly within the urban areas, more higher-type surfacing probably will be required. . . .The first obligation of the State is to maintain this system [and] most of the past construction will require revamping or reconstruction in 25 or 30 years. . . . future healthy highway development in Arizona seems assured (Hewes 1946:50-51).

In his 1946 report, the federal highway engineer did not foresee the huge increase in automobile traffic that was to occur within a decade. For instance, the number of automobiles traveling U. S. Highway 66 totaled more than 1 million by 1954, most with out-of-state license plates. The traffic on "The Main Street of America" became known as "The World's Largest Traffic Jam" as the two-lane road clogged with traffic jams in most of the towns along its route (Housley 1996:102-103).

In addition to traffic jams, the increased traffic on Arizona's two-lane highways contributed to three other consequences. First, the traffic exacerbated the wear and tear on the decade-old pavements. In the decade between 1944 and 1954, the Arizona State Highway Department spent $19 million in maintaining and improving U.S. Highway 66 alone. According to the editor of the Flagstaff newspaper in 1945, U.S. Highway 66 "carries more out-of-state travel than any other highway in Arizona—and it is beyond question in the most miserable condition, narrow, rough, worn out and full of holes" (Housley 1996:104). Second, the traffic contributed to an increase in the number of highway accidents on the two-lane roads, raising public concern about highway safety and promoting interest in divided highways. Third, the increase in tourism fueled and was fueled by an increase in roadside businesses and a proliferation of garish signs along tourist routes, which eventually prompted the highway beautification movement in the 1960s (Figure 21) (Scott and Kelly 1988:178, 186).

POLICIES AND POLITICS: PEOPLE BEHIND ARIZONA'S ROAD SYSTEM, 1909-1955

National Register Criterion B states that a historic property may have significance if it is associated with the lives of persons significant in our past. The task of associating historically important people with

Figure 21. U.S. Highway 66 at Seligman, Arizona, 1955

twentieth-century road construction in Arizona is a difficult one because the first names that come to mind that fit the twin criteria of historic significance and association with road construction are nineteenth-century road pioneers such as Crook, Beale, Cooke, and Hamblin. Twentieth-century personalities associated with road building in Arizona are seldom widely known, as the sampling below will attest.

J.B. Girand, Territorial Engineer

Appointed in 1909 as the first, and only, Territorial Engineer, J.B. Girand personally directed road construction across the state during his three-year tenure. Girand's strategy to link county seats with Territorial Highways was the first Arizona-wide, systematic approach to road construction, and his two proposed routes remain important transportation corridors today, with some modifications. Modern U.S. Highway 80 is built along Girand's route from Yuma to Douglas through Phoenix and Tucson, and U.S. Highway 70 is built along Girand's route from Globe to Solomonsville. During his short tenure, 243 miles of wagon roads were upgraded to gravel highways. Girand initiated the use of prison labor on state highway projects, including the bridge across the Gila River at Florence and the Ash Avenue Bridge across the Salt River at Tempe, a practice that was continued into the 1930s.

George W.P. Hunt, Governor

The construction and maintenance of good roads has been a political issue for decades. Governor George Wiley Paul Hunt supported good roads in his first run for governor of the new state in 1911, and his name

is associated with the Hunt Highway, a road on the north side of the Gila River opposite Florence and running past Poston Butte. Governor Hunt's enthusiasm for roads and his long tenure as governor offered him the opportunity to influence road construction in Arizona. It may be more than coincidental that the Superior-Miami road was built through the canyons of Queen Creek during his tenure and the early years of federal aid. This road greatly facilitated transportation between the capital city and Globe, where Hunt had prospered in business after arriving as a poor teenager from Missouri in 1881.

Laurence I. Hewes, Bureau of Public Roads

At least one engineer in the Bureau of Public Roads had a substantial effect on road building in Arizona. In 1921, Laurence I. Hewes opened the new Western Headquarters of the Bureau of Public Roads and acted as engineer, comptroller, expeditor, and office manager for nearly 30 years until 1950. The office oversaw federal road building in 11 western states plus Alaska and Hawaii, including the connection of federal-aid roads to the roads of Mexico and Canada and the construction of National Forest and National Park roads. Hewes also recruited officials from the state highway departments of western states, the Forest Service, and the Park Service, as well as land management and public roads agencies to found the Western Association of State Highway Officials. "No one man contributed more to the development of the highways of the West than Dr. Laurence Ilsley Hewes. [His] superlative contributions in every phase of highway engineering gave great impetus to Western highway development" (FHWA 1977:490).

Charles C. Small, Civil Engineer

The creation of the Arizona state highway system can be credited to often nameless staff members, but two highway department employees stand out for their contributions. One was Charles Churchill (C.C.) Small, a civil engineer who had begun his career as a railroad location engineer in Massachusetts. At the time, there were few professionals trained in the new science of highway construction, and many highway engineers came from the railroads. He joined the State Engineer's Office in 1919 as chief location engineer.

When Small joined the department, the state boasted about 1,000 miles of highways, most in the two roads established as Territorial Highways in 1909. During the 13 years Small worked for the department, the state highway mileage doubled, and he oversaw several major construction projects including the building of the third state highway, which is the route that became U.S. Highway 66. Small also directed the modernization of the old Territorial Highway from Phoenix to Duncan (later U.S. Highway 70), and the route from Nogales to Flagstaff over Yarnell Hill (later designated U.S. Highway 89).

After Small had been named chief deputy state engineer, he initiated the construction of the final section of U.S. Highway 60 from Globe to Show Low, including the bridge over the daunting Salt River Canyon. A junior member of his staff remembered Small as "the guy who ran the place. State engineers came and went [but] he was the one who had the say." On a treacherous stretch of U.S. Highway 89 between Wickenburg and Prescott, a monument on the slopes of Yarnell Hill reads, "In memory of Charles Churchill Small, member, American Society of Civil Engineers, 1872-1932, Father of Arizona Highways" (Gray 1995a:3).

Fred M. Guirey, Landscape Architect

Another roadside memorial monument recalls the first landscape engineer in the Arizona State Highway Department. The plaque at the Oak Creek overlook honors the man who designed it, Fred. M. Guirey.

Trained as an architect, Guirey led the department in highway beautification efforts during the 1930s. Guirey took his first job with the department as a college student in 1930, helping to design the scenic route from Jacob Lake to the North Rim of the Grand Canyon. Guirey worked as a draftsman for the Arizona State Highway Department for two years, from 1933 to 1935, and then as the landscape engineer for the department from 1935 to 1942, he built carefully planned roadside viewpoints, often using native materials. He also argued in favor of using native plant species along highways, and contributed to the design of the innovative Miracle Mile on State Route 77 in Tucson.

After his years with the Arizona State Highway Department, Guirey worked as a consulting engineer in Phoenix. For more than 25 years, beginning in 1953, he served as an original member and chair of the Maricopa County Parks and Recreation Commission, tripling the acreage in county park system. But Guirey is most remembered for his pioneering work on roadside improvement, and the plaque on the viewpoint overlooking Oak Creek Canyon remembers Guirey as the "Father of our Roadside Rests" (*Arizona Highways* January 1994; *Arizona Republic* 5 November 1978:B-11).

R.C. (Cye) Perkins, State Engineer

Cye Perkins earned his "engineering spurs" working on railroads and at mines in Missouri before moving to the Arizona Territory in 1911 where he went to work for the Highway Department (*Arizona Republic* 18 May 1952, Part VI:2; 5 July 1954:1). He left to work in private companies, but returned in 1926 and worked for the department for the rest of his life, rising to the top position of State Engineer in 1951. He served in the position until his death in 1954. One of his earliest major projects was serving as chief engineer for construction of Maricopa County's first paved road system, which involved a network of 327 miles of concrete highways. Another major assignment was building Gillespie dam and bridge. One of his most challenging jobs was building Navajo Bridge at Marble Canyon, 467 feet above the Colorado River. He also was in charge of construction of U.S. Highway 60 between Globe and Springerville, through the Salt River Canyon, and also helped plan and build improvements of the highway through rugged terrain west of Globe to Superior.

ROUGH TERRAIN: ROAD ENGINEERING AND CONSTRUCTION, 1909-1956

A property may be eligible for the National Register under Criterion C if it embodies the characteristics of a type, period, or method of construction. The design of a road, important construction techniques used in building it, or outstanding feats of engineering necessary to complete it may qualify the road as historically significant under this criterion.

The history of road engineering and construction in Arizona can be divided into two eras. The first, the era of the Territorial and State Engineers from 1909 to 1927, focused on the creation of connected highways. The second era began with the creation of the Arizona State Highway Department in 1927 and focused on the improvement of highways, both through the upgrading of pavement and safety standards, and through beautification projects.

Territorial and State Engineers, 1909-1927

As described above, the efficiency and popularity of the automobile in the first decades of this century forced the development of modern highway engineering, design, and construction techniques, both across the United States and within Arizona. In contrast to earlier forms of transportation, the automobile had the

capability to transport people and goods over distances of several hundred miles in hours rather than days; however, poor road conditions limited the automobile's capabilities. The existing rough roads and steep grades, as well as non-existent water crossings, made automobile travel difficult and slow.

Before 1909, county governments took responsibility for road improvements in Arizona. That year, the territorial legislature established the Territorial Road Fund to be supported by property taxes and expended by the new Territorial Engineer. Also in 1909, newly appointed Territorial Engineer J. B. Girand proposed a territorial highway system to connect Arizona's county seats with two highways intersecting in Phoenix. The proposed north-south highway was to connect the Grand Canyon to Douglas, and the proposed east-west highway was to connect Duncan to Yuma (refer to Figure 11). Reconnaissance and survey of the proposed system took advantage of existing pioneer trails and wagon roads to create approximately 1,000 miles of territorial highway. In 1911, the Territorial Engineer improved the first highway mileage by gravel-surfacing the Bisbee-Douglas segment of the Borderland Highway, a road project that applied road oil to stabilize the wearing surface for the first time in Arizona.[6] By the time of statehood, Girand had been able to improve approximately 243 miles of his proposed 1,000-mile system, using standard techniques.

Arizona's first state highway engineer, Lamar Cobb, proposed a system of highways that incorporated the two Territorial highways and added a third highway across northern Arizona, a system adopted by the State Legislature in 1914 (Table 11; Appendix A, Figure A-1). Cobb defined this state highway system to connect Arizona's county seats with major towns and cities across the state. Some of these connections, such as Globe to Phoenix through Queen Creek Canyon and Prescott to Jerome over Mingus Mountain, would require exceptional roadway engineering and design to build roads through treacherous terrain.

As automobile reliability and travel speeds increased, the State Engineer's expanding staff undertook substantial roadway improvement projects, and the enhanced roadway designs and construction methods improved the quality of the state highway system (Table 12). Roadway design and construction of this era included the following:

- conducting surveys to locate roadway alignments and realignments
- improving road surfaces
- defining minimum roadway design standards, including roadway widths of 16 to 26 feet, and grades of no more than 6 percent (with a few exceptions dictated by terrain)
- bridging major rivers and streams
- building engineered drainage structures (culverts) with masonry using local site materials or concrete

Several road construction projects undertaken by the State Engineer in the 1920s required major engineering and design decisions. For example, the design of the new Superior-Globe highway through Queen Creek Canyon required construction of the first road tunnel in Arizona (refer to Figure 16). The new man-made Canyon and Apache lakes behind Mormon Flat and Horse Mesa dams required the realignment of the Apache Trail to higher ground in very rugged terrain. Moving the Yuma-Phoenix

[6] Before the standardization of highway numbering in the mid-1920s, the Territorial and State Engineers sometimes referred to highway segments by their short, private highway names. The official title of this road was the "Yuma-Phoenix-Tucson-Douglas-Rodeo, NM Highway."

TABLE 11 STATE HIGHWAY SYSTEM, 1914		
Highway Name	**Proposed Route***	**Present Day Equivalent**
Santa Fe Highway	Magdalena, NM to Topock, AZ	US 60 to Springerville, US 180 to Holbrook, US 180/I-40 to Flagstaff, I-40 to Seligman, SR 66 (US 66) to Kingman, I-40 to Topock
Borderland Highway	NM State Line to Yuma, AZ	SR 80 to Tombstone, SR 82 to Sonoita, SR 83 to I-10, I-10 to Tucson, SR 77 to Oracle Junction, SR 79 to Florence, Hunt Highway to SR 87, SR 87 to Mesa, US 60 to Phoenix, Old US 80 (I-10) to Buckeye, Antelope-Palomas Rd/Hyder Rd to Noah, I-8 to Yuma
North – South Trunk, Grand Canyon/Nogales Highway	Grand Canyon to Nogales	I-19 to Tucson, SR 77 to Oracle Junction, SR 79 to Florence, Hunt Highway to SR 87, SR 87 to Mesa, US 60 to Phoenix, US 60 to Wickenburg, SR 89 to Prescott, SR 69/169 to Camp Verde, I-17 to Flagstaff, US 180 to Grand Canyon
Roosevelt Dam Highway	Lordsburg, NM to Phoenix via Roosevelt	SR 75 to Clifton, US 191 to Solomonsville, US 70 to Globe, SR 88 to Apache Junction via Roosevelt, US 60 to Phoenix
Source: State Engineer 1914		

Highway from its original location on the north side of the Gila River to the south side required construction of an all-weather crossing of the river at Gillespie Dam.

By the end of 1926, the State Engineer's office completed the federally funded seven percent portion of the state highway system, and added secondary roads. The integrated system of roads served over 95 percent of Arizona's population (refer to Appendix A, Figures A-3.0 to A-3.18).

Arizona Highway Department, 1927-1956

In 1927, the Arizona Highway Department replaced the State Engineer's Office, and the new department aimed to improve the graded highways in the state to a fully paved system. That year,

TABLE 12
HIGHLIGHTS OF ROAD ENGINEERING DESIGN AND CONSTRUCTION, 1909-1956

Date	Highway Segment[1]	Current Highway	Design/Construction Events
1904	Mesa-Roosevelt Road (Apache Trail)	SR 88	Road construction through difficult terrain
1911	Bisbee-Douglas segment of Borderland Highway*	SR 80	Graded, surfaced with gravel; first reported use of road oil to stabilize road surface
1914-1915	Phoenix-Tempe Highway	US 60	First reported use of moisture control during grading to stabilize road surfacing material (caliche conglomerate and decomposed granite)
1915-1916	Phoenix-Tempe Highway and Grand Avenue section of Prescott-Phoenix Highway	US 60	First reported use of asphaltic oil to stabilize road surfacing
1915-1922	Topock to Holbrook	Old US 66 I-40	First reported use of volcanic cinders for surfacing; highway realigned to eliminate 20% grade at Ash Fork Hill; paved through Flagstaff; gravel surfaced Topock to Oatman, Seligman to Holbrook.
1917-1922	Bisbee Douglas segment	US 80	One of first two paved highway segments in Arizona
1917-1921	Geronimo-Solomonsville	US 70	One of first two paved highway segments in Arizona
1917-1922	Comet Peak (Florence Jct.) to New Mexico state line via Superior	US 60 US 70	Construction through difficult terrain; first road tunnel in Arizona (between Superior and Miami); extensive excavation in Queen Creek Canyon between Superior and Miami; highway paved between Miami and Globe
1925	Prescott-Phoenix Highway via Yarnell Hill	US 89	Newly designed highway segment shortens route to Phoenix by 27 miles
1920	Phoenix-Tempe Highway	US 60	First reported use of concrete paving
1920	Tempe-Mesa Highway	US 60	Highway segment reconstructed; first reported use of bitulithic surfacing on concrete
1921	Topock-New Mexico state line, via Flagstaff	Old US 66 I-40	First segment of highway paved through Flagstaff with asphaltic concrete and bitulithic overlay
1924	--	--	State Highway Department initiated road striping to improve safety
1916-1924	Phoenix-Yuma Highway	I-8 Old US 80 SR 85	Major realignment from Yuma to Gila Bend; new crossing of Gila River at Gillespie Dam; paved from Buckeye to Phoenix
1916-1926	Clifton-Springerville Highway	US 180 US 191	First Forest Service highway constructed in Arizona
1932	Oak Creek Canyon Highway	US 89a	Construction through difficult terrain; required massive excavation and fills to reach the top of canyon
1933-1934	Phoenix-Prescott highway	US 89	Major realignment up Yarnell Hill
1934	Topock-Flagstaff and Flagstaff-Gallup Highway	Old US 66 I-40	First use of highway landscaping and beautification by the State Highway Department
1935	Black Canyon Highway	SR 69	Major realignment of county road for more direct route between Phoenix and Prescott; improved and graveled
1931-1936	Globe-Show Low Highway via Salt River Canyon	US 60	Construction through difficult terrain with modern heavy construction equipment and techniques (bulldozers, portable drills, blasting, massive cuts and fills)
1937	State Highway System (primary)	--	All primary state highways now surfaced with pavement or oil
1938	Topock-Flagstaff and Flagstaff-Gallup Highway	Old US 66 I-40	First completely paved national highway and first paved highway in Arizona

TABLE 12
HIGHLIGHTS OF ROAD ENGINEERING DESIGN AND CONSTRUCTION, 1909-1956

Date	Highway Segment[1]	Current Highway	Design/Construction Events
1941	Tucson-Florence Highway "Miracle Mile" segment	US 80	First divided highway interchange in Arizona with landscaped medians constructed in Tucson
1934-1949	Tucson-Mt. Lemmon Highway	Catalina Highway	Road construction through difficult terrain; first graded in 1934; paving completed 1949
1950	Queen Creek and Pinto Creek bridges	US 60	Bridges reflect ADOT's capabilities for designing and aesthetically pleasing and functional structures
mid 1950s	State Highway System (primary)	All	By 1956, all of the primary State Highway System hard-surfaced with asphaltic concrete or concrete pavement

[1] This table incorporates language used in the reports of the Territorial Engineer and the State Engineer. Before the mid-1920s when numbers were first used to designate highways, highway officials sometimes used names in common usage to designate Arizona highways.

just over 200 miles of Arizona highways had been upgraded to either asphalt or concrete paving, while almost 900 miles were surfaced only with gravel. Another 900 miles of the state's highways were only graded or remained unimproved. Less than a decade later, in 1938, over 2,000 miles of Arizona's state highways had been surfaced with asphalt or concrete. By the beginning of World War II in 1941, the entire federally funded portion of the state highway system had been paved, and the state had begun the task of paving secondary state highways. Although major highway construction slowed due to manpower and material shortages during the war years, the state highway department realized the goal of a completely paved state highway system by the mid-1950s (refer to maps included in Appendix A, Figures A-4.0 to A-7.0).

Along with the task of upgrading the surfaces of existing roads, the State Highway Department continued to construct new alignments, sometimes across very difficult terrain. Some of the new roads overcame natural barriers that had prohibited road construction in the past, and required sophisticated engineering. For example, the 1930s alignment of U.S. Highway 60 from Globe to Show Low crossed the formidable Salt River Canyon and climbed the Mogollon Rim. State Highway 79 (later U.S. 89A) bridged Oak Creek in three places and conquered the sheer north face of Oak Creek Canyon. Other new alignments were designed to provide faster, more direct routes. For example, the Phoenix-Prescott road through the difficult terrain of the Black Canyon of central Arizona provided a more direct route between the two cities, but required more modern engineering than the earlier road through Phoenix and up Yarnell Hill. Although the route was first surveyed in 1920, the Black Canyon Road was not paved until the 1950s.

Upgrading road design included more than simply improving the road's surfaces, and by the 1930s, state highway department engineers concerned themselves with widening roads, flattening curves, and adding super-elevation for safety. Also for safety, they added a centerline stripe and guard rails. But up until the mid-1930s, highway engineers

> gave little or no thought to the immediate roadside. We continued using borrow pits, narrow rights of way, [and] permitted the erection of structures so close to the highway that they were an actual menace. We paid little or no attention to the aesthetic value of the roadside. We allowed pole line workers to butcher trees of any and all description at will. We still blasted with reckless abandon through hill and country sides, even in cases where it might have been avoided, and left unsightly, permanent scars of construction in our wake (*Arizona Highways* April 1935:11).

Following the 1934 Bureau of Public Roads directive that every state receiving federal aid should employ a landscape architect or engineer, the State Highway Department employed Fred M. Guirey to take on the task of beautifying the state's highways. Mr. Guirey maintained that the proper terminology should be "roadside improvement" because his projects encompassed improvements to safety, soil conservation, erosion control, and simplification of maintenance, in addition to beautification. Projects focused on:

- rounding cuts
- adding wide shoulders
- filling open borrow pits, and re-seeding them when necessary
- flattening fill slopes, cut slopes and back slopes as much as possible
- building culverts big enough to handle flood waters and prevent gouging and scouring
- saving existing landscaping when possible, and adding trees, shrubs, and cactus
- building roadside parks, rest areas, and viewpoints at scenic vistas

Mr. Guirey described his goal in 1935: "Our ultimate aim is to fuse the road proper into the surrounding terrain in such a way that it will no longer have the appearance of a structure forced through an unwilling natural setting." He also looked to the future when he mentioned his "hopes that some day that Great American institution, the bill board, will disappear" (*Arizona Highways* April 1935:11, 21). The advent of World War II precipitated the dissolution of the landscape division, and Guirey left the highway department in 1942.

The innovative work of the Arizona State Highway Department from 1927 to 1956 produced roads that have endured with few changes to the present. The department transformed the dusty parallel ruts of Territorial roads and highways to modern roads.

WHAT'S LEFT?: THE ARCHAEOLOGY OF ARIZONA ROADS

A property may be eligible for the National Register under Criterion D if it has yielded, or is likely to yield, information important in prehistory or history. Schlereth (1997) has promoted an approach to "reading" the history of roads through what he calls "above-ground archaeology." This strategy involves consideration of the typology of roads, bridges, and cross-drainage structures, signs, place names, and roadside artifacts and architecture, with an occasional peek beneath the surface in "mini-archaeological excavations" (potholes), or more standard archaeological excavations.

Historic records, plans, and maps provide substantial documentation about the characteristics of some roads. Archaeological recording can be used to verify and supplement such records by providing information about characteristics of roadways and associated features (such as bridges, culverts, and retaining walls), regardless of whether the road is abandoned and in ruins or still in use. The potential for archaeological investigation of roadside architecture has been previously recognized in an earlier historic context (Rodda 1992). The archaeological record of road building in Arizona also includes remnants of temporary camps built to house construction workers. In the 1920s, both contractors and state-supervised teams of convicts lived at these camps. Later, the state highway department built road maintenance facilities at strategic points along the highway.

For an Arizona road to achieve significance under Criterion D, study of the road itself, or artifacts and features associated with the period of significance must have potential to yield important information not available in historic records.

CHAPTER 5
ON THE ROAD: FIVE CASE STUDIES

To broaden perspectives for addressing the challenges of evaluating the historic significance of roads, field reconnaissance was conducted along five road segments selected as a sample of different types of roads around the state (Figure 22). This chapter discusses issues related to evaluating the historic significance and integrity of those five case studies.

BEALE WAGON ROAD

The first roads constructed in territorial Arizona were the work of military surveyors and laborers. Long segments of those wagon roads were little more than marked trails, and such primitive roads are not directly related to the territorial and state highway system that became the focus of this overview as it evolved. Nevertheless, the Beale Wagon Road was field inspected as an example of a military wagon road to provide perspective on the later highway system. The reconnaissance focused on segments of the road in the vicinity of Kingman (Figures 23 through 26). Segments of the road in the Kingman area this area had been previously recorded as site AZ G:13:1 (ARS) (Curtis and Stone 1989) and site AZ F:16:38 (ASM) (Crary 1994).

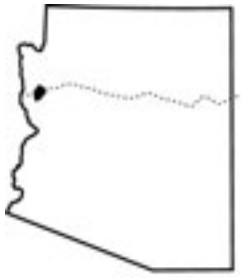
Historic Significance

The Beale Wagon Road is associated with the context of Military Wagon Roads in Arizona from 1846 to 1909, as well as with a historically important person, Lt. Edward Beale (Thompson 1983). Lt. Beale and his troop of soldiers surveyed and constructed a 1,000-mile road from Fort Smith, Arkansas to the Colorado River between 1857 and 1859. The Beale Wagon Road became a popular immigrant trail during the 1860s and 1870s, until the coming of the transcontinental railroad across northern Arizona in the 1880s. During the twentieth century, the National Old Trails Highway, the National Park to Park Highway, U.S. Highway 66, and Interstate 40 have all followed the general corridor of Beale's road built for wagons.

Historic Integrity

After almost a century and a half, some segments of the original Beale Wagon Road remain intact and are visually distinctive. Such segments of the road on the Kaibab National Forest are designated as a historic recreational trail (Cleland 1989). Other segments have been identified on the Petrified Forest National Park (Chappel 1976), and other recognizable segments are known only to trail buffs and historians (Smith nd, 1984, 1991). Parts of the road have been completely obliterated.

Those segments of the Beale Wagon Road that can be firmly identified as part of the original road possesses integrity of **association** with the context of military wagon roads in territorial Arizona. The wagon road retains integrity of **location** where it is distinguishable in a single alignment (that is, where it did not experience the generations of multiple alignments that some automobile roads along the same general route have experienced.) The road retains integrity of **setting** along the rural portions of its length where modern features such as transmission lines and nearby paved roads are not obviously intrusive. The **design, materials,** and **workmanship** of a wagon road are modest, consisting primarily of a route that takes advantage of easy topography and clearing of vegetation and rocks from a narrow path, with



Beale Wagon Road
Example of mid-nineteenth-century wagon road.

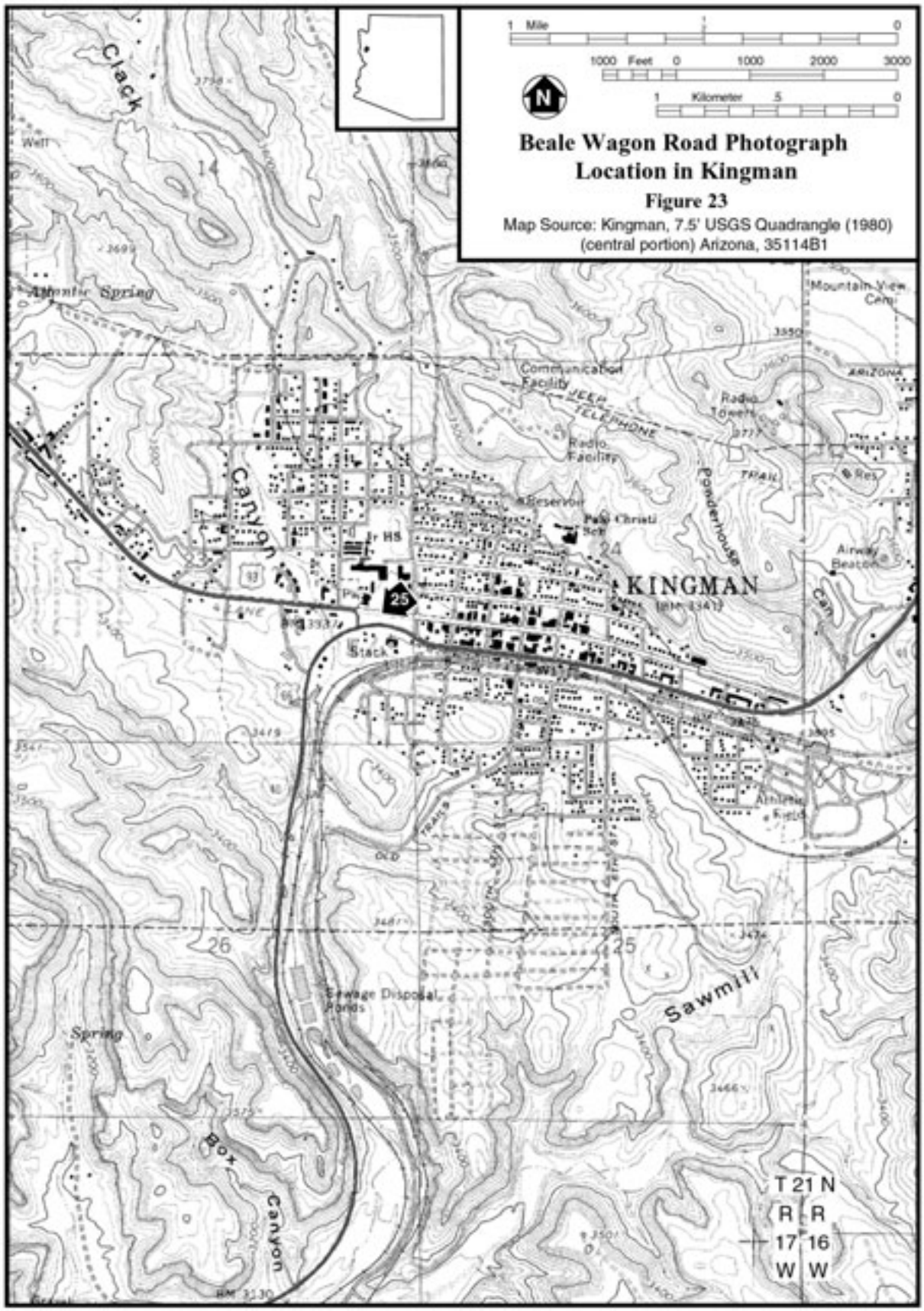
State Highway 88 - Apache Trail
Early twentieth-century wagon road for constructing Roosevelt Dam, and 1920s state highway system designated as part of both.

Old US 60 (from Superior to Calypool Tunnel)
Segment of early highway abandoned by mid-twentieth-century improvements.

Old State Highway 73
1920s state highway mostly converted to Indian Roads.

Old State Highway 79
1920s-1930s state highway that has been renumbered and upgraded but remains in use.

Figure 22. Roads Selected for Field Review


1 Mile 1 0
1000 Feet 0 1000 2000 3000
1 Kilometer .5 0
N
Beale Wagon Road Photograph
Location in Kingman
Figure 23
Map Source: Kingman, 7.5' USGS Quadrangle (1980)
(central portion) Arizona, 35114B1
Clack
Canyon
Well
Spring
Communication Facility
JEEP TELEPHONE
Radio Towers
Radio Facility
Reservoir
Pala Christi Sch
Jr HS
KINGMAN
Stack
Powerhouse
Mountain View Cem
Airway Beacon
Athletic Field
Sewage Disposal Ponds
Sawmill
Box Canyon
T 21 N
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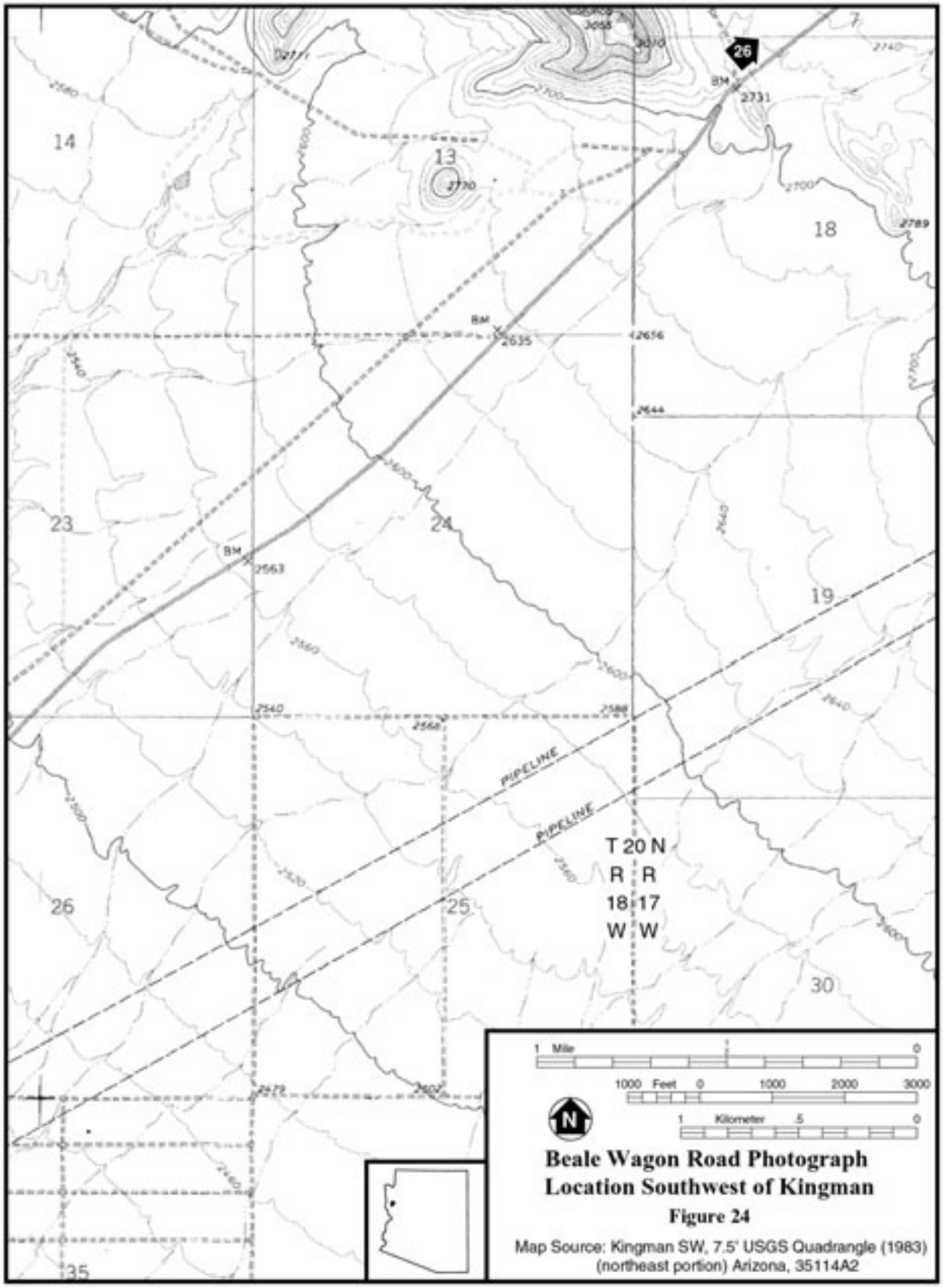
26
BM
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14
13
2770
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BM
2635
2656
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23
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19
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PIPELINE
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26
25
30
35
1 Mile
0
1000 Feet
0
1000
2000
3000
N
1 Kilometer
.5
0
Beale Wagon Road Photograph
Location Southwest of Kingman
Figure 24
Map Source: Kingman SW, 7.5' USGS Quadrangle (1983)
(northeast portion) Arizona, 35114A2

Figure 25. Segment of the Beale Wagon Road that Has Lost Integrity

Although this segment of the Beale Road across a field near Kingman High School retains integrity of association and location, it has lost integrity of setting because it appears to be simply a short cut across a field. It has also lost integrity of design, materials, and workmanship because it does not convey the work of Beale's construction crew.

