
THE HISTORIC RAILROAD BUILDINGS OF ALBUQUERQUE
AN ASSESSMENT OF SIGNIFICANCE

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SUMMARY

The single most important factor in the development of Albuquerque between 1880 and 1930, in its transformation from a farming village into a commercial and industrial center, and in its emergence as the leading city of New Mexico was the railroad. Throughout this period, the Santa Fe Railway was the city's leading employer. In addition, its buildings were viewed with community pride as signs of progress and prosperity. Because of the railroad's leading role, these structures are prominent reminders of the this important period in Albuquerque's history.

Depot Complex. The Santa Fe Railway Depot (built 1902) has already been designated an Albuquerque City Landmark. The three remaining buildings in the depot area--the Curio Store Building(1912), the Telegraph Office (1914) and the Freight House (1946)--complement the depot in their rough stucco finishes and in their California Mission and Pueblo styling. The Depot and the Telegraph Office are good examples of pebble dash stuccoing, while the Curio Store is an early, local example of reinforced concrete construction. The complex served as the city's point of contact with the outside world: passengers, freight, and messages moved in and out, curios were shipped, and newspaper and magazines arrived. Together the four buildings define the town-side, automobile approach to the depot which once included a circle drive. Because of the close spatial, functional and stylistic relationship of the three later buildings to the Depot, the area is eligible for designation as an Historic Overlay Zone.

Locomotive Shop Complex. The eighteen structures remaining from the locomotive shop complex (1914-24) constitute the largest historic industrial plant in the state. They employ a variety of materials and features which reflect the rapid innovation of industrial design at the time. Four of the buildings, because of the quality of their design, construction and style, are particular good representatives of this industrial aspect of the city's history and are eligible for designation as Albuquerque City Landmarks.

The Roundhouse and its turntable were the center for daily maintenance and repairs of steam locomotives. Built in 1914 and 1915 of a modern, industrial material, reinforced concrete, the Roundhouse is apparently the first to follow the Santa Fe Railway's new standard roundhouse plan.

The Machine and Boiler Shops (1921-23) were designed for the periodic major overhauls of locomotives, one of four such facilities on the Santa Fe. Their one story, steel frame structure with extensive glass curtain walls, their use of a

limited number of standardized parts, and their complete integration of machinery, structure, light and ventilation make the shops comparable to the best industrial design of the period. In addition, the simplified Neo-classicism of the track and town-side facades raises the Machine and Boiler Shops above normal industrial buildings to the status of monuments of the Santa Fe system.

The Fire Station, built in 1920, reflects the tendency of railroads to provide their own services and utilities. Its rough, brown sandstone masonry, off center tower, and tile accents give it a rustic Mediterranean style. Besides being one of the best local picturesque revival structures of the 1920s, it is the oldest remaining fire station in the city.

BACKGROUND

In January 1880, three months before the railroad arrived, Albuquerque was designated as the division point between the Atchison, Topeka and Santa Fe, and the Atlantic and Pacific railroads. (The Santa Fe already owned a half interest in the A & P and would completely absorb it in 1902.) This designation meant that Albuquerque would be the site not only of a depot, but also of the A & P's division offices and major repair shops. By the mid-1880s several substantial buildings--locomotive and car repair shops, and a large roundhouse--had been erected. The employment and prestige of these facilities helped attract additional businesses dependent on the railroad: a foundry, lumber and wool scouring mills, and dry goods, grocery and hardware warehouses. The locomotive shops alone employed 970 in 1919, one-quarter of the city's work force. With other jobs at the railroad depot and hotel, on the trains, and in rail related businesses, most residents owed their livelihood to the railroad. (1)

Santa Fe Bankruptcy and Revival. The Santa Fe Railroad, like countless other businesses, was caught up in the headlong rush to develop the West after the Civil War. During the 1880s, in particular, the Santa Fe pushed its lines through vast unpopulated areas. They sought to head off competing railroads and to claim extensive grants of land authorized by congress to encourage the construction of trans-continental lines. Having made substantial capital outlays, but unable to sell most of its land holdings and lacking adequate traffic to sustain its operations, the Santa Fe went bankrupt in the depression known as the Panic of 1893. Two years later it was reorganized as the Atchison, Topeka and Santa Fe Railway. (2)

