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Surveying and Engineering began in Idaho with map-making efforts of Lewis and Clark and David Thompson early in the nineteenth century. One of the Pacific railway surveys came across northern Idaho a half-century later. Engineering enterprises waited many years for white settlement and became more prominent after 1860. Because of Idaho's origin as a mining territory, most of the region's early engineering achievement went into design of placer flumes and ditch systems and lode tunnels, shafts, stopes, and milling or recovery plants. Irrigation canals of any substantial size also required engineering talent. And after 1878, when the Utah and Northern Railway headed northward through Idaho toward Montana, transportation expansion involved engineering beyond some spectacular earlier route investigation projects. With introduction of electrical generating plants not long after 1880 and of long-distance power transmission as fast as such projects became practical, industrial engineering expanded into an important new field. Major canal systems and large reclamation dams brought a new dimension to Idaho engineering achievement early in the twentieth century. Military projects including major air bases after 1840 and the wartime Pocatello naval gun relining plant, with exceptionally sensitive interior environmental tolerances, introduced a new phase in the state's engineering development. Finally a series of interesting nuclear energy applications came after 1949. The Idaho National Engineering Laboratory continues to develop important nuclear projects.

Mining engineering advanced rapidly from early ditch surveys to planning complex systems of tunnels and shafts for major lode properties. Engineers also had to solve difficult problems in processing refractory ores in silver and lead silver camps. In truly difficult areas, such as Atlanta, with recovery problems that resisted solution until 1932, mining engineers had to spend a long time in search of an appropriate treatment. And in the case of Snake River fine gold, a procedure both technically possible and economically commercial has not yet been developed. Very extensive underground development in camps like Silver City (with a five-mile tunnel all the way through Florida Mountain), Wood River, and particularly Coeur d'Alene (with extensive workings far below sea level beneath a canyon whose altitude is about 2,300 feet) makes up an important aspect of engineering achievement. With a total production in excess of 2.8 billion dollars, Coeur d'Alene has exceeded all other areas except Potosi in silver.

As soon as transmission became feasible, mining camps like Silver City turned to rivers like the Snake for hydroelectric power. Swan Falls and American Falls had plants very early in the twentieth century; and with major irrigation expansion, farming areas joined in taking advantage of

this kind of power, Minidoka Dam, Thousand Springs, and Shoshone, Twin and Salmon falls all provided hydroelectric power. Aside from pioneer efforts in power development, mining engineers provided some for the early design for major irrigation projects. In areas such as the Boise Valley, large early mining and canal enterprises were combined. And in the Hagerman Valley, where William W. Priestly installed a brilliant pneumatic ram system for lifting irrigation water up to the bench above the river in 1894, an additional application of his power system was employed for a gold dredge several years before practical dredging was introduced to the United States from New Zealand.

When the nation's major gravity irrigation canal system was constructed for a Carey Act project in the Twin Falls region, and after large Reclamation Service projects brought water to substantial desert tracts, irrigation expansion went beyond the mining engineering stage. Important reclamation dams, particularly Arrowrock (highest in the world from 1915 to 1932), American Falls, and later Anderson Ranch and Palisades, provided additional examples of engineering achievement. Large Snake River power dams and the Army Engineers' Dworshak installation on the north fork of the Clearwater (the latter only a few feet lower than Hoover Dam) have continued this power and reservoir program in recent times.

Aside from some exceptionally difficult problems in trying to find a convenient route across North Idaho, early railway engineering in Idaho encountered little in the way of major problems. (After a long search, the Northern Pacific finally adopted David Thompson's 1809 route for a transcontinental line built just after 1880.) Branch lines to serve some of the Coeur d'Alene mines and Camas Prairie required large high trestles, many of them timber. With major highway construction after 1916, some ambitious bridge projects became necessary. Hansen Bridge across the Snake River canyon and a toll bridge between Jerome and Twin Falls were impressive high structures. More recent spans include a high Moyie River bridge and a high White Bird Bridge. [See a photo essay of White Bridge Construction: http://users.bentonrea.com/~tinear/wb-bridge.htm] Engineering achievements in designing major early highway grades--especially Whitebird, Culdesac, Lewiston, and Horseshoe Bend hills--made possible a route from Boise to North Idaho. Designed for the slower traffic of 1920, these grades have largely been replaced. But many others, some of them truly spectacular, have been built to cross canyons typical of many parts of Idaho. Few states have anything like this assortment of roads.

A specialized engineering application for recreational use came to the Wood River region with development of a Union Pacific ski resort at Sun Valley in 1936. A pioneer chair lift, modeled after a Central American banana tram, was installed at Rudd Mountain on Trail Creek. Eventually new designs resulted in a different variety of lift, but the concept was worked out and demonstrated early in the days of the nation's original ski resort.

Idaho's internationally important engineering contributions have arisen from federal projects managed originally by the Atomic Energy Commission. A National Reactor Testing Station, located in the desert between Arco and Idaho Falls, provided the home of nuclear power for submarines, for surface ships, and for planes until that application was abandoned. With a site chosen for an abundance of underground water in an unpopulated desert and for an absence of earthquake history, this station developed power plants capable of use for other purposes as well.

In an interesting demonstration, Arco was lighted by nuclear electric power one evening in 1952. Idaho's future engineering development will be centered in this major national laboratory, which covers an area not much less than Rhode Island in size.

Like practically every other state, Idaho has developed an ambitious historic sites identification and preservation program. A decade has gone by since congressional approval of the National Historic Preservation Act of 1966 lent federal support to state and local historic preservation planning. Idaho also has enacted a series of historic preservation statutes. Aside from recognizing and protecting important cultural resources, this preservation program meets an essential requirement for the adequate interpretation of Idaho's heritage. Thorough knowledge of the setting in which historic events occurred helps provide a basis for understanding the past. Sound historical investigation normally demands familiarity with the geographic and environmental context in which the story is set. Historic sites interpretation offers more than an appreciation of buildings and places of interest. Along with conventional research materials, Idaho's objects, structure, and sites document the past. In cooperation with a strong national historic preservation and inventory program coordinated and funded by the National Park Service, Idaho is gaining information and protecting cultural resources that will develop and interpret the state's heritage for the benefit of everyone.

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