

Bridge Design in New Mexico

The state's historic highway bridges offer evidence of how bridge types have changed over more than a century. Bridge designs have evolved as materials and standards for safety and loads have changed and engineers have found new ways to design. Knowing a few things about various bridge designs will help you appreciate each bridge's history.

TIMBER BEAM (1850s-1930s). From primitive log spans across streams to timber trestle bridges several hundred feet in length, timber beam designs comprised many of the state's early bridge projects. Timber beam bridges treated with creosote were especially popular across broad floodplains during the 1920s and 30s.

MASONRY & CONCRETE ARCHES (1880s-1930s). Originally developed by the Romans, masonry arch bridges and culverts appeared along early railroad lines in New Mexico. Municipal bridge projects in Raton, Las Vegas, and Santa Fe also used the design. The emergence of reinforced concrete by 1900 offered a more flexible building material, capable of longer, flatter arches.

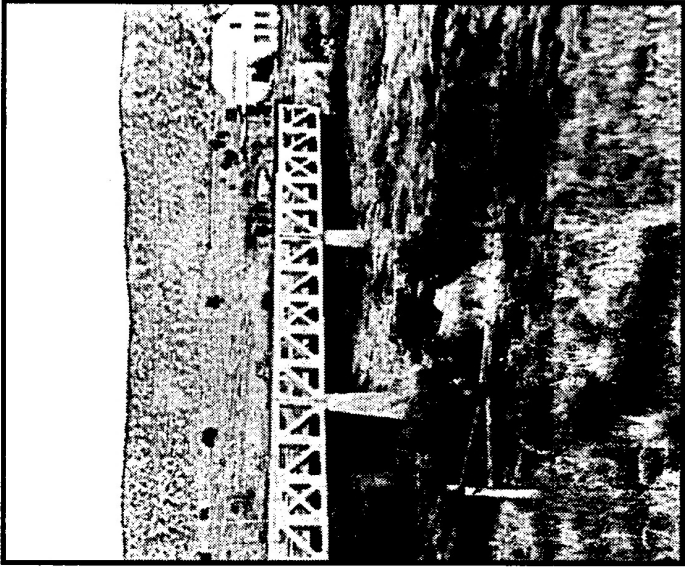
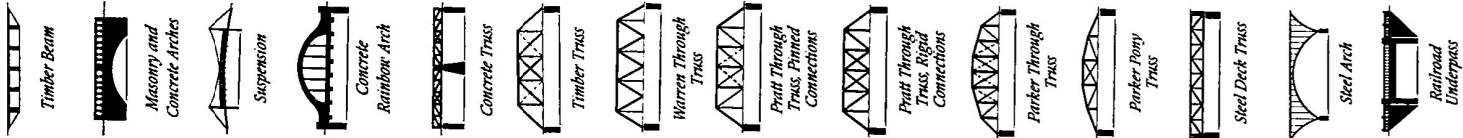
SUSPENSION (1900s-1920s). Generally associated with monumental projects across broad waterways, the design was used for highway bridges in at least six instances in New Mexico. With its roadway hanging from steel cables anchored well back from both riverbanks, the design permitted engineers to eliminate placing piers in the waterway where they were susceptible to flood damage.

CONCRETE RAINBOW ARCH (1920). Based on a design patented in 1912, the concrete arch relied on reinforced concrete vertical members to support the bridge deck. This rare design was used only once in New Mexico, in Santa Fe.

TRUSSES (1900s-1965). Involving the interplay of tension and compression, truss bridges are among engineering's crowning achievements. Truss bridges lacking lateral bracing between the upper beams, or chords, are referred to as *pony trusses*; while those with lateral bracing are called *through trusses*. Designs in which the bridge deck is supported by the trussing located below the deck are referred to as *deck trusses*. Most truss designs used steel trusses, some used timber, others a combination of timber and steel, and still others reinforced concrete.

