

*Immigrants Get It Done!*

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There is no more compelling story than that of the struggle to complete the largest domestic construction project of the 19th century. In historian Stephen Ambrose's words there was "Nothing Like it in the World". He chose that phrase as the title of his 2000 book on the transcontinental railroad. I had it on the shelf for several years and only within the last few months took it up and was immediately drawn to its relevancy to much of the current national debate over how and how many immigrants should be allowed into the U.S. today.

Simply put, the engineering feat that was the railroad could not have been completed without immigrant labor—many from well beyond our traditional sources of new labor.

But first, a few explanatory words about the project itself. By mid-19th century, railroads were beginning to replace the canals and rivers as the transport of choice in much of the eastern U.S. Between 1845 and 1854 total track miles grew from 4,311 to 15,675! East of the Mississippi river a web of rails had opened virtually every corner of the country. The big exception was west of the Mississippi river. The distances involved, the terrain, and the opposition to westward expansion by the Indians had made much progress seemingly impossible. Two factors changed the outlook—GOLD in California and growing sectional divisions that would ultimately result in the Civil War. Both of these developments had profound impact on the progress. The growing population push to California and other points west made better connections with the east vital. While at the same time the sectional divide would delay any real progress until the conflict was behind us.

In 1853, at Congress' direction military surveyors were dispatched to search for routes west. Their extensive findings were published in multiple volumes with maps and charts outlining the way west. Despite finding several possible routes, nothing could get through Congress. A route from New Orleans or any other southern city was seen as a new growth area for expanding slavery. Northern interests demanded that "free" territory be served with this new transportation. Thus, no funding or federal land grant to spur construction was possible.

Since the construction was stalled by the impossibility of Congressional funding, this seems a good time to digress slightly to future President Lincoln's early involvement in these adventures.

The National Archives has a succinct description of the issues involved:

“During the 1850s, a struggle was going on in the Mississippi Valley between those who favored north-south traffic and those who advocated east-west travel across the continent. It was a contest between the old lines of migration and the new; between the South and the East; between the slow and cheap transportation by water and the rapid, but more expensive, transportation by rail. It arrayed St. Louis and Chicago against each other in an intense rivalry. The people of the city of St. Louis and other river interests supported the principle of free navigation for boats, whereas the citizens of Chicago and the railroad interests stood by the right of railroad companies to build a bridge....

Even the government opposed the building of the bridge. In 1853, Jefferson Davis of Mississippi, then President Franklin Pierce's secretary of war, declared his interest in a transcontinental railroad by the southern route as a means of linking the Far West to the South. That same year, the Rock Island extended its line from Chicago to Rock Island and the Mississippi and Missouri Railroad broke ground at Davenport, Iowa. The Rock Island Bridge Company was formed and work on the bridge commenced in the fall of 1853. Southerners were opposed to any northern bridge because it would allow the north to settle the west in greater numbers. Davis made no objection at this time because he felt that the progress of the southern route seemed assured. In the spring of 1854, however, as the passage of the Kansas-Nebraska Act heated up sectional rivalries, Davis realized that his southern transcontinental railroad might be delayed. “

When the Rock Island bridge was completed in 1856 it marked the first crossing of the Mississippi river by any railroad. It was built on the exact site of a survey completed by Lt. Robert E. Lee in 1837 regarding the topographical feasibility of bridging the Mississippi.

“Just fifteen days after the celebration of the completion of the bridge, part of the bridge was wrecked and burned as a result of a steamboat collision. This incident set the stage for act two of the court battle that helped to settle the issue of whether railroads could cross navigable streams. This incident also brought into the public eye an Illinois attorney by the name of Abraham Lincoln.

