

VALUATION SECTION, MONTANA 8.

GENERAL LOCATION

Valuation Section Mont. 8 covers the Lewistown Great Falls Line, which extends in a general northwesterly direction from Lewistown through Fergus, Choteau and Cascade Counties to Great Falls, a distance of about 137 miles. The section actually terminates in West Great Falls about one and one-half miles west of the passenger depot.

SURVEYS

An exploration of this territory was made early in 1910, and immediately following four location parties were placed in the field to make more detailed surveys of the routes examined. The first party worked from Glengarry on the Harlowton & Lewistown Line in a northwesterly direction to Arrow Creek. The second party made surveys in the Big Sag Country, the third in the Belt Creek District and the fourth between Belt Creek and Great Falls.

Leaving Glengarry this survey extended almost due west for three miles, thence northwesterly to the Judith River, thence along the Judith River about fourteen miles to Sage Creek. In the Sage Creek Valley a loop line was surveyed to reach the divide between that creek and Running Wolf Creek. Leaving the summit the line ran north and west to Coffee Creek, which was followed to near its junction with Arrow Creek. Arrow Creek was followed in a southwesterly direction for about ten miles, thence the line swung northwesterly past Square Butte and reached the high bench at Waltham, thence southwesterly and westerly across Belt Creek to Falls Yard. The total length of this line was 166 miles. The surveys were completed in the Fall of 1910.

In October, 1911, further surveys were undertaken with a view of shortening the original line of 166 miles to about 135 miles. Three parties covered the territory quite thoroughly, making about 114 miles of discarded survey before finding the adopted line.

Partial records indicate that about 417 miles of location survey was made to produce the 137 miles of adopted and constructed line exclusive of the many miles of preliminary.

CONSTRUCTED LINE

The line as constructed follows Big Spring Creek on a descending gradient for the first nine miles out of Lewistown. In Mile Nine Big Spring Creek forms a junction with Cottonwood Creek and the line crosses these creeks on a high timber trestle. This trestle is used and was built jointly by the C.M. & St. P. Ry. and the Great Northern Co. From this

point the line strikes across heavy drainage toward Arrow Creek, and as a consequence the gradients are rolling and the work is very heavy. It might be interesting to know that the line from Lewistown to Arrow Creek does not vary from a straight line more than four miles at any point.

From Arrow Creek Station the line descends with a 1.5 percent gradient and with sharp curvature along Surprise Creek to Pownal. This territory is Bad Land formation and heavy cuts and fills are used for the side hill development. This gradient between Arrow Creek and Pownal is the heaviest on the line, and as will be shown later quite complete facilities are provided for helper engines between the stations.

From Pownal the line descends along Arrow Creek to Ira Junction with the so-called Big Sag, thence follows the Big Sag through valley formation, but with rolling gradients to Highwood, a distance of about fifty miles.

Leaving Highwood a descent is made along Highwood Creek for about four miles, thence an ascent with side hill development to the bench at Waltham, thence a descent with extremely heavy work to Belt Creek, thence an ascent to the bench near Salem, which bench is followed to the Falls Yard, which is in the outskirts of Great Falls.

Through Great Falls two lines were constructed, one to the freight house and team tracks and one to the passenger station. These lines diverge near Black Eagle Park. The line to the passenger station bears almost due west from Black Eagle Park to an undercrossing with the Great Northern Havre Line, thence swings southwesterly along the Missouri River to the passenger station on First Avenue, thence crosses the Missouri River, and extends in a northwesterly direction to the end of the Valeria Section. The freight line is commonly called the Valeria Way Line. From the junction at Black Eagle Park this line extends in a southeasterly direction along the so-called Valeria Way to Eighth Street, thence west to Third Street, thence north to the freight house and team tracks at Second Avenue. In accordance with the franchise this line is operated by electric engines.

NATURE OF THE COUNTRY

Between Lewistown and Arrow Creek the country was fairly well settled and some highways were in existence at the time of construction. Since construction many new settlers have arrived and a large amount of additional land has been put under cultivation.