STEEL ARCH (1920s-1950s). An attractive structural form well-suited for crossing chasms wider than 600 feet, the arch design generally entails two-hinged arches set on foundations, then cantilevered toward each other until they are joined at the center. The only example in New Mexico is the Los Alamos Canyon Bridge.

RAILROAD UNDERPASS (1920s-1930s). First appearing in the 1920s to separate highway and railroad grades, railroad underpass projects increased in the 1950s as New Deal construction programs sought to create jobs that promoted highway safety. The fill taken from the underpass excavation was frequently used to raise the railroad grade, and retaining walls and walkways paralleling the roadway often exhibited decorative concrete molding



Variadero Bridge, on the Rio Conchas, Variadero, NM.

For more information on historic highway bridges in New Mexico, please contact:

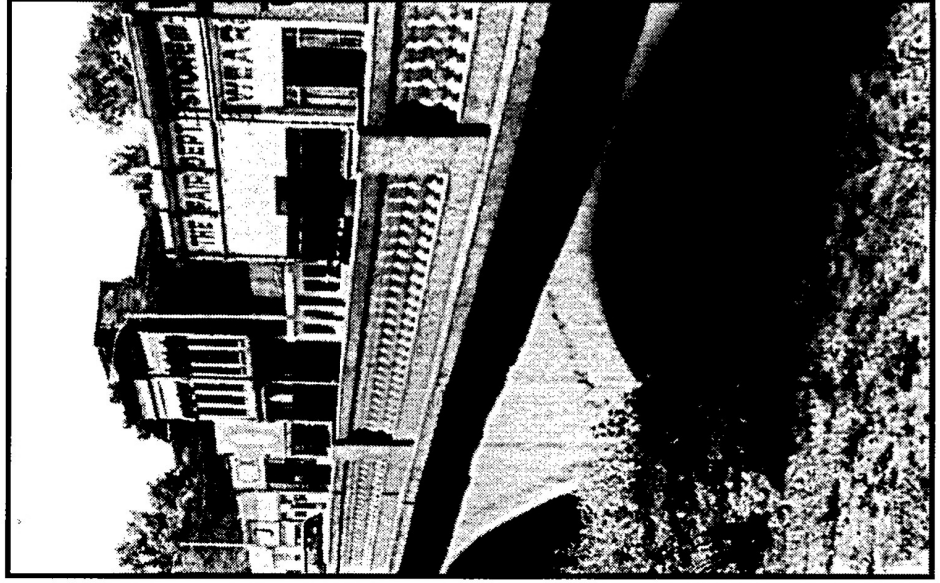
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SPANNING THE HIGH DESERT THE HISTORIC HIGHWAY BRIDGES OF NEW MEXICO



Gallinas River Bridge, Las Vegas, NM.

Discover the Historic Highway Bridges of New Mexico

New Mexico – Land of Bridges. Yes, this arid state is home to over 3,000 highway bridges! They range from masonry culverts and metal truss designs dating from the territorial period to relatively recent structures with great steel arches spanning previously uncrossed chasms.

While many of New Mexico's bridges cross major waterways such as the Rio Grande and San Juan, Pecos, Canadian and Gila Rivers, others span arroyos that are dry most of the year. A drive through the desert countryside can turn into an adventure, however, when spring runoffs and sudden summer thunderstorms transform canyons into what engineers once called "cloudburst streams."

New Mexico's bridges reflect its rugged and daring development, providing yet another record of life and transition in the desert Southwest. Several of New Mexico's significant older bridges have been included in the National Register of Historic Places. Some continue to serve motorists along federal, state, and local roads, while others have been preserved as examples of early bridge construction.

This map helps you to locate and invites you to visit the Historic Highway Bridges of New Mexico!

A Brief History

Prior to statehood, bridge construction in New Mexico was minimal.

Wagons crossed waterways at fords, or vados, or used ferries during high water. Simple timber and beam bridges were built during the territorial period, but these often washed out during floods. Since road construction was regarded as a local matter, counties and private individuals undertook many of these early bridge projects.