In 1896, Edward Ripley was named president of the line, a position he would hold until 1920. This would be the

golden era of the Santa Fe, a time when it regained solvency, prospered and grew. Two aspects of Ripley's previous experience qualified him to lead the Santa Fe's recovery efforts. First, he had built a reputation as an innovative railroad manager. Second, as an organizer of the 1893 Columbian Exposition in Chicago he had been exposed to mass-market promotion and to the public relations potential of architecture. Under Ripley, the Santa Fe became a national leader in modern efficiency management and in corporate image-making. The drive for operational efficiency slowly gathered momentum, ultimately finding its clearest expression in a series of new locomotive shops including those in Albuquerque. The image-making campaign began more quickly and its effects appeared sooner in the depot complex. (3)

Architectural Image-making. The Columbian Exposition structure which most influenced the Santa Fe Railway was the California Building which adopted the style of a Spanish mission. The Santa Fe soon began building depots, lunch rooms and hotels in this romantic California Mission style. The purpose was twofold: to increase passenger traffic by attracting tourists to the Southwest, and to improve the line's public image at a time when many viewed railroads as monopolistic and called for regulation of their rates. These Mission style hotels and lunch rooms have long been associated with the Fred Harvey Company which managed them; after all, they were called Harvey Houses. However, the Santa Fe Railway chose the Mission style for its corporate identity; it financed, built and owned all the structures; and its architects designed most of them. (4)

Depot Complex. In 1902, the Alvarado Hotel (the largest Harvey House), an Indian curio building, and a new depot were built in Albuquerque, making the city a center of the Santa Fe's tourism effort. Auxiliary buildings, including the Curio Store Building (now the Traffic Office) and a new Telegraph Office, were added a decade later. A two story Freight House (Office) appeared in 1945-46. Although the Alvarado Hotel and Indian Building were demolished in 1970, the third major building, the Depot, remains as a reminder of the former grandeur of the complex. With its bell tower and long, arched porches, the Depot is the best example of the California Mission style remaining in Albuquerque. It has been designated a City Landmark and determined eligible for the National Register of Historic Places. Although the Curio Store and Telegraph Office lack some Mission style details such as tile roofs and arched porches, both employ stucco walls and cut-out parapets as a shorthand version of the style. The Depot and the Telegraph Office are among the best remaining local examples of pebble dash stucco which was common from 1900 to 1925 (and looks a bit like pebbles covered by a thick glaze).

The Hotel, Indian Building, Depot and Telegraph Office all were built of wood frame and stucco. The Curio Store, though, has a reinforced concrete foundation, pillars, walls and roof. When it was built in 1912, it was one of the first examples of this new form of construction, and appears to be the second oldest remaining example in the city, predated only by the 1910 Rosenwald Building. The concrete walls of the Curio Store were stuccoed, but its continuous window sills, string courses and cornices were left exposed as accent details. (5)

The two story Freight House is an example of the Pueblo style which became popular after the Alvarado and Depot were built. The style was developed in large part through the efforts of the Santa Fe and Harvey Company designer Mary Colter. Although similar to the California Mission style in its evocation of the romantic Southwest, the undulating parapets of the Pueblo style project a specifically New Mexican image. The Santa Fe's reliance on low-maintenance concrete accounts for the concrete details--lintels, porch brackets and roof drains. The Freight House and Curio Shop both retain their original grey stucco, a color often used for economy's sake but seen in few surviving examples.

These four remaining buildings have long defined the town-side, automobile approach to the depot. A patch of brick paving laid in a herringbone pattern remains just west of the depot, but a circle drive further west has been replaced by a parking lot.

Shops and Operations. While the first Mission style depots and hotels were being built at the turn of the century, steps were being taken to reduce operational costs: larger locomotives were developed and the line was rebuilt for heavier loads; shops were centralized at the most advantageous locations; employee bonuses and a pension program were begun; record keeping in the shops and supply stores began more detailed; and a system of apprentice instruction was instituted. All were aimed at improving efficiency and, thereby, increasing profits. (6)

The bonus system and record keeping would have the greatest effect on new shop construction. First, standardized schedules were written to cover every step in the repair of each locomotive type. An ideal time was next calculated for the completion of each step. Any worker who completed the work in less than one-and-one-half times the allotted period received a pay bonus. Ideal times had to be adjusted for each shop once it was discovered that local machinery and work place conditions effected efficiency. A leading trade journal, *Engineering Magazine* explained that: "exact comparison between performances of the same operation in different shops is permitted. Variations or defects of practice, methods or machinery are thus immediately apparent,

and may be investigated and corrected." (7) With methods increasingly perfected, the two most important remaining factors were the presence of overhead moving cranes and adequate lighting. It also became possible to calculate that the cost of building modern shops which incorporated these features was justified by the reduction of labor costs which would result.