Figure 26. Segment of the Beale Wagon Road

This segment of the Beale Wagon Road located in the desert plain west of Kingman retains integrity of association, location, and setting. It also retains integrity of design, materials, and workmanship because the work of Beale's crew can clearly be seen (in the field, if not in this photograph) in the path created by the removal of rocks from the roadbed to the side of the road. The segment is sufficiently long to convey the feeling of a primitive wagon road.

occasional cuts and fills and perhaps some retaining walls of stacked rocks. Segments that have been upgraded into automobile roads, overlain by new roads, or degraded into simple dirt roads with no remaining evidence of Beale's work have lost integrity of design, materials, and workmanship. Evaluating the integrity of **feeling** of a road is highly dependent on specific situations but would be related to factors such as the environmental setting, length of the intact roadway in relation to viewsheds, and ability to convey a sense of what traveling down the original road would have been like.

Earlier recorders of segments of the Beale Wagon Road evaluated them as eligible for the National Register under Criterion A where the identification was supported by historic documentation and traits of a simple wagon road remained intact. The reconnaissance supported that evaluation where sections of the Beale Wagon Road retain integrity of location, setting, and design, and are sufficiently long to retain integrity of feeling. Such segments also could be considered eligible under Criterion B because of the association with Lt. Edward Beale, under Criterion C because surviving examples of this type of road are uncommon, and Criterion D because there are no construction plans or as-built drawings of such roads. Such segments would be significant at the state level, and perhaps even at the national level because this road was important throughout the southwestern region of the United States.

APACHE TRAIL, STATE HIGHWAY 88 FROM TORTILLA FLAT TO ROOSEVELT DAM

Built for wagons in 1904 and improved for automobile travel in the 1920s, the Apache Trail connects Roosevelt Dam with the Phoenix metropolitan area. Just east of the tourist attraction of Tortilla Flats, the unpaved road provides a thrilling ride through rugged canyons. The field reconnaissance focused on this section of the trail (Figures 27, 28, and 29), which has been previously recorded as AZ U:7:2 (ASM) and AR-03-218 (FS) and listed on the Arizona State Register (Barz 1995).

Historic Significance

The Apache Trail can be directly associated with an important historical event in the history of Arizona—the construction of Roosevelt Dam, which had been designated as a National Historic Landmark until it was modified and made larger in the 1990s. The Apache Trail was built in 1904 to provide access for wagons hauling supplies, equipment, and workers to the Roosevelt Dam construction site. First known as the Roosevelt Road or Mesa-Roosevelt Roadway, the dirt road acquired the moniker "Apache Trail" from a publicist at the Southern Pacific Railroad seeking to add a bit of Western romance to the sightseeing trip to the dam (Otis 1996:23). However, the name is appropriate because Apaches working as laborers for the U.S. Reclamation Service did much of the challenging work of the building the road through rugged terrain. When the dam was completed in 1911, the route became a favorite adventure trip for Arizonans, and it was included in the route of the Ocean-to-Ocean Highway until the completion of the Superior-Miami highway in 1922. The Apache Trail was also a part of the east-west Territorial Highway, from Phoenix to Globe and Solomonville.

After passage of federal highway standards in the Federal Highway Act of 1921, the steep grades and tight curves of the Apache Trail disqualified it from becoming part of the 7 percent system of federally funded roads. Thus, the Arizona State Highway Department had to finance the rerouting and upgrading of sections of the original road when they were inundated after additional dams were built along the Salt River in the early 1920s. The Arizona State Highway Department also built seven new bridges along the Apache Trail between 1920 and 1925. All of these bridges continue to serve traffic today, and pony trusses across Lewis and Pranty Creek and Fish Creek, the Mormon Flat and Boulder Creek trusses, and the Pine Creek and Alchesay Canyon filled spandrel concrete bridges were included in the National Register listing of Vehicular Bridges of Arizona (Fraserdesign 1987).

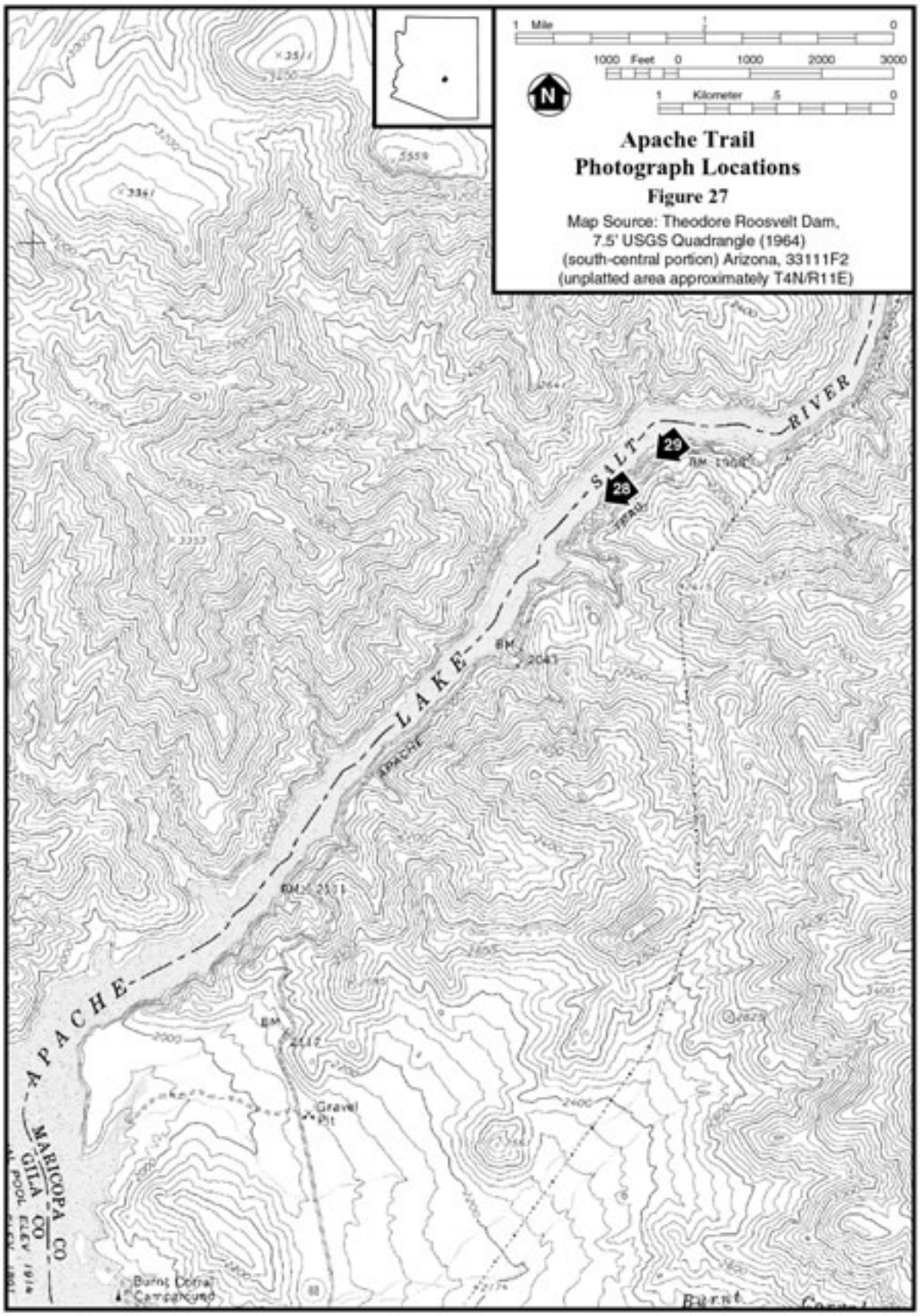

1 Mile 0
1000 Feet 0 1000 2000 3000
1 Kilometer .5 0
N
Apache Trail
Photograph Locations
Figure 27
Map Source: Theodore Roosvelt Dam,
7.5' USGS Quadrangle (1964)
(south-central portion) Arizona, 33111F2
(unplatted area approximately T4N/R11E)
SALT RIVER
LAKE
APACHE
29
28
Gravel Pit
MARICOPA CO
GILA CO

Figure 28. Segment of the Apache Trail
This segment of the road about two miles west of Roosevelt Dam retains integrity of association, location, setting, design, materials, and workmanship, and is sufficiently long to convey the feeling of a 1920s unpaved highway.

Figure 29. Segment of the Apache Trail
This segment of the Apache Trail about one mile west of Roosevelt Dam retains integrity of association, location, and setting of the 1920s state highway built as a realignment of the original 1904 road, which was inundated by the rising waters of Apache Lake after completion of Horse Mesa Dam. The road also retains integrity of design, materials, and workmanship, and is sufficiently long to convey the feeling of a 1920s highway.

The entire 78.6 miles of State Route 88, from Apache Junction to the junction with U.S. Highway 70 near Globe, was approved as part of the state highway system on September 9, 1927. A 1930s description of the road still applies. "This entire route runs through mountains and, though the road is well maintained and not dangerous to drive, it contains many hairpin curves and has several points where the depth of the canyons below and the sheerness of their walls are terrifying" (Federal Writers Project 1989:364). The significance of the Apache Trail derives from it being one of the few examples of an in-use road through extremely rugged terrain that retains historic characteristics that distinguish it from roads built with federal funding.

Historic Integrity

The unpaved portion of State Highway 88 from just east of Tortilla Flats to Roosevelt Dam possesses integrity of **association** with the construction of Roosevelt Dam, the east-west Territorial Highway, and the first state highways in the 1920s. Much of the road retains integrity of **location** only with reference to its period of significance as a state highway in the 1920s because portions of the original road were re-located when the Mormon Flat and Horse Mesa dams created lakes on the Salt River below Roosevelt Dam. Thus, parts of the road have lost integrity of location with respect to the 1904 wagon road to Roosevelt Dam and the east-west Territorial Highway. The road retains integrity of **setting** along the rural portions of its length. Integrity of **design, materials,** and **workmanship** has been retained in most of the graded unpaved portion and the bridges located on the road east of Tortilla Flats to Roosevelt Dam. The last several hundred yards of the road approaching the newly enlarged Roosevelt Dam, however, have been upgraded with new guard walls, and therefore have lost integrity of **design**. The reconnaissance indicated that most of the unpaved road east of Tortilla Flat to the dam consists of road segments sufficiently long to retain integrity of **feeling**, and are recommended as eligible for the National Register under Criterion A at the state level of significance in the context of the state highway system from 1912 to 1939.

ABANDONED SEGMENT OF U.S. HIGHWAY 60, SUPERIOR TO CLAYPOOL TUNNEL

As highways are modernized, the upgrading process often abandons segments of earlier roads. A segment of U.S. Highway 60 east of Superior to the Claypool Tunnel is an example of one of these abandoned roads (Figures 30 through 35). Segments of U.S. Highway 60 have been recorded in numerous places across the state and been assigned approximately a dozen numbers in the Arizona State Museum survey system. For example, abandoned segments of the highway that have been replaced by realignments east of Superior have been designated as site AZ U:12:87 (ASM) and evaluated as eligible for the National Register under Criteria A and D (Stone 1995; also see Hathaway and Kwiatkowski 1993, and Lite 1994). To the west of Superior, six abandoned segments of U.S. Highway 60 replaced by realignments were designated as site AZ U:12:57 (ASM) and evaluated as National Register-eligible under Criterion D, but no further documentation beyond that recorded during the survey was recommended (Hathaway 1991). Farther west between Florence Junction and Apache Junction, U.S. Highway 60 was recorded as site AZ U:11:70 (ASM), and was evaluated as ineligible for the National Register because the original roadway had been substantially upgraded (Bilsbarrow 1995).

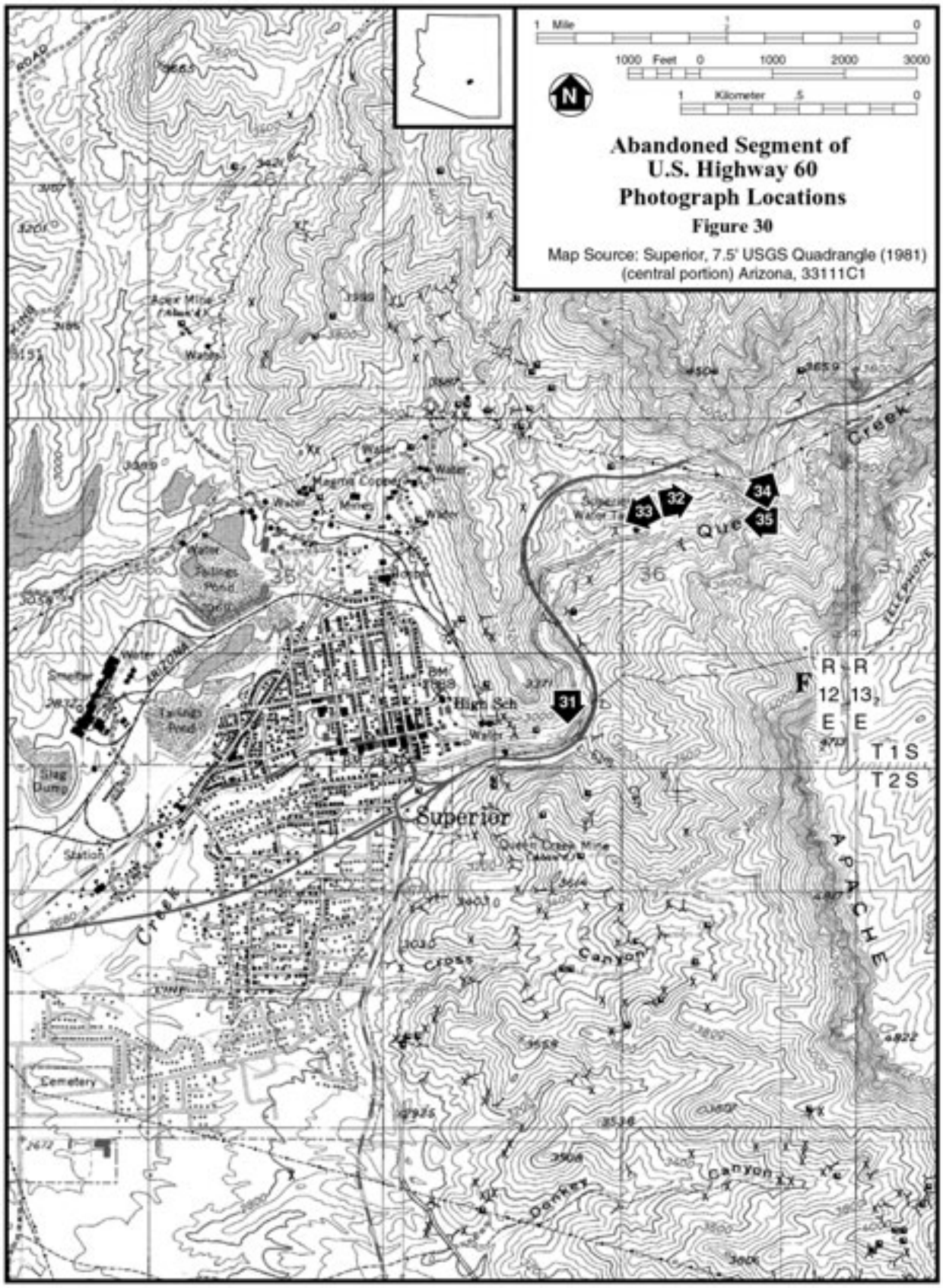

1 Mile 1 0
1000 Feet 0 1000 2000 3000
1 Kilometer .5 0
N
Abandoned Segment of
U.S. Highway 60
Photograph Locations
Figure 30
Map Source: Superior, 7.5' USGS Quadrangle (1981)
(central portion) Arizona, 33111C1
31
32
33
34
35
Superior
Queen Creek
Devil Canyon
Boyce Thompson Arboretum
R 12 E
R 13 E
T1S
T2S
APACHE

Figure 31. Abandoned Segment of U.S. Highway 60

Sufficiently long to convey the feeling of a historic road, this abandoned segment of U.S. Highway 60 east of Superior retains integrity of association and location, and despite some erosion of the road surface, it has retained considerable integrity of design, materials, and workmanship Although the topographically higher replacement roadway intrudes into the setting of the original road, the replacement road is now a half-century old and comparison of the two roadways illustrates historic aspects of the evolution of road design.

Figure 32. Abandoned Segment of U.S. Highway 60

This abandoned segment of U.S. Highway 60 below the 1952 Queen Creek Tunnel retains integrity of association, location, design, materials, and workmanship, and is sufficiently long to convey the feeling of a 1920s highway.

Figure 33. Abandoned Segment of U.S. Highway 60

This segment of the old highway retains integrity of association, location, setting, design, materials, and workmanship, and is sufficiently long to convey the feeling of a historic road.

Figure 34. Abandoned Segment of U.S. Highway 60

This segment of the old highway just east of the Claypool Tunnel retains integrity of association, location, and setting. The limited erosion of the road surface has not substantially affected the integrity of design, materials, and workmanship, and the segment is sufficiently long to convey the feeling of a historic road.

Figure 35. Claypool Tunnel along Abandoned Segment of U.S. Highway 60
Built in the early 1920s, the Claypool Tunnel on Old U.S. Highway 60 retains integrity of association, location, and setting. It also retains integrity of design, materials, and workmanship, and feeling of outstanding road engineering. (This view is looking through the tunnel to the west; refer to Figure 16 for a historic photograph of a westward view through the tunnel).

Historic Significance

A 1912 map of Arizona depicts a wagon road from Superior east to the Silver King mine, and a similar road west from Miami to Bellevue. However, the rugged terrain of Queen Creek Canyon between these roads thwarted construction of all but the crudest and little used wagon road that did not warrant depiction on the map. Superior and Miami were not effectively connected until Arizona's second largest federal-aid project built a highway through the canyon in the early 1920s (refer to Table 5). The route through Queen Creek Canyon required constructing a bridge over Queen Creek and blasting of Claypool Tunnel. A contemporary account described the road through the red rock canyon: "The road chiseled in sheer rock walls winds down through a narrow gorge bordered with spires, balanced rocks, and formations that appear fantastic even in the light of day" (Federal Writers Project 1989:348).

The Queen Creek Canyon section of the highway was re-routed in the late 1940s and early 1950s. The 1921 bridge was replaced in 1949, and in 1952 the Queen Creek Tunnel replaced the old Claypool Tunnel. The 1921 open spandrel concrete arch bridge across Queen Creek was included in the National Register listing of Vehicular Bridges of Arizona (Fraserdesign 1987).

Historic Integrity

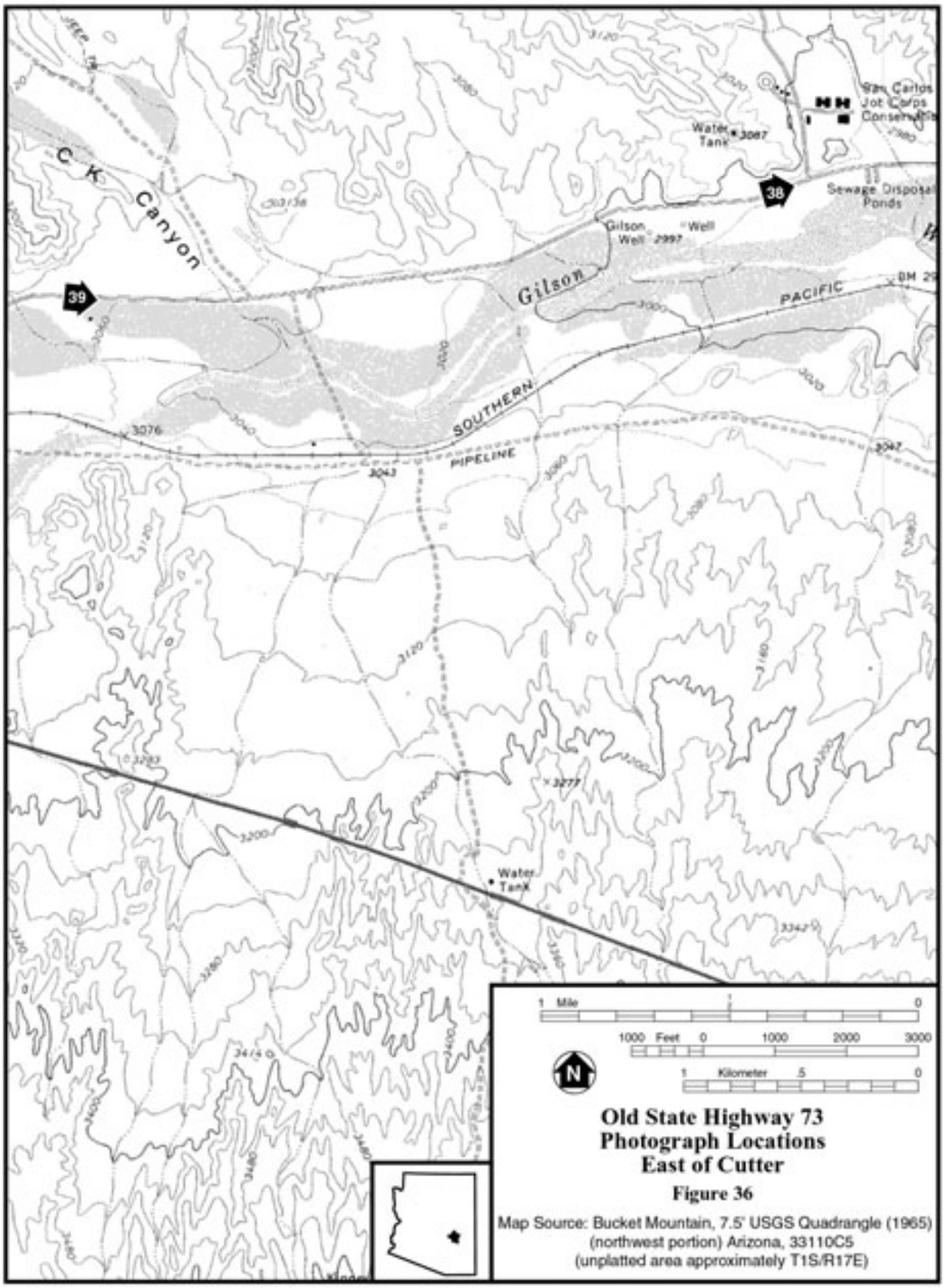
The abandoned segment of U.S. Highway 60 east of Superior remains intact, although the 3-inch-thick, pebbly asphalt is eroded in some locations. This abandoned segment is closed at either end with gates marking it as "private property." Although closed to vehicular traffic, this segment can be hiked for about a mile from Superior east across the 1921 bridge (and under the 1949 bridge), through the Claypool Tunnel, and to the junction with the modern U.S. Highway 60 just east of the Queen Creek Tunnel.

This abandoned portion of U.S. Highway 60 retains integrity of **association** and **location** as one of Arizona's most important federally funded, state highway system projects of the 1920s, and as an outstanding example of road engineering. At some places, views of the new highway intrude into the **setting** of the abandoned segment, but the newer road now is 50 years old, as well, and the contrast illustrates aspects of the evolution of road engineering. Integrity of **design, materials,** and **workmanship** has been retained in most portions of the road, although erosion of the road surface as it joins U.S. Highway 60 at the eastern end of the Queen Creek Tunnel has affected the integrity of materials and workmanship.

This approximately 1-mile-long abandoned section of U.S. Highway 60 also is sufficiently long to retain integrity of **feeling,** and is recommended as eligible for the National Register under Criterion A at the state level of significance in the contexts of the state highway system from 1912 to 1939, and federal aid projects from 1917 to 1933. The road also is recommended eligible under Criterion C at the state level of significance in the context of outstanding road engineering from 1912 to 1956.

OLD STATE HIGHWAY 73

In the continual process of upgrading the state's highway system, some of Arizona's earliest highways have been eliminated from the state system and now serve as county or local roads. Old State Highway 73 is an example of one of these early state highways that has been mostly converted to Indian Routes. The reconnaissance focused on segments of Old State Highway 73 in the general vicinity of San Carlos (Figures 36 through 41).


C K Canyon
Gilson
PACIFIC
SOUTHERN
PIPELINE
Water Tank
Gilson Well
Well
Sewage Disposal Ponds
38
39
3076
3277
1 Mile
1000 Feet 0 1000 2000 3000
1 Kilometer .5 0
N
Old State Highway 73
Photograph Locations
East of Cutter
Figure 36
Map Source: Bucket Mountain, 7.5' USGS Quadrangle (1965)
(northwest portion) Arizona, 33110C5
(unplatted area approximately T1S/R17E)

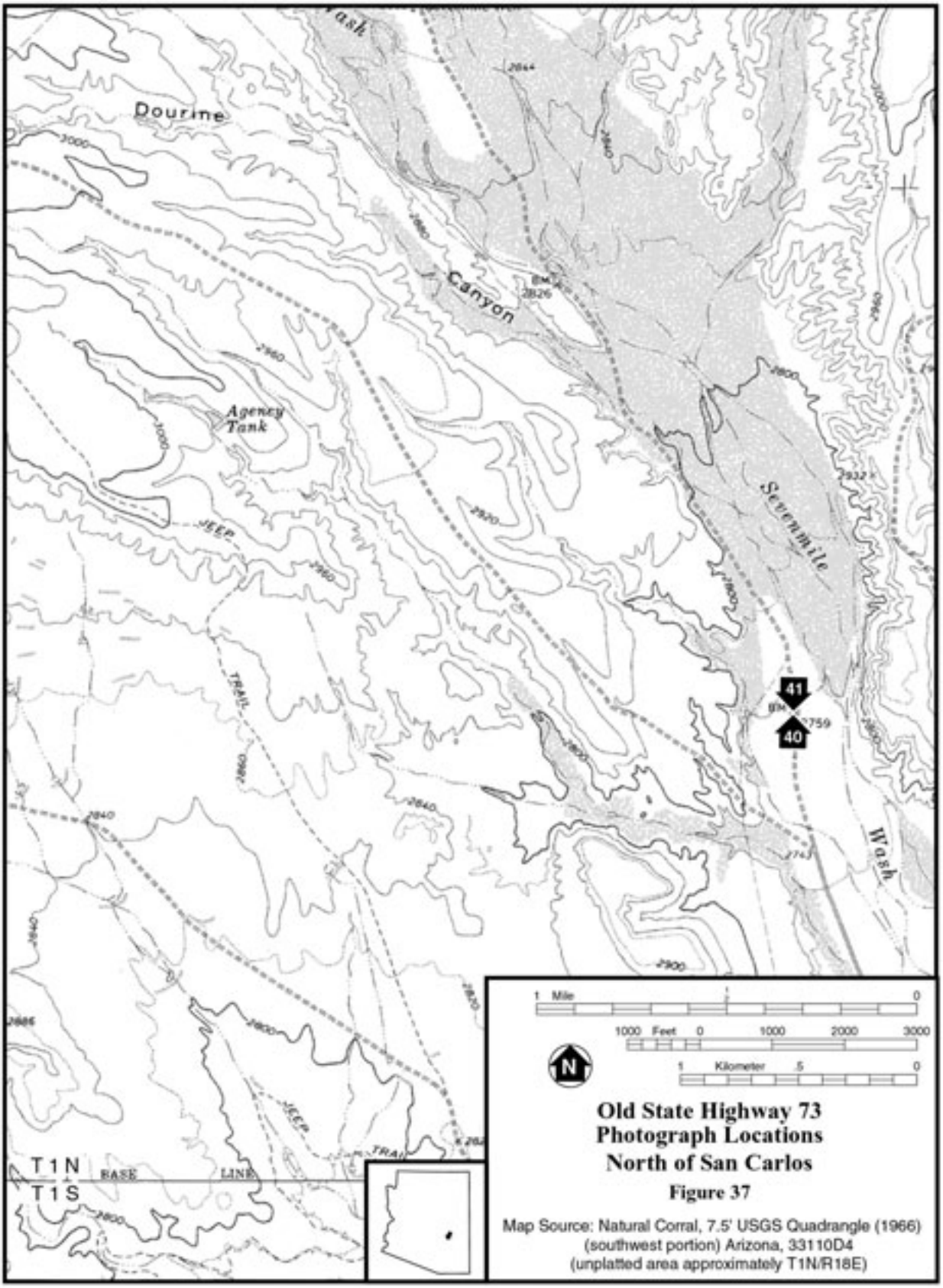

Dourine
Canyon
Agency Tank
Sevenmile
Wash
41
40
759
JEEP
TRAIL
T1N
T1S
BASE LINE
1 Mile 0
1000 Feet 0 1000 2000 3000
1 Kilometer .5 0
N
Old State Highway 73
Photograph Locations
North of San Carlos
Figure 37
Map Source: Natural Corral, 7.5' USGS Quadrangle (1966)
(southwest portion) Arizona, 33110D4
(unplatted area approximately T1N/R18E)

Figure 38. Segment of Old State Highway 73

Although this segment of Old State Highway 73 (now Indian Route 6 between Cutter and San Carlos) retains integrity of association and location as a 1920s state highway, it has lost integrity of design and workmanship at this location because it has been paved and widened to accommodate the left-turn lane into the junior high school.

Figure 39. Segment of Old State Highway 73

This segment of Old State Highway 73 (now Indian Route 6 between Cutter and San Carlos) would have been unpaved when it was part of the 1920s state highway system. Although this segment retains integrity of association, location, and setting, the paving has compromised its integrity of design, materials, and feeling.

Figure 40. Segment of Old State Highway 73
Old State Highway 73 (now Indian Route 10) north of San Carlos remains an unpaved road, and retains integrity of association, location, setting, design, materials, workmanship, and feeling of a 1920s highway (view north).

Figure 41. Segment of Old State Highway 73
Old State Highway 73 (now Indian Route 10) north of San Carlos remains an unpaved road, and retains integrity of association, location, setting, design, materials, workmanship, and feeling of a 1920s highway (view south).

Historic Significance

Old State Highway 73 can be considered in two sections. The first section, which originally connected Cutter and Rice, is now Indian Route 6 between Cutter and San Carlos.[1] The second section, which originally connected Rice and Cooley, is now a combination of Indian Routes 10, 4, and 9, as well as new State Route 73 between San Carlos and McNary.[2] The entire 89.1-mile route from Cutter to McNary was approved as one of the first nine state highways on September 9, 1927 and therefore is associated with the context of the state highway system from 1912 to 1939.

The section from Cutter to Rice was included in the proposed route of the east-west Territorial Highway and part of the Lee Highway. This segment was improved with federal funds as a part of Federal Aid Project No. 15, which upgraded the highway from Globe to Geronimo prior to July 1, 1924, and therefore this section of Old State Highway 73 is related to the context of federal aid projects from 1917 to 1933. By 1927, U.S. Highway 70 bypassed this segment.

The section from Rice to Cooley (San Carlos to McNary) was included in both the Ocean-to-Ocean and Atlantic-Pacific transcontinental highways in the mid-1920s. One of the earliest improved roads in the Arizona Territory, the 80-mile segment from Fort Apache about 20 miles south of McNary to the railhead at Rice, was built in the 1890s by Indian laborers under military supervision.

In 1899, soldiers from Fort Apache built a timber bridge along the route to span the White River.[3] In 1911, the Territorial Legislature funded a wooden bridge supported by concrete piers (designed by Territorial Engineer J. B. Girand) across the Black River along the same route between Fort Apache and Rice. When the Arizona State Highway Department improved the route for automobile traffic in the 1920s, the wooden bridge across the Black River was replaced by a steel structure in 1929, with support provided by the same concrete piers (Fraserdesign 1987). This bridge was included in the National Register listing of Vehicular Bridges of Arizona.

The life of State Highway 73 as the main road between Globe and the White Mountains towns of McNary, Pinetop, and Show Low was short-lived. As early as 1930, the Arizona State Highway Department began planning an alternate route to follow lower elevations less subject to the whims of winter storms. The new route was designated U.S. Highway 60 when it became part of the state highway system on June 28, 1935.

Today, the section of Old State Highway 73 designated as Indian Route 6 follows the old route from Cutter to San Carlos. Another section, designated Indian Routes 10, 4, and 9 travels north from San Carlos to Sawmill Tank, and then northeast to the junction with the current State Route 73 halfway between Fort Apache and Cedar Creek. The new State Route 73 then follows the 1920s route of Old State Highway 73 east to Fort Apache and Whiteriver, and northeast to McNary.

[1]When it was anticipated that the new Coolidge Dam would inundate the settlement of San Carlos, the headquarters of the San Carlos Indian Reservation were moved to Rice (the location of the Indian school), and the name of Rice was changed to San Carlos in 1931.

[2]McNary is also a new name for an old town. In 1925, the McNary Lumber Company of Louisiana bought an existing sawmill in the town of Cooley, and changed the name of the town. The settlement of Cooley had been named for the Arizona pioneer Corydon E. Cooley, who served as a scout for General Crook and settled on a ranch in the area with his Apache wife in the 1870s.

[3]When that bridge washed out in 1916, the Army replaced it with the state's last known covered wooden bridge, which was replaced in 1934 by a steel bridge.