Between Arrow Creek and Highwood the valley was occupied largely by stock ranches. In this section a considerable amount of alfalfa and hay was produced by irrigation methods. The adjoining bench lands were uncultivated. Between Highwood Station and Great Falls the country is quite rough and is partly

of Bad Land formation.

As would be indicated by the description very little provender could be obtained locally at the time of construction, and, as a consequence, most of it was shipped in over the Great Northern Railway, thence hauled by teams to the points of use.

CONSTRUCTION ORGANIZATION

Construction was carried on under the overhead supervision of a division engineer, three district engineers and eleven resident engineers. The division engineer maintained offices in Lewistown. There was also an assistant engineer of bridges and buildings with offices in Lewistown, who cared for the construction of permanent bridge work and culverts. A Master Carpenter's Office was maintained to attend to the construction of the water stations, depots, etc. When track laying began the office of Superintendent of Construction was opened in Lewistown to care for the track laying, ballasting and other miscellaneous items of construction.

CONTRACTS

Twohy Bros. Company of Portland, Oregon were given the contract for the construction of the first sixty-three miles of line out of Lewistown and for the work within the city limits of Great Falls. The contract for the construction of the seventy miles between the sixty-third mile point and Great Falls was awarded to Winston Bros. Company of Minneapolis, Minn. These contractors did a part of the work with their own forces, but a large part of it was sub-let to other contractors.

Labor was scarce during the entire period of this construction and thousands of men were shipped from both the East and the West. During the Fall months when harvest was in progress, it was especially hard to get men, and those that were on the work left for the harvest field. This labor difficulty entered largely into the cost of the line.

As previously indicated in the description of the country there were a few wagon roads in existence, but it was necessary in many cases for the contractors to construct roads to facilitate their operations. The more important road work was done near Arrow Creek where a road was constructed down to the valley of Surprise Creek and in the vicinity of Belt Creek and Red Coulee. In connection with the work in Belt Creek a timber bridge was built across the Creek at what was known as the Peck and Lacy Crossing. Road work was paid for by the Railway Company. The bridge was later sold to the county for about one-half its original cost.

CONSTRUCTION

To facilitate a description of the construction, the work will be divided into sections according to the contract.

Section No. 1. Lewistown to Mile Sixty-three.

Twohy Bros. established their headquarters and store houses at Stanford on The Great Northern Railway and transported supplies, material and equipment by team from there. The equipment, etc. used in the vicinity of Lewistown was transported from that point. Shipments to Stanford were usually routed via the Chicago, Milwaukee and St. Paul Ry. to Judith Gap where they were transferred to the Great Northern.

The grading on this section was variant, but generally quite heavy. Between Miles 0 and forty-five, the average was 41,000 cubic yards, Miles forty-five to fifty-one, 103,000 cubic yards, and Miles fifty-one to sixty-three, 28,000 cubic yards. Practically 100 percent of the material was classified. The grading was largely done by teams with the use of grading machines or scrapers as the occasion required. Steam shovels were used in the approaches to the Sage Creek Tunnel and on the heavy work in Miles twelve and thirteen. These shovels were brought overland from Stanford to the point of use, a distance in each case of about twenty-one miles. Coal and explosives were hauled from Stanford. At the Sage Creek Tunnel Approach Cuts bad water occasioned frequent delays while boilers were being cleaned and flues renewed. As a last resort a two and one-half inch pipe line was laid from the East Approach to Judith River.

Taken as a whole the grading on the first sixty-three miles was extremely difficult and was very deceiving to the contractors. What appeared on the surface as common earth changed to shale, loose and solid rock when the cuts were opened. In the Arrow Creek Valley where the material was apparently silt, it was found too hard to plow. Grading machines operated with sixteen and twenty horses were unable to perform efficient work. Cemented gravel developed in many of the cuts which required blasting. Along Big Spring Creek a considerable amount of wet excavation was encountered which was classified as loose rock. The work on Mile Nine where the Great Northern and the C. M. & St. P. lines are in close proximity was all done by the Great Northern, the C. M. & St. P. Co. standing their share of the expense. The fill at Station 620 on Mile Twelve was placed during the Winter Season, and in the Spring the settlement was so great that about 15,000 additional cubic yards were placed. After the line had been in operation a short time a slide occurred under the foundation of the east abutment of Judith River viaduct, which caused a break in the concrete work. About 9,000 cubic yards of approach embankment were removed and a pile trestle driven to relieve the pressure.