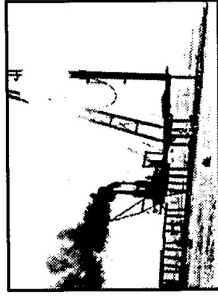
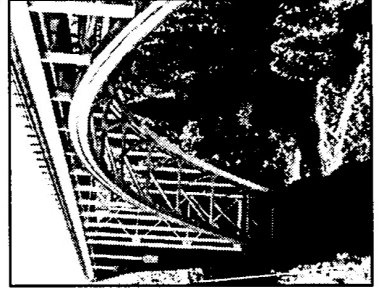
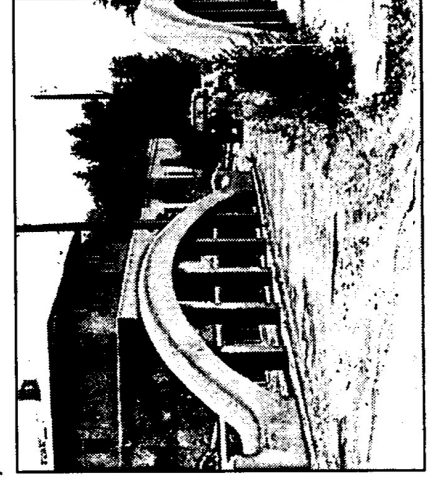
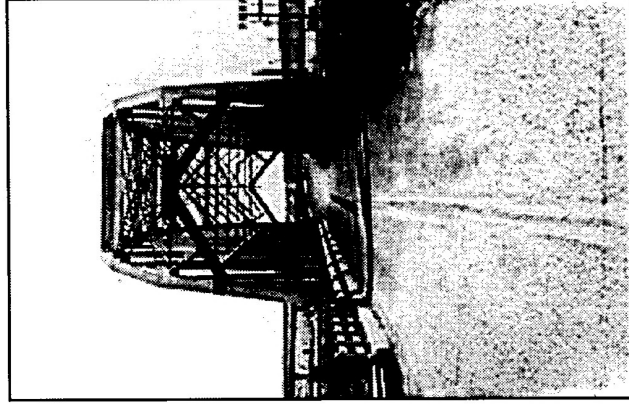
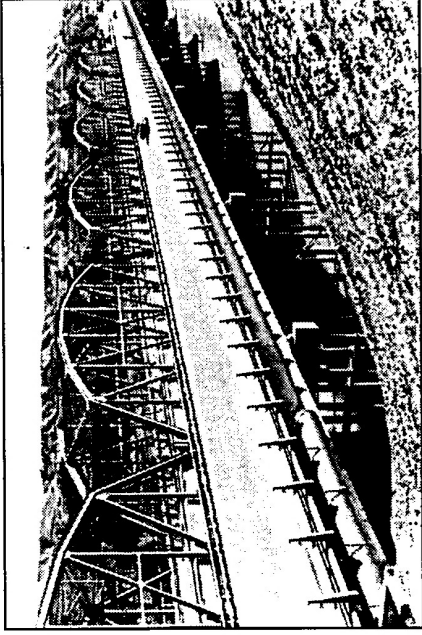
The coming of the railroad in 1879 brought examples of sturdier bridges; and by the early 1900s, steel and masonry bridges also began to appear along wagon roads.

With statehood in 1912 came the formation of the New Mexico State Highway Department, under James A. French. As it sought to develop a highway system that connected all of the counties and main towns, the department assumed responsibility for the construction of the state's highway bridges.

Each bridge project presented engineers with a special challenge defined by the location. Bridge plans needed to anticipate high water levels, the relative stability of riverbanks, and the volume and weight of traffic. As building materials improved and vehicles' speeds increased, bridges also needed to become safer and more efficient.

During the 1920s and 30s, bridge construction pushed forward, with engineers using an array of bridge

designs. By World War II, New Mexico's modern highway system had begun to emerge with bridges linking the system together. In the two decades following the war, additional links were forged including award-winning structures spanning Los Alamos Canyon and the Rio Grande Gorge.