Historic Integrity

Integrity as a nineteenth-century military wagon road has been lost along the entire length of Old State Highway 73. Despite the change in numerical designation, Old State Highway 73 retains integrity of **association** as one of Arizona's first state highways. As a whole, the road appears to retain integrity of **location** although it would be necessary to compare historical maps and detailed as-built drawings to confirm the integrity of location of specific segments of the highway. The road also retains integrity of **setting** along the rural portions of its length. Integrity of **design, materials,** and **workmanship** as an early state highway have been compromised from Cutter to San Carlos (Indian Route 6) because the road has been paved. Portions of the graded, unpaved road (Indian Routes, 10, 4 and 9) between San Carlos and the junction with today's State Route 73 retain integrity of design, materials and workmanship of an early state highway, and are sufficiently long to retain integrity of **feeling.**

Are segments of Old State Highway 73 worthy of preservation and therefore eligible for the National Register? In contrast to the Beale Wagon Road, which is a rare, well-preserved example of nineteenth-century road construction for animal drawn conveyances, Old State Highway 73 is a common type of motor vehicle road. Unlike the Apache Trail, Old State Highway 73 retains no obvious primitive aspects of early twentieth-century road construction through challenging terrain, nor does it display characteristics of outstanding engineering through rough terrain like Old U.S. Highway 60. Old State highway 73 is essentially indistinguishable from probably thousands of miles of similar graded two-lane roads throughout the state. A more in-depth evaluation should consider related historic properties, comparison with similar roads related to the relevant historic contexts, and local sentiment about the historic values of the road.

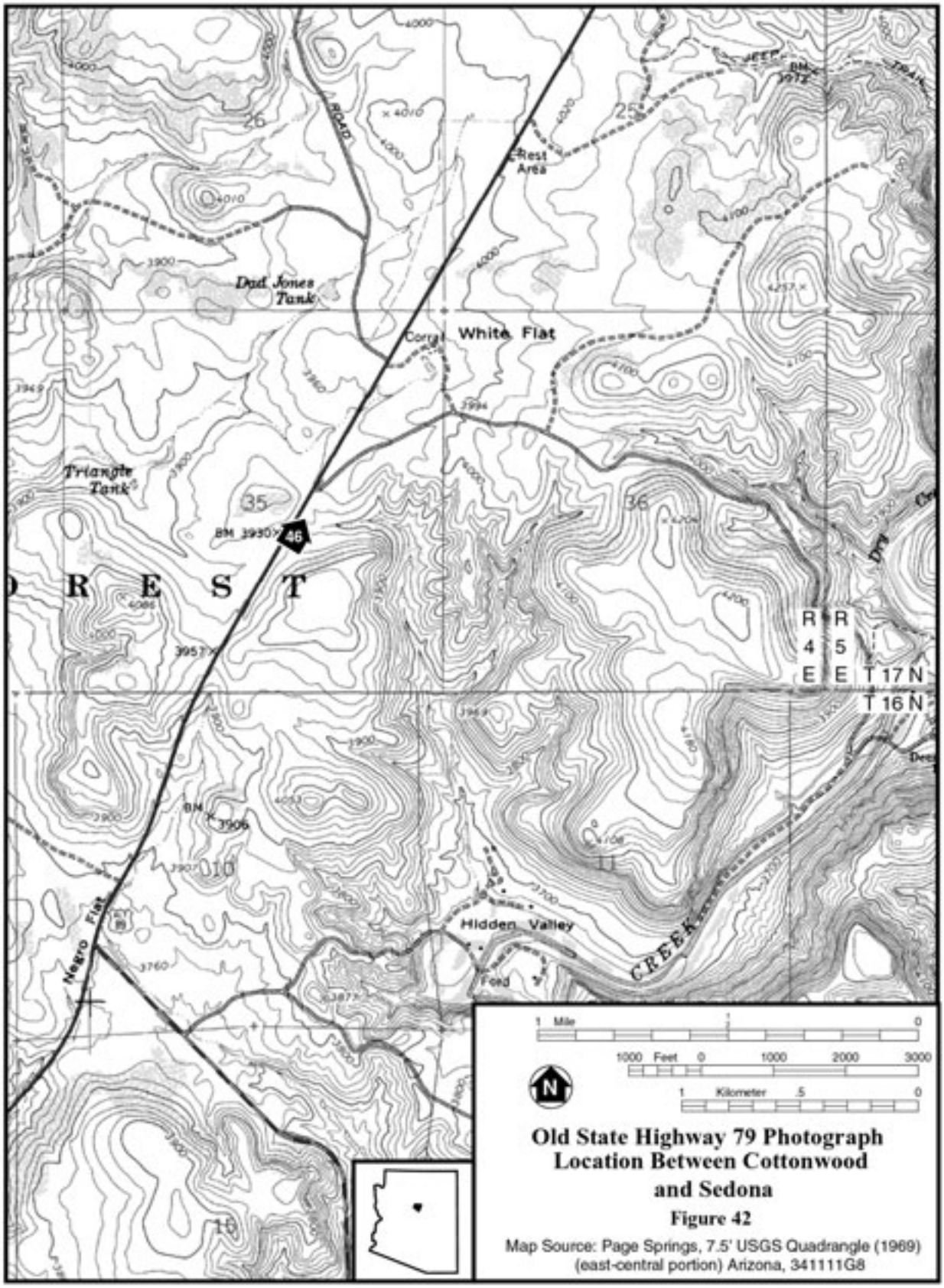
OLD STATE HIGHWAY 79 FROM COTTONWOOD TO FLAGSTAFF

Some of Arizona's early highways continue to serve as important traffic corridors. An example of a state highway that has been used continually since its 1920s-1930s construction as State Highway 79 is known today as State Route 89A. This road branches off U.S. Highway 89 just north of Prescott and continues east over Mingus Mountain to Jerome, across the Verde Valley to Sedona, and through Oak Creek Canyon to Flagstaff. The reconnaissance focused on the segment in the vicinity of Sedona and through Oak Creek Canyon (Figures 42 through 49).

Historic Significance

Old State Highway 79 is related to the contexts of the state highway system from 1912 to 1939, and federal aid projects from 1917 to 1933. At least one portion of State Highway 79 was improved in 1935, and also relates to the context of Depression-era road projects from 1934 to 1939. A portion of Old State Highway 79 also relates to the theme of outstanding engineering.

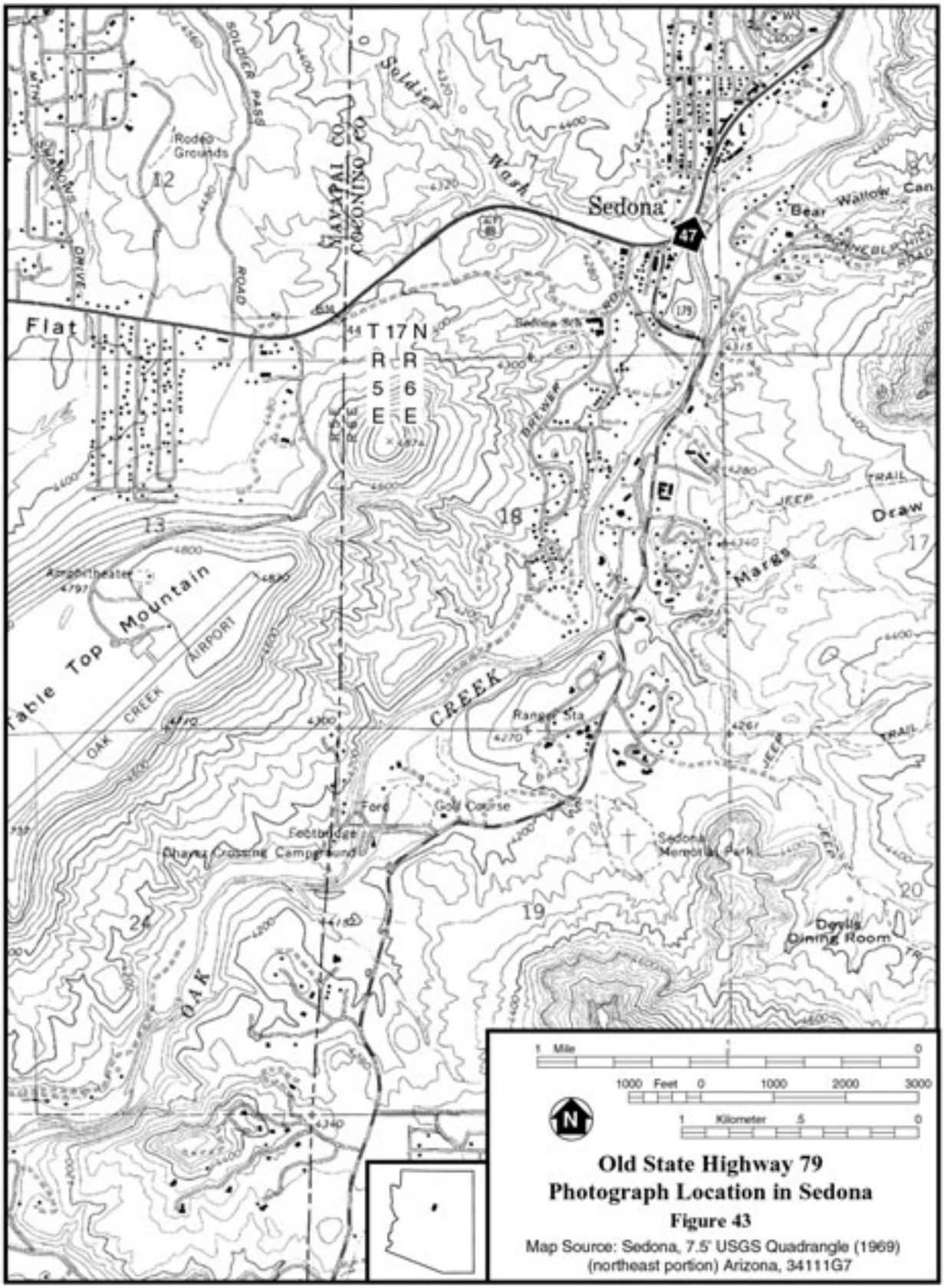
As proposed in 1909, the north-south Territorial Highway headed east from Prescott to Camp Verde along an existing dirt two-track road, and the proposed route remained unchanged through 1916 (Arizona Good Roads Association 1913:21; Arizona State Engineer 1916:22). By the early 1920s, the actual route of State Highway 79 differed from the earlier route, and branched from U.S. Highway 89 north of Prescott, climbed over Mingus Mountain, and terminated in the copper centers of Jerome and Clarkdale. This 25.7-mile segment from Prescott to Jerome was the first portion of State Highway 79 to be built, and was completed by 1927. The utilization of more than $280,000 of federal highway construction money under several federal aid projects (Nos. 12, 17, 19 A-B, and 36 A-B), relates this segment to the context of

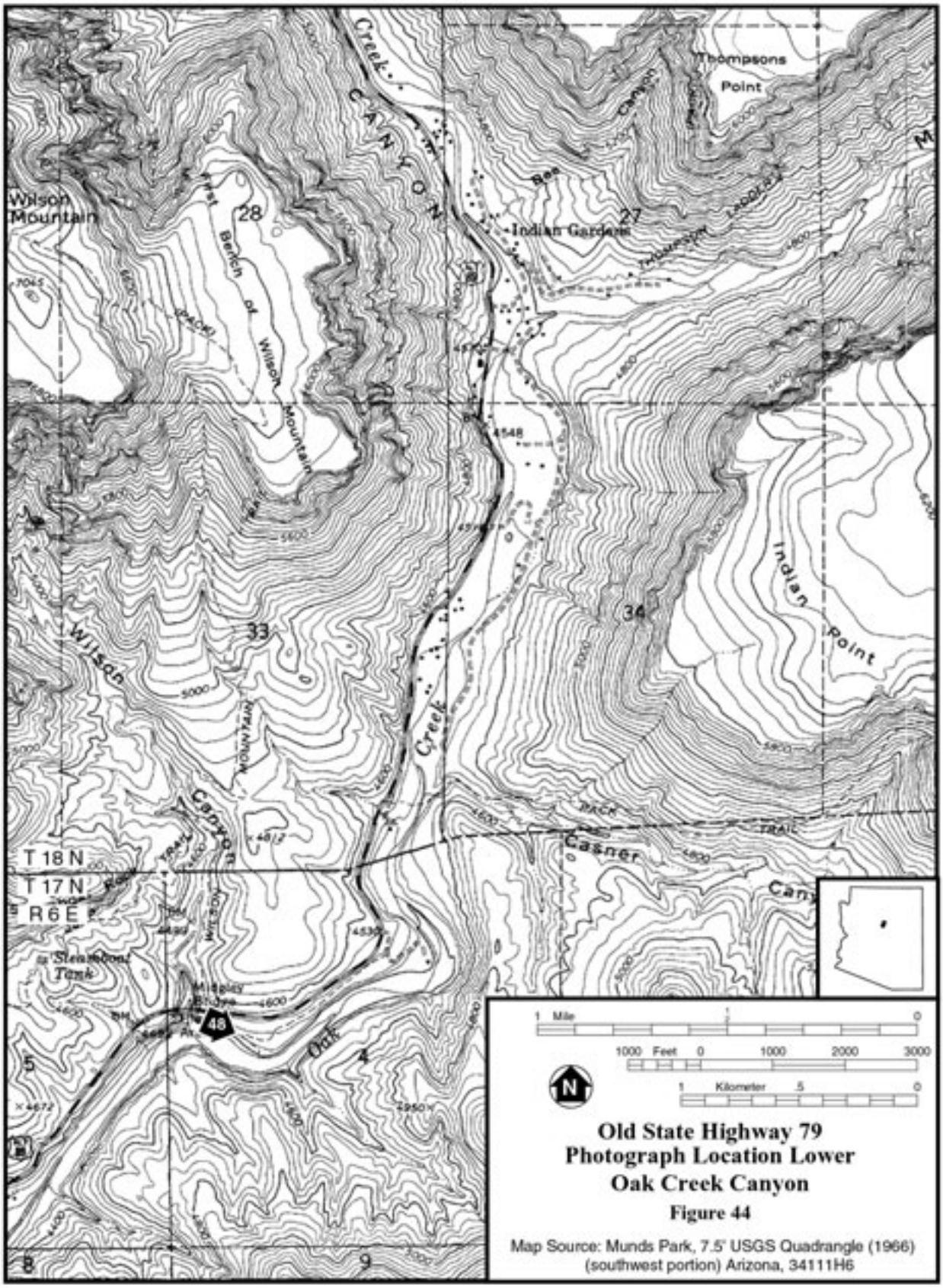


Old State Highway 79 Photograph Location Between Cottonwood and Sedona

Figure 42

Map Source: Page Springs, 7.5' USGS Quadrangle (1969) (east-central portion) Arizona, 341111G8

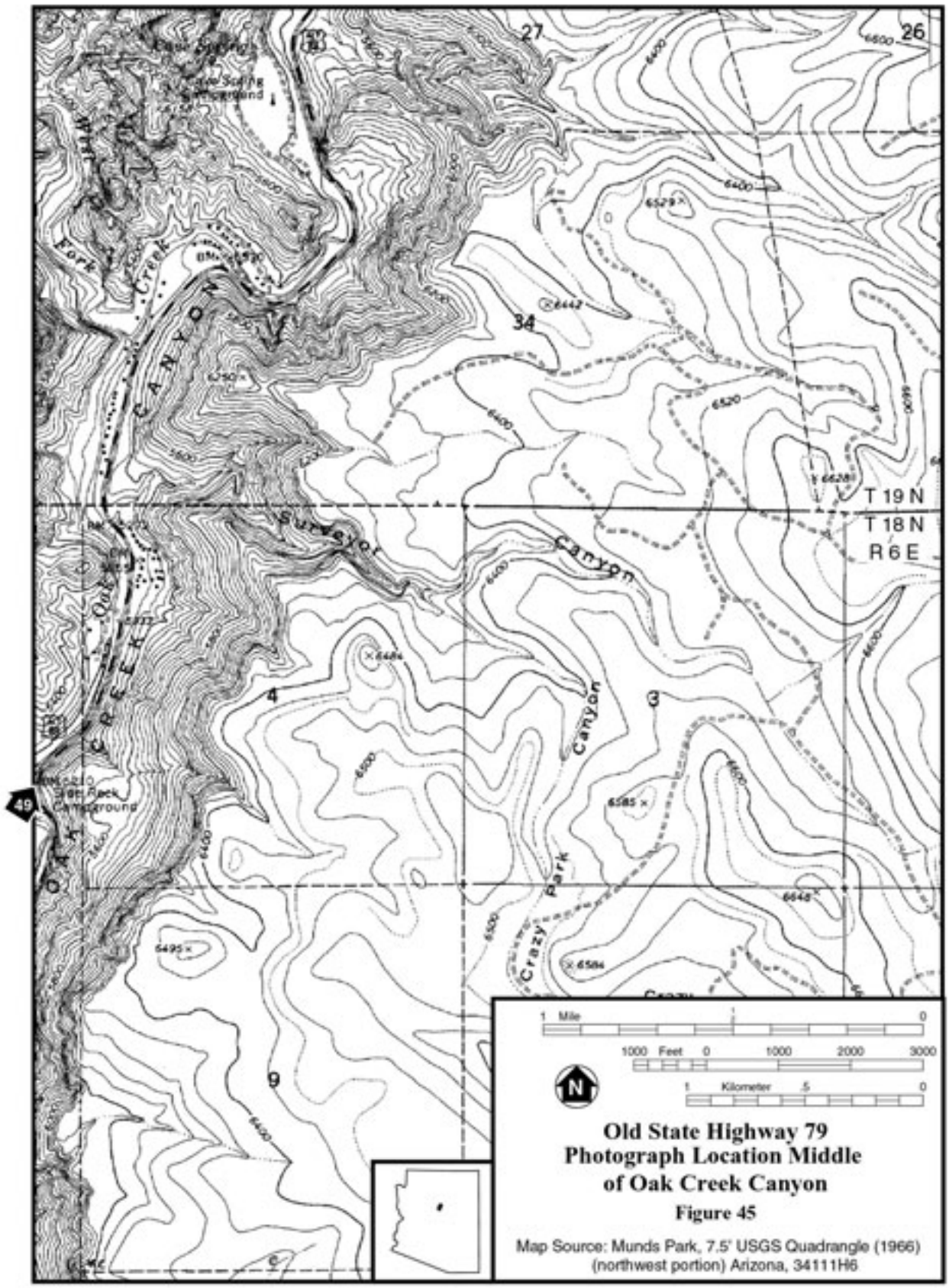

Sedona
Soldier Wash
Rodeo Grounds
SOLDIER PASS
DRIVE
ROAD
MAVAPAI CO.
COCONINO CO.
Flat
T 17 N
R 5 E
R 6 E
Bear Wallow Can
BEAVER
TRAIL
JEEP
Draw
Marge
Table Top Mountain
Amphitheater
AIRPORT
OAK CREEK
CREEK
Ranger Sta
Ford
Golf Course
Footbridge
Sedona Memorial Park
Devils Dining Room
OAK
1 Mile
1000 Feet 0 1000 2000 3000
1 Kilometer .5 0
N
Old State Highway 79
Photograph Location in Sedona
Figure 43
Map Source: Sedona, 7.5' USGS Quadrangle (1969)
(northeast portion) Arizona, 34111G7



Old State Highway 79 Photograph Location Lower Oak Creek Canyon

Figure 44

Map Source: Munds Park, 7.5' USGS Quadrangle (1966) (southwest portion) Arizona, 34111H6



Old State Highway 79
Photograph Location Middle of Oak Creek Canyon

Figure 45

Map Source: Munds Park, 7.5' USGS Quadrangle (1966) (northwest portion) Arizona, 34111H6

Figure 46. Segment of Old State Highway 79

This segment of Old State Highway 79 (now U.S. Highway 89A) near milepost 364 between Cottonwood and Sedona posses integrity of association, location, and setting as one of the state's earliest highways. It also retains integrity of design, materials, and workmanship, and is sufficiently long to convey the feeling of an historic road, but it is a very common type of paved two-lane road.

Figure 47. Segment of Old State Highway 79 not within Oak Creek Canyon

This segment of the highway entering the town of Sedona from the west retains integrity of association and location, but has lost integrity of design and workmanship of a 1920s-1930s highway because of the widening of the road and addition of modern sidewalks and railing.

Figure 48. Old State Highway 79 at Lower End of Oak Creek Canyon

Just north of Midgley Bridge at the southern entrance to Oak Creek Canyon, this segment of Old State Highway 79 retains integrity of association, location, setting, design, materials and workmanship, and is sufficiently long to convey the feeling of a 1930s state highway. A traveler heading north on this stretch of Old State Highway 79 can begin to appreciate the road's significance as an example of outstanding engineering as it wends through the canyon.

Figure 49. Segment of Old State Highway 79 in Middle Oak Creek Canyon

This segment of the highway just south of Slide Rock Bridge in Oak Creek Canyon retains integrity of association, location, and setting, but has lost integrity of design and workmanship at this location because of the widening of the road to accommodate a left turn lane into Slide Rock State Park.

federal aid projects from 1917 to 1933. The completed gravel road was included with eight other roads in the first designation of state highways by the new Arizona State Highway Commission on September 9, 1927.[4] The unimproved remainder of the road, from Jerome to Flagstaff, was first designated State Route 79 in 1927, and later designated a state highway (rather than a "route") after construction had been completed in the 1930s.

The second segment of State Highway 79 to be built was the 13.2-mile segment from the junction of U.S. Highway 66 in Flagstaff to the north rim of Oak Creek Canyon, and it was approved as a state highway on June 18, 1934. The third segment of State Highway 79 to be built, a 46.4-mile segment from the north rim of Oak Creek Canyon to Jerome, was approved as a state highway on July 26, 1935. Part of this segment, the road from the top of Oak Creek Canyon south through the canyon, was built as Forest Service Project No. 7 and designed by Bureau of Public Roads engineers.

The road through Oak Creek Canyon included three bridges. The first bridge to be built was the 1931 bridge across Pumphouse Wash at the northern end of the canyon. This bridge was included in the National Register listing of Vehicular Bridges of Arizona (Fraserdesign 1987). Roadbed width of the Pumphouse Wash Bridge is 28.5 feet after a sensitive rehabilitation of the bridge by ADOT. The second bridge spanned Oak Creek at Slide Rock, and was completed in 1932. The original bridge, which was 20 feet side, has been widened in recent years, and determined to be ineligible for the National Register (Fraserdesign 1987). The third bridge, known as the Midgley Bridge, was not completed until 1938 and spanned Wilson Canyon at the southern end of Oak Creek Canyon. The Midgley Bridge has a roadway width of 24 feet, has not been altered, and also was included in the National Register listing of Vehicular Bridges of Arizona (Fraserdesign 1987). The segment of Old State Highway 79 through Oak Creek Canyon exemplifies outstanding engineering because of the massive cuts and fills required to negotiate the rugged canyon terrain.

Historic Integrity

Despite the change in numerical designation from State Highway 79 to State Route 89A (which occurred in the 1940s), the highway possesses integrity of **association** as one of Arizona's first state highways, and as one of the roads built and later improved with federal funding in the 1920s and 1930s. As a whole, the highway appears to retain integrity of **location** but it would be necessary to compare historical maps and detailed as-built drawings to confirm the integrity of location of specific segments of the highway.

The highway retains integrity of **setting** along still-rural portions of its length and in the largely unchanged town of Jerome. It has lost integrity of setting within the rapidly growing towns of Cottonwood and Sedona, and integrity of **design, materials,** and **workmanship** has been lost along those portions of the old highway that have been widened to accommodate additional lanes and left-turn bays.

The highway winding through Oak Creek Canyon and some segments of the rural highway between Cottonwood and Sedona retain integrity of location, setting, design, materials, and workmanship, and are sufficiently long to retain integrity of **feeling**. The segment of Old State Highway 79 that runs through Oak Creek Canyon, is visually distinctive for it engineering characteristics, and is an example of

[4]The eight other state highways approved on September 9, 1927 were State 73 from McNary to U.S. 70, and portions of State 81 (then U.S. 666, and now U.S. 191) in eastern Arizona; State Highways 82 and 83 in the southeastern portion of the state; State Highways 84, 87, and 187 near Casa Grande; and State 88 from Apache Junction to Globe, the Apache Trail (State Highway Department 1939:16-18).

outstanding engineering. Accordingly, this segment of Old State Highway 79 is recommended as eligible for the National Register under Criterion C.

The portion of Old State Highway 79 through Jerome also may be considered a contributing element to a historic district in Jerome. Because the road retains many of its historic characteristics, it contributes to the overall ambiance and setting of the historic copper mining town.

Other parts of Old State Highway 79 between Cottonwood and Sedona, like Old State Highway 73, are more difficult to evaluate because they are similar to hundreds if not thousands of miles of similar roads in the state. In the case of State Highway 79, the type is two-lane paved roads rather than the unpaved roads represented by Old State Highway 73. A more in-depth evaluation should consider potentially related historic properties, comparison with similar roads related to the relevant historic contexts, and local sentiment about the historic values of the road.

CHAPTER 6
WHICH HISTORIC ROADS ARE WORTHY OF PRESERVATION?

> The "historical and cultural foundations of the Nation should be preserved as a living part of our community life in order to give a sense of orientation to the American people" (National Historic Preservation Act [16 USC 470(b)(2]).

Historic preservation and cultural resource management are all about conserving physical remnants of our nation's heritage. The National Historic Preservation Act is focused on the remains of the past rather than history per se, and National Register is a list of properties deemed worthy of preservation (National Park Service 2002). But like beauty, worthiness for preservation might be said to be in the eye of the beholder.

Historical significance and National Register eligibility are not things that can be tripped over or found unexpectedly in the built environment. Rather, significance is something that is defined and built with historical analysis and narrative. The National Park Service recognizes that intellectual history imbues National Register properties with meaning, and has defined criteria for listing on the National Register to give structure to the subjectivity of eligibility evaluations.

Because creative intellects are, in principle, unlimited a sufficiently bright and motivated scholar could develop a historic context to argue that all surviving physical remnants of the past are associated with national, state, or local historic themes in one way or another. However, a simple association with an aspect of history cannot stand as a sufficient reason for preservation. To be eligible for the National Register a property must have an association with an **important** event or broad pattern of our history; or to an **important** person; or it must be the work of a master or represent an **important** architectural, engineering, or artistic achievement; or it must provide **important** information. Additionally, a property must retain sufficient integrity with respect to that association so that it conveys its significance. Admittedly, what is "important" and what constitutes "sufficient integrity" are open to debate.

In practice, historic preservationists and cultural resource managers develop a mutual understanding of appropriate standards, strategies, and procedures for defining what is worthy of preservation and give consistency to evaluations of National Register eligibility. However, consensus procedures are dynamic and they evolve. This study found that evaluating what historic roads are worthy of preservation is difficult because a consensus has yet to be developed.

Unless exceptional in some way, roads have only recently been considered as potential historic resources. The National Task Force for Historic Roads, a division of the Rural Heritage Program of the National Trust for Historic Preservation, and the Westchester County (New York) Department of Planning, sponsored the first regional Conference on Historic Roads in 1995 (Marriott 1998:24). At the 1996 annual convention of the National Trust for Historic Preservation, a sell-out crowd attended the presentation, "Saving Historic Roads." A follow-up presentation at the 1997 annual convention, "Saving Historic Roads, Part Two," again attracted a large crowd, as did the day-long field session investigating Route 66 between Santa Fe and Albuquerque, New Mexico. The National Trust for Historic Preservation, as well as the National Park Service and the California Department of Transportation sponsored "Preserving the Historic Road in America," the first national conference on historic roads held March 1998 in Los Angeles. The first book to address historic roads management, *Saving Historic Roads* (Marriott 1998), was published only recently. The National Park Service is working on a National Register Bulletin to address historic roads but it has not yet been published (Marriott 1998:129).

To date, only a few states have developed statewide contexts for historic roads. In 1991, the California Department of Transportation commissioned a planning study entitled *Historic Trails and Roads in California* (Owens 1991). The first volume, *Historical Context and Typology*, has been useful for cultural

resource managers in the state, but the second volume, *Trail and Road Inventory and Historical Evaluation Process*, has proven less valuable. In 1992, the Arizona SHPO developed the historic context, *Automotive Transportation in Arizona, 1900-1940* (Rodda 1992). This document examined roadside property types such as tourist courts and service stations, but did not examine the roads themselves. In 1994, the Wyoming Department of Transportation prepared a *Historic Context and Evaluation of Automobile Roads in Wyoming*. This evaluation acknowledges the historical significance of state and federal highways in Wyoming, but concludes that ongoing maintenance and upgrading of the roads has destroyed their integrity. Although the Wyoming SHPO has not formally accepted this evaluation, the Wyoming Department of Transportation has been using this context and evaluation as operational policy (Julie Francis, personal communication, 1997). In 1996, the New Jersey Department of Transportation undertook development of a context for the National Register evaluation of historic highways in the state, dating from the late eighteenth century through the mid-twentieth century. The Department of Transportation envisions this study will be used to seek a consensus with the New Jersey SHPO about strategies and practices for addressing historic roads (Andrea Tingey, personal communication, 1998).

The next section of this chapter identifies some of the special challenges of evaluating the National Register eligibility of roads. The subsequent section discusses some considerations for each of the four National Register criteria of significance as well as issues of assessing historic integrity. No claims are made that this discussion resolves these issues, but it is presented as a step toward developing an acceptable working consensus on how to identify what roads are worthy of preservation.

SOME CHALLENGES IN EVALUATING HISTORIC ROADS

Evaluating the National Register eligibility of old roads often has some special challenges. Six common problems are discussed in the following sections.

Where Does It All End?

National Register guidance indicates that for purposes of National Register nomination roads should be classified as "structures" (that is, functional constructions made for purposes other than human shelter), but defining boundaries for long, linear structures that can extend for hundreds of miles is a unique challenge. The most appropriate places to draw boundary lines are at the ends of an entire length of road, rather than just a segment, but they are not always easy to identify. Boundary definition is easier for officially designated routes. For example, in the 1920s, the Arizona State Highway Engineer designed U.S. Highway 80 to begin in Arizona at Yuma and continue east to the New Mexico border. Therefore, it is relatively easy to identify the boundaries of this property, but a researcher dealing with a project that crosses the highway at one narrow location obviously faces a problem in evaluating that small segment of a potential historic property that extends for hundreds of miles.

Long Roads, Short Dollars

Typically, a cultural resource management project is defined and funded to conduct survey and evaluation within a defined area of potential effect. If an old road crosses through and beyond the defined study area, how can the integrity of the recorded segment be compared to the rest of the road beyond the study area? Is the recorded segment the best preserved or rare? Lack of knowledge about the entire road also might limit the perspective for appropriate mitigation measures.

The Spaghetti Problem

When they cannot be avoided, old buildings often are completely demolished to accommodate new construction on the same site. In contrast, highway projects more often than not involve upgrades of existing roads and sometimes portions of the old road are left intact. Segments of the old road that do meet new standards for grades and curves are widened and paved (or re-paved), a process that can destroy the historic integrity of the original road. Other portions of an old road may be brought up to new standards by changes in horizontal and vertical alignment, a process that sometimes spares "ox-bow" remnants of the original road. In some cases, some segments of an old road may be so steep or narrow that an entirely new alignment is selected, leaving substantial segments of an old road intact.

As road construction methods and standards have improved over the decades, two or three or more versions of a road may be built along the same route, creating the "spaghetti problem." Confounding as it may be to confront the entangled lines on the map, the good news is that the process of road construction leaves segments of some old roads intact. If all new roads followed the exact alignment of all old roads, there would be no "spaghetti problem," but there also would be no old roads to preserve.

If It's Old, It's Eligible

Researchers encountering a primitive road have a tendency to leap to the conclusion that "If it's old, it must be eligible for the National Register." The more appropriate reasoning is "If it has documented historical significance and retains integrity, it's eligible for the National Register." This requires historical research to determine whether the physical remnants have important historical associations. Historic documentation of minor roads often is meager, and important associations cannot be identified.

All History, No Road

This problem is the flip side of the previous problem. In contrast to a road with no history, this is the problem of a history with no historic road. Several of the most important transportation corridors across the state have lost integrity with respect to their periods of significance, and so it is impossible to match the important history with anything on the ground. As an example, the 243 miles of Territorial highways built between 1909 and 1912 no longer exist on the ground. These Territorial highways were dirt roads with only a few stretches improved with oil or gravel, and they have been upgraded and paved over the years. The Territorial highway system was obviously important because it evolved into the state and federal highways that connect Arizona cities and towns today. However, we are unlikely to find much on-the-ground evidence of these highways, although there may be a few isolated "oxbows" of abandoned dirt or gravel alignments still in existence.

The Ubiquity Problem

The problems identified above relate to the difficulties of assessing a single road, but they pale in comparison to a larger problem with roads—their ubiquity. There are "good roads everywhere" across Arizona, and many of them look alike. In evaluating the National Register eligibility of historic roads, the staggering number of examples must be considered. This problem is not unique to roads. Preservationists today must evaluate post-World War II suburban developments. The thousands of ranch-style houses that are becoming 50 years old in Phoenix alone is a good example of the issues of ubiquity. While hundreds, if not thousands, of miles of two-lane bituminous roads may share in the rich history of road building in Arizona, they are very similar in appearance.

How can a road convey historical significance? Just as a building can convey its history though stylistic details such as fenestration and massing, the age of a road can be conveyed through the details of road architecture, including roadway width, surfacing, shoulder treatment, and associated features.

Although it can be generalized that modern roads are wider than their 1920s counterparts, the evolution of change has been gradual. It is not possible to link road width directly to a construction date in the same way that a historian of modern material culture can pinpoint the manufacture date of a "pop top" soda can between 1962 and 1974 (the years between the invention of the pull-ring opener and its evolution into the stay-on tab). The 1921 Federal Highway Act specified a standard of at least 18 feet for the width of two lane roads in the federal system of highways, and in general, roads built in Arizona before about 1930 were no wider than that standard. In the words of the Arizona State Highway Department,

> "Most of the construction until 1928 consisted mainly of grading, and graveling roads to 6 inches in depth and 18 feet wide. Until 1930, two-lane bituminous surfaces were 18 feet wide. From 1930 to 1937, they were constructed to a 20 foot width and since 1937 to a 22 foot width" (State Engineer 1939:22).

Concrete, asphalt, and gravel have been used simultaneously to surface Arizona roads since about 1920, and none can be relied upon to indicate a specific date of construction. The history of a single road may include a series of surface treatments from dirt to grading, from oiling to gravel, and from concrete to asphalt. Road safety features such as guardrails and shoulders also are not good indicators of road age because the highway department is constantly upgrading these features to evolving safety standards. In addition, the highway department has installed different types of guardrails—and different shoulder treatments—during the same time period as dictated by different road situations.

