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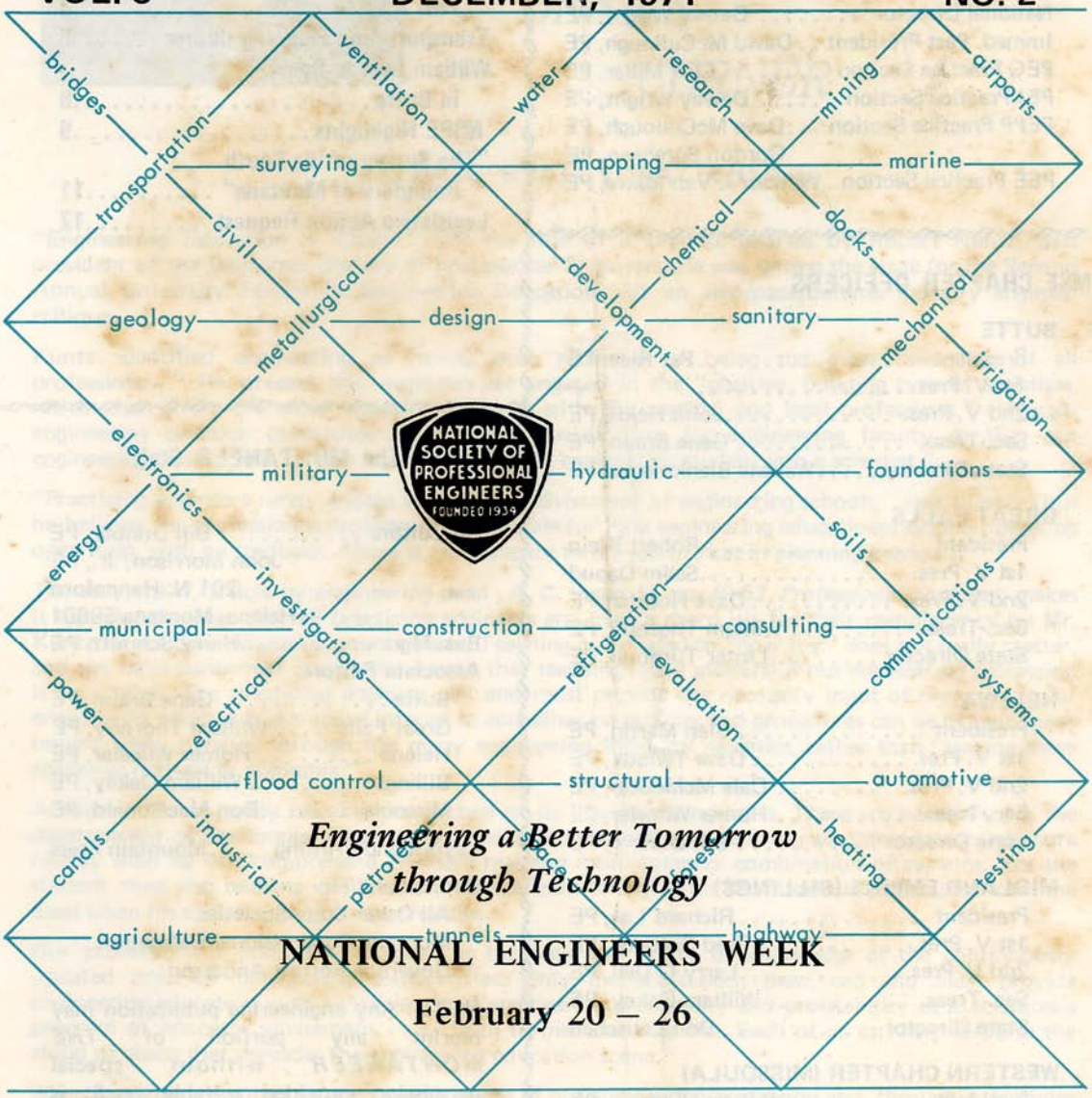

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THE SURVEY OF THE SOUTH BOUNDARY OF MONTANA
A Study of the Field Notes of the Original Survey and an Account of Recent Retracements

By WILLIAM R. BANDY, PE and LS

The original survey of the Boundary Line between the territories of Wyoming and Montana was made in the years 1879 and 1880 by Mr. Rollin I. Reeves, Surveyor and Astronomer under instructions issued him by the Commissioner of the General Land Office dated April 18, 1879.

The instructions provided for the initiation of the survey at the northwest corner of Wyoming Territory, which had been established by a previous survey in 1873. The line was to be produced east along the 45th parallel of latitude with corners established every mile. The instructions also specified that the surveyors should make an astronomical observation for the accurate determination of the true latitude at intervals not to exceed 27 miles.

The initial point for the survey was in the rough mountains 60 miles south of Bozeman, Montana near the headwaters of the West Gallatin River. The lack of roads, passable trails, and supply stations made the transportation of equipment and supplies a serious problem for the surveyors. The difficulties in reaching the place of beginning, and then producing the line eastward over some of the roughest sections of the Rocky Mountains are described by Mr. Reeves in the official field notes of the survey on file in the offices of the Bureau of Land Management in Billings and Cheyenne.