Several slides occurred on the Surprise Creek Hill between Miles Forty-five and Forty-eight after Twohy Bros. had completed their work. The contracts for removing these slides were

let to D. J. Burke. In many cases it was impossible to obtain measurements from cross sections, consequently he was paid on car measurement.

Section No. 2. Mile Sixty-three to Falls Yard.

Winston Bros. established headquarters and store house at Fort Benton on the Great Northern Railway. Outfits and supplies were shipped to Fort Benton and transferred to the work by teams.

The grading on this section was also quite variant. Between Miles Sixty-three and 105 the average was about 25,000 cubic yards per mile. From 105 to 155, about 55,000, 115 to 119 about 145,000 and 119 to 135, 45,000. Grading machines and scrapers with teams were used wherever possible. The rock work was done by hand.

In Mile eighty-two, the line as located when the contracts were let, skirted the north shore of Big Crane Lake, but later, to shorten the distance and save curvature, it was decided to cross a portion of the lake. A temporary pile trestle was constructed for the use of the contractor at the Railway Company's expense and fill material placed therefrom. The lake bed was soft, causing excessive subsidence and the wave wash flattened the bank out. A large amount of rip rap was placed as a protection against the wave wash.

A very serious slide known as the Amphitheater Slide occurred on Mile 117 on this section between Tunnels Three and Four. This slide first appeared to be a subsidence as the embankment settled from six to eight feet over night. It has been estimated that the vertical drop aggregated over 100 feet. An attempt was made to raise the fill with borrowed material, but while the work was in progress cracks developed in the surface of the ground above the slide. A steam shovel was installed on the upper side of the fill to remove the sliding material and place it on the slopes down to Belt Creek to retard the movement, if possible. This steam shovel was twice buried and uncovered by hand shoveling. A part of the bore of Tunnel No. Four was included in this slide.

Section No. 3. Within the Great Falls City Limits.

The grading on the line to the passenger station was quite heavy averaging 58,000 cubic yards per mile, largely of solid rock. The work was all performed with steam shovels and standard gauge equipment. A large amount of this material was placed between the main line and the Missouri River bridge which required switching on switch backs.

The grading on the so-called Valeria Way Line averaged about 18,000 cubic yards. All of this work, done in Great Falls, was necessarily under the restriction of city ordinances and many precautions were taken to protect passers-by, etc. This extra work was paid for on a force account basis and added a considerable

amount to the cost.

TUNNELS

There are six tunnels on this section. They were driven and lined with timber by contract. The concrete lining was placed by the Railway Company forces.

Tunnel No. 1 or Sage Creek Tunnel is 2014 feet long. Blue shale, hardpan, loose and solid rock were encountered in the drive, and the east half was quite wet. During the construction of this tunnel a cloud burst occurred which obliterated the surface ditches over the west portal, and as the gradient is adverse, partially filled the tunnel with water. The water was pumped out at a considerable expense and caused about ten day's delay. This tunnel was lined through-out with concrete soon after the track reached it.

In Surprise Creek Tunnel, or Tunnel No. 2, blue shale material was encountered. This tunnel was not lined with concrete.

The four Belt Creek tunnels were through materials of hard blue shale, loose and solid rock. The hardest material was encountered in Tunnel No. 5. The timber lining for these tunnels was hauled from Windham on the Great Northern.

The Amphitheater Slide necessitated the re-timbering of about 200 feet of Tunnel No. 4, and the widening of the bore by eighteen inches. Concrete materials and outfit were hurried to this tunnel immediately after the slide and it was lined with concrete as a protection against further distortion. The lining in the east end was re-enforced with concrete buttresses to insure greater stiffness.