The net result of Arizona highway standards and practices is a network of similar looking roads. Whether originally planned as a segment of the Territorial highway system, included in the state highway system, constructed with federal aid, improved with Depression-era funding, or built by a municipal or county government, two-lane bituminous roads across level terrain look very similar to one another.

THE PROCESS OF EVALUATING NATIONAL REGISTER ELIGIBILITY

Age, significance, and integrity are the cornerstones of National Register eligibility. National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation,* defines a two-step process for evaluating National Register eligibility (National Park Service 1998). The first step is to determine age and historic significance by considering the applicable National Register criterion or criteria. The second step is to assess whether the property retains sufficient historic integrity to convey its significance. Long structures like roads may not retain historic character defining elements throughout their entire lengths, but that would not eliminate them from National Register eligibility if one or more segments are sufficiently intact to convey their historic values.

Evaluating Significance

Evaluating the National Register eligibility of a road requires documenting its characteristics and archival research. Primary sources of information about roads are historic maps, including those from the General Land Office, U.S. Geological Survey, and state and local government agencies. Contemporary newspaper articles from the time the road was built, or paved, or improved, may provide clues as to its importance. *Arizona Highways* articles may discuss the technological advances involved in the construction of the road, and may document any association with prominent road engineers, landscape architects, or planners.

Historic photographs and postcards also may provide clues. Records of the Territorial Assembly may provide information on nineteenth-century toll wagon roads, and records on file at ADOT may provide other valuable information.

Once a road is recorded and its history has been outlined, the evaluation of its National Register eligibility must turn to consideration of the road's significance within the appropriate historic context. National Register guidelines define historic contexts as "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" (National Park Service 1998:7). Defining the appropriate context is the key challenge. The absence of well-defined historic contexts for vehicular roads in Arizona has hindered consistent evaluations. This historic overview was prepared to provide perspective for defining appropriate historic contexts. The following sections discuss how each National Register criteria of significance can be applied to roads.

Criterion A

Criterion A applies to those historic roads that are "associated with an event or events that have made a significant contribution to the broad patterns of our history." At first glance, this is a daunting challenge because nearly every historic event of the twentieth century in Arizona can be associated in some way with a road. President Theodore Roosevelt traveled the Apache Trail on the day he dedicated the new dam named for him in 1911. In the 1920s, farmers delivered citrus and cotton to the railroad over rural roads, and miners drove their cars along new state highways to seek jobs in Jerome, Bisbee, and Morenci. Escapees from the 1930s Dust Bowl followed U.S. Highway 66 across northern Arizona to look for work and better lives in California. World War II flyers drove State Route 85 between Ajo and Gila Bend during their flight training on the gunnery range.

However, and this is a very important "however," under National Register guidelines it is not enough for an old property simply to be associated with events that have made a significant contribution to the broad patterns of our history. The property must have an **important** association with the historical event or patterns. Some important facets of our history simply are not directly connected to the built environment, and not all elements of the built environment relate to historically important themes. Several statewide historical contexts already developed, including those for the military, mining, and commercial histories of Arizona, do not include roads as associated property types because the authors of these historical contexts did not consider roads to have an important association with the events of their particular histories. Thus, although it is tempting to suggest that a road is historically significant because it is associated with Arizona tourism, cotton production, or copper mining, the association with such historical events and patterns must be direct and important rather than tangential.

Often roads are thought of as important because they "opened up" areas to settlement. However, most county and state highway department road projects improve existing routes in response to demands of growing traffic or evolving safety standards. Although the new and improved roads may enhance development, the service areas were "opened up" long before. Even Girand's Territorial highways, the earliest highways built in Arizona, improved existing routes to connect county seats rather than to "open up" new areas for settlement.

Roads certainly might achieve significance because of associations with important Arizona themes such as tourism, mining, or agriculture, but because this overview was prepared to address ADOT's challenges of managing a network of roads, it focuses on how roads can achieve historical significance with the historical context of road development. As discussed in Chapter 4, an important facet of the history of road building in Arizona is the story of how they came to be funded. From this perspective, the evolving

territorial, state, and federal government programs for promoting road construction can provide a framework for considering the National Register eligibility of vehicular roads in Arizona Criterion A: These include the following themes and time periods:

- Military Wagon Roads, 1846-1909
- Privately Built Toll Wagon Roads, 1864-1891
- Territorial Highways, 1909-1912
- State Highway System, 1912-1939
- Federal Aid Projects, 1917-1933
- Roads Built on Federal Lands, 1917-1926
- Depression-Era Road Projects, 1934-1939
- Road Construction during World War II, 1941-1945
- Outstanding Road Engineering, 1912-1956

A good example of a road that can be considered significant within the context of military wagon roads from 1846 to 1909 is the Beale Wagon Road. The two territorial highways are significant within the theme Territorial highways from 1909 to 1912. The Apache Trail, initially improved during the construction of Roosevelt Dam and incorporated into the east-west Territorial highway and then the state highway system, is an important example of two themes, Territorial highways from 1909 to 1912, and the state highway system from 1912 to 1939. The nationally significant Route 66 is important in Arizona history within at least two themes, the state highway system from 1912 to 1939, and Depression-era road projects from 1934 to 1939, because it was designated as the third state highway in 1913, and paved with federal aid in the 1930s.

Because most of the Depression-era projects focused on improving existing routes in a piecemeal fashion, it will be relatively rare to find an Arizona road that will achieve significance in this theme alone. Two examples of roads built (not simply improved) with Depression-era funds are U.S. Highway 60 from Globe to Show Low, and U.S. Highway 93 from Kingman to Boulder Dam. Important enough at the time to be touted in a 1935 summary of 10 outstanding Civil Works Administration-Federal Emergency Relief Administration projects, the improvements to State Highway 79 (now U.S. Highway 89A) from Jerome to Clarkdale can be considered important under Criterion A because of the project's association with Depression-era make-work road projects in Arizona.

Some roads constructed to access military installations during World War II can be important under the theme of road construction during World War II from 1941 to 1945. An example is the six-mile stretch of State Route 92 built to connect Fort Huachuca with State Route 82.

An example of the inappropriate application of Criterion A can be found in the fascination with private highways. Researchers have often asserted the historic significance of an old road because of its association with the designated route of the flamboyantly named "Atlantic-Pacific Highway," the "Ocean to Ocean Highway," or the "National Old Trails Road." While private highway associations in other states did construct roads, in Arizona they simply chose previously established routes and marked them with roadside signage or map notations. The state and federal government, not the private highway associations, funded and built these highways in Arizona. Many of their chosen routes coincided with the 1909 Territorial highways, most were incorporated into the 1921 seven percent system, and all were important enough to be included in the state highway system by 1929 (Arizona State Highway Department 1939:16-17). Thus, the 10 private highways designated in Arizona may be important, but the roads themselves do not achieve historical significance because of their association with private highway associations. These roads are more appropriately evaluated under historical themes of Arizona road construction such as the state highway system from 1912 to 1939.

Criterion B

Criterion B applies to historic roads that are "associated with the lives of persons significant in our past," and is applied infrequently to historic roads. Of the 73 historic American roads listed on the National Register to date, only four are associated with an important person (refer to Appendix C).[1]

Good examples of Arizona roads that are important under Criterion B include the Beale Wagon Road and the General Crook Trail, each associated with the career of a famous nineteenth-century military figure and falling within the theme of military wagon roads from 1846 to 1909. The first north-south road to Prescott, built by the Prescott, Walnut Grove, and Pima Road Company of King Woolsey, Jack Swilling, and others, also could be considered important under Criterion B within the theme of privately built toll wagon roads from 1864 to 1871 (refer to Table 3).

A poor, or at least an undemonstrated, example of assigning historical significance under Criterion B is the Hunt Highway and its connection, if any, with Arizona Governor George W. P. Hunt. Present-day maps depict the Hunt Highway running due east from Price Road to Ellsworth Road at the southern edge of Maricopa County, angling to the southeast and paralleling the Union Pacific Railroad (formerly Southern Pacific) tracks to Poston Butte north of Florence, and turning east again to intersect with State Route 79. However, on a 1939 Arizona State Highway Department map, only portions of the road appear and they are labeled as "unimproved, inquire locally for road condition." It would appear that the Hunt Highway has no connection to the state highway system, the federal seven percent system, federally funded road improvement projects in the 1930s, or military road-building in World War II. Further research is needed to understand the connection, if any, between this two-lane road and the state's first governor. Other poor hypothetical examples would be the assertion that the Pinal Pioneer Parkway is significant because the Hollywood cowboy actor Tom Mix met his death on that road, or that the Squaw Peak Parkway in Phoenix is significant because Nancy Reagan traveled on it from the airport during visits to her father's home at the Arizona Biltmore Estates.

Criterion C

Criterion C applies to those historic roads that "embody the characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values." The design of a road, important construction techniques, or outstanding feats of engineering may qualify a road as significant under Criterion C. Roads that can be attributed to the "work of a master" architect, planner, engineer, or designer may also be significant under Criterion C.

Sixteen of the 73 American historic roads currently listed in the National Register refer to the designer, planner, engineer, or surveyor of the road (some of these, however, are not listed under Criterion C) (Marriott 1998:180-201; refer to Appendix C). Chief among these road planners is the landscape architect Frederick Law Olmsted, whose parks and parkways designed for horse and carriage traffic in the late nineteenth century became automobile roads in the twentieth century. Perhaps the most famous example of Olmsted's work is Riverside Park and Drive in New York City, designed in 1874. Seven other

[1]A segment of the Bridger Immigrant Road in Big Horn County, Wyoming, is attributed to the pathfinding work of mountain man Jim Bridger, and the Old Mountain Road in Albemarle County, Virginia, is associated with Thomas Jefferson and Merriwether Lewis. Merritt Parkway in Fairfield County, Connecticut, was named after the U.S. Congressman who promoted the new road in the 1930s, and Riverside Drive in New York City was redone in the 1930s by then-mayor Robert Moses (Marriott 1998:183, 190, 199, 201).

examples of Olmsted-designed parkways have been listed on the National Register.[2] Five current National Register listings for historic roads cite the names of planners, two listings mention engineers, and one listing notes the surveyor of the route.[3]

Those outstanding feats of engineering, design, and construction that put highways around, over, and sometimes through the natural obstacles of hills, canyons, and rock walls are important aspects of the history of road development. Within the context of road building in Arizona, roads can be evaluated under Criterion C within the context of outstanding road engineering from 1912 to 1956. Another important engineering and construction theme of railroad grade crossing improvements from 1936 to 1942, is included in an earlier study of historic bridges in Arizona (Fraserdesign 1987).

Good examples of Arizona historic roads that are important within the theme of outstanding road engineering from 1912 to 1956 are the Apache Trail with its Apache-built retaining walls and culverts, and U.S. Highway 60 through the Salt River Canyon. Similarly, the first paved highways in Arizona are significant under Criterion C, including the Bisbee-Douglas segment of U.S. Highway 80 and the Geronimo-Solomonsville segment of U.S. Highway 70, both paved between 1917 and 1921 (refer to Table 12).
An inappropriate application of Criterion C to historic roads is the trap of "antique charm," and the logic that "If it's old, it's significant." The presence of old culverts or retaining walls does not automatically demonstrate historical significance under Criterion C. Only if the associated road is important within a specific context or it can be demonstrated that such old features are rare examples of once common types might they be regarded as significant under Criterion C. A second misunderstanding of the application of Criterion C may emerge from road nomenclature. Despite the name, Frank Lloyd Wright did not design the eponymous boulevard in Scottsdale, and the road is not the work of a master.

Criterion D

Criterion D applies to those historic roads that "have yielded, or may be likely to yield, information important in prehistory or history." Assessing a roadbed as significant under Criterion D asserts that the property has the potential to yield important information. It is true that important information might be recovered through excavation of archaeological sites such as historic roadside construction camps, and through the collection of historic road-associated artifacts such as horseshoes, soda and beer bottles, discarded tires, and license plates. However, often the history of the road itself can be best understood from archival and documentary sources.

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[2]These include the Cazenovia Park-South Park System and the Delaware Park-Front Park System in Buffalo, New York (both listed under Criterion C); the Eastern Parkway (Criterion C) and the Ocean Parkway (Criterion A) in Kings County, New York; Lake Park in Milwaukee, Wisconsin; the Kentmere Parkway in New Castle County, Delaware (Criteria A and C); and the Back Cove Esplanade in Cumberland County, Maine (Criterion C) (Marriott 1998:179-201).

[3]Planners are cited by name in National Register listings for the Merritt Parkway in Connecticut; the St. Joseph Park and Parkway System in Missouri; the South Parkway and the Memphis Parkway in Tennessee; and the Zion-Mt. Carmel Highway in Utah (all Criteria A and C). Engineers for Foote's Crossing Road in the Gold Country of California (Criterion A) and the Trail Ridge Road through Rocky Mountain National Park in Colorado (Criteria A and C) are mentioned by name, as is the 1821 surveyor of Robinson Road in Leake County, Mississippi, Raymond Robinson (Criterion A). (Marriott 1998:179-201).

There are few aspects of road construction technology that can be meaningfully researched through archaeological investigations. Only rarely is archaeological study of a roadbed alone likely to yield valuable historical information. Similarly, unless road-related features such as culverts, bridges, and retaining walls are not documented in archival records, archaeological recording is unlikely to provide important information. Without an associated archaeological site, a scatter of roadside artifacts usually would not be considered significant under Criterion D.

This position is supported by previous work. Although the National Register of Historic Places Multiple Property Documentation Forms for U.S. Route 66 in New Mexico and Arizona each suggest that abandoned segments of the road have "essentially become archaeological sites," neither researcher suggests the road segments are significant under Criterion D (Cleeland 1988; Kammer 1993). Another example is the eloquent determination of eligibility for a section of U.S. Highway 50 in Northern California, which concludes that segments of the old highway are eligible under Criteria A, B, and C, but makes no argument for the eligibility of any segments under Criterion D (Supernowicz 1993:72).

Assessing Integrity

A conclusion that a road is historically significant under any National Register criterion is not sufficient for National Register listing. The documented significance of a property must be coupled with demonstrated historical integrity in order to establish eligibility for listing in the National Register. National Register guidelines state that "integrity is the ability of a property to convey its significance." The guidelines recognize seven aspects of integrity (location, design, setting, materials, workmanship, feeling, and association), and require a property to "possess several, and usually most, of the aspects" to be eligible for the National Register (National Park Service 1998:44).

The Seven Aspects of Integrity

To establish integrity of **association**, a road segment must be identified in an appropriate historical context. Comparison of the current alignment of a road with one or more appropriately dated maps or any available as-built drawings can be the basis for establishing integrity of **location.**

An assessment of the integrity of **setting** should consider the surrounding landscape of a road during its period of significance and then determine if that landscape has been substantially altered. A segment of a historic highway that served as main street to a small Arizona town may retain integrity of setting if a majority of the original roadside buildings remain. Similarly, a segment of historic highway served by roadside commercial properties such as motels, gas stations, and diners may retain integrity of setting if a majority of the roadside buildings remain. Another example of good integrity of setting would be an early state highway built as a rural road that retains its rural setting. In contrast, an originally rural highway overtaken by suburban development, or a rural highway that has been become the access road for an interstate highway has lost integrity of setting. Simply put, a road has lost integrity of setting when its surroundings no longer resemble the surroundings during its period of significance.

The purpose of a road is to connect one point to another, and thus, the linearity of a road may be its most defining characteristic. To retain integrity of **feeling**, a road segment must be long enough to convey that linearity or connectivity, but precisely defining how long that is will require site specific assessment. One researcher suggested that an "ideal would be an uninterrupted view down the road to the horizon" but admits that "measured limits cannot be reasonably set for this requirement" (Cleeland 1988). A California study suggested that "a minimal length of 1000 feet is necessary to illustrate the basic linear nature of the

road system" but adds that "the 1000-feet figure should serve only as a guide, rather than a finite number. In certain instances . . . a minimal length of 100 feet may be adequate" (Supernowicz 1993:70-71).

To establish structural integrity, that is, integrity of **materials, design** and **workmanship**, the researcher should consider the period of significance for the existing road segment, and then determine if it displays the materials, design, and workmanship for a road from that time period. In the field, the researcher should examine and characterize the following aspects of the road:

(a) condition
(b) surface (two-track, graded dirt, gravel, or paved)
(c) width (exclusive of shoulders)
(d) vertical alignment (grade, cut banks, and fill slopes)
(e) horizontal alignment (radii of curves)
(f) edge (presence or absence of shoulders, clear zone)
(g) associated features (guardrails, retaining walls, culverts, tunnels, overpasses, bridges)

The surface of a road displays the **materials** used in its construction, or in subsequent maintenance and upgrading procedures. The intrinsic nature of roads demands periodic maintenance and resurfacing, and a historic road segment that exhibits original paving material will be unusual. Many historic roads in Arizona began as dirt two-track roads, were later improved with gravel, and then paved with concrete or asphalt. Thus, while retention of an original surface would be ideal, it is also highly unlikely and replacement of original materials with similar materials may not substantially limit the ability to convey historical significance.

The width of a road surface is an important characteristic to consider in evaluating integrity of **design.** The design of a road segment that has been widened since its period of significance has been compromised. Additional elements of road design include the vertical alignment of the road (grade, cut banks and fill slopes), and its horizontal alignment (tangents and curves). The presence or absence of shoulders or a cleared zone along the road edges is another element of road design. Integrity of **workmanship** can be determined by examination of features associated with the road, including guardrails, retaining walls, culverts, tunnels, overpasses, and bridges.

The period of significance dictates the appropriate elements of design and workmanship that must be considered. If, for example, a segment of the Bisbee-Douglas road is judged to be significant under Criterion A as a Territorial highway, then its period of significance is from 1909 to 1912, a time when the highways of Arizona were all two-lane gravel roads. Thus, an existing segment of that road widened or realigned during a 1930s road project has lost its integrity of design as a Territorial highway. If, however, the same road segment is considered important within the context of Depression-era road projects from 1934 to 1939, then it might retain integrity of design and workmanship with regard to that later theme.

Specific Aspects of Road Design and Workmanship

Gravel, asphalt, and concrete have been used simultaneously to surface roads since 1920 and none of the three can be used as a time-specific marker for dating roads. To further confuse the issue, many concrete roads subsequently were overlain with asphalt as part of routine road maintenance. However, clues to road history can be found in the specifics of road pavement. During the late 1920s and 1930s, the weight of trucks bore heavily on the edges of narrow roads, causing cracks in concrete pavement. To combat this edge stress, engineers designed roads with thicker concrete along the edges, commonly about 8 to 10 inches thick with the middle of the road only about 6 to 7 inches thick. In the late 1940s, construction of

wider roads reduced edge stress and it became more economical to build roads of uniform thickness (Ray 1984:7). Thus, a concrete road of uniform thickness probably post-dates World War II.

Additional clues may help to date later concrete roads. A perennial problem with concrete roads had been the "bump, bump, bump" caused by joints in the road. By 1951, a new technique of sawing the hardened concrete with a diamond saw blade made a smoother seam and eliminated the "bump" (Ray 1984:11). By 1960, the "slipform" method of producing concrete, which uses a continuously moving form to shape the concrete, became widespread (Ray 1984:10). In the early 1970s, road engineers borrowed a technique from airport runways and began grooving concrete pavements to prevent hydroplaning (Ray 1984:13).
A better marker for road age than pavement is width. Since Roman times, major wagon roads were built about 18 feet wide, a width sufficient to allow two horse-drawn vehicles to pass each other. In the early twentieth century, the width of most roads in Arizona ranged from 14 feet to 18 feet (despite Arizona Territorial Engineer J. B. Girand's 1909 recommendation of 16 feet to 24 feet). The Federal Highway Act of 1921 set a standard of at least 18 feet for the width of two-lane roads in the federal aid system.

In 1928, the national organization AASHO recommended a 20-foot road width for a two-lane road. The Arizona State Highway Department also recommended the 20-foot width for roads from 1930 to 1937, changing their recommendation to a 22-foot width in 1937. During the 1930s, road widths of 22 feet to 24 feet were common. Today, the standard width is about 24 feet for a two-lane road, not including shoulders or clear zones (Marriott 1998:92).

Curves and straight-aways make up the horizontal alignment of a road, while the vertical alignment consists of grades, as well as cuts and fills to mitigate slopes. An indication of relative age of a road can be determined by examining its horizontal and vertical alignments. Early roads followed the natural topography as much as possible because the dependence on manual labor or animal-powered equipment limited the volumes of earth that could be moved. Grades were as low as possible, so that animal-drawn wagons could negotiate them. As motorized vehicles became more commonplace and before mechanized road construction machinery became available, road grades increased due to the greater ability of the motorized vehicles to climb hills. For example, the road up Yarnell Hill in 1913 contained grades of 6 to 26 percent (Arizona Good Roads Association 1913:16). Introduction of mechanized road-building equipment after World War I allowed road builders to move dirt more economically, and they designed straighter, flatter roads (Gray 1995d:17).

Road safety features, including shoulders and guardrails, are not good indicators of road age because they are continually upgraded as standards evolve. In the early days of road construction before safety became an important issue, trees, telephone poles, and light poles often abutted the roads and presented hazards to drivers leaving the roadbed (Marriott 1998:87, 94-95). Shoulders have been included in road design at least since the AASHO recommended them in 1928 in their first standards of practice manual. The manual recommended shoulders 8 feet wide "when practicable." In addition to shoulders, some roads now include "clear zones," a safety measure that removes obstacles from areas beyond the shoulder.

The first guardrails were simply vertical wooden posts, installed along the edge of the roadway in the 1930s and painted white to warn drivers of curves. Improvements to the white poles were horizontal pieces of wood attached to the posts and also painted white. Another variation on guardrails was the post and cable barrier that involved addition of long steel cables between the white poles. This type of guard rail may be seen today on the 1932 Little Lithodendron Wash Bridge in Navajo County. Road engineers upgraded the steel cables stretched between posts to rounded steel beams attached to wood or steel posts. Later, they used the galvanized steel "W" beam attached to posts as guardrails. In the late 1950s, New

Jersey engineers designed the Jersey Barrier (also known as the Safety Shape), a concrete barrier used today both as guardrails and to separate lanes of traffic on divided highways (Ray 1984:13).[4]

Guardrails are not particularly sensitive date markers because the highway department installed different types of guardrails during the same period of time, according to the road situation. For instance, a 1941 photograph of U.S. Highway 66 illustrates simple white poles acting as guardrails alongside a straight stretch of road, while a 1937 photograph of another stretch of the same highway illustrates a denser installation of white poles with two steel wires acting as guardrails. This second stretch of road runs parallel to a railroad track and is slightly curved, a situation that required a sturdier guardrail system. A third photograph of a sharper curve on Highway 66 illustrates guardrails made of white poles connected with a steel band. A fourth type of protection for drivers on mountain curves were low masonry walls constructed of local cobbles, also illustrated by a 1930s photograph of Highway 66 (Smith 1941:26; Wallis 1990:facing pages 1, 4, 14).

Water is the enemy of roadbeds, and culverts and other types of cross-drainage structures allow water to pass under a road. In the 1920s and 1930s, the State Engineer built "gravel or concrete fords over dry washes and intermittent streams in the desert regions," which were cheaper than culverts or bridges (State Highway Department 1939:22). There are several types of culverts, and sometimes they are easier to date than pavement and guardrails. Many of the 1930s and early 1940s concrete culverts carry a date on the abutment, stamped by a WPA construction crew. Round pipes, either concrete, corrugated metal, or smooth iron, can handle lesser water flows than box (square-shaped) culverts. Wooden box culverts typically pre-date concrete culverts. If a concrete culvert has been damaged and the interior structure is visible, reinforcing bars, or "re-bar," can provide temporal clues. Square reinforcing bars date to the 1930s and are older than round re-bar. Some re-bar carries an identification number keyed to the manufacturer. Perhaps the most important clue that can be gleaned from a culvert is the width of the roadway it served.

ASSESSING POTENTIAL EFFECTS

National Register evaluations of roads commonly are done within the context of considering effects of proposed projects in accordance with Section 106 of the National Historic Preservation Act. Therefore, if a road has been evaluated as historically significant and having sufficient historic integrity to be eligible for the National Register, then project effects must be assessed. Regulations state that "an undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion on the National Register" (36 CFR 800.9(a)). Thus, an informed determination of effect should address the criterion or criteria of significance that were met and what attributes of integrity were considered important in determining a road to be eligible for the National Register. For example, if a road is eligible largely because it maintains its integrity of setting, the installation of a new high-voltage electrical transmission line parallel to the historic road could be considered an adverse effect, but a re-paving of the road might not be considered an adverse effect. Alternatively, if a graded, unpaved road is eligible largely because it retains its integrity of materials, then a paving project might be considered an adverse effect.

[4]Preservationists have been working to re-create historical guardrails to modern safety standards. Along the Columbia River Highway, the Oregon Department of Transportation replicated historic post and beam guard railing using wooden rails with a hidden steel backing. The National Park Service, working with the Federal Lands Highways Division of the FHWA, installed a steel-backed timber guardrail along the George Washington Memorial Parkway in Virginia. In addition, the National Park Service developed a new version of stone masonry guard walls with a concrete core (installed on Skyline Drive in Virginia), and simulated stone guard walls made of precast concrete (installed on Baltimore Washington Parkway in Maryland) (Marriott 1998:203-208, 210-211).

CHAPTER 7
CONCLUSION AND RECOMMENDATIONS

The development of a system of roads throughout the nation and within the State of Arizona was an accomplishment of undeniable historical importance. Roads were and continue to be a vital component in the functioning of American society. However, evaluating the historical significance of individual roads can be a difficult. Because roads are long and linear, meaningful boundaries are often difficult to define. A living resource continually upgraded by state, county, and local agencies to meet growing needs and evolving safety standards, roads often present problems of integrity. Ubiquitous on the modern landscape, roads often are difficult to tie to specific significant historical events or broad patterns of history, and many are examples of very common types of roads that convey little sense of their history.

In complying with Section 106, ADOT encountered difficulties in evaluating the National Register eligibility of roads on one project after another. It was this challenge that stimulated this study. The initial attacks on the problem were unsuccessful in developing a "cookbook approach" for evaluating the historical significance of roads, and identified little common ground to work toward consensus among the various interested parties. The Section 106 perspective not only defined the impetus for this study, but in some ways, also thwarted new ways of thinking about which Arizona roads are or are not worthy of preservation. The major conclusion that eventually evolved over the course of this study is that it is much more productive to address that question by evaluating road systems or networks as a whole than it is to consider individual roads, or particularly road segments, one at a time. This holistic approach is reflected in *Interim Procedures for the Treatment of Historic Roads*, a document adopted by ADOT, FHWA, and SHPO in November 2002. These procedures are viewed as an interim step toward developing a Section 106 Programmatic Agreement and do not resolve the many disparate claims about what roads warrant preservation. Certainly more effort and time will be required to develop the Programmatic Agreement and develop practical, consistent procedures.

In this final chapter, some highlights of the study are summarized with respect to evaluating the historical significance and integrity of roads. Because this study languished for so long, some of this thinking has to some degree been overtaken by events and what once seemed so crucial or insightful about evaluating a particular road segment no longer seems so important within the context of evaluating entire road systems. Probably the most enduring product of this study will be the historical summary of how Arizona's roads—particularly the state highway system—came to be built.

HISTORICAL SIGNIFICANCE

The overview of the history of road development in Arizona, as discussed in Chapter 4, identified the following nine historic contexts as one framework for evaluating the historical significance of roads in Arizona:

1. Military Wagon Roads, 1846-1909
2. Privately Built Toll Wagon Roads, 1864-1871
3. Territorial Highways, 1909-1912
4. State Highway System, 1912-1939
5. Federal Aid Projects, 1917-1933
6. Roads Built on Federal Lands, 1917-1926
7. Depression-Era Road Projects, 1934-1939
8. Road Construction during World War II, 1941-1945
9. Outstanding Road Engineering, 1912-1956

Certainly, other historic themes and contexts can be defined to evaluate the historical significance of roads, but these contexts provide a basis for evaluating roads as roads, rather than as an adjunct to other themes such as tourism, or development of agriculture and mining.

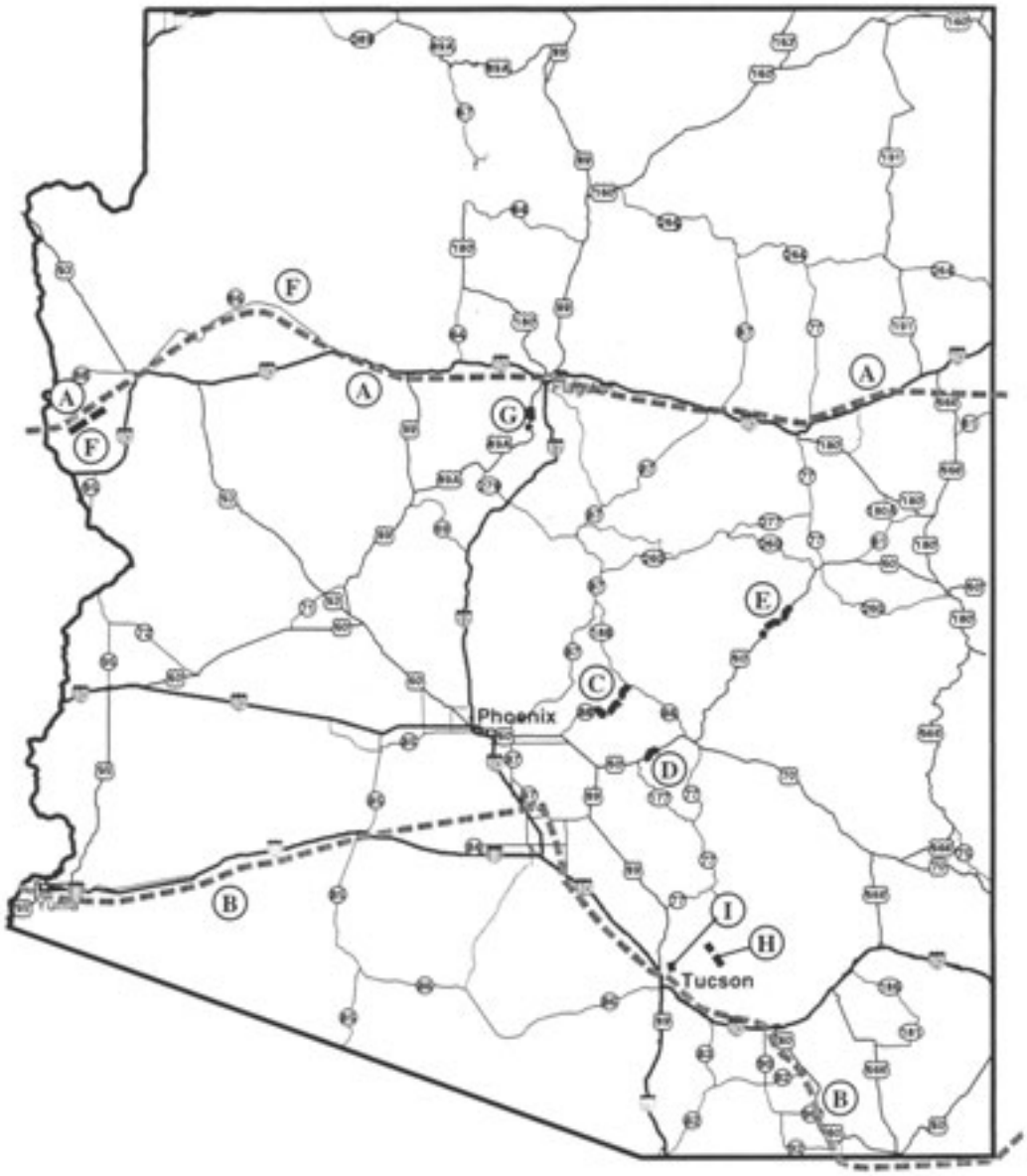
These contexts provide a statewide framework for evaluating the National Register eligibility of roads, under Criteria A, B, and C. Investigation of some roads may have the potential to yield important information and therefore be eligible under Criterion D as well. However, the written documentation of many roads commonly will provide more information than archaeological investigations. Exceptions could include situations where artifacts directly associated with a road may provide important information about the period of significance of a poorly documented road, or where a road is associated with important features that are not well documented.

Roads associated with the first two historic contexts listed above reflect use of non-motorized vehicles. The Beale Wagon Road and Cooke's Wagon Road are the two major nineteenth-century military wagon roads built across Arizona (Figure 50). Reasonably intact sections of these road are likely qualify for listing in the National Register under Criterion A as well as Criterion B. If they retain reasonable integrity, less well known military wagon roads also may qualify for listing, along with privately constructed nineteenth-century toll wagon roads. Wright and others (1997) provide a useful case study for distinguishing character defining segments of the La Grita Toll Road, and those that have lost historic integrity. Segments of important wagon roads may be preserved in Arizona, but they are expected to be uncommon.

The third historic context listed above, territorial highways from 1909 to 1912, reflect efforts that resulted in construction of 243 miles of roads for motorized vehicles during a brief period of time before Arizona achieved statehood. Two highways, known as the North-South and East-West highways, were designated with the goal of connecting Arizona county seats. Very little progress was made in developing the North-South highway. The East-West highway approximated the parts of the alignments of the later U.S. Highways 70 and 80. Because the routes followed by the territorial highways continued to be of crucial importance, the early roads themselves were reconstructed as parts of the subsequent state highway system. Thus, intact segments of the territorial highways, related to the third context listed above, are likely to be rare.

The fourth through eighth historic contexts listed above reflect the state and federal funding programs for highway development. The majority of state and federal highways (excepting interstates) in use in Arizona today are associated with one or more of these historic contexts. The great number of these roads, typically built to very similar standards, creates the problem of determining which of these common types of roads may be worthy of preservation .