The story goes like this. As darkness fell on the evening of May 6, the steamer *Effie Afton* moved slowly upriver toward the newly completed bridge. The vessel blew her whistle signaling that she was moving through the draw. The draw slowly opened and the steamboat moved through. Some two hundred feet after the *Effie Afton* cleared the draw, she heeled hard to the right. Her starboard engine stopped, the port power seemingly increased. She struck the span next to the opened draw. The impact caused a great deal of damage to both the bridge and the boat. Then a stove in one of the cabins was knocked over and its fire spread rapidly to the deck and then to the bridge timbers. The vessel burned to cinders within five minutes. One span was completely destroyed, and there was some pier damage as well as minor damage to the rest of the bridge. By the following day, the rest of the bridge caught fire and was completely destroyed. Steamboats up and down the river celebrated, blowing whistles and ringing bells.”

In the subsequent lawsuit the owners of the riverboat sued the bridge owners for damages while the bridge owners claimed the destruction of the bridge was a deliberate act of desperate shippers determined to save river navigation at all costs.

Abraham Lincoln was hired by the railroad interests and with his usual thoroughness investigated the issue in preparation for what turned out to be a 14 day trial. His closing arguments lasted two full days. The hung jury was a victory for the railroad and meant that shippers were unable to stifle the progress of rail crossings over waterways. It sounds so strange—but had the boat owners prevailed, lawsuits could have delayed rail construction at every navigable stream.

The real reason for the timetable of the transcontinental construction however was the coming conflict itself. Had the war not caused such disruption, construction would have been well underway in the late 1850s. However, it turned out, the organizational skills and management of huge numbers of men and enormous budgets were honed during the war and when construction resumed post-war those skills were of great value, and maybe essential, to overcome the logistical challenges of the project.

The rough outline of the problem is very simple, but seemingly impossible to achieve. Imagine building a rail line through undeveloped territory beginning in Omaha, Nebraska, following the Platte River, crossing the Rocky Mountains at South Pass in Wyoming and then through northern Utah and Nevada before crossing the Sierras to Sacramento, California. Omaha is approximately 980' above sea level. South Pass is around 7,500'. Was the technology possible to power locomotives, with rail cars behind through such drastic changes through the continental divide and on to California? Since a rise of 116 feet per mile was the maximum allowed, the requisite cuts and fills were going to be a massive engineering task—even on paper—to say nothing about the practical chore of actually moving the amount of dirt and rock required. No-one yet knew the number of bridges, fills, and tunnels that would be necessary.

In early 1861, Theodore Judah, a rail construction engineer and Daniel Strong, a local miner, surveyed what became the western portion of the route. Collis Huntington was inspired by one of Judah's lectures on the possibilities of a railroad. Huntington found four partners who initially invested \$1,500 each. The partners included Leland Stanford, a grocer, the future governor of California, and founder of what became Stanford University. These investors became known as the Big Four and their venture was called the Central Pacific Railroad. Charles Crocker, Leland Stanford, Collis Huntington and Mark Hopkins.

The House of Representatives voted for the line on May 6, 1862, and the Senate on June 20. Lincoln signed it into law on July 1. Two companies were hired -- the Central Pacific would build from the west and the Union Pacific from the east.

Besides land grants along the right-of-way, each railroad were to be paid \$16,000 per mile that was built over an easy grade, \$32,000 per mile in the high plains, and \$48,000 per mile in the mountains. This was only the beginning of the massive costs plus the inevitable unexpected cost overruns with any project of this size.

In considering the technical achievements of this construction, this is literally the 19th century moon-shot. The cost is beyond easy calculation. Construction was an intricate choreography of movements culminating in the actual spiking of the rails with sledgehammers.

1,902 miles from Council Bluff, Iowa to San Francisco Bay; shipping EVERYTHING needed for a workforce into the construction area; calculating the necessary materials; using the newly constructed rails to actually supply the materials to the workforce as the rails moved forward. All this required a level of expertise that had never been necessary—until the war. The same management skills from that conflict are going to be the essential skills necessary to accomplish this massive task.