The Santa Fe began the construction of a series four modern shop complexes to realize these savings and to accommodate the new larger locomotives. By 1909, much of the operation at Topeka, Kansas had been modernized. Facilities at Albuquerque were constructed between 1914 and 1924, with the main locomotive shops appearing between 1921 and 1923. Similar shops at Cleburne, Texas date to about the same time, and those at San Bernardino, California followed shortly after. (8)

Albuquerque Shop Buildings. About 1912, the Santa Fe Railway approached the City of Albuquerque with their plans to modernize and expand the outmoded A and P locomotive shops which stood between Second Street and the main tracks, and from Hazeldin south to Pacific. They requested and received a grant of \$65,000 dollars from the city to purchase property for the expansion. Three, formerly-residential blocks were purchased to the south as far as the current Bridge Street overpass. A surplus of \$25,000 was returned to the city. First phase construction began on the new property in 1914 and was completed by mid-1915 (see Table), at a cost of approximately \$500,000. The 35-stall Roundhouse and the Storehouse (comparable to an Army quartermaster department), remain today. Several major buildings for freight car repairs located near the Bridge Street overpass, and a Power Station, all built at this time, have since been demolished.

All subsequent shop buildings remain standing. Construction of a new Blacksmiths Shop was authorized in 1916. Built about the same time was the Flue Shop which was later attached to the Boiler Shop. Design of the massive new Machine Shop was completed in August, 1920; work was begun in February of the following year and completed eight months later. The companion Boiler Shop was designed in mid-1922 and completed in 1923. The most notable auxiliary building, the Fire Station, was built in 1920. A Tender Repair Shop was designed in 1924 and added off the north side of the Boiler Shop the following year, completing the shop complex. (9)

Industrial Construction. The decade from 1914 to 1924, when the new Albuquerque shops were constructed, coincided with the greatest period of innovation in the history of industrial design and building technology. Factories of the late 19th century had followed a building tradition which stretched back to medieval warehouses. Because of high

property values in cities, these factories were customarily multi-story buildings. Generally they had stone or brick, load-bearing piers outside and heavy timber framing inside. (The original Atlantic and Pacific roundhouse and shops were stone construction with timber framing.) Concrete reinforced with steel became common in industrial construction after 1905. It was fire-proof, required less maintenance than brick or stone, dampened machine vibration better and was faster and more economical to build. Since the structure was reduced to a minimum with reinforced concrete, large areas of the walls were left free for windows to better light the factory. (10)

The need to build even more quickly during the First World War, spurred the adoption of steel frame construction. Steel had not been used earlier in multi-story factories because it failed if exposed to fire, and did not provide dampening for machine vibration. So war-time factories were shifted to less-expensive property away from city centers where it was economical to build one-story buildings and safe to use steel. Besides being faster and cheaper to build, steel structures left even more wall surface free for light and ventilation and also spanned greater widths than reinforced concrete. This last characteristic allowed greater flexibility to design an enclosure around the industrial process. The process could be laid out for maximum efficiency without being constrained by the smaller structural grid of reinforced concrete. (11)

Because the Albuquerque shops were constructed both before and after the First World War, they reflect several stages of this rapid evolution. Some smaller buildings such as the locker and wash rooms are of brick, while the Sheet Metal Shed has a wood timber structure. Reinforced concrete was used for the Roundhouse, Storehouse and Flue Shop built just before the war, and for most of the smaller, auxiliary buildings. The Blacksmiths Shop, built about 1917, employs a steel frame structure but retains vestigial brick walls. The Machine and Boiler Shops, built after the war, employ a steel frame, with spans as wide as 86 feet, and continuous glass curtain walls on the long east-west sides.

Roundhouse. In addition to using a new material, the 35-stall Roundhouse also followed a standardized plan designed by the Santa Fe's engineering department in Chicago. This plan detailed the construction of a single stall which could be multiplied to produce the number of stalls needed for each new roundhouse. The standard plan is dated May, 1914, while the layout of the Albuquerque Roundhouse is dated May 22, 1914, making it an early, perhaps the first, use of this new Santa Fe system standard plan. A tall center section, cutting across the middle of each stall, allowed the addition of two improvements: clerestory windows which provided better light and a 7 1/2 ton traveling crane which

facilitated minor locomotive repairs. Although this was a substantial advance over the poorly-lit, old sandstone roundhouse, the new roundhouse exhibits some features which had become conventional in 19th century roundhouses such as steam heat pipes in the engine pits and an elaborate drainage system to facilitate cleaning. The concrete detailing under the monitor roof, too, harkens back to the rafters of early, wooden roundhouse roofs. (12)