Driving a piling for the Rio Grande Bridge at Radium Springs. 1931



The underpass at Algodones. 1928

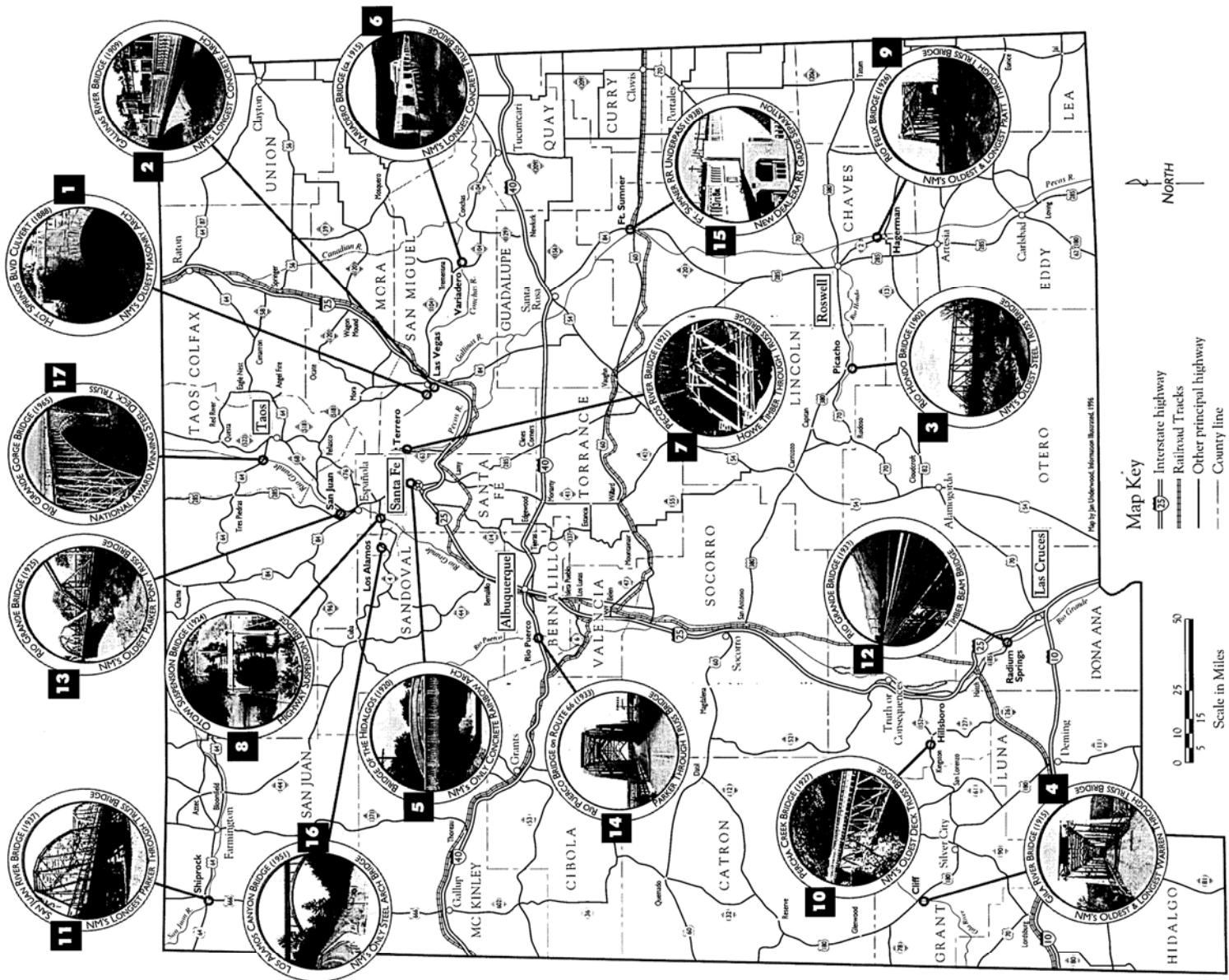
A few of New Mexico's Historic Bridges (clockwise from top).