The human factor was the greatest challenge for the construction companies. Supplying labor required an enormous recruitment effort—particularly for the Central Pacific line. The Chinese numbered 10,000 to 15,000 during high points of construction and they perhaps amounted up to 20,000 in total between 1865 and 1869, composing as much as 90 percent of the workforce for much of the construction. Actively recruiting Chinese proved essential to provide the stable labor force. The managers were amazed at the abilities and persistence of these people. Ability, sobriety, and teamwork were essential to the construction. In these attributes, the Chinese far surpassed any of the other groups hired for the job. They drank tea, brewed on the job site, and for the most part, avoided hard liquor. The brewing purified

the water and helped keep them much healthier than their white counterparts. They also were much less likely to leave for the mines on news of each new gold or silver strike. Wages varied from \$1 to \$3 per day during the construction with no real compensation bonus for hazardous duty—it was all risky. Many of the dangers were built-in and could not have been accomplished with our modern sense of OSHA regulations. Two rules governed: the rails had to be built and speed was paramount. Workers, especially Chinese, could be replaced—time lost could not be recovered. The entire project was essentially completed in less than five years.

The eastern section of the line, built by the Union Pacific Railroad Company, required tracks laid across vast flat expanses of mid-western prairie, but the western portion of the line required tunneling through the imposing Sierra Nevada mountains – blasting and digging cuts through deep rock, carving out 15 tunnels through solid granite in high altitudes, dumping large quantities of dirt and rubble to create fills, constructing trestles across deep canyons, building retaining walls.

Most of the building was with hand tools. Horse drawn wagons carried the basic materials, but the earth moving was largely done with shovels loading into one-horse dump carts and physically moving the dirt and rock either out of the way or into a low area requiring fill material. During the tunnel digging, several of the 15 tunnels were through solid granite. Holes were punched directly in front of the workers. Black powder was then poured into the holes and ignited. When the rubble was cleared away, more holes were punched, more powder—ignite—-punch-pour-ignite—repeat. An advance of one foot or two per day was progress! This is backbreaking, incredibly dangerous work. They experimented with nitroglycerine, but transporting such a volatile chemical proved too dangerous and was not really used enough to make a real contribution to the effort.

Stephen Ambrose’s description of the drilling can’t be improved—I quote:

“They usually operated in teams of three at a time at the tunnel facing, with four teams working side by side. Of the men who held the drills one reached as high as he could,

another held it a waist level, another down at his toes. The fourth man worked from stepladders that allowed the men to reach the top. Two men pounded. The man with the drill was turning it constantly while holding it firm and in place. The men who were pounding did so with sledgehammers weighing from fourteen to eighteen pounds each. They swung, hit the drill at the far end, dropped the hammer, brought it up again behind them, and swung once more. Alternately, at many times a minute. they could drill four inches of holes, one and three-quarters inches in diameter, in eight hours.

They stopped only to drink some tea, or when the holes got deep enough—one and a half to two inches in diameter, a foot and a half or more deep—for another man to put in the black powder, then the fuse. When the three or four holes were filled, the fuses were lit and everyone retreated down the tunnel to a safe distance. After the explosion, the three-man crew trudged back to the facing to do it over again...three shifts working the clock” This was all done by smoky torch lights.

After several explosions, the blasted rock had to be shoveled up into wheelbarrows and pushed out to the tunnels and dumped down the mountainside. Now, remember the goal. A tunnel had to be large enough for a train to pass through. Generally that meant around sixteen feet width and a semicircle roughly nineteen feet high at the top of the opening. This entire process had to be completed not once, but nineteen times! By the time the railroads met at Promontory Point, the Union Pacific had dug four tunnels. This accomplishment seems insignificant when compared to the fifteen tunnels dug by the Central Pacific through the seemingly insurmountable Sierra Nevadas. One tunnel alone was at an elevation of 7,000 feet and was the longest tunnel built, cutting through approximately 1,750 feet of solid granite.

Did I forget to mention the Rocky Mountain winters? Life in the tunnels was often preferable to harsh winter conditions outside—so life was confined to the tunnels—eating, sleeping, and working very much removed from the light of day!