Locomotive Maintenance. To understand the relationship of the roundhouse to the larger locomotive shop buildings it helps to know a little about locomotive maintenance. Steam locomotives, which provided the primary power for American railroads until the ascendance of diesel engines in the late 1940s and 1950s, required substantial daily servicing and maintenance, as well as periodic major overhauls. Every 4 to 6 hours, a steam engine was rid of clinkers--the irregular lumps left after coal firing--and its moving parts and pipes were inspected and, if necessary, repaired. Once a day, fire tubes, flues and smoke boxes were cleaned and boilers were washed out to remove mineral build-up. Each morning, the locomotive would depart from its home roundhouse for a run of 100 to 150 miles to the next division point. From Albuquerque, the division points were Las Vegas to the north, Gallup to the west, and San Marcial to the south. There, in another roundhouse, inspections, lubrication and necessary repairs were made, and, in adjoining ash pits, clinkers and ashes were dropped. After the return trip, daily maintenance was performed and the engine housed in its home roundhouse. Roundhouses were also equipped with drop pits and machinery to perform general repairs. (13)

Periodically, a locomotive was taken to a large shop for a major overhaul. In the 19th century, this might be necessary after as few as 40,000 miles, but after 1900, with the introduction of more durable parts and features designed to reduce maintenance, some engines ran as much as 400,000 miles before receiving major repairs. In the erecting bay of the locomotive shop, the engine was completely dismantled and the parts sent to various departments for cleaning, inspection and repair. After being cleaned in a lye vat, working parts were reconditioned and necessary replacements fabricated in the machine shop. Lathes turned the large driving wheels so that all were exactly the same size. In the blacksmith shop, breaks in the frame were repaired. The boiler and fire box were patched with steel plate or, if needed, replacements were fabricated. Each part was given a final inspection and tested to meet precise standards before the locomotive was reassembled. On average, a complete overhaul took about a month to perform. Over the fifteen year life of an average locomotive, it might be rebuilt or receive other major shop repairs once every 12 to 18 months. In this century, the Albuquerque shops serviced 40 locomotives in the average month. (14)

Machine and Boiler Shops. Built in 1921, only seven years after the roundhouse, the Machine Shop was even closer to the cutting edge of industrial design. In most regards it is comparable to the Ford Motor Company Glass Plant of 1922 which Grant Hildebrand, a leading scholar of twentieth century industrial design, has called "the single factory which carried industrial architecture forward more than any other." (15) The Machine Shop and the Glass Plant are both one story steel frame buildings, clad mostly with glass. Where necessary, additional skylights are added on the roof. In both factories, the steel frame is meticulously worked out to accommodate all functions--offices and locker rooms as well as production areas. Each uses a limited set of standardized parts: one or two sizes of steel columns and girders, one type of truss, stock steel windows and so forth. This standardization increased the speed and lowered the cost of design and drawings, and the ordering of parts and construction. It took only eight months to erect the massive, 240 by 604 foot Machine Shop, comparable in size and speed of construction to the typical Ford factory building. (16)

The finest industrial design of the era completely integrated the production process, the machinery, light and ventilation, with the building structure and form. In the tall bay of the Machine Shop, for instance, the structural support for two levels of overhead traveling cranes (one a 250 ton crane) is integrated with the building structure which also carries the roof and glass curtain walls. The Santa Fe's engineering department's long experience in the design of steel railroad bridges prepared them for the structural engineering of the Boiler Shop.

The Boiler Shop built the following year adopts all the major features developed in the Machine Shop. However, its concrete facades are obscured by the Blacksmiths Shop to the east and the fire shed to the west. In addition, its features are not as completely integrated as those of the Machine Shop, the result, perhaps, of being hemmed in by the already-existing Blacksmiths Shop, Flue Shop and Sheet Metal Shed. (17)

The Albuquerque locomotive shops employ cross axial planning similar to the Ford River Rouge complex which included the Glass Plant. At River Rouge, all the assembly lines are aligned on one axis which is intersected on a perpendicular axis by the rail lines and streets which bring material to the factories, move parts between them and take away finished cars. In the Albuquerque Machine and Boiler Shops all the rail lines run north and south, both inside the buildings and outside along either end. Running east and west are the transfer table between the buildings, four sets of over-head traveling cranes in the buildings and

a fifth traveling crane outside, south of the Machine Shop. Although the size of locomotives precluded the adoption of assembly line production, this cross axial plan allowed the highly efficient movement of the heavy locomotive parts to the various departments for repair and subsequent return for reassembly, as well as the introduction of new materials and parts.