Two roads reflecting the context of the state highway system from 1912 to 1939, stand out as important—the Apache Trail and Route 66. They also are distinctive, in part, because of how later usage, as well as public promotion and perhaps even sentimentality, created a special place for these roads in the lore of old Arizona. But more importantly, segments of both roads retain integrity of location, setting, feeling, association, and workmanship with respect to their period of significance. For different reasons, both roads were, at least in part, bypassed when not abandoned by more modern roads, and as a result they retain historic characteristics. The Apache Trail retains good historic integrity along much of its length east of Tortilla Flat as described in Chapter 5. Highway 66 retains similar distinctive features in the vicinity of Gold Road where twists and turns that would never be built today remain in use. Other rural stretches of Highway 66 are less distinctive though some are currently listed on the National Register. Stretches of Highway 66, associated with historic roadside architecture or historic towns, may well be regarded as contributing elements to larger districts or landscapes if they retain sufficient integrity.



[Alignments of the Beale Wagon Toad and Cooke's Wagon Road are Approximate. Other potentially eligible Nineteenth century military and privately built wagon roads are not illustrated.]

A Beale Wagon Road (after Walker and Bufkin 1986:40) (Criteria A and B)
B Cooke's Wagon Road (after Walker and Bufkin 1986:40) (Criteria A and B)
C The Apache Trail, State Route 88 (Criteria A)
D Abandoned Segment of U.S. Highway 60 through Queen Creek Canyon (Criteria C)
E U.S. Highway 60 through Salt River Canyon (Criteria C)
F Route 66 at Gold Road Canyon (Criteria A)
G Old U.S. Highway 79 through Oak Creek Canyon (Criteria C)
H Catalina Highway (Criteria C)
I Miracle Mile (Criteria C)

Figure 50. Some Important Historic Roads in Arizona

The final historic context listed above recognizes that some outstanding engineering accomplishments are likely to be eligible under Criterion C. Five major road engineering accomplishments in Arizona are widely recognized as historically important (refer to Figure 50). They include two stretches of U.S. 60. One is the now abandoned segment through Queen Creek Canyon, partially described in Chapter 5. The other is the in-use segment through the Salt River Canyon, which was one of the first roads where essentially modern heavy road construction technology was employed to build a new highway through very difficult terrain (Figure 51).

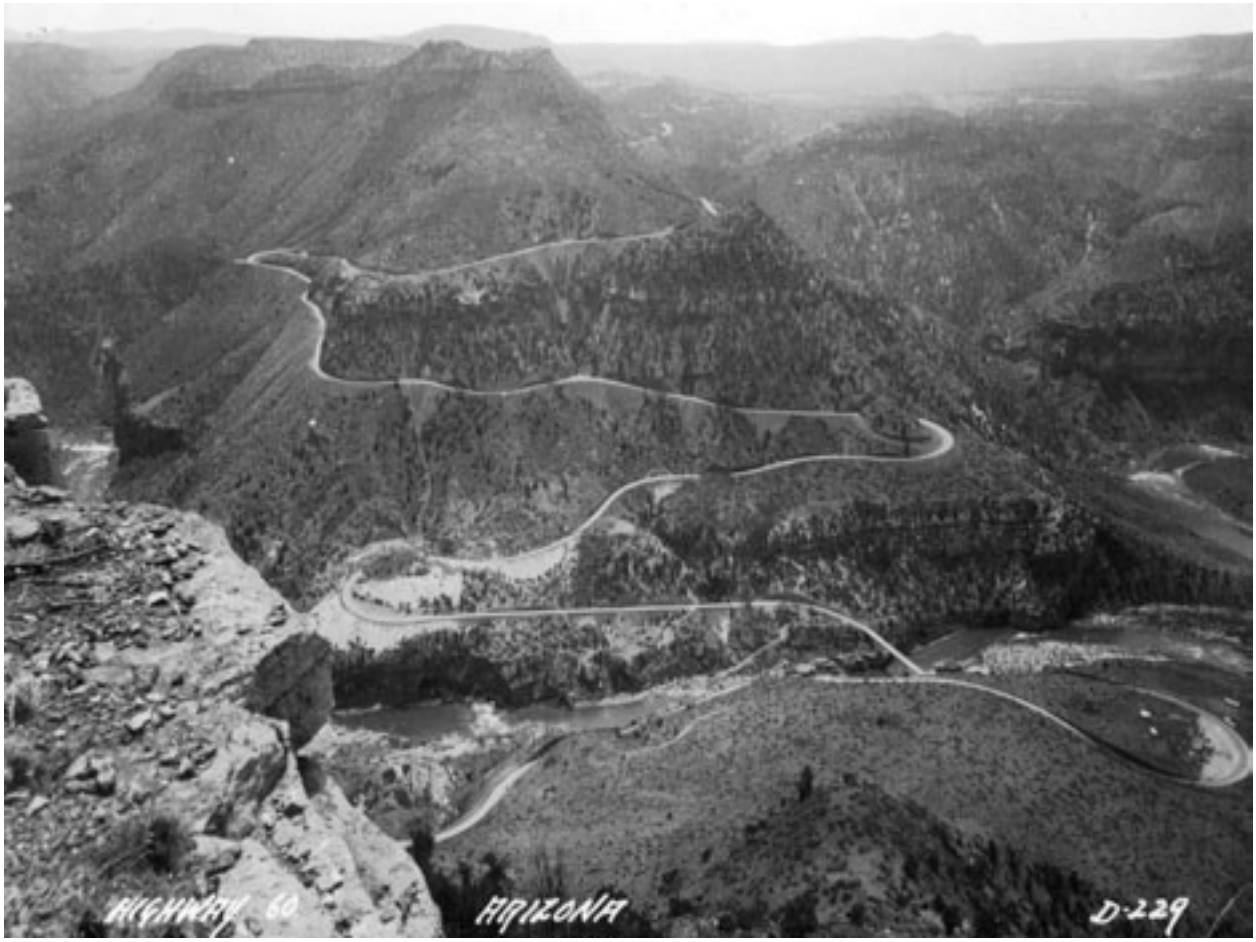


Figure 51. U.S. Highway 60 through the Salt River Canyon, circa 1940

A third major engineering accomplishment is old State Route 79 (now State Route 89A) through Oak Creek Canyon, which also is described in Chapter 5 (Figure 52). The fourth is the Tucson-Mt. Lemmon (Catalina) Highway, another example of construction through extremely difficult terrain (Figure 53). A final somewhat different example of significant engineering—in this case not having to do with difficult terrain, but instead a "first of its kind" design—is the "Miracle Mile" segment of the Tucson-Florence Highway (U.S. Highway 80). This divided highway interchange, built in 1938, was the first to be designed and built in Arizona.

Figure 52. Old State Highway 79 through Oak Creek Canyon, circa 1940

Figure 53. Catalina Highway, circa 1940

HISTORICAL INTEGRITY

It is important to remember that an important historic association is not enough to make an old road eligible for the National Register. In addition to historic significance, a road must retain sufficient integrity of location, setting, design, materials, workmanship, and feeling to convey that significance. Many of the most important transportation corridors in the state are old, and each generation has improved on those roads to meet growing traffic demands and improved safety standards. As a result, many of the most important routes of travel through Arizona have lost their historic integrity because of improvements made over the years.

It is important to verify that a road is in its historical alignment, although it also must be recognized that realignments are an inherent element of the periodic upgrading of roads and do not automatically disqualify a road from National Register eligibility. Other physical characteristics of roads that should be considered include roadway width, vertical and horizontal design, nature of shoulders, roadway surface, associated features such as bridges, culverts, retaining walls, and guard rails. Changes to the landscape also should be considered in assessing the setting and feeling of the road. Chapter 6 provides a more complete discussion of these issues.

THE NEXT STEP

One indication that the evaluation of roads has lost sight of the forest for the trees is the multiple site numbers that have been assigned in the Arizona State Museum numbering system to different parts of the same highway. The museum has worked to impose some order by insisting that a single number be used for a given roadway. Although that strategy forces consideration of a broader context, it does little for the

researcher trying to evaluate a small segment of road within the typically narrow scope of a survey conducted to support Section 106 consultations that must be completed within a month or two.

The programmatic, big picture approach reflected in the November 2002 *Interim Procedures for the Treatment of Historic Roads* is a step in the direction of providing a strategy for dealing with larger preservation strategies as well as treating road segments encountered by individual cultural resource management projects. The *Interim Procedures* are modeled after a Section 106 Programmatic Agreement executed in 2001 by SHPO, Bureau of Reclamation, Salt River Project, and the Advisory Council on Historic Preservation for treatment of the main canals, laterals, and associated features of the historic Salt River Project. The strategy is based on the determination that the entire system is eligible for the National Register, and simultaneous recognition that it is not reasonable to try to stop maintenance and upgrading of all aspects of the functioning canal system to preserve all historic character-defining elements in place. A program for documenting the history and physical characteristics of the various elements is pursued to mitigate future modifications of the system as ongoing urbanization continues to transform the once rural landscape it served. Most small, routine projects affecting the system are expeditiously "cleared" without any requirement for additional treatment. The task of selecting which elements of the system warrant preservation in place and then working to preserve those elements is ongoing.

Similarly, the *Interim Procedures for the Treatment of Historic Roads* is based on the determination that the all in-use and abandoned segments of the "Historic State Highway System" (specifically excluding bridges and interstate highways) developed between 1912 and 1955 are eligible for the Arizona Register of Historic Places (without criteria being specified) and for the National Register under Criterion D. The two exceptions are Route 66 and the Apache Trail ("crown jewels"), which are considered eligible for the National Register under Criterion A. Projects that would not affect the location or function/design of elements of the system would be evaluated as having no adverse effect. If such projects affected any related roadway features (such as culverts, headwalls, and perhaps cuts and fills), they would be documented simply with black-and-white photographs and a tabular summary of their physical attributes. These procedures will expeditiously "clear" many routine maintenance and minor upgrade projects. Proposed projects that would affect the location or function/design of an element of the Historic State Highway System would result in determinations of adverse effect, and Section 106 procedures for addressing such effects would need to be followed.

Development of a Section 106 Programmatic Agreement to more formally define procedures will need to address how other potential "crown jewels" will be identified, and the nature of the historic documentation that will need to be developed. It is likely that the ADOT historic preservation program will be compiling narrative histories and documentation of all the major highways of the state system.

As this study evolved it came to focus on the state highways. The *Interim Procedures for the Treatment of Historic Roads* addresses those roads, but there are many tribal, forest, local government, and informal or private roads on Arizona's landscape that are not addressed. The adoption of a more holistic approach for the state highway system has established a model for dealing with these other types of roads, and the procedures specifically allude to the relatively simple photographic and tabular documentation of roadway features as an acceptable treatment for effects on roads other than the state highway system.

At the other end of the spectrum, much of the interstate system is now approaching 50 years of age and State Historic Preservation Offices across the country are realizing that interstate highways warrant historic evaluation. That challenge may even instigate a more coherent national perspective for dealing with historic roads.

In closing, we are reminded that the American Association of State Highway Officials was founded in 1914 to "bring some sense to the every-which-way condition of highway construction" (Scott and Kelly 1988:13). That goal was achieved, and we are hopeful that further studies can build on this overview to bring more sense to the every-which-way of evaluating the historic values of roads.

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PHOTO CREDITS

Figure

Cover. Norman Wallace, photographer. Courtesy Arizona Department of Transportation.

1. Information compiled from Bourne 1995:114-115; Federal Highway Administration 1976:241; and Liebs 1985:17-20.
2. Photograph courtesy of the Arizona Historical Society, Tucson, AHS #58,714.
3. Originally published by *Life Magazine* on October 17, 1907 (Volume L, No. 1303). The illustration is signed "S. M. Flagg." Melissa Keane collection.
4. Originally published by *Life Magazine* on January 8, 1925. The illustration is signed "fge." Melissa Keane collection.
5. Yorke and Margolies 1996.
6. *Road Map of Arizona* (Arizona Highway Department 1939).
7. Photograph courtesy of the Arizona Historical Society, Tucson, AHS #47,670.
8. Information compiled from Walker and Bufkin 1986, and Cook 1989.
9. Postcard published by Brown's News Stand, Flagstaff, Arizona; printed by the Albertype Co., Brooklyn, N.Y. Melissa Keane collection.
10. Photograph courtesy of the Arizona Historical Society/Tucson, AHS #42,679
11. Maps compiled from *Map of Arizona* (*Arizona Highways* 1912)*; Mileage Map of the Best Roads of Arizona Showing Paved Roads [and] Road Distances* (Clason Map Company 1923?); *and Road Map of Arizona* (Arizona Highway Department 1939).
12. Postcard published by Brisley Drug Co., Prescott, Arizona; printed by the Albertype Co., Brooklyn, N.Y. Melissa Keane collection.
13. Photograph courtesy of the Arizona Historical Society, Tucson, AHS #27,212. The text in the lower left corner reads, "View between Globe and Phoenix on Ocean to Ocean highway, copyright by [M]eriwether, 1912." Henry B. Meriwether operated a photography studio in Globe circa 1909-1913 (Rowe 1997:93).
14. Postcard published by Harry Harz, Phoenix, Arizona; printed by Curt Teich Co., Chicago. The text on the reverse of the postcard reads, "The Gillespie Dam on the Gila River, southwest of Phoenix diverts waters of the Gila River to several thousand acres below. Up to a very short time ago, automobile travel on the Phoenix-Yuma highway crossed the Gila River on the concrete apron of this dam, a unique experience for the tourist. Completion of a modern steel bridge spanning the river below the dam has improved the highway and eliminated this thrill." Melissa Keane collection.
15. Real photo postcard published by Frasher's, Inc., Pomona, California, circa 1930. Melissa Keane collection.
16. Postcard published by Harry Herz, Phoenix, Arizona; printed by Curt Teich Co., Chicago. The text on the reverse of the postcard reads, "A wonderful mountain highway through a region of mighty rock masses, towering cliffs, and deep canyons, the short route, Globe, Miami, Superior to Phoenix, a distance of 80 miles." Melissa Keane collection.
17. Postcard published by Harry Herz, Phoenix, Arizona; printed by Curt Teich Co., Chicago. The caption under the image reads, "Crossing the American Sahara near Yuma, Arizona." Melissa Keane collection.
18. Norman Wallace, photographer. Courtesy of the Arizona Department of Transportation.
19. Norman Wallace, photographer. Courtesy of the Arizona Historical Society, Tucson, AHS #44.
20. Postcard published by Lollesgard Specialty Co., Tucson, Arizona; printed by Curt Teich Co., Chicago. The caption on the reverse reads, "Splendid modern highways, which pierce every part of the state of Arizona, makes driving safe and all points of interest, both desert and mountains, accessible." Melissa Keane collection.
21. Originally published in *Life Magazine* in 1955, this famous image of Highway 66 has been widely reproduced, here on a postcard. Melissa Keane collection.

25-26, 28-29, 31-35, 38-41, 46-49. Photographs by Melissa Keane.

51. Real photo postcard published by The L. L. Cook Company, Milwaukee. Caption on photo reads, "Highway 60, Arizona, D-229." Melissa Keane collection.
52. Real photo postcard, no publisher indicated. Caption on photo reads, "Oak Creek Highway 79." Postage indicia reads, "Albuquerque, N. Mex., Feb 27, 1937." Melissa Keane collection.
53. Real photo postcard, no publisher indicated. Caption on photo reads, "Hitchcock Highway—near Summerhaven—on Mt. Lemmon, Arizona, 6-x-371." Melissa Keane collection.

APPENDIX A
MAPS OF THE ARIZONA STATE HIGHWAY SYSTEM, 1914-1946

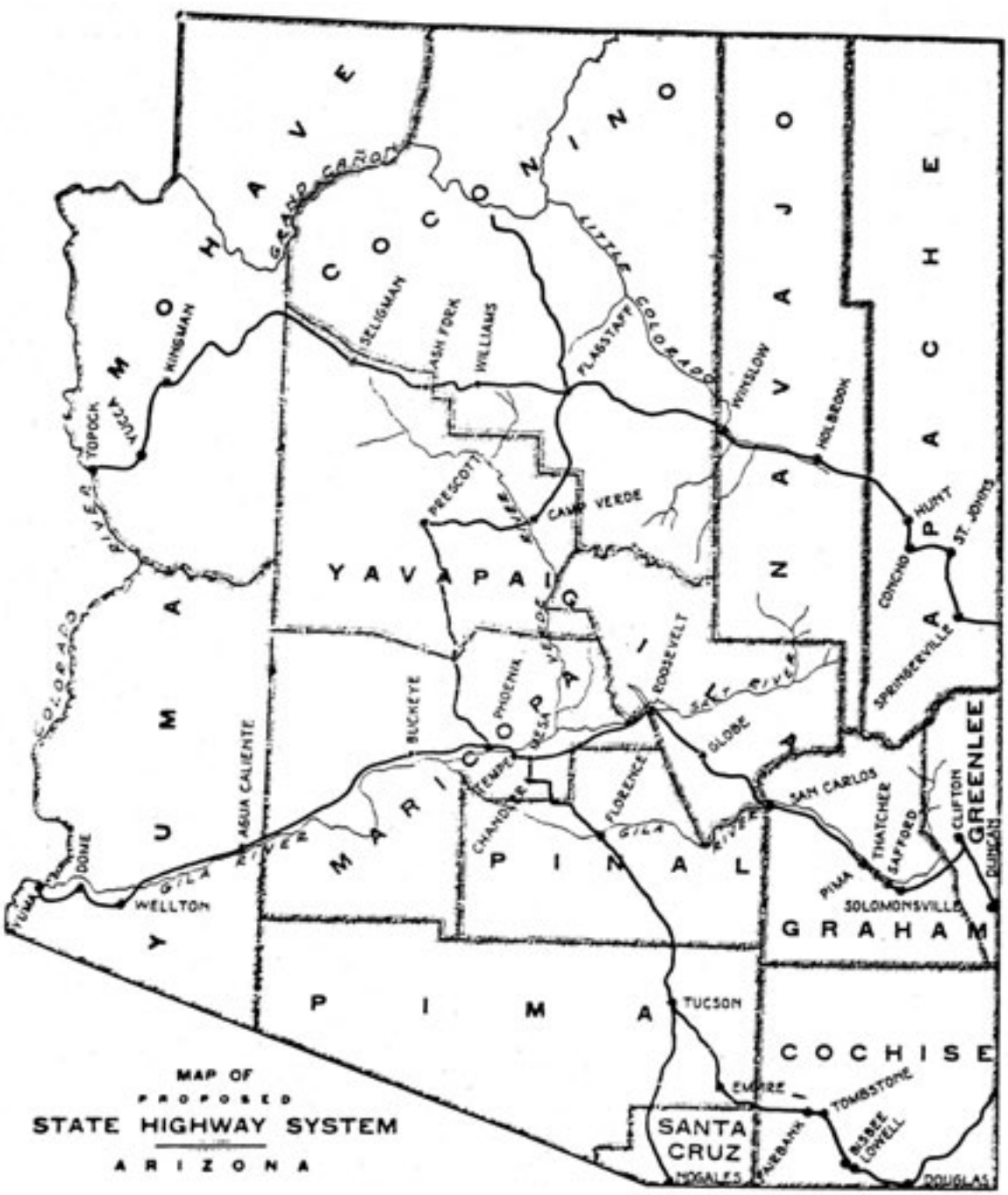


Figure A-1: Proposed State Highway System, 1914
Source: State Engineer 1914

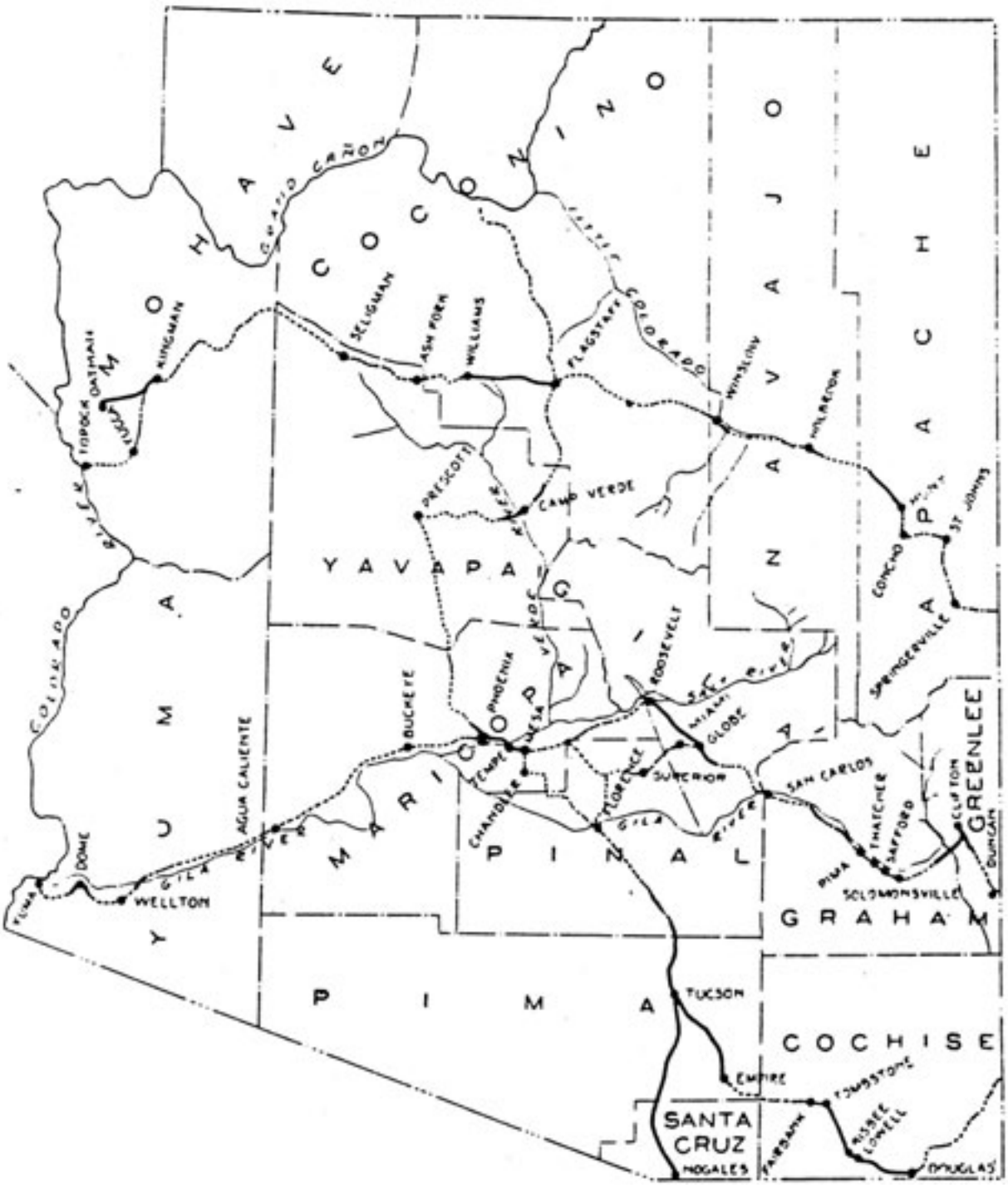


Figure A-2: State Highway System, 1918
Source: State Engineer 1918

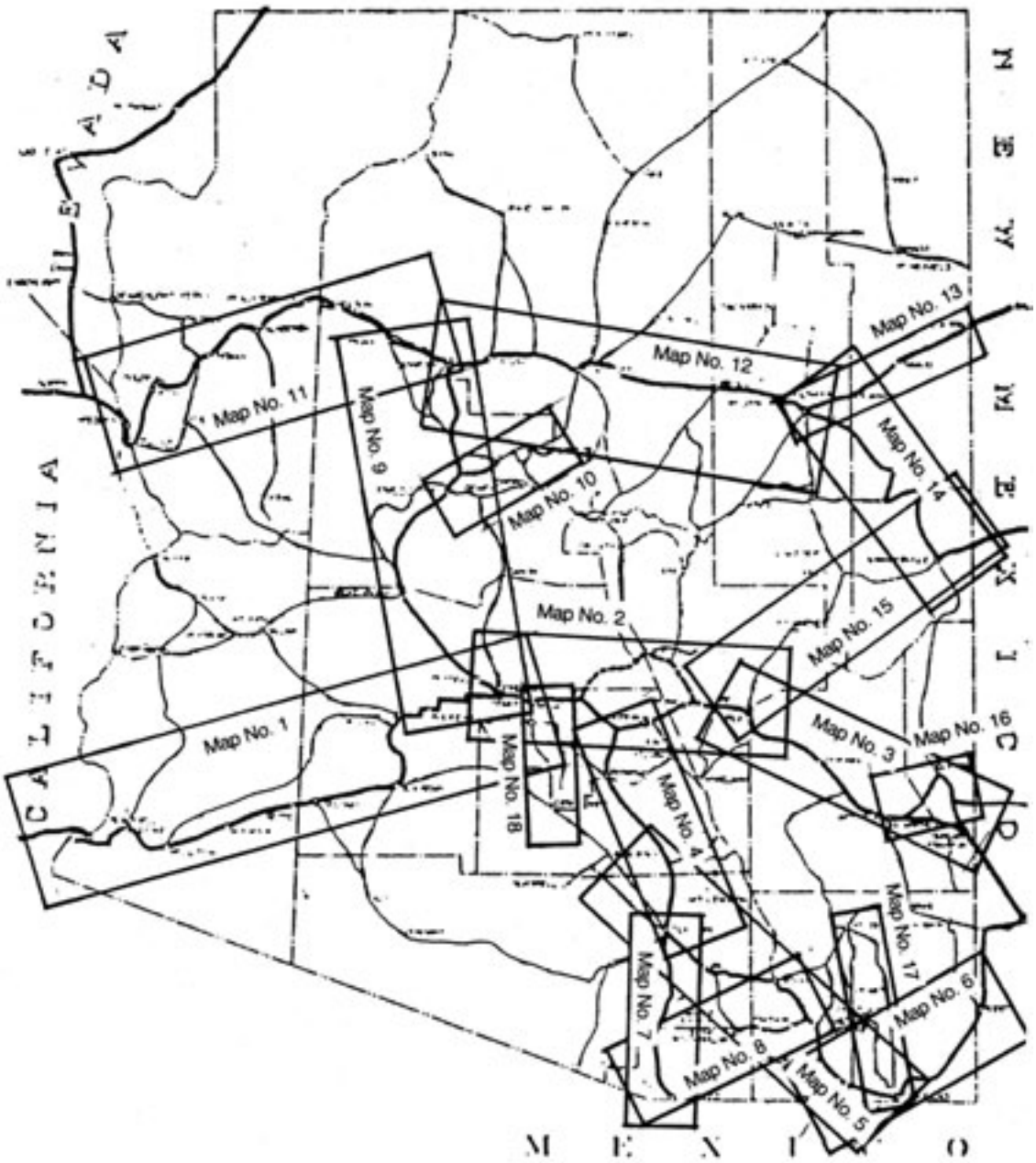


Figure A-3.0: State Highway System, 1924
(index to maps on Figures A-3.1 to A-3.18)
Source: State Engineer 1924

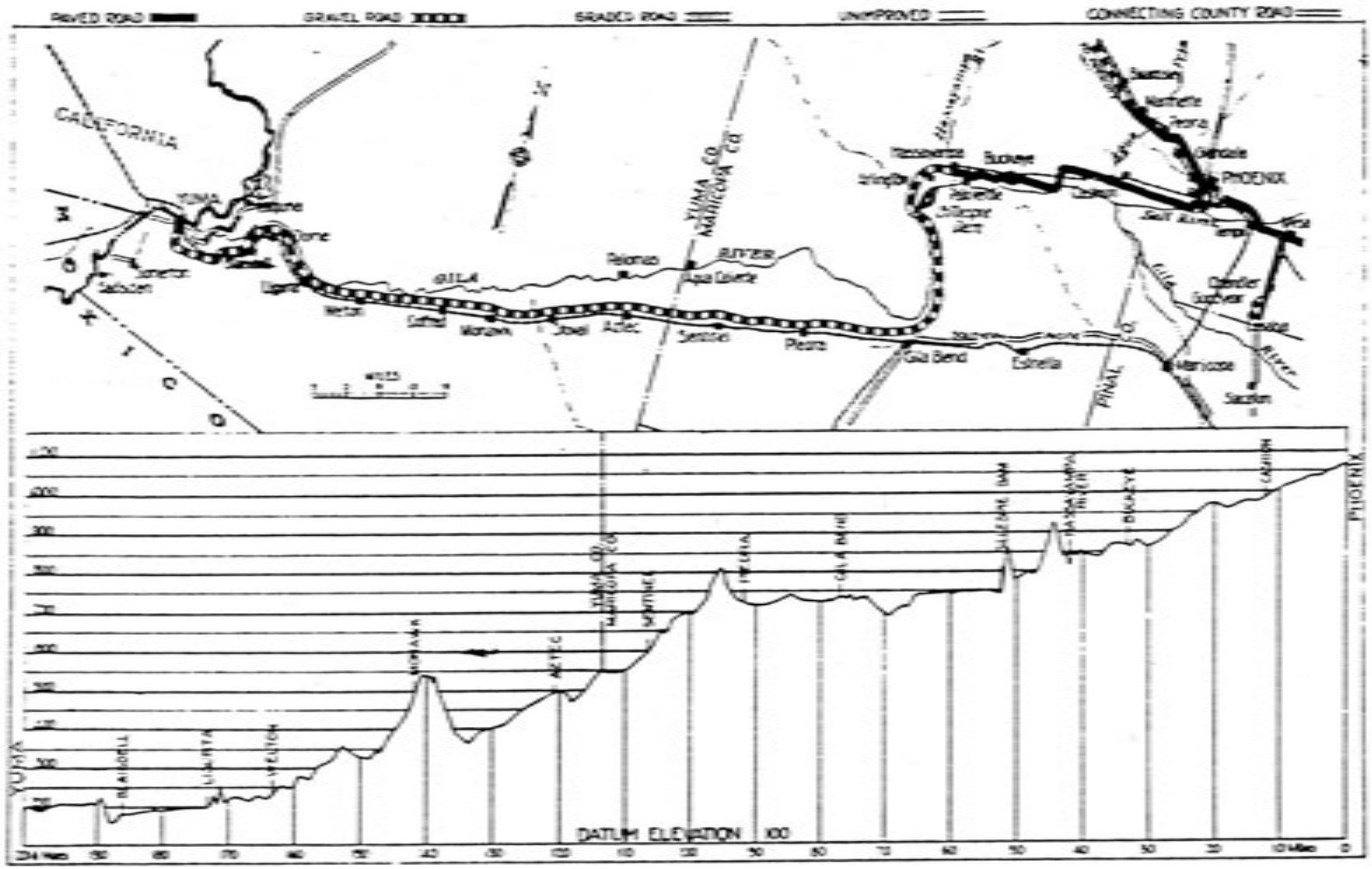


Figure A-3.1: Map No. 1, Yuma-Phoenix Highway, 1924
Source: State Engineer 1924

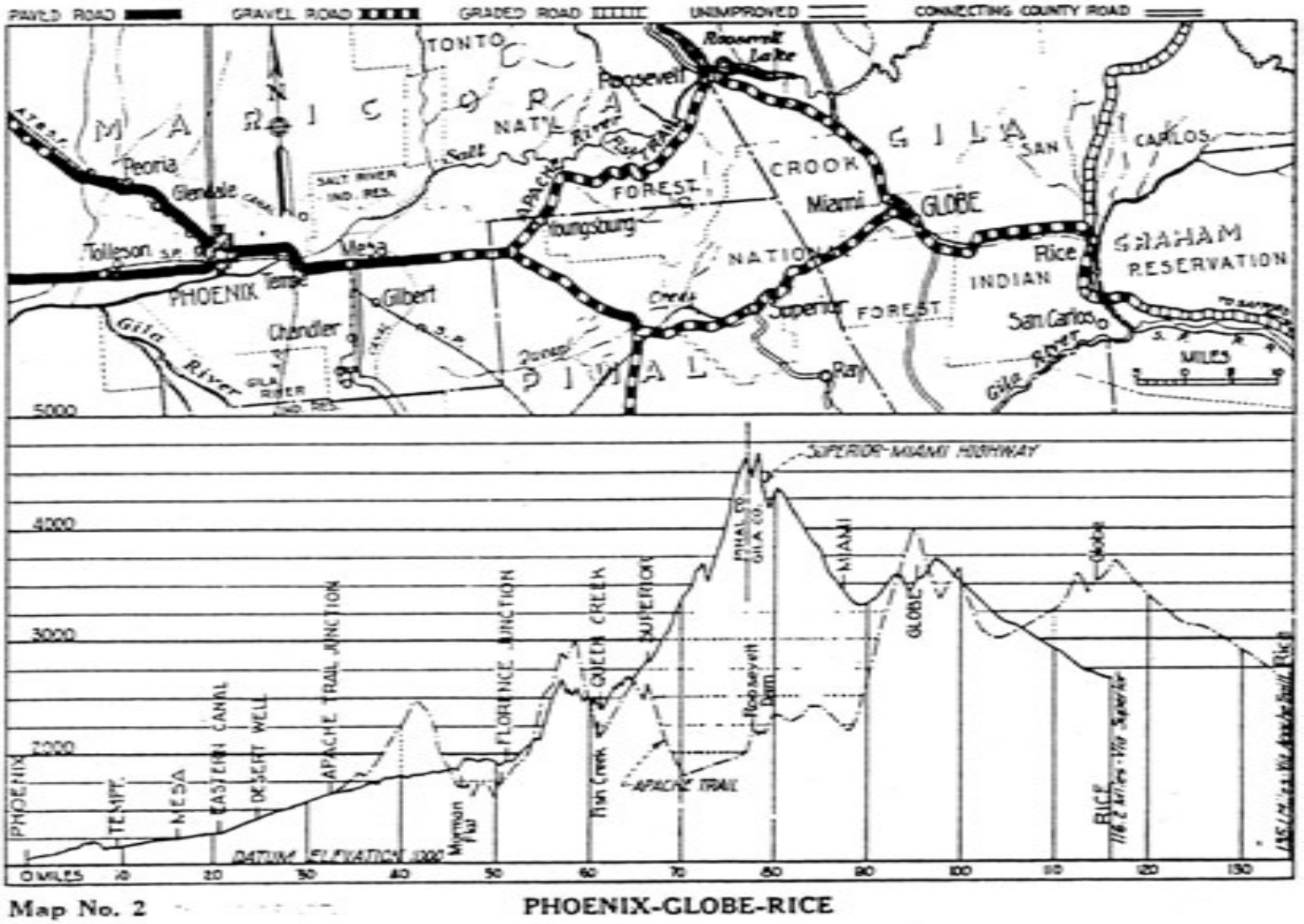


Figure A-3.2: Map No. 2, Phoenix-Globe-Rice Highway, 1924
Source: State Engineer 1924

