

NORTHERN PACIFIC RAILWAY COMPANY

STATE OF MONTANA
VALUATION SECTION NO. 1
NORTH DAKOTA-MONTANA STATE LINE TO HUNTLEY.

PRE-INVENTORY INFORMATION.
GENERAL OUTLINE AND HISTORY OF THE WORK.

This is a single track main line section.

Was built by the Northern Pacific Railroad Company in the years 1879, 1880, 1881 and 1882, as part of the following construction divisions:-

Missouri Division which extended from the Missouri River to Glendive.

Yellowstone Division which extended from Glendive to Livingston.

From a point one hundred miles west of the Missouri River, near Gladstone, to Glendive, one hundred and thirteen miles, the general work of grading was done by Walker Bellows and Company under their contract of October 16th, 1879. This contract was called Missouri Division Contract No. 2. The general work of building bridges and tracklaying and surfacing was done by Walker Bellows and Company under their supplemental contract, No. 2, copy of this contract has not yet been found. A copy of the final estimate however is submitted with the inventory.

From Glendive to point near Pompey's Pillar about two hundred miles west, the general work of grading, building bridges and culverts was done by H. Clark and Company under terms of contract dated December 27th, 1880, and accepted proposal of October 21st, 1881. This contract was called Yellowstone Division Contract No. 1. The contract of December 27th, 1880, was extended on October 10th, 1881 to cover the line as far west as Livingston. The extension of the contract was called Yellowstone Division Contract No. 2. The tracklaying and surfacing on the Yellowstone Division from Glendive west was done by H. Clark and Company under the terms of their accepted proposal of July 12th, 1881; copy of this proposal is filed with the inventory, although a copy of the final estimate or of any of the intermediate estimates have not yet been found.

From the North Dakota Montana State Line to about two miles east of Glendive the line follows the course of Glendive Creek, and from Glendive to the end of the section the line runs up the Yellowstone River.

The construction of the line along the Yellowstone River involved some quite difficult and expensive work. The high bluffs on the one hand, many of which are composed of friable and sliding material, combined with the necessity for pro-

tection against the wash of the Yellowstone River on the other hand provided a difficult situation to handle, and work bettering and improving this line has been carried on every year by the Railway Company since the completion of the original construction period.

The difficulty experienced in successfully locating a line along these bluffs is well shown in the report of J.B. O'ough for the year ending July 31st, 1882. (C.E. Old Vault File 47-11). "It became a problem how to lay the line along the steep rocky bluffs such as Dixon, Cheyenne, Rosebud, Guys, etc., where the river with great volume and swift current was on the one side and the perpendicular cliffs, one hundred feet high or more on the other. It was thought best to place the roadbed, so far as possible, on solid ground and slope the bluffs one quarter to one. This slope, of course, was an experiment to be tested when the spring should open. The bluffs outs made very wide embankments when wasted out to the side.

When spring did open we found that the bluff slopes would not stand at one quarter to one. They commenced sliding and we had to begin resloping, using one half to one and even flatter in places. It was also found that the waste banks stood the washing of the river much better than was expected. It was therefore determined at Riverside, Huntley, and other bluffs, where the river bed was more permanent and the rock in the bluffs harder, to throw the line farther from the bluffs, use a flatter slope and make a more uniform width to the waste banks.

I think we shall have no trouble with the line around these bluffs. But at Guys, Cheyenne, and other points below, we have changed the line so as to throw it some twenty feet or more away from the bluffs, thus giving room for material to come down without interfering with the track".

The bluffs which proved to be the most troublesome were the Iron Bluffs, Barrs Bluffs and Eagle Bluffs.

IRON
BLUFFS

Iron Bluffs are located on miles nine and ten west of Glendive. Quoting from the Engineer's Annual Report for the year ending June 30th, 1882,—"The most extensive work of this kind is at Iron Bluff, ten miles above Glendive. Here a vast mass of crumbling material, almost wholly without adhesion among its own particles, extending back several hundred feet from the river bank, from fifteen to forty feet in depth, and containing several million cubic yards, is slowly sliding toward the river bed.

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During the entire time of this work there was no delay of trains though upwards of 40000 cubic yards of material was handled over the track, and most of it blasted.

But two casualties occurred; one was fatal, one of the laborers being struck by a large fragment of rock and instantly killed. This occurred in March. The other was a case of burning by the explosion of a keg of powder, and did not result seriously".

EAGLE
BLUFFS

Quoting from Annual Report of J.W. Kendrick for the year ending July 31st, 1882, -"This bluff is three miles west of Glendive. It is subjected to a heavy wash from the river, the channel of which sweeps the base of the bluff. It is not the main channel, however. During the winter of 1880 - 1881, a short crib dyke was built, and served the purpose very well. In the high water of the spring of 1881 a good deal of trouble was experienced from sliding banks and it was decided to dam the channel and make it silt up.