San Juan River Bridge at Shiprock.

Rio Puerco Bridge at Old Route 66.

El Puente de los Hidalgos in Santa Fe.

Los Alamos Canyon Bridge.



THE HISTORIC HIGHWAY BRIDGES OF NEW MEXICO

- 1 SAN JUAN RIVER BRIDGE (1971)**. On NM 185 one mile south of Springville. This 475-ft. long timber beam bridge is one of the best examples of an economical bridge design used throughout the state in the 1920s and 30s. It was first constructed in 1925, replaced in 1938, and replaced again in 1971. It is the longest highway bridge along the Rio Grande valley.
- 2 GALLINAS RIVER BRIDGE (1909)**. On Bridge Street in Lordsburg, this 105-ft. long concrete arch bridge is the state's longest concrete arch bridge. Located in the Bridge Street Historic District, the bridge includes design details that mirror the facades of many of Bridge Street's nearby commercial buildings.
- 3 RIO HONDO BRIDGE (1902)**. Just south of US 70/380 at Lincoln County Road R-4 in Pecos, this 133-ft. long, one-span structure is the oldest steel truss bridge left in New Mexico. A Pratt truss bridge with pinned connections design, it was once part of a three-span bridge that crossed the Pecos River east of Roswell.
- 4 GILA RIVER BRIDGE (1915)**. On a county road paralleling the Rio Grande, this 54-ft. long, one-span steel truss bridge is the state's oldest and longest Warren through truss bridge. Its construction improved early automobile travel in western New Mexico between Silver City and the Mogollon mining district.
- 5 BRIDGE OF THE HIDALGOS (1920)**. On Grant Avenue just north of N. Federal Place, this 54-ft. long, one-span structure is the only concrete rainbow arch bridge in New Mexico. In addition to its use of modern reinforced concrete, its design includes corbel-like decorations at the ends of each of its floor beams.
- 6 VARIADERO BRIDGE (ca. 1915)**. East of NM 104, where it crosses the Rio Conchos, this four-span, 200 ft. long structure is the state's longest concrete truss bridge. Using a style found only in San Miguel County, it is one of two remaining examples of this unique design.
- 7 PECOS RIVER BRIDGE (1921)**. West of NM 65, where it crosses the Pecos River at Terreno, the one-span, 106-ft. long structure is the only remaining Howe timber-through truss bridge in New Mexico. During the early 1920s, the West Service constructed three similar bridges over the upper Pecos River.
- 8 OTOWI SUSPENSION BRIDGE (1924)**. On San Ildefonso Pueblo just south of Natchez, this bridge is the state's longest suspension bridge in New Mexico. The 292-ft. long bridge is located within the Otowi Bridge Historic District where Edith Warner's teahouse was a popular stop for many of those working on the Manhattan Project at nearby Los Alamos.
- 9 RIO FELIX BRIDGE (1926)**. East of NM 2 and one mile north of Hagerman, this three-span, 432 ft. long structure is the state's oldest and longest Pratt through truss bridge with rigid connections. Its unusual skewed construction reflects engineers' efforts to adapt the bridge's design to the needs of the highway's alignment.
- 10 PERCHA, CREEK BRIDGE (1927)**. South of NM 152 and two miles west of Hillsboro, this 241-ft. long, one-span structure is the state's oldest deck truss bridge. Located over steep canyon walls, the bridge was designed by a team of engineers from below, their design offered the advantage of removing the truss from the roadway.
- 11 SAN JUAN RIVER BRIDGE (1927)**. On US 666 and US 64 one-half mile west of Shiprock, this six-span structure is the longest (1,007 feet) Parker through truss bridge in New Mexico. In 1975, the reinforced concrete bridge paralleling it was added to meet the needs of the increased traffic in the area.
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