BRIDGES AND CULVERTS

The pile and timber bridges were constructed in accordance with the C. M. & St. P. Co's. standard plans by the contractor's forces. All the material was furnished by the Railway Company, delivered on cars to the point nearest the work and thence hauled by team. The piles were of cedar and the timber of western fir.

For Section No. 1, the material was delivered at a spur known as the Twohy Bros'. spur, about twelve miles south of Lewistown on the Harlowton Line, at Brooke on the Hilger Line and at Stanford and Dover on the Great Northern. For Section No. 2, Winston Bros. work, material was delivered at Windham, Great Falls and Fort Benton, all on the Great Northern Railway.

The permanent bridges and the concrete culverts were constructed by the Railway Company's forces under the direction of the Assistant Engineer of Bridges and Buildings. The important permanent bridges were the Judith River Viaduct, Indian Creek Viaduct, Sage Creek Viaduct, Belt Creek Viaduct, Red Coulee Viaduct and the Missouri River Crossing in Great Falls. These

bridges all consisted of steel super-structures on concrete foundations. There were also several other concrete viaducts and large concrete arch-culverts.

Concrete aggregates were obtained as near the construction sites as possible, but in many cases this was very difficult, and they were hauled for long distances. Cement, lumber, reinforcement, equipment, camp supplies, etc. were all hauled from the nearest point on the Great Northern or C. M. & St. P. Lines. The steel work was erected after the track reached the bridge site.

The culverts on this line were of various types. Corrugated iron pipe was used in fills between three and twelve feet in height. For other places cast iron pipe, cast concrete pipe or timber boxes were used with the exception of the places where the concrete arches were built at important water ways. The cast concrete pipe was made by Railway Company forces in Great Falls. The culverts with the exception of the concrete arches were all installed by the contractor's forces.

TRACK LAYING AND BALLASTING

Track laying was begun on Dec. 23rd, 1912 and was completed in January 1914. The work followed the completion of grading as rapidly as possible, but was held up at the various permanent bridges during the erection of the steel. New seventy-five pound rails were used with western fir ties. The work was practically all done with a Roberts Brothers' machine.

Ballasting was begun on May 6th, 1913 and the first lift completed in September, 1914. Material was taken from pits located at Wauchusett, Amherst, Ware and Arrow Creek.

FENCES, BUILDINGS, WATER SUPPLIES, ETC.

The entire right of way was fenced and the necessary crossing facilities provided. The work was done by contract and the material furnished by the Railway Company. Snow fences were provided where protection was required.

Temporary water tanks were erected at Wauchusett, Amherst, Sage Creek, Mile Fifty, Mile Sixty-two, Geraldine and Shonkin and near the east city limits of Great Falls. Two temporary tanks were also constructed on Highwood Creek west of Highwood Station.

Permanent water stations were installed at Ware, Denton, Pownal, Square Butte, Geraldine, Montague, Highwood, Salem and Great Falls.

The development of water supplies for this line was very expensive. Deep wells were drilled at Arrow Creek and Pownal, which did not develop a satisfactory supply. At Ware and Square Butte springs were developed, and at Great Falls the intake is in the Missouri River.

Standard freight and passenger depots were built at Danvers,

Denton, Coffee Creek, Arrow Creek, Pownal, Square Butte, Geraldine, Montague, Shonkin, Highwood and Waltham, and smaller depots or shelters at the less important places. At Great Falls a large two story brick passenger depot, surrounded by a well laid out park, was built, and at the freight terminal, a brick freight house with a two story office portion. An engine terminal consisting of an eight stall roundhouse, turn table, power house, sub-station and other facilities were built at Falls Yard. The buildings are modern construction with concrete foundations and brick super-structures. Two stall engine houses, clinker pits and wyes were installed at Arrow Creek and Pownal to care for the helper engines.

The Valeria Way and the yards at Falls Yards were equipped for electrical operation. Electric locomotives operated with 1500 volts, direct current, are used.

OPERATION AND MANAGEMENT

This line is operated as a part of the Northern Montana Division with offices in Lewistown. Standard equipment is used.