Industrial Monuments. The one conservative feature in the shops' design is their reinforced concrete facades which could have easily (and more inexpensively) been treated as glass curtain walls like the north and south sides. (However, even the revolutionary Ford Glass Plant of the same period continues to use brick cladding on its base where the less expensive corrugated metal used above would have done just as well.) The steel frame of the Albuquerque shops stands behind and integrated into the concrete facades. Since the concrete is structurally redundant, these facades facing the town and the tracks can only be understood as examples of corporate pride. The interiors are single story spaces from thirty to fifty-seven feet tall; in contrast, the facade piers and spandrels (recessed horizontal panels) form a grid which harkens back to the the multi-story, reinforced concrete factories commonly built between 1905 and 1920. These spandrels were omitted from the otherwise similar facades of the San Bernardino shops, built 1924, which gave them a more vertical, Art Deco appearance.

Nevertheless, the predominant style of the facades, both at Albuquerque and San Bernardino, is an abstracted Neo-classicism: plain concrete piers extend up to a simple bracketed cornice topped by a pedimented frieze with a recessed Santa Fe company emblem. The clear order and rationality implied by Neo-classicism was the natural compliment to the standardization and rigorous efficiency of steel frame buildings and of modern industry. The handful of locomotive shops, with their austere classical styling, rise above the normal, purely functional buildings to become the industrial monuments of the Santa Fe Railway. (18)

Fire Station. The only other Albuquerque shop building with architectural pretensions is the Fire Station, built in 1920. Its rough-faced, random ashlar, brown sandstone walls, its crenelated parapet, asymmetrical tower and tile accents give it an unusual, rustic Mediterranean appearance. This departure from the Santa Fe's normal modes--functional concrete and California Mission style--may have stemmed from a desire to complement the old Atlantic and Pacific division offices which then stood next to the fire station site. It is the oldest remaining fire station in the city and one of the most accomplished picturesque revival buildings erected in the city during the 1920s. (19)

Decline of Steam Locomotives. These would be the last great railroad buildings erected in Albuquerque. Traffic peaked on the Santa Fe in the 1920s, dropped sharply in the 1930s because of the Depression and the rise of the automobile and trucking, and recovered only temporarily during the Second World War. In 1935, the Santa Fe began experimenting with diesel engines which would prove to be more economical to operate, run longer distances and require less frequent maintenance than steam locomotives. Because of the difficulties it had always had supplying steam locomotives with coal and water on its western lines, the Santa Fe became a leader in the conversion to diesel. The Second World War halted the purchase of new engines and the Albuquerque shops experienced a final peak of activity with a record 1,500 workers. The switch to diesel was resumed after the war; 1,261 new engines were purchased by 1952 and the last steam engine was retired from the Santa Fe in 1956. At the end of the war, San Bernardino and Cleburne were chosen for the centralized diesel locomotive shops. In 1953, the Albuquerque shops became the central facility for repairs of equipment for the maintenance of the rail lines. This function substantially underutilizes the shops, requiring only 200 employees. The Roundhouse was used until recently for storage, but now stands empty. (20)

Albuquerque and New Mexico Industrial Architecture. There has not been a comprehensive survey of industrial architecture in New Mexico. Working from industrial census figures, however, it is possible to identify the other employers which may have had facilities comparable in size to the Albuquerque shops. Employment in industry--mining and manufacturing combined--in New Mexico in 1919 totaled 13,343 but declined to 11,462 in 1929. The largest single establishment was the Phelps Dodge copper mine at Tyrone with something over 1,000 employees. That innovative company town, designed in 1914 by Bertram Goodhue, was later demolished to make way for an open pit copper mine. The Albuquerque locomotive shops in 1919--after the new roundhouse was constructed but before the new shops were--already employed 970, the second largest industrial facility in the state. Three of the four other facilities in the state with over 500 employees were coal mines. The coal mining areas active at the time were Madrid, Gallup and Raton, all of which have long since been abandoned. The above-ground, wooden, mining structures at Madrid, for instance, collapsed into ruins about 1980. The fourth facility was a copper mine, the location of which has not been determined. (21)

In Albuquerque, the largest industrial companies after the locomotive shops each employed fewer than fifty people. Most of the structures associated with these early Albuquerque industries have been demolished, including wool scouring mills, a foundry, flour mills, early water and power

plants, brick kilns and warehouses. The only important historic, industrial structures remaining besides the locomotive shops are the Southwest Brewery, a multi-story brick building erected in 1899 (listed on the National Register of Historic Places, March 30, 1978), the Prager Power Station built at the American Lumber Company yards in 1904, and the Wool Warehouse built in 1929 with a reinforced concrete frame and brick curtain walls (also listed on the National Register, July 23, 1981). The most important still-standing reinforced concrete structures which predate the 1914 roundhouse are the three-story Rosenwald Building, a department store built in 1910 (a City Landmark and listed on the National Register, June 29, 1978), and the Indian Curio Store of 1912. (22)