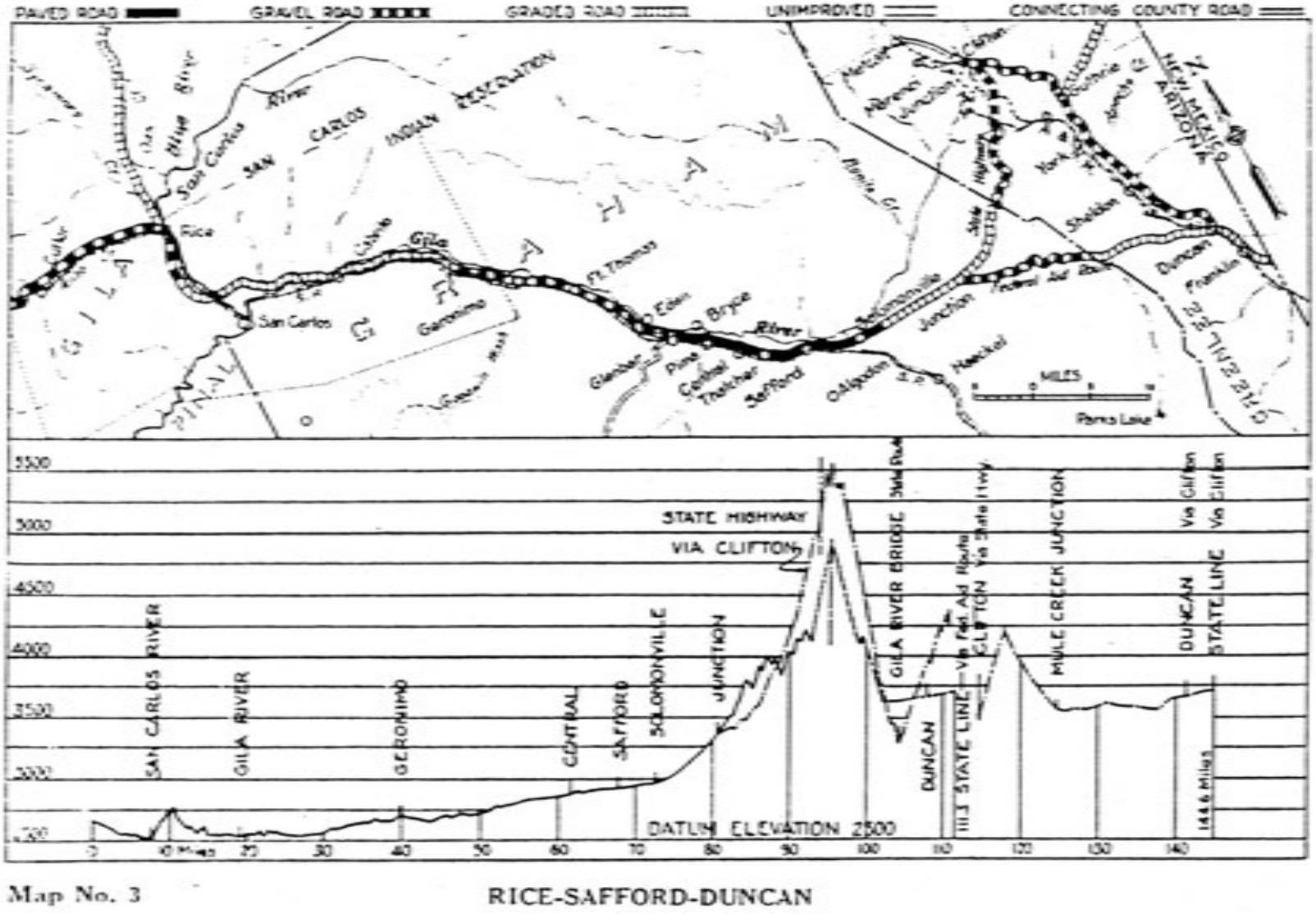


Figure A-3.3: Map No. 3, Rice-Safford-Duncan Highway, 1924
Source: State Engineer 1924

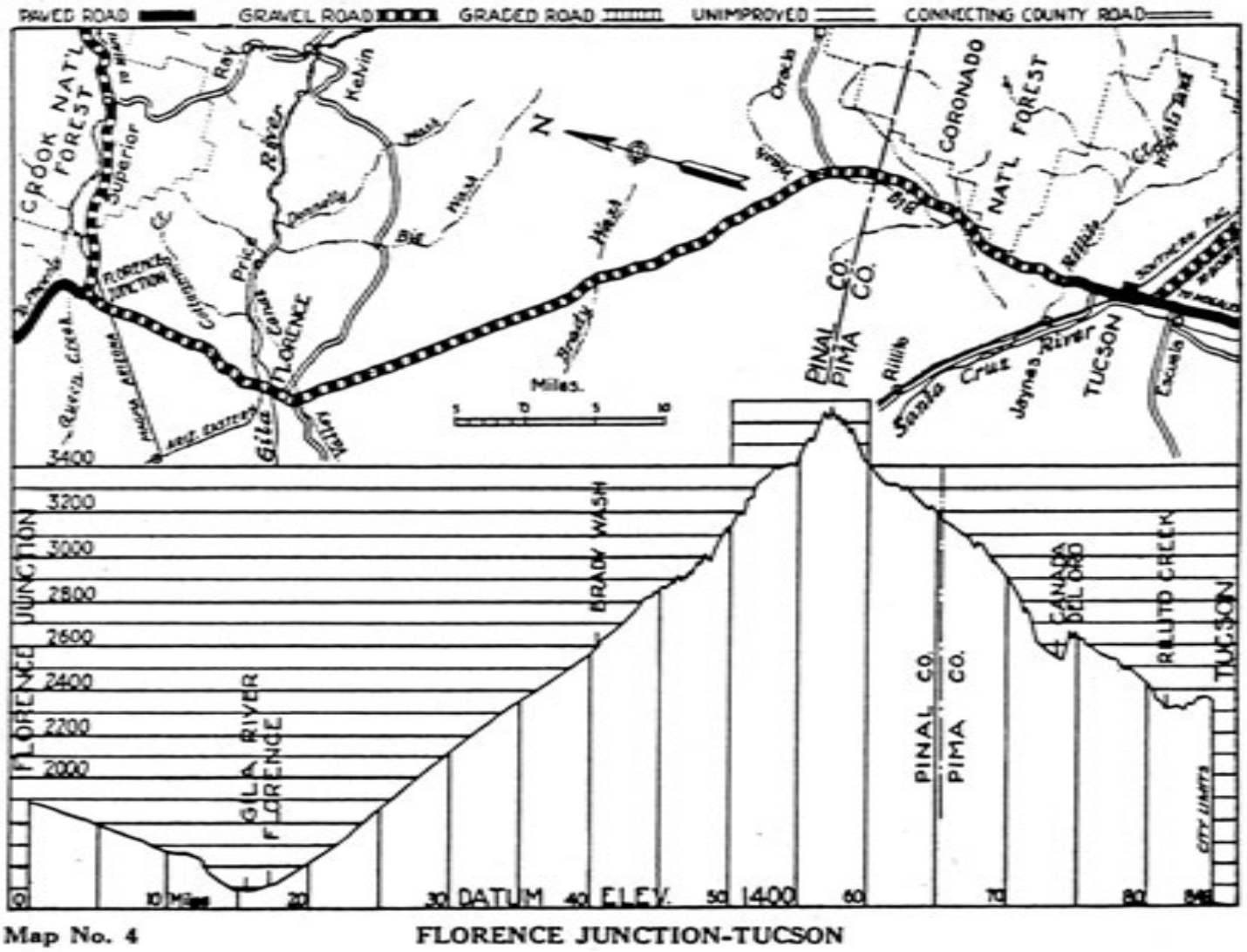


Figure A-3.4: Map No. 4, Florence Junction-Tucson Highway, 1924
Source: State Engineer 1924

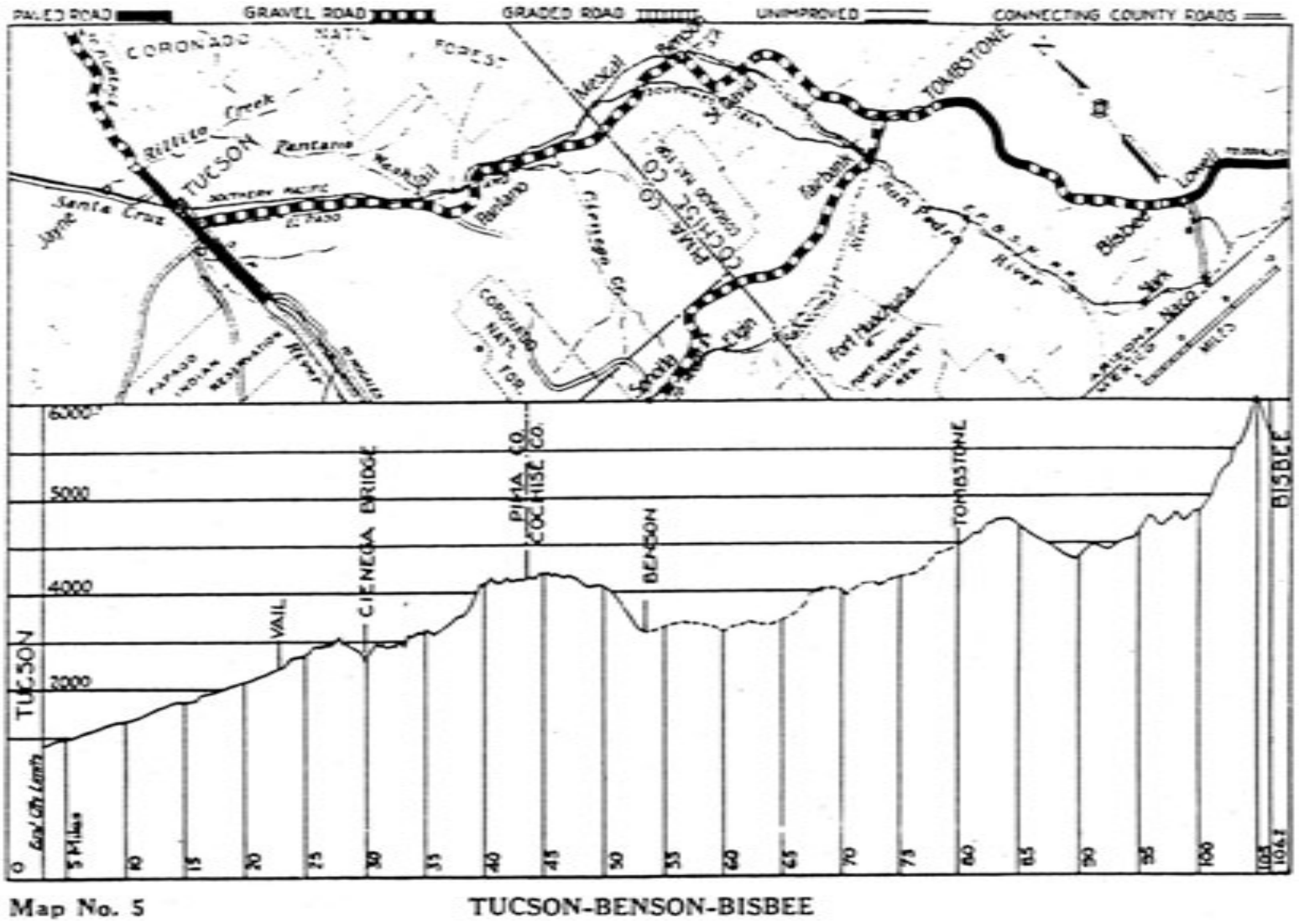


Figure A-3.5: Map No. 5, Tucson-Bisbee-Benson Highway, 1924
Source: State Engineer 1924

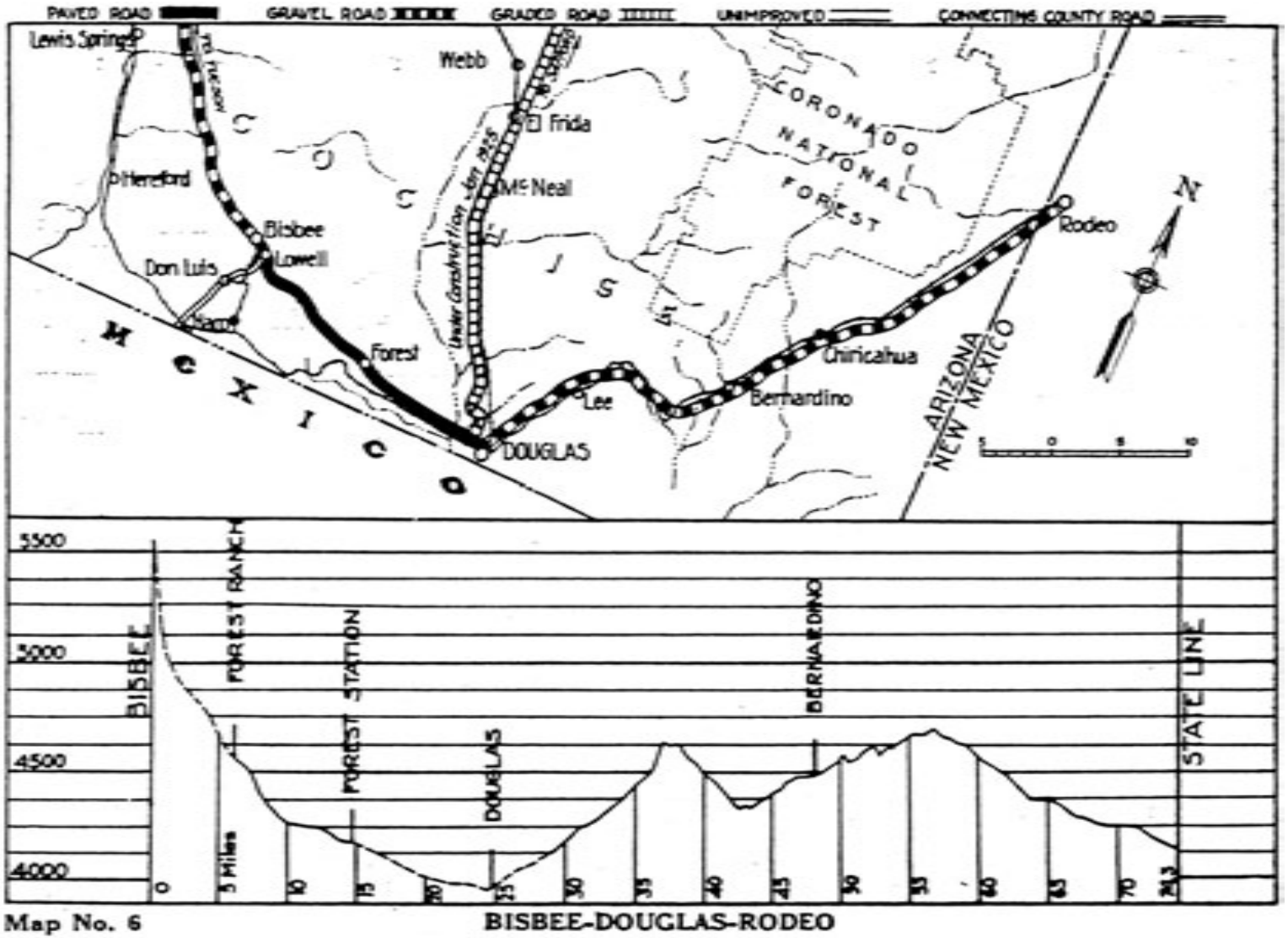


Figure A-3.6: Map No. 6, Bisbee-Douglas-Rodeo, New Mexico Highway, 1924
Source: State Engineer 1924

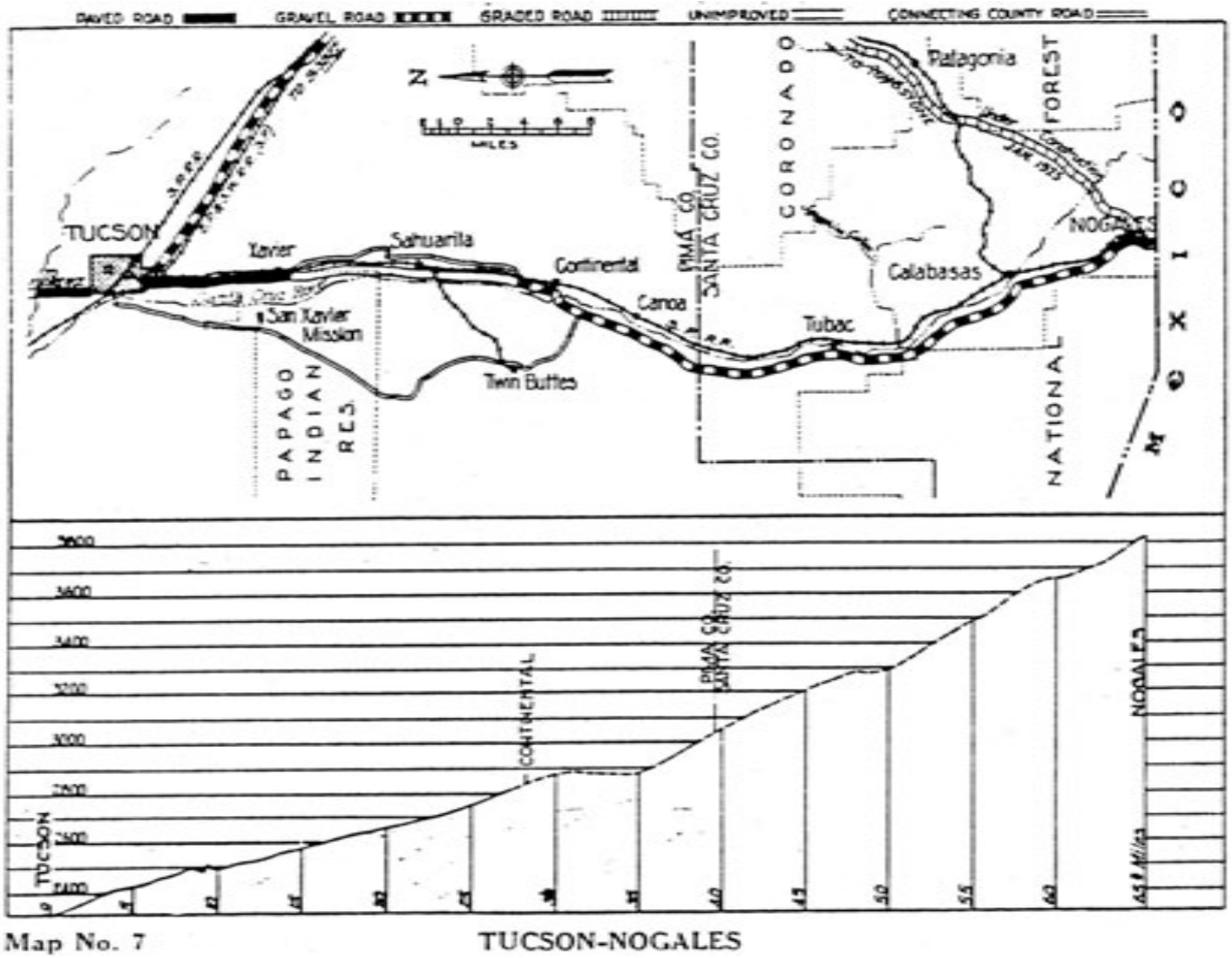
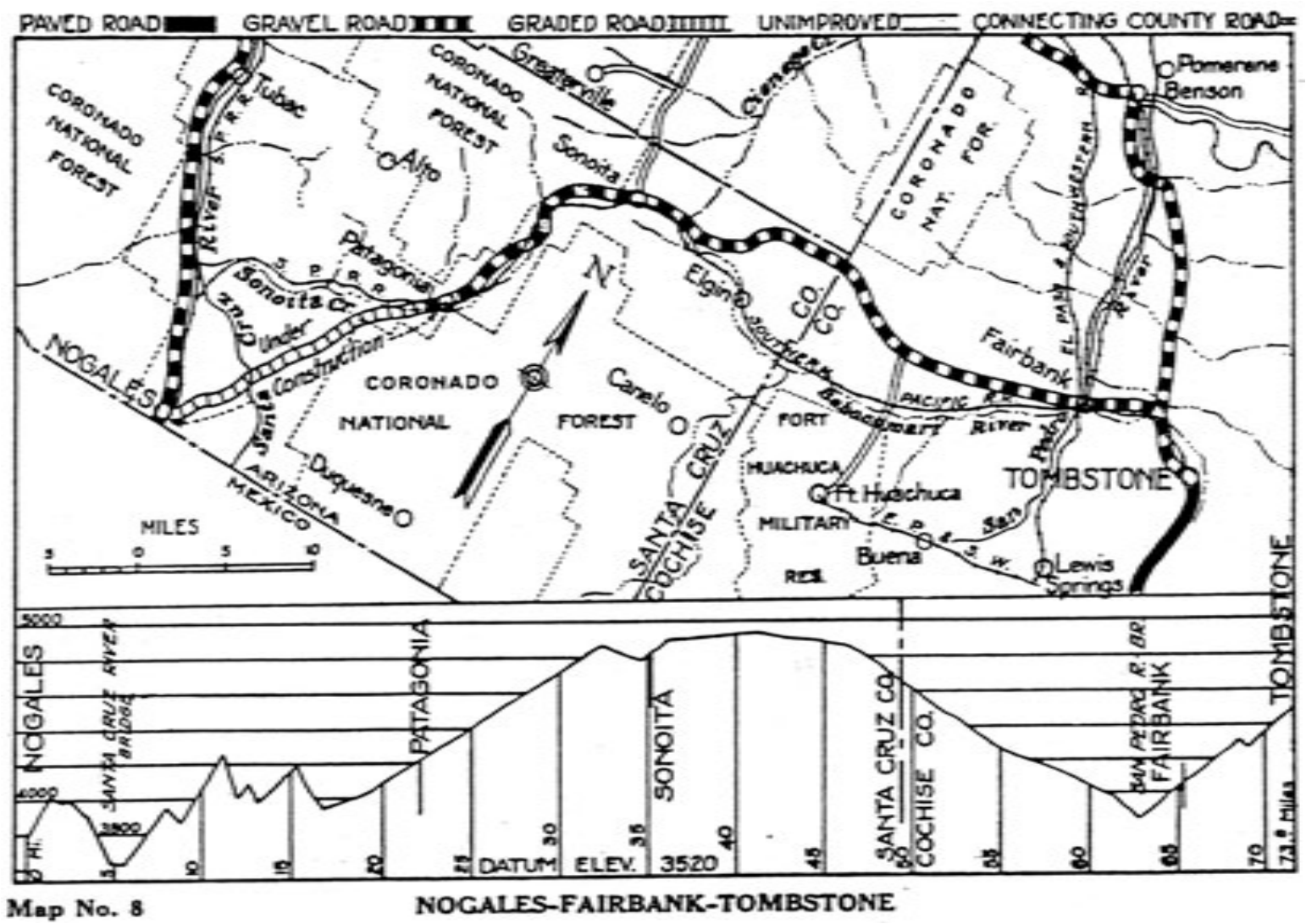
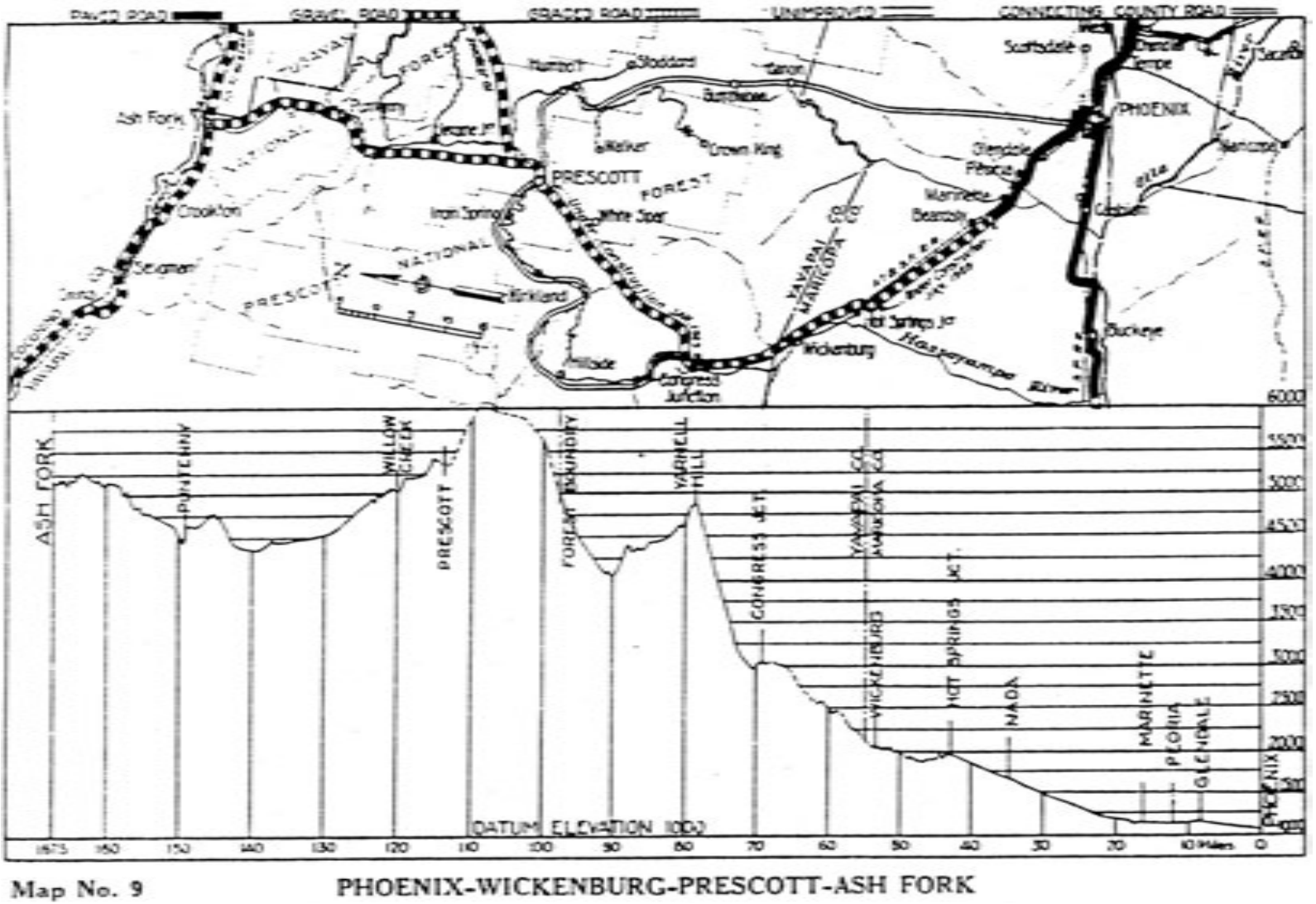


Figure A-3.7: Map No. 7, Tucson-Nogales Highway, 1924
Source: State Engineer 1924



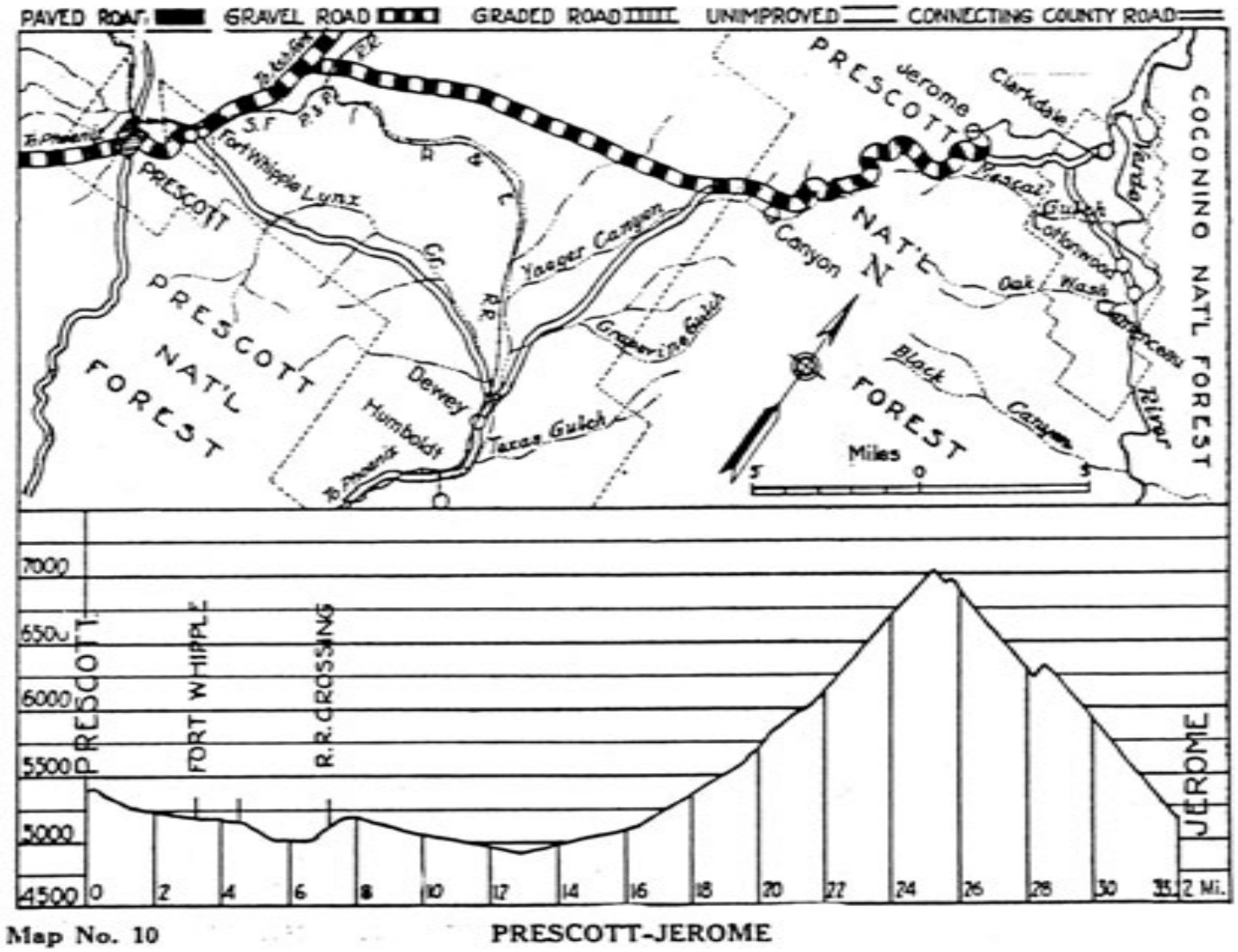
Map No. 8 NOGALES-FAIRBANK-TOMBSTONE

Figure A-3.8: Map No. 8, Nogales-Fairbank-Tombstone Highway, 1924
Source: State Engineer 1924



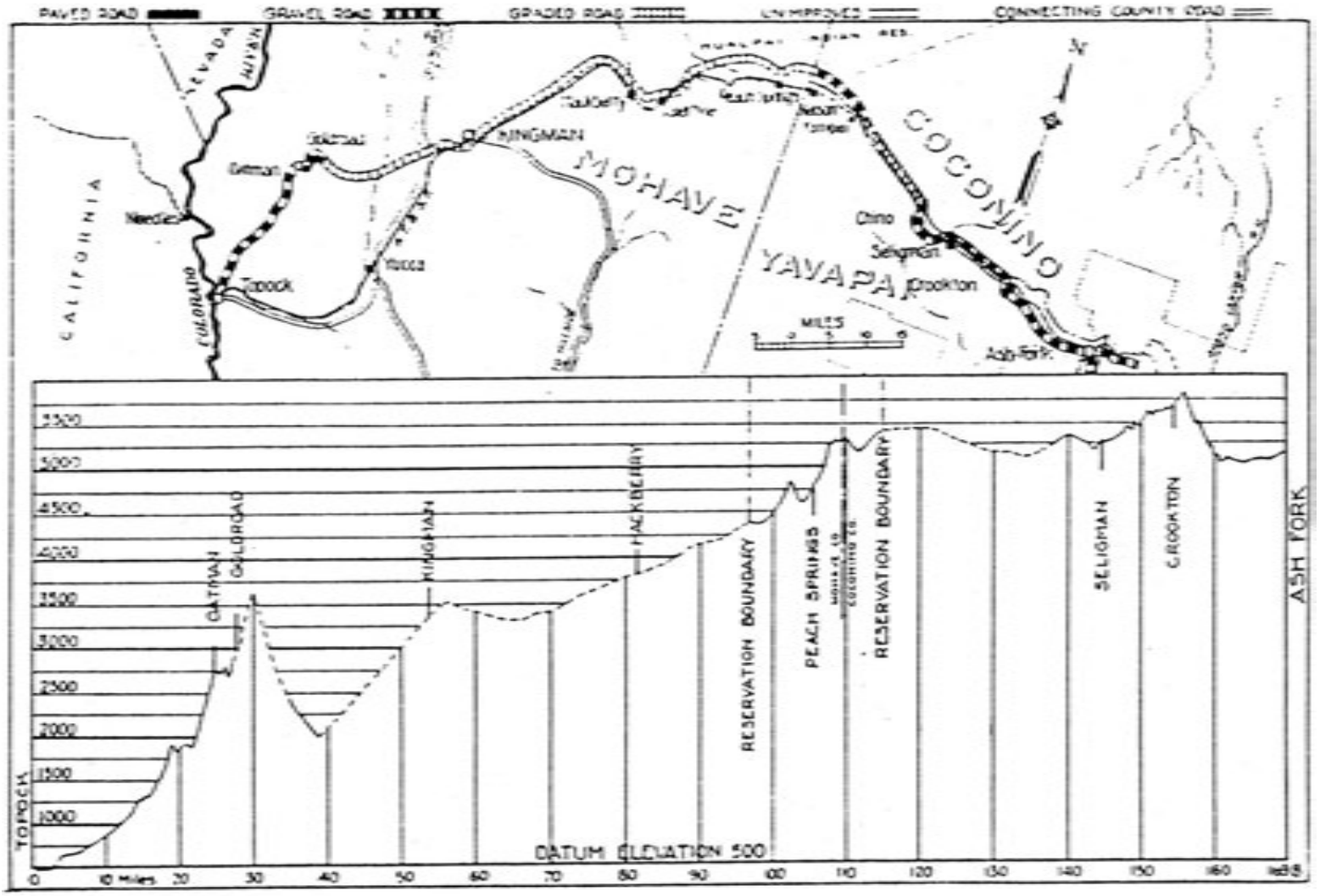
Map No. 9 PHOENIX-WICKENBURG-PRESCOTT-ASH FORK