The work was commenced in November and a fascine dam (See Appendix, Page 8 $\frac{1}{2}$) was thrown across. This dyke, though it was well built, was not a success; the water making a breach at the south end next the railroad, although every precaution had been taken that could be to avoid this.

This dam was 700 feet long and 10 feet high in highest place.

Very little of the dam went away, the damage being that the water cut around the end and though the force and scour of the water was immense it took very little of the structure away. This break remains to be fixed, and the coming winter it will have to be piled and stopped by fascines and rock. This done, I should recommend opening a channel at the north end of the dam and instead of a dam have a dyke. This will answer the purpose as well, and from the foundation of the south bank of the river, it being a quick sand, it will be extremely difficult to make a secure junction between it and the dam.

Of 6100 feet of dyke work which we had exposed this was the only failure, and this is not a large percentage in a river so unstable as the Yellowstone. (For Maps and Profiles see Drafting Room #305-3)".

As will be noted the construction of this line has been a long struggle between the sliding bluffs on the one hand and the Yellowstone River on the other. Many expedients have been employed, perhaps the most common of which has been the construction of dykes to turn the current of the river away from the roadbed and by causing a deposit of silt between them to permanently change the water channels; many of these dykes have been so successful in their mission that now they themselves are entirely submerged in the silt deposit and are no longer visible. It is evident that there has been a great deal of work done combating the river and slides of which no record is now to be found.

On this section occurs one tunnel, called the Big Horn; during the placing of the permanent lining in 1898 the remaining timber lining was burned out causing a bad cave-in; in order to facilitate the repairing of this cave-in, and to hurry the completion of the permanent lining, a temporary line was hastily thrown around the tunnel hill and kept in operation until the permanent lining was complete. The quantities involved in building this temporary line are included in the regular inventory as an essential construction step.

To facilitate the construction of the Yellowstone Division two steamers were purchased by the Railway Company, quoting from Engineers Annual Report for the year ending June 30th, 1882:- "The Company had provided the Steamers "Transfer No.2" and "F.Y. Batchelor" for aiding and advancing work during the season on the Yellowstone River. Both were kept in active use as long as the stage of water permitted. The "Batchelor" was employed in transporting material for piers of the bridge over the Yellowstone near Billings, and in other work incident to construction; also in carrying commercial freight at intervals. The service of these boats were of exceeding value - were indispensable in fact - and will add many miles to the track record of 1882. Work at the Big Horn kept them in the upper river until it had fallen too low to allow of their passing down, and both are now laid up in a secure harbor awaiting the high water of next season. The "Transfer No. 2" has fulfilled its mission, and apparently its usefulness in this Company's service has ended; and it is recommended that as early as practicable it be brought out of the river and sold. The "Batchelor" is a model boat for use in shallow rivers, and it is recommended to be kept for one or more years, in service from Glendive, and used to protect an advance the Company's interests in the Lower Yellowstone and Upper Missouri Rivers". The net cost to the Railway Company, thus far found, for the use of these two steamers as a construction aid is as follows:

Transfer Barge No. 2	\$ 19878.79
F.Y. Batchelor	12656.83
(See Letter W.C.Pinger July 16th-1917-File 12-2938 and Equipment Voucher No. 92-1884).	

A large amount of construction material was lost during the construction period because of sudden rises of the Yellowstone and Missouri Rivers as evidenced by Voucher 4107 of 1882 which shows loss as follows:

32955 Cross Ties45	\$ 14829.75
49431 L.F. Piling40	19772.40
Total		\$ 34602.15

This same voucher shows that 3000 ties valued at \$1500.00 were used in building of dykes on the Yellowstone Division, copy of this voucher is filed with the inventory.

Copies of all the final estimate vouchers ^{which} have been found covering roadway work are submitted with the inventory together with lists of extra work bills, such as also have been found, incurred under same on account of grading and fencing; these lists of extra work bills do not pretend to be a complete statement of all the extra cost or in any sense a partial statement of original cost but merely enumerate some of the items of extra cost found readily available. As will be seen from these vouchers the Railway Company has done a large amount of work on this section since the completion of the original construction period; some 38471 lineal feet of temporary timber bridges have been filled, temporary bridges and culverts have been replaced in permanent materials cuts and fills have been widened, additional ballast and riprap placed and other kindred work; much of this has been done by the Railway Company with its own forces of which a good record has not been found.

For the last ten years, because of a shortage in suitable local materials, a great deal of the riprap rock has been hauled from St. Cloud, Minnesota.

The ballast is composed of gravel and some cinders, the gravel coming from pits whose location is shown on chart attached to the inventory and the cinders from points noted therein.

The subsidence of the roadbed will be developed at time of Government Inventory.

A list of items in abandoned roadbed is included in the inventory and itemized separately.