Railroad Shops in New Mexico and the West. Over half of the manufacturing workers in the state in 1919 were employed in steam-railroad repair shops, including, in addition to the Albuquerque shops, two facilities with between 250 and 500 workers and five with between 100 and 250. These undoubtedly were the roundhouses and minor shops at Las Vegas, Clovis, Belen, Raton, San Marcial and Gallup, and additional facilities at Deming, Lordsburg, Vaughn, Tucumcari and Roswell. Roundhouses at Raton, San Marcial and Gallup have been demolished. The 34-stall Las Vegas roundhouse built in 1917 was listed on the National Register September 26, 1985. The 12-stall Clovis roundhouse is included in a pending National Register nomination of Historic Railroad Properties of Eastern New Mexico. A handful of small brick and stone shop buildings from the turn of the century remain at Chama where they continue to be used by the Cumbres & Toltec Scenic Railroad. (23)

When interviewed by telephone, the architectural historians at the state historic preservation offices of Kansas, Texas, Colorado and California knew of no research or historic building nominations covering roundhouses or locomotive shops except for the Historic Preservation Certification statement on the five-stall Belt Line Roundhouse, built in San Francisco in 1913. A leading railroad historian, Walter Grey of the California State Railroad Museum in Sacramento, estimates that there are only 12 to 15 roundhouses remaining on common carrier lines in the Pacific and Rocky Mountain states. There may be half as many historic, major locomotive shop complexes. Jim Steely of the Texas Historical Commission estimates that six roundhouses or portions of roundhouses remain in that state. (24)

NOTES

1. Marc Simmons, Albuquerque: A Narrative History, (Albuquerque: University of New Mexico Press, 1982), pp. 212-227, 275; Charles Biebel, Making the Most of It: Public Works in Albuquerque During the Great Depression, 1929-1942, (Albuquerque: Albuquerque Museum, 1986), pp. 1-3; David Myrick, New Mexico's Railroads, (Golden, Colorado: Colorado Railroad Museum, 1970), pp. 29, 34; Fourteenth Census of the U.S. Taken in the year 1920, "Manufactures, 1919," (Washington D.C.: Government Printing Office, 1923), p. 963; Byron Johnson and Robert Dauner, Early Albuquerque, (Albuquerque; Albuquerque Juornal/Museum, 1981), pp.77.79-83.
2. Keith Bryant Jr., History of the Atchison, Topeka and Santa Fe Railway, (N.Y.: Macmillan, 1974), pp. 140-168.
3. Bryant, pp. 151-221; Charles Going, "Methods of the Santa Fe. Efficiency in the Manufacture of Transportation," The Engineering Magazine, Part 1, 36, no. 6 (March, 1909), pp. 909-30, Part 3, 37, no. 2 (May 1909) pp. 225-48.
4. Bryant, pp. 106-122; Virginia Grattan, Mary Colter: Builder Upon the Red Earth, (Flagstaff, Arizona; Northland Press, 1980), pp.20-58; David Gebhard, "Architecture and the Fred Harvey Houses: The Alvarado and La Fonda," New Mexico Architecture, January-February, 1964, pp.18-25; John Stilgoe, Metropolitan Corridor: Railroads and the American Scene, (New Haven: Yale University Press, 1983), p. 202; Robert Pounds, Santa Fe Depots, the Western Lines, (Dalles: Kachina Press, 1987), pp. 22-24.
5. "Curio Store Building," five sheets of architectural plans, Topeka, February, 1912.
6. Bryant, pp. 171, 202-203; Going, Part 1, pp. 910-911; E.D. Worley, Iron Horses of the Santa Fe, (Dallas: Southwest Railroad Historical Society, 1965), pp. 372.
7. Going, Part 3, p. 233.
8. Construction information for the Albuquerque shops comes from: "Great Work Being Done on Machine Shops," Albuquerque Journal, March 14, 1915, Secton 2, p. 5, cols. 1-7; "New Storehouse at Albuquerque, a Model of Efficiency," Santa Fe (Employees) Magazine, 9, no. 12 (November 1915), pp. 55-58; "Construction Notes," Santa Fe Magazine, all issues from 7, no. 3 (February, 1913) through 9, no. 11 (October, 1915); Sanborn Map Company, "Sanborn Insurance Maps of Albuquerque, New Mexico," 1919, 1924, 1931; Henry Bender Jr., "The Albuquerque Shops of the Santa Fe," The New Mexico Railroader, 6, no. 8 (August, 1964), pp. 1-7; C.F.W. Felt,