Fortunately Mr. Reeves kept a detailed account of the more important day to day happenings. This record of the trip was made while the great hardships suffered by members of the party were fresh in his mind. They are written in clear, and often in colorful language, resulting in a most interesting narrative. He so vividly describes the vexing problems confronting the surveyor in that kind of country that numerous quotations from the field notes are given herein as the best means of describing them.

The writer retraced some twenty-two miles of this State line through the roughest part of the country in the Cooke City area a few years ago and can vouch for the roughness of the terrain. This retracement was made in conjunction with his work for the General Land Office in tying in the section lines and mineral surveys to the State Line monuments. On this retracement work, elevations of 10,300 feet above sea level were attained.

The Survey party was organized in Green River City, Wyoming in July 1879 by Mr. Reeves, who was the chief surveyor and astronomer. Mr. H. P. Tuttle accompanied the party as astronomer, and they had an average of 16 assistants, including packers, chainmen, axemen and other helpers. Mr. Reeves states he had "about 50 head of horses, mules, and jackasses for transportation."

They left Green River City on the Union Pacific Railroad July 28, 1879 and traveled up Green River to Big Sandy Creek, Little Sandy and Dry Sandy creeks, through South Pass and on to Fort Washakie, Wyoming. They were joined by a company of soldiers at Fort Washakie who acted as a military escort to protect them from the Indians. From Fort Washakie they moved up Big Wind River to its source, then up Pacific Creek through Two Ocean Pass. They then went down the head waters of Yellowstone River to Yellowstone Lake and around the lake on the south and west shores. The difficulties encountered in this area are described in the field notes as follows:

"From the time we left the headwaters of the Big Wind River about 100 miles from Fort Washakie we tried to follow the trail made in 1873 by Lieut. Jones, U. S. Engineer, but which was obliterated in many places. From that point until we again struck a good trail near the lower end of the lake, the route was through dense timber all the way. The grades were frequently very stony, steep, and prolonged. The trail frequently could not be found at all, and we had no guide with us. In many places the down timber and undergrowth were matted so closely and firmly we could not get through it. Swamps were numerous, and the ground was miry and deceptive. Altogether, it was unqualifiedly the most laborious, long march I ever made. We were lost for several days at a time. Notwithstanding these trials, we enjoyed many features of the journey. No sickness, loss, or accidents were suffered, and no fights fought, though bickering, back-biting, and grumbling were indulged in as they always will be on expeditions of this kind."

From the lower end of the lake the main party went down the Yellowstone River via Sulphur Mountain, Mud Volcano, the Falls, and canyon of the Yellowstone to Baronets Bridge, and then west to Mammoth Hot Springs. They reached Mammoth on September 2, over a month after they left Green River City. Some of the party who had become separated from the others while coming around the lake continued on the Mammoth by way of Norris Junction, being guided by the scout Yellowstone Kelly.

SURVEY OF THE SOUTH BOUNDARY OF MONTANA (Continued)

While in Mammoth they replenished their food supply by sending parties to Fort Ellis. They then went westward across Yellowstone Park to the initial point of the survey, being guided by a Mr. James Page who had worked on the survey of the West Boundary of Wyoming Territory.

In projecting the line eastward, the tangent method of determining the true latitudinal curve was employed. By this method a true meridian is established at the point of beginning by astronomical observations, from which a deflection angle of 90° is turned to the east. This line was carried eastward until a suitable place for another astronomical observation was reached, but never to exceed 27 miles. For each corner point, proper offsets were made north from the tangent to the true parallel of latitude. In projecting this line through the rougher areas where deep impassable canyons were encountered, the general practice was to flag the line from ridge to ridge and then triangulate across the canyons. Afterwards, the surveyors would measure out from the triangulation stations and establish such intermediate mile corners as were found to be accessible.

ORIGINAL SURVEY WELL DONE CONSIDERING HANDICAPS

Although errors in alinement and measurement have been found, the survey as a whole was well executed, taking into consideration the adverse conditions under which it was made. This is especially true of the construction of corner monuments. In almost every instance these have been found to have been constructed in strict conformity with the instructions. Unfortunately, the instructions specified the use of wood for corner posts instead of more durable material. The more notable errors in alinement are usually found in the last mile leading into a new astronomical station as accumulated error being thrown in this mile.

Editor's Note: W. R. Bandy is the retired Area 3 Chief, Division of Cadastral Engineering, U. S. BLM. This article is the first of three installments concerning the original survey of Montana South Boundary.

Legislative Action Request (LOR 71-11)

It is becoming increasingly clear that the nation's effort to improve the environment is having substantial impacts. While there is little doubt that actions to abate pollution are succeeding, there is also little doubt that these actions are producing significant social and economic side effects. Just recently, for example, a federal court ruled that the Atomic Energy Commission's licensing procedures must take account of environmental impacts and include an assessment of those effects in terms of available alternatives and the public's need for electric power. There appears to be a growing awareness among lawmakers, furthermore, that some sort of balance, or priority ordering, might be desirable in appraising future environmental restraints and strict enforcement of existing ones.

NSPE needs to be in position to communicate engineering's reaction as discussion of this subject comes up in both the public and private sector. It would be helpful, therefore, if you could supply us with your views on these broad considerations. You may also wish to comment on such particularities as the effects of strict environmentalism on engineering employment, industrial productivity, domestic costs and prices, competitive world trade, general impact on economic growth, etc.