Figure A-3.9: Map No. 9, Phoenix-Wickenburg-Prescott-Ash Fork Highway, 1924
Source: State Engineer 1924



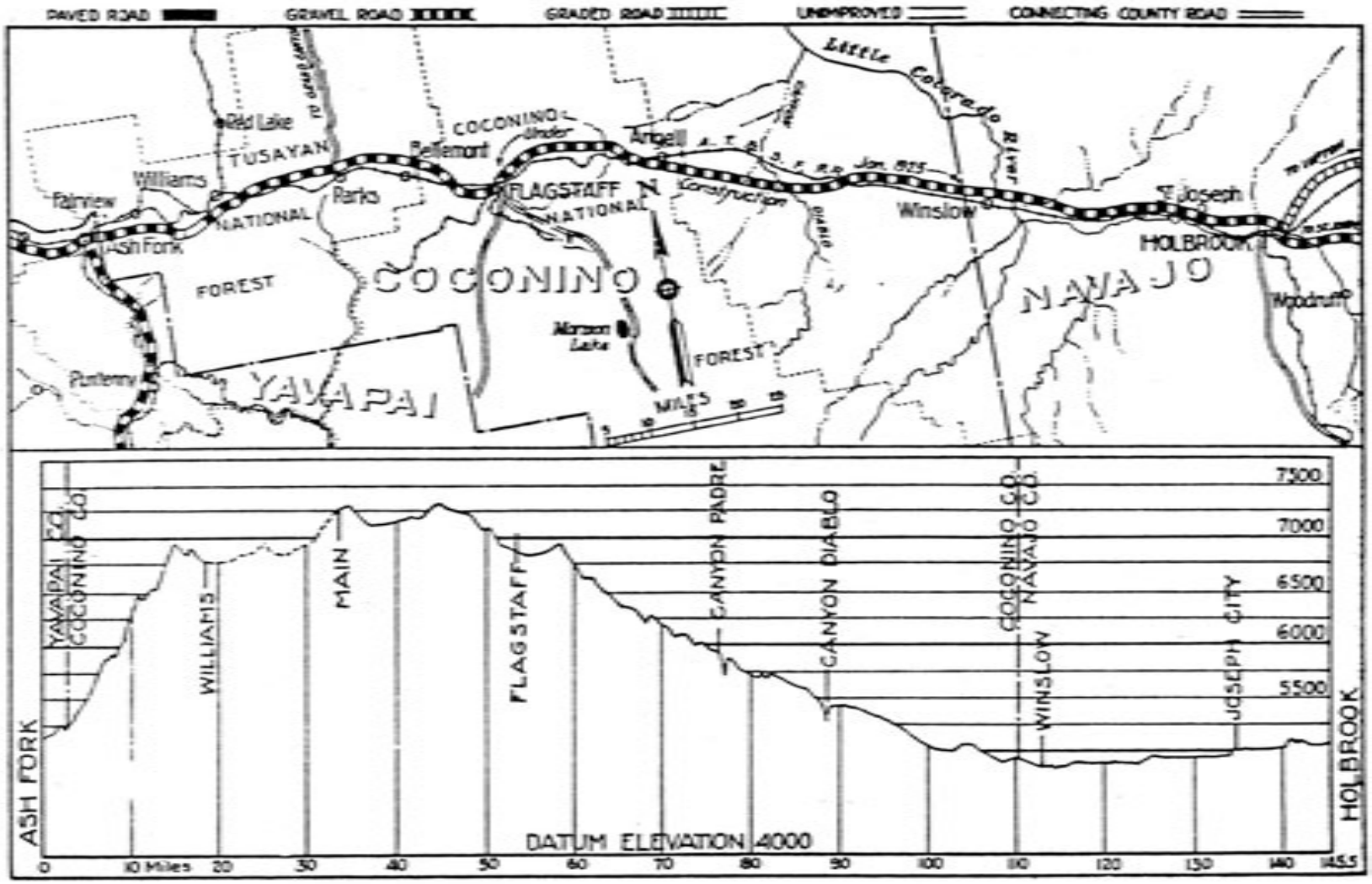
Map No. 10 PRESCOTT-JEROME

Figure A-3.10: Map No. 10, Prescott-Jerome Highway, 1924
Source: State Engineer 1924



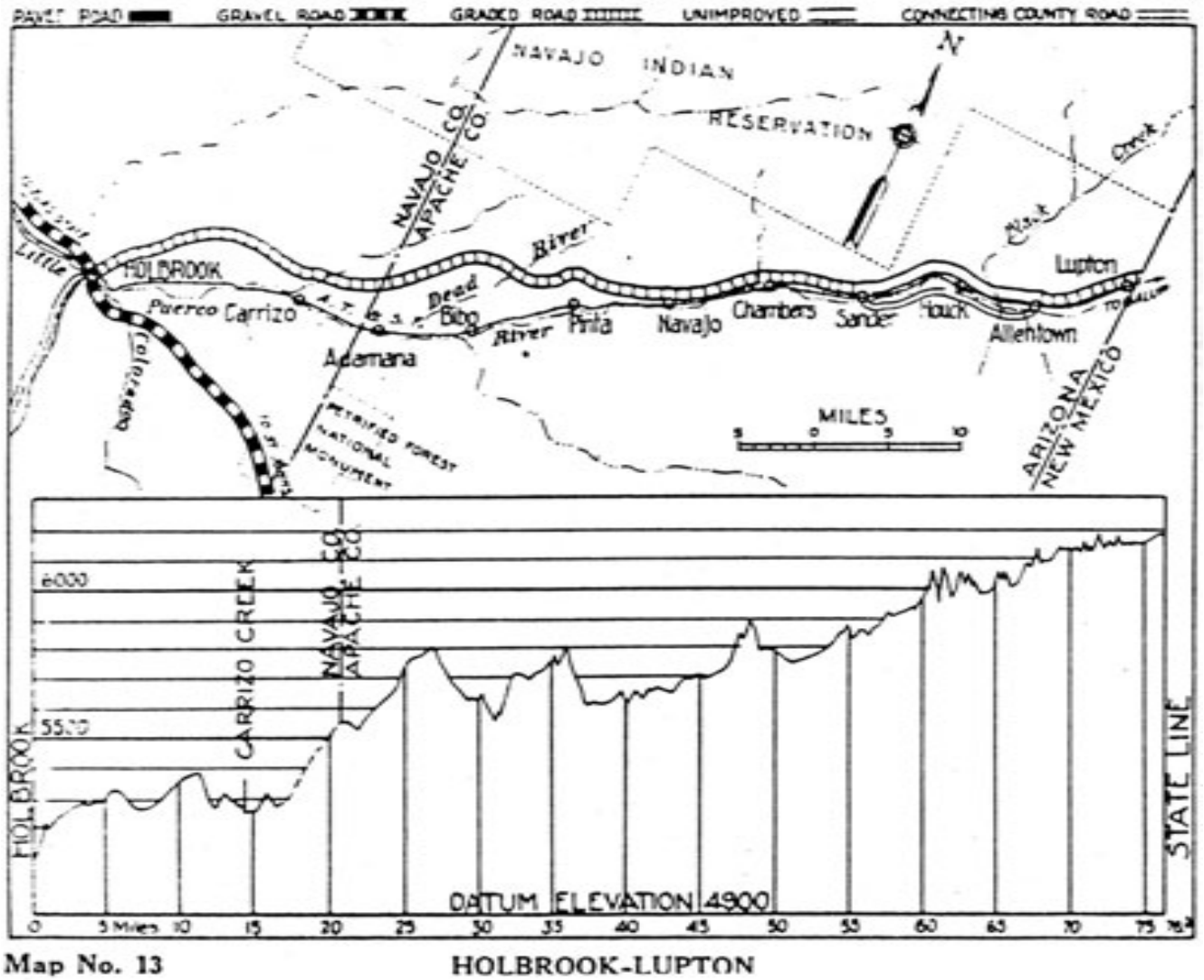
Map No. 11 TOPOCK-KINGMAN-ASH FORK

Figure A-3.11: Map No. 11, Topock-Kingman-Ash Fork Highway, 1924
Source: State Engineer 1924



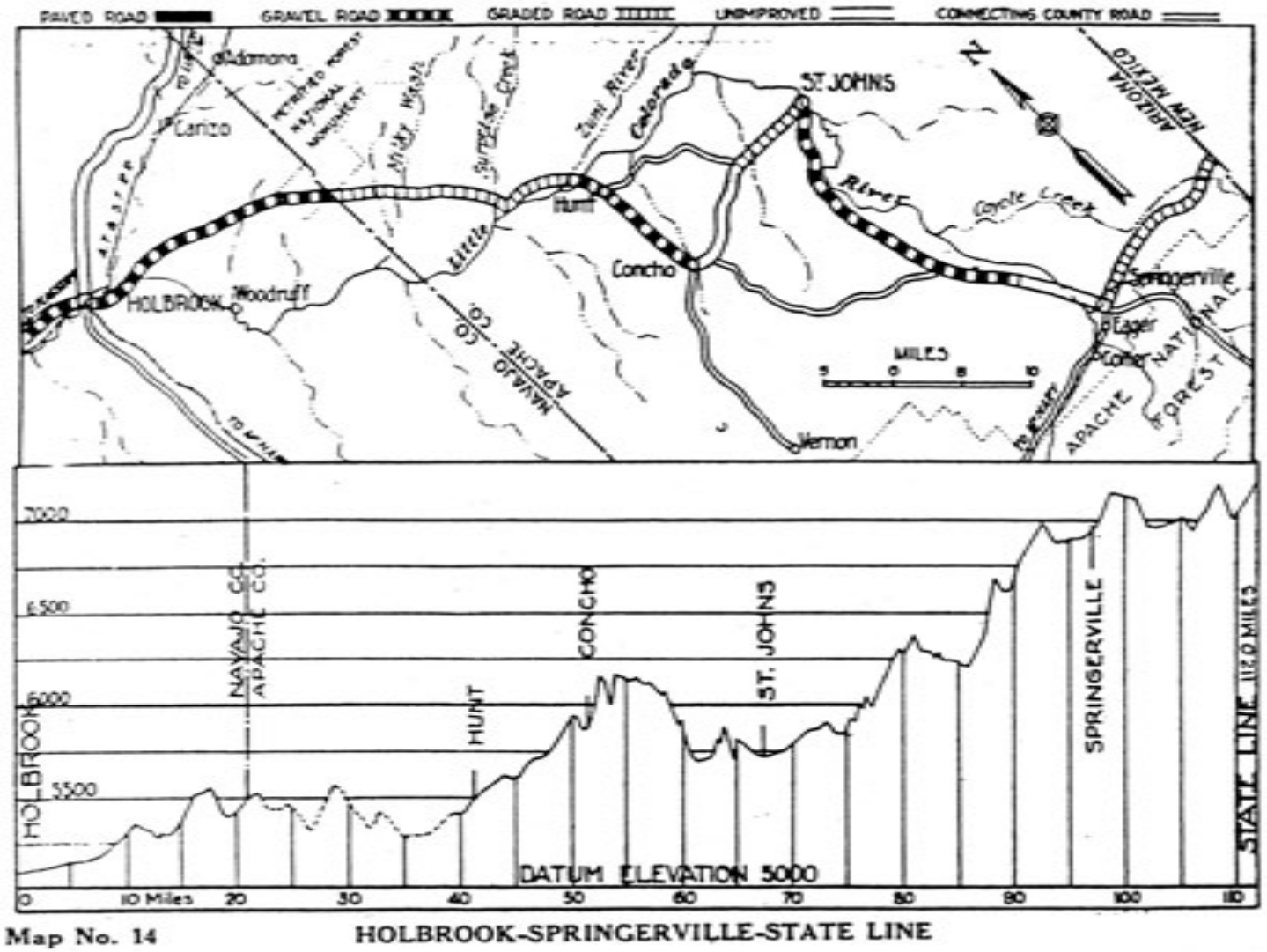
Map No. 12 ASH FORK-FLAGSTAFF-WINSLOW-HOLBROOK

Figure A-3.12: Map No. 12, Ash Fork-Flagstaff-Winslow-Holbrook Highway, 1924
Source: State Engineer 1924



Map No. 13 **HOLBROOK-LUPTON**

Figure A-3.13: Map No. 13, Holbrook-Lupton Highway, 1924
Source: State Engineer 1924



Map No. 14 HOLBROOK-SPRINGERVILLE-STATE LINE

Figure A-3.14: Map No. 14, Holbrook-Springerville-New Mexico State Line Highway, 1924
Source: State Engineer 1924

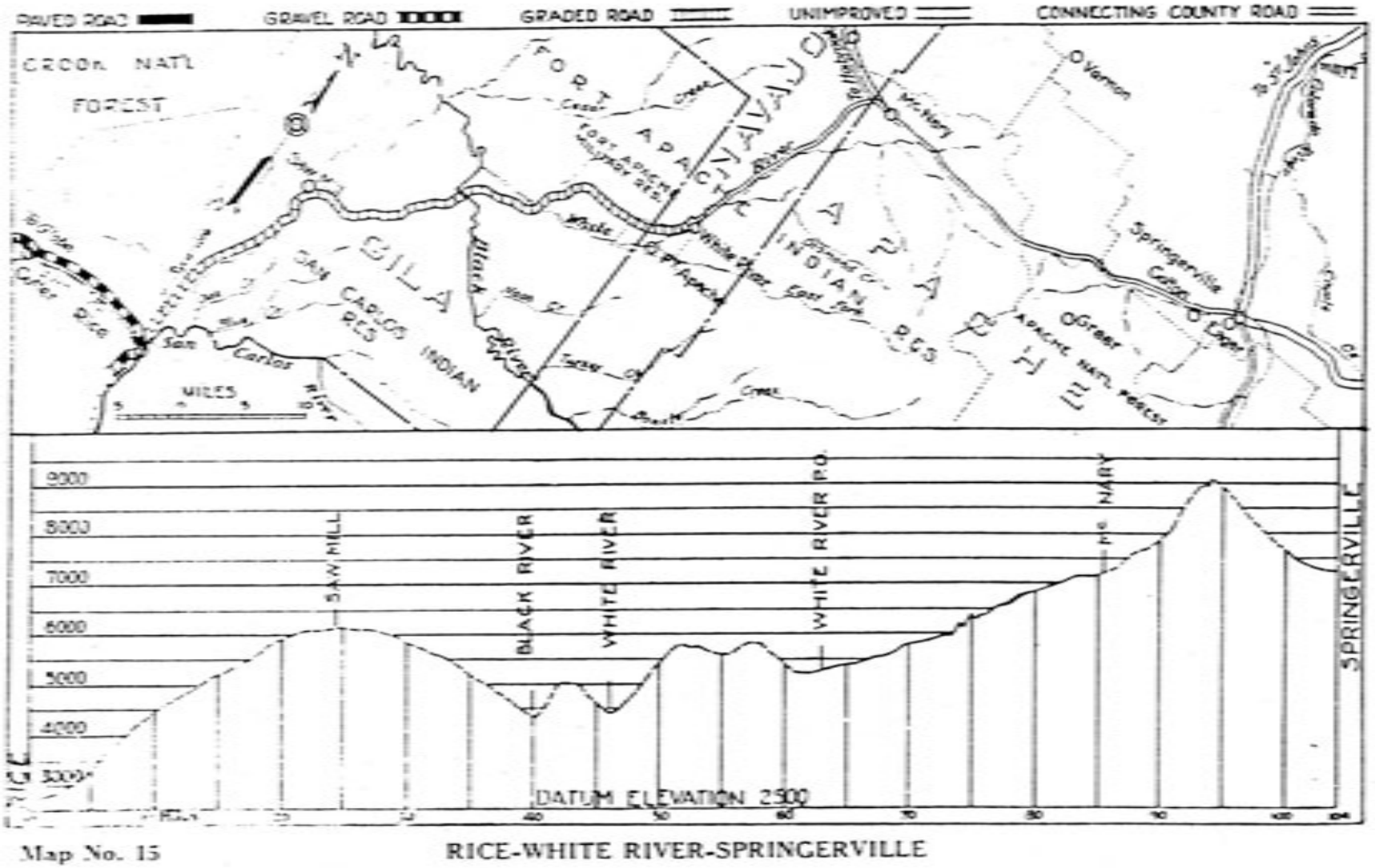


Figure A-3.15: Map No. 15, Rice-White River-Springerville Highway, 1924
Source: State Engineer 1924

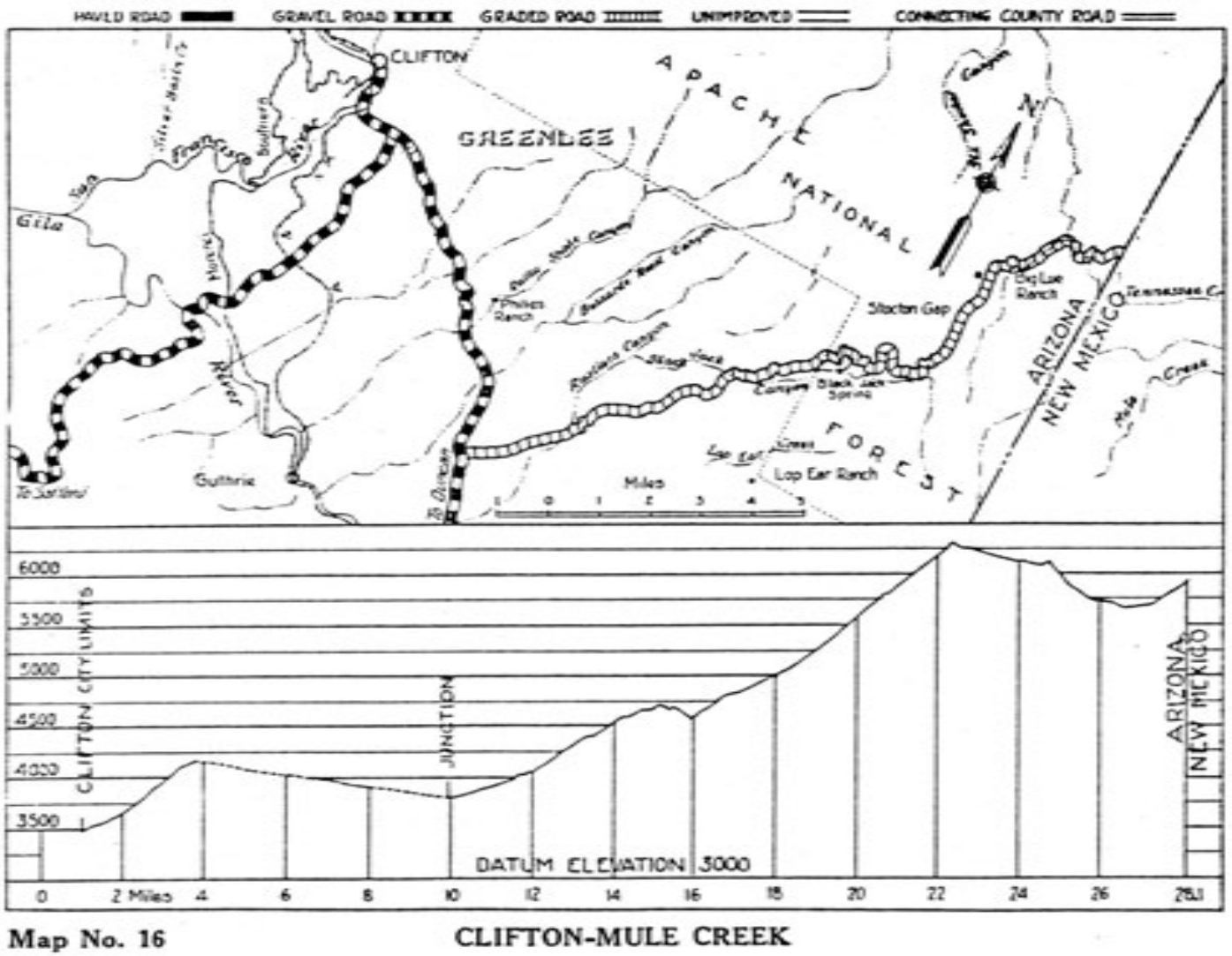
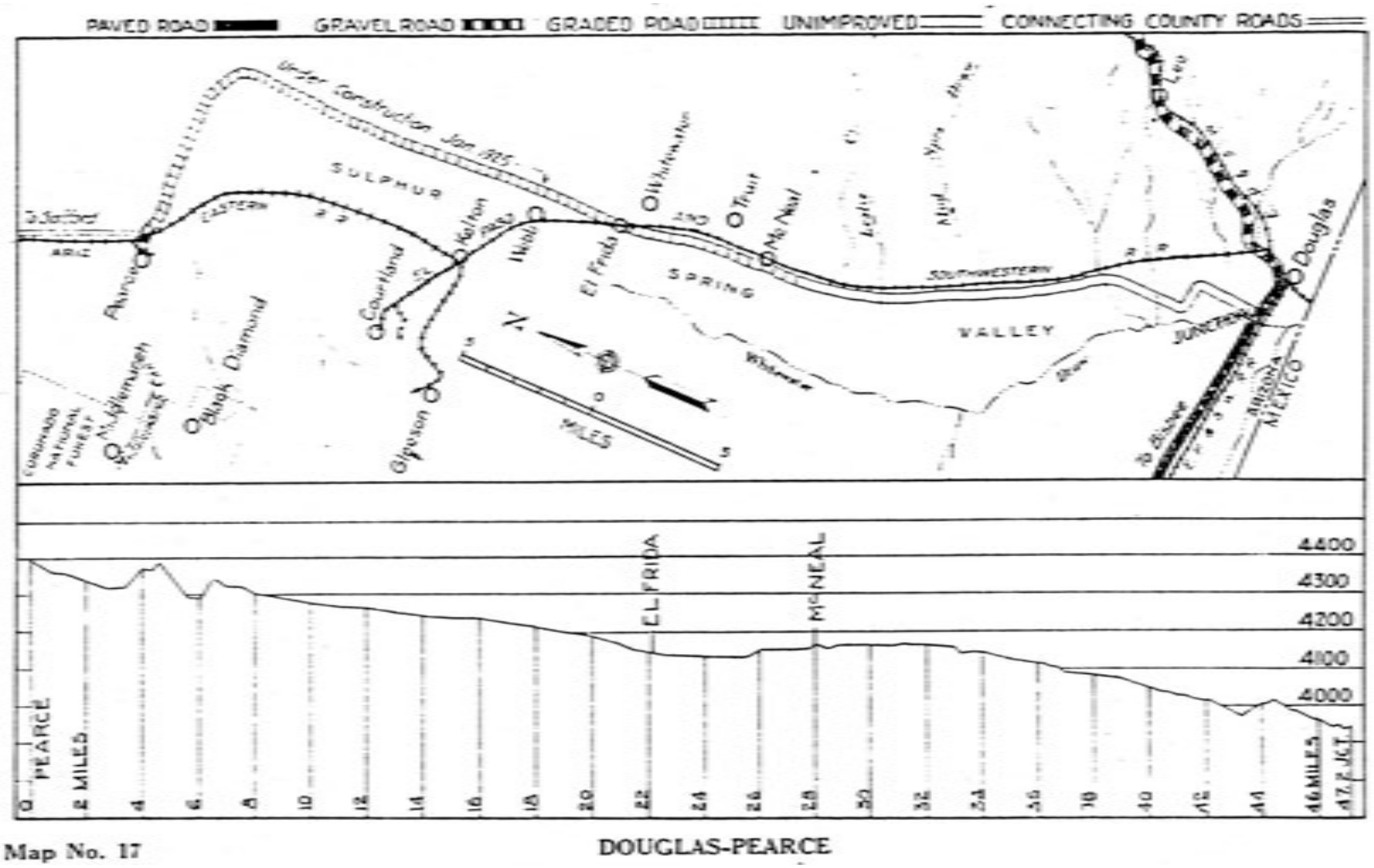


Figure A-3.16: Map No. 16, Clifton-Mule Creek Highway, 1924
Source: State Engineer 1924



Map No. 17

DOUGLAS-PEARCE

Figure A-3.17: Map No. 17, Douglas-Pearce Highway, 1924
Source: State Engineer 1924

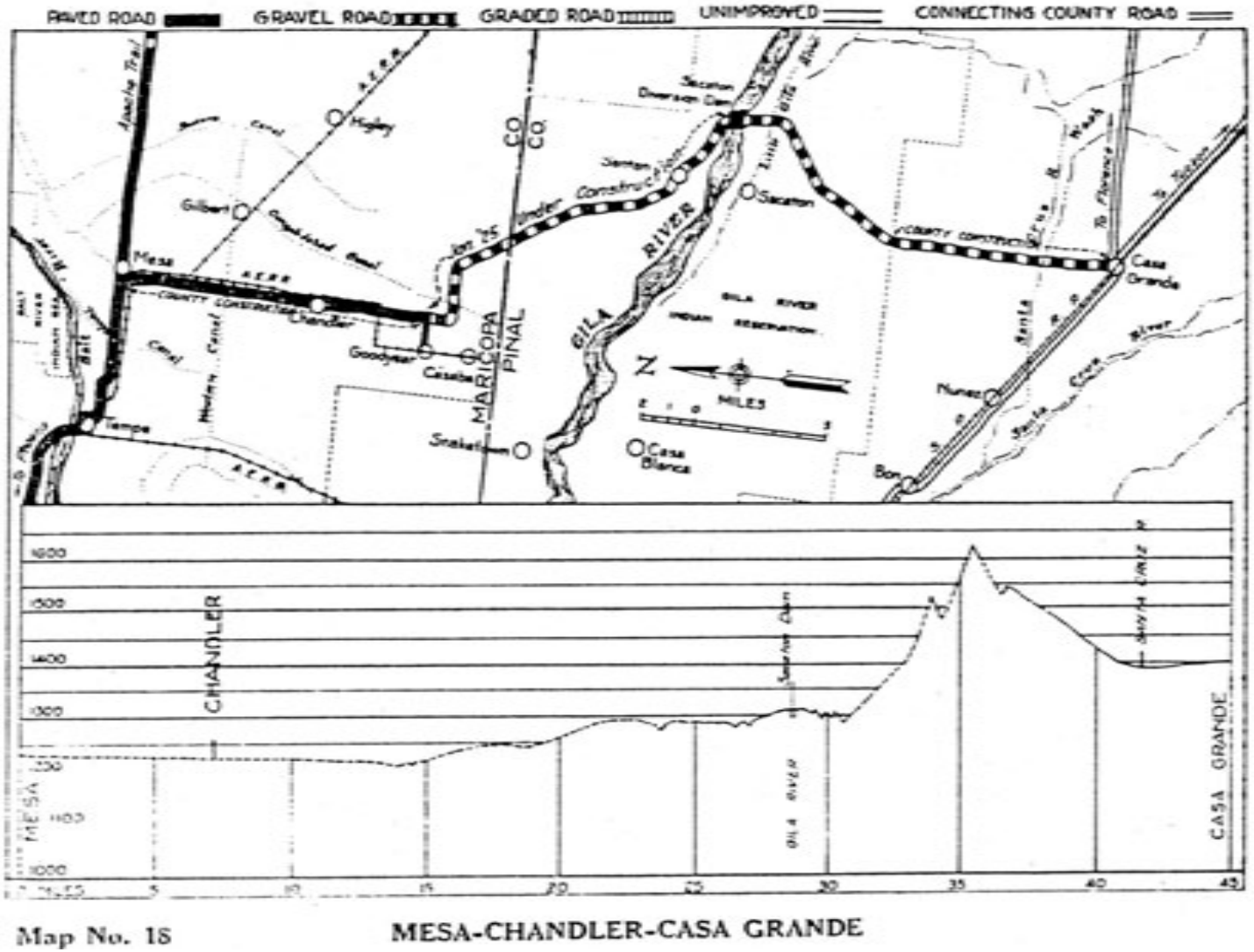


Figure A-3.18: Map No. 18, Mesa-Chandler-Casa Grande Highway, 1924
Source: State Engineer 1924