This effort moved tunnels around a foot or two a day into the mountains. Working from both sides toward the center helped progress, as did, for one tunnel, drilling a vertical shaft from the top and working from the middle out both sides. But, despite all the innovations attempted, the work was basically hand-labor. Only when the openings were finished could the building of the railroad—rails, ties, etc.—actually begin.

The terrain was a bit easier once they reached the high desert of Nevada and Utah, but there they had to contend with extreme heat, long supply lines, and the breakneck speed of construction.

As construction neared Promontory Summit, workers laid ten miles and fifty-six feet of track in one day on April 28, 1869, working between 5 am and 7 pm. The accomplishment was in response to a \$10,000 wager Charles Crocker made with Thomas Durant of the Union Pacific that his Central Pacific workers were capable of doing what seemed impossible. A squad of eight Irish rail-handlers and an army of several thousand Chinese accomplished the feat. In the end 25,800 ties, 3,520 rails (averaging 560 lbs. each), 55,080 spikes, 14,050 bolts, and other materials, totaling in weight 4,462,000 pounds, were laid down. The track was not a simple straight line but curved so the workers had to bend the rails for all the curves. “Rails were placed on two blocks and forced into the desired curve by blows of a heavy hammer – a time-consuming process,” according to one account.

Crocker related that an Army officer witnessed the advance and said, “I never saw such organization as that. It was just like an army marching over the ground and leaving the track behind them.” The *San Francisco Bulletin* described the effort as “the greatest work in tracklaying ever accomplished or conceived by railroad men.”

While I am concentrating on the Central Pacific, the Union Pacific had their own challenges with not just distance, but with Indians. The Cheyennes were a particular problem. In raid after raid they destroyed supplies, killed construction crews and destroyed completed sections of track and burned equipment. “We’ve got to clean the

damn Indians out,” chief engineer Grenville Dodge reported, “or give up building the Union Pacific Railroad. The government may take its choice.” The builders eventually made a deal with the Pawnees to provide security, including one celebrated fake raid on a group of passengers for the amusement of the travelers. (However, the Indian stories are another paper)

I’m also not including tonight the standard lecture on the evils of government bonds and the scandals surrounding the infamous Crédit Mobilier company. Those stories would keep us here far too long and have already bored too many undergraduate history students.

Nevertheless, some money talk must be added to round out our story. The Interior Department conducted an audit in 1880 to put some final numbers on the railroad questions. Since the assumption was that all lands unclaimed in the west belonged to the U.S. government, the auditors calculated that the amount granted to the two companies in their construction contracts totaled \$391,804,610. Total railroad investment was put at \$4,653,609,000.

The U.S. government issued \$64,623,512 in bonds (loans) to the various companies involved in the construction. In the final settlement, concluded in 1898, the returned principle and interest repayment was \$167,746,490! Not bad! This doesn’t include any land sales from the vast acreage along the routes retained by the government. Considering that this land was virtually unsalable without the rails, it was literally a win-win.

In 1870 it took approximately seven days and cost as little as \$65 for a ticket on the transcontinental line from New York to San Francisco; \$136 for first class in a Pullman sleeping car; \$110 for second class; and \$65 for a space on a third- or “emigrant”-class bench. That anyone could now travel from New York to California in less than a week was miraculous for those answering the perpetual call to go west. While earlier trips required physical stamina and literally months of time, untold hardship and physical risk,

now anyone who could sit and sleep on a bench could cover the vast distances west of the Mississippi River in relative comfort. Children, old people, and animals invaded areas previously “empty” or only the province of young healthy males! The development of these western lands was simply not possible without the railroads and the men who built them literally created these United States.

Major Sources:

Ambrose, Stephen: *Nothing Like It In the World: The Men Who Built the Transcontinental Railroad 1863-1869*. Simon & Schuster (2000).

The Bill Lane Center for the American West at Stanford University: *The Chinese Railroad Workers in North America Project*