"Standard High Type Reinforced Concrete Engine House," architectural plans, May, 1914; C.F.W. Felt, "Plans of 35 Stall Roundhouse at Albuquerque," architectural plans, May 22, 1914; E.A. Harrison, "AT&SF Machine Shop, Albuquerque," 17 sheets of architectural plans, Chicago, August 12, 1920; E.A. Harrison, "AT&SF Boiler Shop," 10 sheets of architectural plans, Chicago, June 30, 1922; A.F. Robinson, "Tender Repair Shop," structural plan, October, 1924; E.A. Harrison, "Tender Repair Shop," 3 sheets of architectural plans, Chicago, March, 1925.

The conjecture that the new Topeka locomotive shops were built before those in Albuquerque is based on a photograph of the interior of the Topeka works in Joseph Snell and Don Wilson, Birth of the Atchison, Topeka and Santa Fe Railway, (Topeka: Kansas State Historical Society, 1968), p. 60, which shows the tracks and the overhead crane alined in same direction; this type of arrangement was often used before World War I, but was superseded in the 1920s industrial design by cross axial planning (i.e. tracks and cranes perpendicular to each other) which was employed at the main Albuquerque shops (1920-22). William Parr (Architect, Western Lines, Atchison, Topeka and Santa Fe Railway), Amarillo, Texas, interviewed July 28, 1986, stated that the shops at Cleburne, Texas were virtually identical to those at Albuquerque, therefore, my surmise that they were built about the same time. Bryant, p. 250, states that the San Bernidino shops were expanded in 1924.

9. See note 4 for construction information.

10. Stilgoe, p. 125; Reyner Banham, A Concrete Atlantis: U.S. Industrial Building and European Modern Architecture, (Cambridge: MIT Press, 1986), pp. 29,38-41,57,62,88; Grant Hildebrand, Designing for Industry; the Architecture of Albert Kahn, (Cambridge: MIT Press, 1974), pp. 31,92; Carl W. Condit, American Building Art: the Twentieth Century, (N.Y.: Oxford University Press, 1961), pp. 3-5; Johnson and Dauner, pp. 79,82.

11. Banham, pp. 39,54,92,104; Hildebrand, pp. 31,53-55,99; "Standardized Factory Buildings," Factory and Industrial Management, 55 (April, 1918), pp. 329-330; J. Anderson Wyatt, "Building the Factory," Harper's Weekly, 55 (May 20, 1911), p. 16; O.D. Lee, "Construction Features of the Watervliet Shops of the Delaware & Hudson Company," Cassier's Magazine, 41 (May, 1912), pp. 469-80.

12. Felt, "Standard Engine House;" Felt, "Roundhouse at Albuquerque;" Berg, pp. 166-175.

13. Cecil Allen, Modern Railways: Their Engineering, Equipment and Operation, (Westport, Connecticut: Greenwood press, 1959), pp. 109-113; Walter Berg, Buildings and Structures of American Railroads, (N.Y.; Wiley & Sons, 1904),

pp. 51,166-167; Worley, pp. 41,44; Jerry Willaims and Paul Mcallister eds., New Mexico in Maps, (Albuquerque UNM press, 1979), pp. 42-43.

14. Worley, pp. 41,44,46,49; Going, Part 3, pp. 232-33; "Hospitals for Disabled Locomotives," Scientific American Supplement, 88, no. 2290 (December 13, 1919), pp. 352-53+; Thaddeus Dayton, "The Graveyard of Old Engines," Harpers Weekly, 54, no. 30 (February 5, 1910), p. 30; H.B. Hening and E. Dana Johnson, Albuquerque, (Albuquerque; Press of the Albuquerque Morning Journal, 1908), 2 unnumbered pages on railroad shops; "Growth of Albuquerque is Paralleled by the Santa Fe Ry." Albuquerque Progress, 10, no. 5 (June 1943), p. 9.

15. Hildebrand, p. 111.

16. Hilderand, p. 102-123; Harrison, "AT&SF Machine Shop, Albuquerque."

17. Harrison, "AT&SF Boiler Shop."

18. Hildebrand, p. 62; Banham, pp. 20,54,68,70; Stilgoe, p. 126. Photographs of the San Bernardino shops: Merle Armitage, The Railroads of America, (N.Y.: Duell, Sloan and Pearec-Little Brown, 1952), pp. 114-115; Donald Duke and Stan Kistler, Santa Fe: Steel Rails through California, (San Marino, Cal.: Golden West, 1963), p. 141.