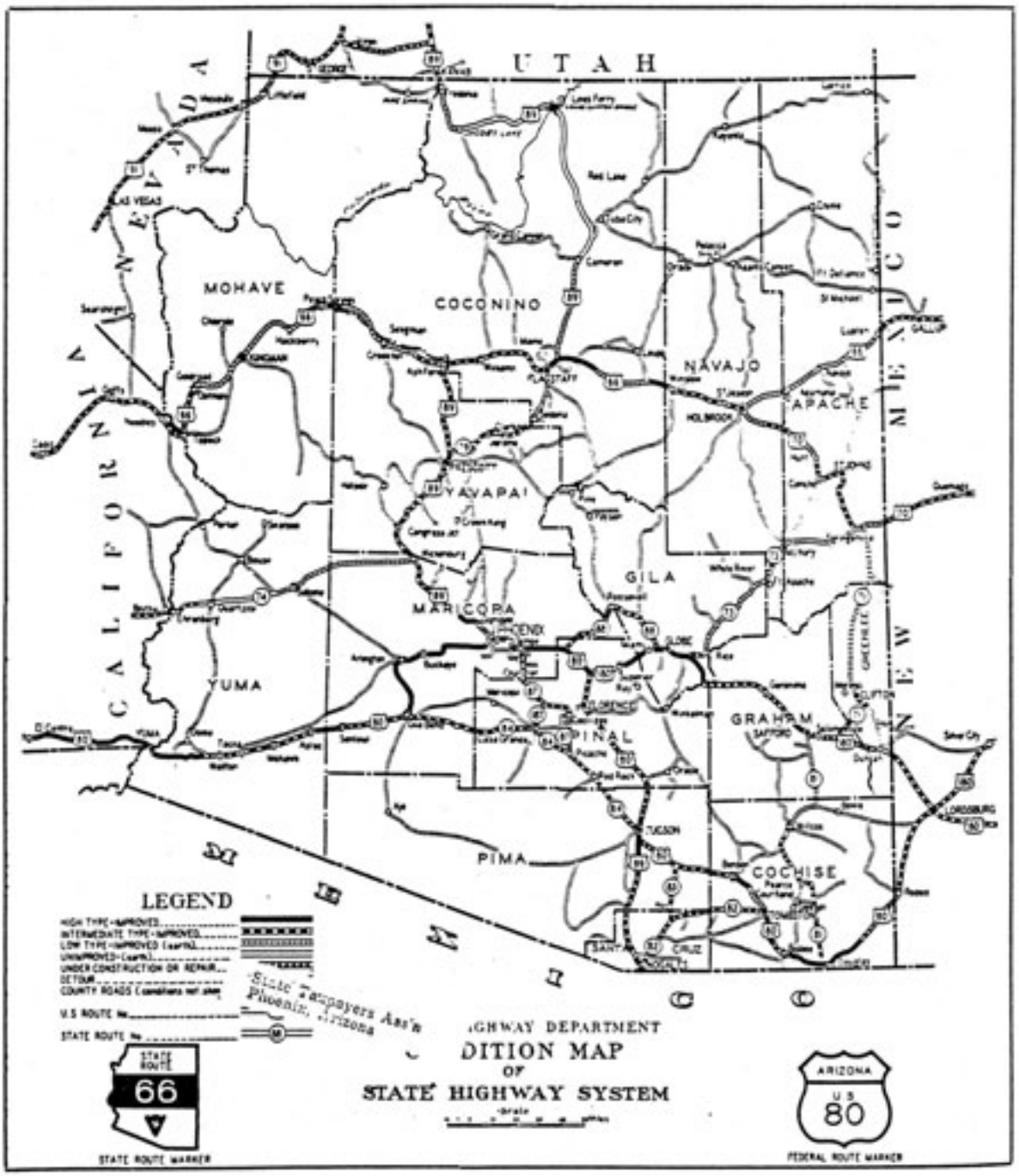


Figure A-4: State Highway System, 1930
Source: State Engineer 1930

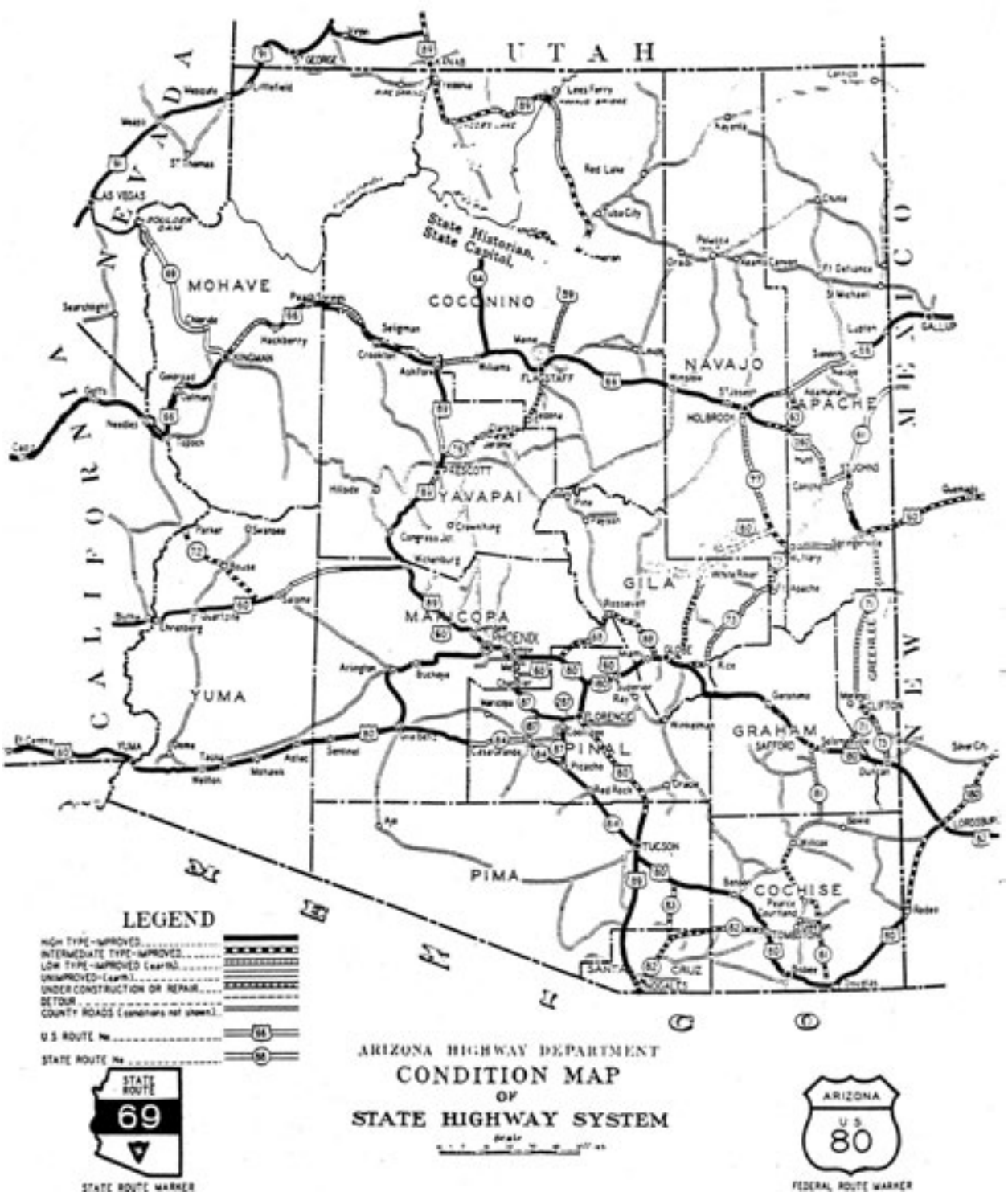


Figure A-5: State Highway System, 1935
Source: *Arizona Highways* 1935

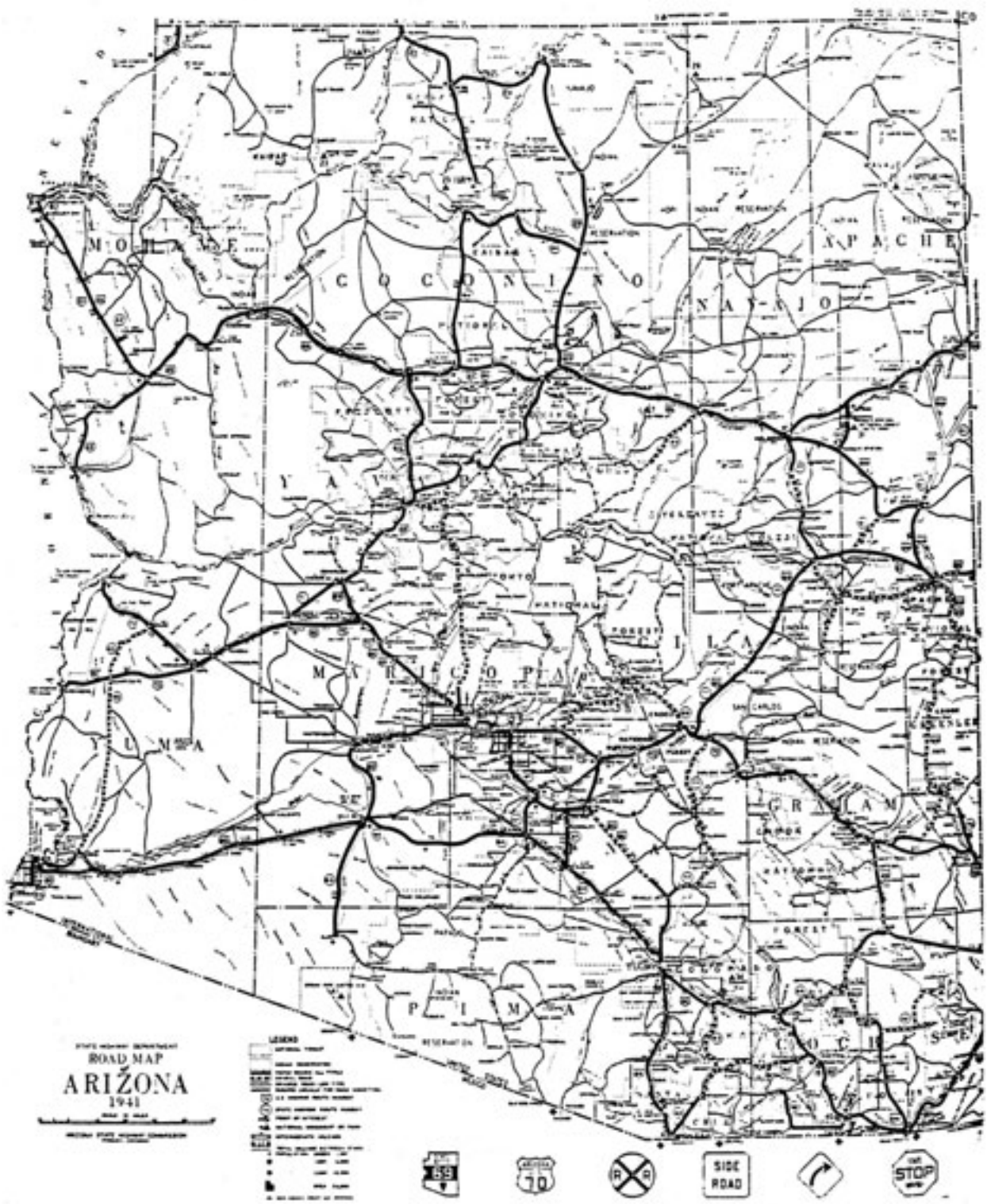


Figure A-6: State Highway System, 1941
Source: *Arizona Highways* 1941

Figure A-7: State Highway System, 1946
Source: *Arizona Highways* 1946

APPENDIX B
ANNOTATED BIBLIOGRAPHY

Ansaldi, Richard

1978 ***Gas, Food, and Lodging: A Postcard Odyssey Through the Great American Roadside.*** **Harmony Books, New York.**

This book is just plain fun. Pair Ansaldi's full-color collection of postcards with Scott and Kelly's scholarly text and black and white contemporary photographs to gain a broad understanding of roadside vernacular architecture of today and yesterday.

Arizona Good Roads Association

1913 ***Arizona Good Roads Association Illustrated Road Maps and Tour Book.*** **Reprinted by** ***Arizona Highways*****, 1987.**

This 200-page guidebook was first published in 1913 as not only "the first book of road maps and touring information ever published in Arizona" but also "the most practical, comprehensive, and attractive Road Map and Touring Book in the United States." In addition to the hand-drawn maps and scenic photographs (some reproduced from postcards), the authors included photographs of "fork scenes" on many routes, that is, the fork in the road. These charming photographs meant to guide the traveler are often simply views of one dirt track splitting into two in the middle of desert vegetation, with no directional signs in sight. The book directly documents the difficulties of traveling across country in the early part of the century, and indirectly documents the enormity of road construction that has taken place in Arizona over the last eight decades since its publication.

Arizona Highways. **Published by the Arizona State Highway Department from 1921 until 1974, and now published by the Arizona Department of Transportation.**

Published intermittently between the first issue in 1921 and the "Volume One, Number One" issue in 1925, this magazine has evolved into slick, full-color travel magazine of today. In its first years, the magazine functioned as a source of information on the current condition of state roads, a voice for the good roads movement, and a lobbyist for increased federal aid to roads. Into the mid-1940s, *Arizona Highways* included detailed information on road projects under construction, such as the following description of a project underway in the fall of 1941.

> District No. 2, *R. C. Perkins, District Engineer.* W. E. Orr Contractor has a contract for the grading and draining the roadway over a relocated line; the furnishing and placing of coarse and fine aggregate base course and a road mixed bituminous surface using SC-4 road oil and type B seal coat. The construction of two multiple span 14 feet reinforced concrete bridges and one single span rigid frame reinforced concrete structure and other work incidental to the construction of 1.7 miles of the Superior-Miami Highway beginning about five mile northeast of Superior and extending through the region known as Devil's Canyon. The work is to be completed by September 30, 1941. Federal Aid Project F.A. No. 16 (3) A.F.E. 7006. B. B. Browning, resident engineer.

These listings in fine print in the back of the magazine are invaluable in tracing roadwork history on a particular piece of highway. In addition to the excruciating detail describing road projects, the magazine has always promoted the tourist industry in Arizona with enchanting photographs and enthusiastic prose.

Bottles, Scott L.

1987 ***Los Angeles and the Automobile: The Making of the Modern City.*** **University of California Press, Berkeley.**

A persistent urban myth accuses automobile manufacturers and rubber companies of conspiring to force the demise of public transportation in Los Angeles in the 1940s. Dr. Bottles refuted this myth in his dissertation and presented a different scenario for the growth of freeways in southern California. He argues, convincingly, that the people have Los Angeles complained about the public railways and thankfully turned to the auto as an alternative form of transport. This scholarly book is primary reading for an understanding of the historical bases for America's love of the automobile.

Eckhoff, E.A., and P. Riecker

1880 ***Official Map of the Territory of Arizona.*** **Reproduction available at the Phoenix Museum of History.**

A good starting point for historic road research is one of the first maps of Arizona, completed in 1880 by two civil engineers and signed by J. C. Fremont, Governor. The "Official Map of the Territory of Arizona" compiled information from surveys undertaken by the rail roads and the military to depict county borders, mining districts, Indian reservation boundaries, military telegraph routes, and the Southern Pacific Railroad. The authors make no indication as to the condition of the many roads indicated on the map and most are unnamed, the "Mormon Wagon Road," "Frontiers Road" and the "Beale Road" being exceptions. Reproductions of this map available for purchase at the Phoenix Museum of History (Eckhoff and Riecker 1880).

Federal Highway Administration, U.S. Department of Transportation

1976 ***America's Highways 1776-1976: A History of the Federal-Aid Program.*** **U.S. Department of Transportation, Federal Highway Administration, Government Printing Office.**

This hefty volume covers the federal funding of highways, two hundred years of Congressional legislation, the evolution of highway construction techniques, the inter-relationship of county, state, and federal administration of highway projects, and the individuals who contributed to national highway policy. The book is full of maps, illustrations, and historical photographs of roads.

Goddard, Stephen B.

1994 ***Getting There: The Epic Struggle between Road and Rail in the American Century*****. Basic Books, a Division of HarperCollins, New York.**

Goddard describes the cooperation and then the competition between railroads and highways, and the relationship of the government to these two industries that are so important to the American economy. Goddard's primary interest is in seeking a new balance in our autocentric way of life to keep the United States competitive in the new global economy. In making his argument, he provides an insightful history of the many factors that influenced how America's roads came to be built.

Kaszynski, William

1994 ***The American Highway: The History and Culture of Roads in the United States. Basic Books, McFarland & Co., Jefferson, North Carolina and London.***

This recently published book by a lawyer from Minnesota who obviously has a special interest in the history of America's roads is exceptionally well illustrated with more than 300 photographs and charts from the National Archives, the FHWA files, and other sources. The history of road building is recounted in a straightforward chronological approach. The history of road building from Roman times to 1900 is briefly discussed. Subsequent periods include the early days (1900-1919), first generation (1920-1945), golden age (1946-1969), and interstate era (1970-2000). The book concludes with Kaszynski's thoughts about future technological improvements as well as a brief mention of historic preservation efforts.

Liebs, Chester H.

1985 ***Main Street to Miracle Mile: American Roadside Architecture.*** **Bullfinch Press, Boston.**

A landmark publication in the new "commercial archaeology," the study of the material culture of recent history, Mr. Liebs' engrossing book takes us along familiar roads to give us a new understanding of just how the roadside businesses changed over time. He traces the evolution of city lunch stands into drive-ins and McDonald's, the evolution of roadside campsites into motor hotels and Howard Johnson's, and the invention of gasoline stations to service the new automobiles. Liebs also includes chapters on auto showrooms, supermarkets, miniature golf courses, and drive-in theaters. The many well-chosen historical photographs offer additional insights into the language of roadside architecture. This book is a must for any student of the American road.

Marriott, Paul Daniel
1998 ***Saving Historic Roads: Design and Policy Guidelines.*** **The National Trust for Historic Preservation, John Wiley and Sons, New York.**
This volume dedicated to the preservation of historic roads is the first of its kind. Mr. Marriott is experienced in dealing both with both preservationists and with highway administrators, and this book is a wise and canny handbook into the mindsets of both. He pulls out pertinent information for preservationists from the highway administrators "Bible" for road construction and safety standards, the AASHTO Green Book, and maps out strategies to deal with the objections to preserving historic roads. Marriott recounts six case studies of successful road preservation in the United States, enumerates those roads already listed on the National Register of Historic Places, and describes alternative designs for guardrails, guard walls, and bridge rails that meet contemporary safety standards. *Saving Historic Roads* is an excellent first book on the strategies and success stories of road preservation.

Patton, Phil
1986 ***Open Road: A Celebration of the American Highway.*** **Simon and Schuster, New York.**
A personal essay on the American highway, full of unattributed facts (and a few fictions). Read through quickly, it is a good introduction to the development of the interstate highway system and a source of good quotes, but it fails to be a dependable source for historical information.

Scharff, Virginia
1991 ***Taking the Wheel: Women and the Coming of the Motor Age.*** **University of New Mexico Press.**
Dr. Scharff adds women to the discussion of automobiles in America. As passenger, driver, and purchaser, women influenced the mechanics and design of automobiles, and in doing so, made the business of driving the horseless carriage an easier proposition for both men and women. Dr. Scharff suggests that the introduction of innovations such as the closed sedan, the electric starter, automatic transmissions, and cloth upholstery can be attributed to the presence of women in the automobile marketplace. As any good women's studies book should do, Dr. Scharff's scholarly work adds a dimension often missing from the more general histories of autos in America.

Schlereth, Thomas J.
1997 ***Reading the Road: U.S. 40 and the American Landscape*****. University of Tennessee Press, Knoxville.**
Schlereth develops an "above-ground archaeology" approach for exploring the history of U.S. Highway 40, which was once part of the National Highway. In this update of an earlier version published a decade before under a different title, Schlereth suggests that the American highway system can be viewed as a "mammoth outdoor museum of American history" (p. xi). Although much of this book focuses on the Indiana section of U.S. 40, Arizona readers will find much of interest in Part I, which discusses how physical evidence of any American road can be interpreted in a way that illuminates its historical development and contemporary meaning. Part III is a useful bibliographical essay that includes half a dozen pages discussing other works related to the above-ground archaeology of the American highway.

Scott, Quinta, and Susan Croce Kelly
1988 ***Route 66: The Highway and Its People*****. University of Oklahoma Press, Norman.**
The authors' pairing of a photographic essay with scholarly text provides a thoughtful portrait of Route 66, a portrait that explores beyond the kitsch of so many books about Route 66. Ms. Kelly's discussion of the development of the federal highway system is concise, insightful and entertaining. Quinta Scott's black-and-white photographs of the people and places along Highway 66 evoke both the present and the past lives of the road.

Wallis, Michael
1990 ***Route 66: The Mother Road.*** **St. Martin's Press, New York**
More colorful and less scholarly than Scott and Kelly's look at Route 66, Michael Wallis's effort is thorough and pleasing, and has been very popular. Wallis arranged his chapters by state from east to west, and simply to turn the pages is to take a trip through the middle of America. His photographs and words range from kitsch to kindly, from poignant to goofy. In contrast to most Route 66 books, Wallis includes photographs of the road itself, from concrete

overpasses and culverts to guardrails and cracks in the asphalt, along with photographs of the grizzled characters and balmy promotional signage along Route 66. Mr. Wallis was one of the featured dinner speakers at the National Trust for Historic Preservation conference in Santa Fe, New Mexico in October 1997.

Witzel, Michael Karl

1992 ***The American Gas Station: History and Folklore of the Gas Station in American Car Culture.*** **Motor Books International, Osceola, Wisconsin.**

What Chester Liebs did for the diner and the auto court in *Main Street to Miracle Mile,* Mr. Witzel does for the American gasoline station, answering questions you didn't know you had. For instance, just how did they transport gasoline from the refinery to the gas tank in the days before tanker trucks and gasoline pumps? The photographs of men pouring gasoline from a pitcher into a funnel are unnerving, as are the photos of large drums of gasoline connected to a simple garden hose -- one cannot help but think of the flammability of the liquid stored inside. And where did the owners of the Model T's purchase gasoline? Auto dealers, bicycle shops, car garages, carriage shops, livery stables, hardware stores, feed companies, and general retailers installed the new pumps on the sidewalks outside their establishments before the emergence of stricter zoning laws and gas stations run by major oil companies. Period photographs and original architectural drawings bring the gasoline stations of the 1920s through the 1960s alive in this fun and informative book.

Yorke, Douglas A, Jr., and John Margolies

1996 ***Hitting the Road: The Art of the American Road Map.*** **Chronicle Books, San Francisco.**

From about 1910 until the Arab oil embargo in 1973, America's gas stations provided free maps to their customers. The authors display the cover art of these maps throughout this book, and use the map illustrations of scenic vistas, cruising automobiles, and inviting gasoline stations to portray America's love affair with the automobile and the open road. In the minimal text tucked between the large full-color reproductions of road map art, the authors add a bit of American road history.

APPENDIX C
ROADS LISTED IN THE NATIONAL REGISTER OF HISTORIC PLACES

This appendix has been adapted from the book, *Saving Historic Roads: Design and Policy Guidelines,* and is a complete list of the historic roads in the National Register of Historic Places as of 1998. It has been included here for information and reference purposes, to illustrate the types of roads across the United States that have been considered worthy of National Register designation.

State	Name	Period of Significance	Comments
Arizona	Historic Route 66 MPS	1926-1944	Multiple Property Submission includes 7 road-related listings, all segments of Route 66
Arkansas	Facilities Constructed by the Civilian Conservation Corps (CCC) in Arkansas MPS	1935	Multiple Property Submission includes one road-related listing, the road to Blue Hole, a small swimming pond in Petit Jean State Park
Arkansas	Dollarway Road	1913-1914	First rural concrete highway west of the Mississippi; longest continuous stretch of concrete pavement at time of construction (23.6 miles); Jefferson County
California	Redwood Highway	1909-1923	Highway through Redwood National Park; Del Norte County
California	Foote's Crossing Road	1913	Built by A.D. Foote, prominent Western mining engineer to connect gold mines with Nevada City; precipitous descent into canyon with only a 7% grade; 15.1 miles long
Colorado	Trail Ridge Road	1926-1941	Highest continuous highway in the United States; 37.9 miles through Rocky Mountain National Park
Colorado	Rim Rock Drive Historic District	1931-1950	22.4 mile long highway along the rims of the major canyons to provide visitors with scenic views of the Colorado National Monument; district includes three tunnels, scenic overlooks, and guard walls
Colorado	Denver Park and Parkway System TR	1907-1914	Thematic Resources; 12 road-related listings, all urban parkways in Denver
Colorado	Denver Mountain Parks MPS	1912-1941	Multiple Property Submission includes two road-related listings, Bear Creek Canyon Scenic Mountain Drive and Lariat Trail Scenic Mountain Drive
Connecticut	Merritt Parkway	1934-1942	Built as a parkway from New York; limited to recreational, non-commercial traffic; no signs; landscape plan used only native materials
Connecticut	Route 146 Historic District	1925-1935	18th century road upgraded in the early 20th century; linked Branford and Guilford in New Haven County
Delaware	Brandywine Park Kentmere Parkway	1883	Designed by Frederick Law Olmsted for horse and carriage traffic to connect two major parks in the city of Wilmington; now carries automobile traffic
District of Columbia	Parkways of the National Capital Region MPS	1913-1965	Multiple Property Submission includes three road-related listings, Suitland Parkway, Baltimore-Washington Parkway, and the George Washington Memorial Parkway (American Legion ridge to Memorial Bridge)
Florida	Venetian Causeway	1926	2.5-mile long roadway links Miami and Miami Beach, 12 bridges

State	Name	Period of Significance	Comments
Florida	Florida State Route 1	1921-1944	6-mile segment of the Old Spanish Trail from Jacksonville to the Pacific Ocean; early brick construction technique; Santa Rosa County
Illinois	Green Bay Road Historic District	1832-1925	Native American trail; established as a post road in 1823; declared pleasure driveway in 1925
Iowa	Snake Alley	1894	Switchback road built on a steep grade connects downtown Burlington with residential area; modeled after vineyard roads in France
Iowa	Lincoln Highway Greene County MPS	1912-1928	Multiple Property Submission includes six road-related listings, all segments of the Lincoln Highway
Kentucky	Peterson Avenue Hill	1902	Early brick street in Louisville up a steep hill
Maine	Back Cove	1895-1925	Esplanade designed by Olmsted; lined with 100 linden trees; on Portland peninsula in Cumberland County
Massachusetts	Bay Road	1600s to 1800s	Native American trail, 2-mile section (36-mile total) remains unimproved. Also known as the Old Post Road and the King's Highway from Boston to Mount Hope
Minnesota	Minnesota Military Roads MPS	1850-1875	Multiple Property Submission includes two road related listings, both military roads
Mississippi	Robinson Road	1821-1950	Early road surveyed by Raymond Robinson, toll road in 1930; now part of U.S. 82 in Leake County
Missouri	St. Joseph MPS	1910-1943	Multiple Property Submission includes one road-related listing, the St. Joseph Park and Parkway System designed to carry traffic between and within city parks; outgrowth of City Beautiful movement
Montana	Going-to-the-Sun Road	1921-1933	Transmountain highway linking east and west sides of Glacier National Park, created as scenic drive; Glacier County
Montana	Glacier National Park MPS	1910-1945	Multiple Property Submission includes two road-related listings, Bowman Lake Road and North Fork Road
Nebraska	Lincoln Highway	1920	4,580-foot-long section, 18-foot wide, retains original brick paving from 1920; first transcontinental highway; Douglas County
New Jersey	River Road Historic District	1738-1940	Native American trail; used by troops in the Revolutionary War; north-south corridor in Somerset County
New Jersey	Old Mine Road Historic District	Late 1700s	Native American trail, frontier road; also known as the National Trail; Sussex County
New Mexico	Route 66 Through New Mexico MPS	1936-1956	Multiple Property Submission includes five road-related listings, all segments of Route 66
New York	Riverside Park Riverside Drive	1874 1934-1937	Original design by Olmsted; transformed in 1936-1937 by Robert Moses; New York City
New York	Olmsted Parks and Parkways TR	1868-1920s	Thematic Resources includes two road-related listings, both parkway systems in Buffalo
New York	Susquehannah Turnpike	1804-1901	Early toll road retains nine original mile markers; Greene County
New York	Eastern Parkway	1874-1899	First Olmsted parkway to be completed; 1,000 trees along the 3-mile route designed as part of a planned community in Kings County
New York	Ocean Parkway	1876-1899	Designed by Olmsted, first designed parkway in the U.S; Kings County.

State	Name	Period of Significance	Comments
New York	Old Albany Post Road	1600-1899	Native American trail used as post road 1797-1806; retains original 18th century alignment, dimensions, and several milestones; Putnam County
New York	Bronx River Parkway	1915-1930	First automobile parkway in the U.S.; one of first uses of median, separated-grade interchanges, pollution control, and land conservation; Westchester County
New York	Storm King Highway	1916-1922	Winding, two-lane highway carved into the rock face of a mountain in the Hudson Highlands; Orange County
North Dakota	Blome, R.S., Granitoid Pavement in Grand Forks	1910	Paving material designed to support new auto traffic and still provide traction for horses (artificial stone made with Portland cement, granite, crushed stone and sand); Grand Forks County
Ohio	S. Bridge, National Road, NHL	1918	National Historic Landmark, brick road; only brick curb built along the National Road (on 26-degree curve); Guernsey County
Ohio	First Concrete Street in the U.S.	1893	Essentially unaltered since poured in 1893
Ohio	Soldiers Memorial Parkway McKinley Memorial Parkway	1918-1920	0.33 mile-long parkway planned and landscaped in a cruciform design to commemorate Sandusky County war dead; brick paving; sandstone curbs; 50-foot grassy medians with buckeye trees; outgrowth of City Beautiful movement
Ohio	Hessler Court Wooden Pavement	1906	Rare example of wooden pavement, 8.75 miles long; Cuyahoga County
Oklahoma	Route 66 and Associated Historic Resources in Oklahoma MPS		Multiple Property Submission includes one road-related listing, a 9-foot section of original Route 66 roadbed
Oregon	Barlow Road	1845-1919	Intact 30-mile portion of the Oregon Trail, used as toll road until 1919; Clackamas County
Oregon	Columbia River Highway Historic District	1913-1922	Scenic parkway, outstanding engineering feat in Columbia River Gorge; Multnomah County
Oregon	Rocky Butte Scenic Drive Historic District	1934	Scenic meandering drive up a butte; includes a unique tunnel, observation post, and stone road features; Multnomah County
Rhode Island	Smithfield Road Historic District	mid-1700s	Narrow, winding, stonewall-lined road; one of the least altered segments of the Great Road; Providence County
Rhode Island	Great Road Historic District	mid-1700s	Road built in 1683 to connect Quaker villages to markets in Providence; currently a two-lane asphalt road; Providence County
South Carolina	Ashley River Road	1691-present	Charleston County
Tennessee	Forest Hills Boulevard Historic District	1928-1938	Two-lane curvilinear street paved with tan-colored concrete; early example of suburban street design incorporating the street into the landscape; outgrowth of City Beautiful movement; Knox County
Tennessee	Talahi Improvements	1929	Planned suburban community built around the automobile, scenic views, and the Cherokee cultural influences; based on Olmsted's 1869 plan for Riverside, Illinois; Knox County

State	Name	Period of Significance	Comments
Tennessee	South Parkway-Heiskell Farm Historic District	1910-1936	3-block segment of the Memphis Parkway System; four-lane boulevard with wide landscaped median; design by urban planner George Kessler
Tennessee	Memphis Park and Parkway System MPS	1900-1939	Multiple Property Submission includes one road-related listing, the Memphis Parkway System; urban parkway system designed to encourage residential growth and use of city parks; landscaped medians; only parkway in Tennessee implemented during the City Beautiful movement; designed by George Kessler
Texas	Mission Parkway	1900	Parkway built to connect four Spanish missions with residential areas in San Antonio
Texas	Mother Neff State Park and F.A.S. 21-B (1) Historic District	1920	Scenic parkway designed in the 1920s and renovated by the CCC in the 1930s
Texas	King's Highway Historic District		Part of Dallas County, Oak Cliff MPS
Texas	Heights Boulevard Esplanade	1892	First paved road in the area of Houston
Texas	Broadway Bluff Improvements	1914	Planned community based on the City Beautiful movement, improved the appearance of a bluff by using elements of the natural landscape and vertical division of the roads; Potter County
Texas	U.S. Route 66-Sixth Street Historic District		Potter County
Utah	Zion National Park MRA	1901-1940	Multiple Resource Area includes one road-related listing, the Floor of the Valley road in Zion National Park; 9-mile long scenic road paved with a red-tinted chip sealer to harmonize with towering red cliffs; also uses native sandstone blocks in the construction of road-associated features
Utah	Zion-Mt. Carmel Highway	1901-1940	Designed by Thomas H. MacDonald of the Bureau of Public Roads; scenic road links Zion, Bryce Cedar Beaks, and Grand Canyon national parks
Vermont	Brookfield Historic District	1800s	Unpaved, picturesque main street that follows route of historic stage road; Orange County
Vermont	Historic Crown Point Road	1760	Unimproved road follows route of key trail in the French and Indian War and the Revolutionary War; settlers followed the trail from Massachusetts to New Hampshire; Windsor County
Virginia	Southwest Mountain Rural Historic District	1760-1941	Old Mountain Road (Route 22) follows original route; included in the district is an unpaved portion of the Fredericksburg Road from the 18th century; associated with Thomas Jefferson and Merriwether Lewis; Albemarle County
Virginia	Mount Vernon Memorial Highway	1929-1932	Road links Washington, D.C. with Mount Vernon; provides striking vistas of national monuments and scenery; first highway constructed and maintained by the National Park Service
West Virginia	Hopkins Mountain Historic District	1933	Hopkins Mountain Road originally built as a service road for the U.S. Forest Service; renovated into a two-lane road by the CCC in the 1930s; Greenbrier County

State	Name	Period of Significance	Comments
Washington	The Yellowstone Road	1913	Brick-paved segment of the Yellowstone Trail, a transcontinental highway from Boston to Seattle; King County
Washington	Grandview Road-Yellowstone Trail	1909-1930	3-mile segment of concrete roadway; intact remnant of the Yellowstone Trail; Yakima County
Wisconsin	Lake Park	1892	First city-owned park in Milwaukee included a road designed by Olmsted for recreational driving
Wisconsin	Delavan's Vitrified Brick Street	1913	Paved with vitrified bricks (bricks heavily fired to make them stronger than ordinary bricks and impervious to water); Walworth County
Wisconsin	Highland Boulevard District	1895-1915	Landscaped esplanade fronted by long blocks of monumental residences on broad lots with wide setbacks; planned by the Milwaukee Common Council to create public thruway , prohibit undesirable traffic, and connect city parks
Wyoming	Bridger Immigrant Road-Dry Creek Crossing	1800s and 1900s	Built by Jim Bridger; used by immigrants and miners headed to the Montana gold fields (short cut off the Oregon Trail); now abandoned; only two segments remain including this one at Dry Creek Crossing
Source: Marriott 1998:179-201			

MAP OF ARIZONA

1912

LEGEND

- Highways
- Wagon Roads
- Indian Reservation
- Forest Boundaries
- County Lines
- County Seats
- Towns
- Railroad Stations
- Springs
- Wells

0 10 20 30 40 50 Miles

(Circa – 1925)

MILEAGE MAP OF THE

BEST ROADS OF ARIZONA

SHOWING PAVED ROADS ROAD DISTANCES

SCALE IN MILES

0 10 20 30 40 50

POLE MARKINGS

The following list gives the National Trails and other posted roads. The official marker is shown if posted along their routes. A key letter and figure show the location of trails on the map

NAME	KEY	MARKER
Apache Trail	F-8	
Arrowhead Trail	A-5	AF
Atlantic Pacific Hy.	A-9	
Bankhead Highway	B-10	BH
Black Canyon Route	E 7	
Borderland Route	F-8	
Dixie Overland Hy	D-10	DOH
Lee Highway	A-9	
Nat'l Old Trails Road	A-5	RED WHITE BLUE
Nat'l Park to Park Hy.	A-5	THE NATIONAL PARK TO PARK HIGHWAY
Ocean to Ocean Hy.	H-8	
Old Spanish Trail	C-9	OST
Parker Cut Off	A 6	

ROAD LEGEND

- Paved Roads
- Graveled Roads
- Graded Earth Roads
- Other Thoroughfares
- Road Distances in Miles 25 10 15

PREVENT FOREST FIRES IT PAYS

GULF OF CALIFORNIA

NOTE:
SOLID CENTER-LINE STRIPE ON HIGHWAY DENOTES NO PASSING ZONE.
BROKEN CENTER-LINE STRIPE ON HIGHWAY DENOTES SAFE PASSING ZONE.
NO TOLL FERRIES OR TOLL BRIDGES ON STATE HIGHWAY SYSTEM.

U T A H

COLO.

The only point in the United States common to four State corners.

N E W M E X I C O

N E V A D A

C A L I F O R N I A

STATE HIGHWAY DEPARTMENT

ROAD MAP of ARIZONA 1939

SCALE IN MILES
10 5 0 10 20 30 40 50

ARIZONA STATE HIGHWAY COMMISSION
PHOENIX, ARIZONA.

J.M. PROCTER	CHAIRMAN	KEMPER MARLEY	MEMBER
R.E. MOORE	VICE CHAIRMAN	L.B. OWENS	MEMBER
F.C. BLEDSOE	MEMBER	W.R. HUTCHINS	ENGINEER

LEGEND
- NATIONAL FOREST
- INDIAN RESERVATION
- PAVED ROADS-ALL TYPES
- GRAVEL ROAD
- GRADED ROAD-LOW TYPE
- INQUIRE LOCALLY FOR ROAD CONDITION
- 70 U.S. HIGHWAY ROUTE NUMBER
- 73 STATE HIGHWAY ROUTE NUMBER
- 25 POINT OF INTEREST
- 16 NATIONAL MONUMENT OR PARK
- 5 INTERMEDIATE MILEAGE
- ★57★ TOTAL MILEAGE BETWEEN STARS
- ○ POPULATION UNDER 1,000
- ◎ " 1,000 5,000
- ◉ " 5,000 10,000
- " OVER 25,000
- + RED CROSS FIRST AID STATION
- ✠ INTERNATIONAL PORT OF ENTRY

STATE ROUTE 69 — STATE HIGHWAY ROUTE MARKER

ARIZONA US 70 — U.S. HIGHWAY ROUTE MARKER

R R — ROUND SIGNS ALWAYS DESIGNATE RAILROAD CROSSING

SIDE ROAD — SQUARE SIGNS ALWAYS DESIGNATE CAUTION

DIAMOND SIGNS ALWAYS REQUIRE REDUCED SPEED

STATE STOP HIGHWAY — OCTAGONAL SIGNS ALWAYS REQUIRE A COMPLETE STOP

Compiled and drawn by W.M. DeMeritt

ARIZONA PRINTERS, INC.
— PHOENIX —