19. E.A. Harrison, "New Fire Department Building," 6 sheets of undated architectural plans, Chicago; Johnson and Dauner, p. 80.

20. Allen, pp 122-123,147-149; Worley, pp. 403-410; Myrick, p. 41; Bryant, pp. 249,310-317; Santa Fe Engineering Department, "Centralized Work Equipment Shop," February, 1982.

21. "Manufactures, 1919," pp. 961-65; Fourteenth Census of the U.S. Taken in the Year 1920, "Mines and Quarries," (Washington D.C.: Governmet Printing Office, 1923), vol. 11, p. 168; Fifteenth Census of the U.S., (Washington D.C.: Government Printing Office, 1933, vol. 3, "Manufactures, 1929," pp. 346-349, "Mines and Quarries," p. 175.

22. Johnson and Dauner, pp. 62,85-93.

23. Williams and McAllister, pp. 42-43; "Chama: A Reminder of the Railroad Age," La Cronica, no. 19 (August, 1984), pp.5-6.

24. Telephone interview with Walter Grey (Historian, California State Railroad Museum), July 16, 1986; Telephone interview with Jim Steely (Texas Historical Commission), July

16, 1986; Telephone interview with Tom Winters (California Office of Preservation), July 14, 1986; Telephone interview with Martha Hagadern (Kansas State Historical Society), July 17, 1986; Telephone interview with Chris Psaffs (Colorado historic preservation office), July 15, 1986.

TABLE OF REMAINING HISTORIC RAILROAD BUILDINGS OF ALBUQUERQUE
(WITH MAJOR BUILDINGS DEMOLISHED SINCE 1925)

#	Original Building Name (Alternate names, #s)	Main Materials	Designed /Built	Demolished
<u>Depot Complex</u>				
	Alvarado Hotel	Wood frame, stucco	1902	1970
	Indian Building	Wood frame, stucco	1902	1970
13	Depot	Wood frame, stucco	1902	
12	Curio Store Building (Traffic Office)	Concrete, stucco	1912	
15	Telegraph Office	Wood frame, stucco	1914	
16	Freight House	Brick, stucco	1945-46	
21	Alvarado Heating Plant (Coach Repair Shop, NE of Lead and tracks)	Brick, stucco	1913-19	
<u>Shops Complex</u>				
	Atlantic and Pacific Offices	Adobe	1881	1961
90	Roundhouse	Concrete	1914-15	1986
89	Turntable	Concrete, steel	1914-15	
74	Storehouse and Platform	Concrete	1914-15	
100	Fragments of Planning Mill (near Bridge Street Overpass)	Brick	1914-15	
109	Locker and Wash Room (for # 100, Planning Mill)	Brick	1914-15	

TABLE OF REMAINING HISTORIC RAILROAD BUILDINGS OF ALBUQUERQUE--Continued

#	Original Building Name (Alternate names, #s)	Main Material	Designed /Built	Demolished
80	Power Plant	Concrete	1914-15	1984
	Car Shed	Wood frame	1914-15	Yes
	Car Wheel Shop	Concrete	1914-15	Yes
91	Engine Oil Supplies/ Locker Room (R.H. Foreman's Office)	Brick	1915	
126	Sheet Iron Shed (CWE Storage shed)	Wood frame/ corrugated mtl.	pre-1919	
77	Wash Room (N. of Roundhouse)	Brick	1915-19	
49	Locker and Wash Room	Brick	1915-19	
47	Blacksmiths Shop (CWE Shop 4)	Steel frame, brick	1916	
129	Waste Reclaiming Plant (Waste House)	Concrete	1920	
134	Flue/Pipe Shop (Machine shop, CWE Shop 3, attached to Boiler Shop)	Concrete	1919-20	
136	Fire Station	Sandstone, concrete	1920	
163	Machine Shop (CWE Shop 5)	Steel, concrete	1920-21	
153	Transfer Table	Concrete, steel	1920?	
133	Assembly Hall	Concrete	1919-22	

TABLE OF REMAINING HISTORIC RAILROAD BUILDINGS OF ALBUQUERQUE---Continued

#	Original Building Name (Alternate names, #s)	Main Material	Designed /Built	Demolished
152	Boiler Shop (CWE Shop 1)	Steel, Concrete	1922-23	
149	Welding/Tin Shop	Concrete	1922	
135	Babbit Shop	Concrete	1924	
188	Tender Repair Shop (Heavy Equipment Shop, CWE Shop 2, attached to Boiler Shop)	Steel, Concrete	1924-25	
242	Motor Car Garage (Battery House)	Brick	1924-31	

