VALUATION SECTION IDAHO 1

GENERAL DESCRIPTION:

Valuation Section Idaho 1 covers all of the main line of the C. M. & St. P. Ry., in the State of Idaho, comprising about 98 miles.

RECONNOISSANCE:

As a natural consequence all explorations in Idaho were continuous of those described in the Historical Sketch of Valuation Section Montana 4 and must therefore be continued in the same order of description.

Starting with the most southerly route that was considered practicable, namely; the Nez Perces Pass Route, the explorations were continued south from Rose Fork down McGruder Creek to the Selway Fork of the Clearwater River, in May, 1905. No trails existed along the last named river and progress with a train of pack horses was slow and tedious and not without danger due to the necessity of fording streams at high water stage. This party consisted of an Engineer and two men with pack horses and provisions for four weeks. They followed Selway Fork to the junction of Moose Creek, thence up Moose Creek easterly to its head at Lost Horse Pass, thence back to Grantsdale in Montana. They were in the field four weeks and covered about 100 miles. Another Engineer started in May, 1905, at Lewistown, Idaho and examined this route easterly up the Clearwater River to Selway Fork, thence up Selway to Nez Perces Pass. Between Lewistown and Kooskia examination was made from trains on the Northern Pacific Ry. East from there pack trains and saddle horses were used. About 75 miles of this exploration was covered by train and about 100 miles on horse back which required about a month of time.

Next in sequence is the Lolo Pass Route. No exploration was made from Lolo Pass west in 1905, but an instrumental survey was started in February, 1906, which will be described later under the head of "Preliminary Survey".

The next exploration covered a proposed route from Fish Lake Pass in the Bitter Roots down the North Fork of the Clearwater River to Ashsanka over an approximate distance of 125 miles. Many side trips were made in connection with this exploration and elevations were taken on bench and uplands along the north side of the riv

This closed explorations covering a line from the Bitter Roots with Lewiston, Idaho, as the western objective point.

The route explored next in sequence departed from the last named about 60 miles west of the Bitter Root Divide and extended west on a high bench terminating at Garfield, Wash., near the state line, a distance of about 75 miles, with a shorter exploration of 50 miles lying to the south.

Another exploration was made from Collins, Idaho, northerly to St. Maries covering about 45 miles. This trip had in view a connection with the present constructed line from the Fish Creek Pass Garfield Route, and the information obtained was used later in connection with the St. Maries Branch.

In May,1906, an exploration was made east from Avery, or what was then known as North Fork, up the St. Joe River to the head waters and connected with the Cedar Creek explorations on the south slope of the Bitter Roots. This trip covered about 60 miles and required about a month's time. The country was wild and rugged and pack horses were used for transportation.

Lastly we take up the exploration of the present or adopted line from St. Paul Pass via the St. Joe River through Watts Summit in the Coeur d'Alene Mountains to the state line near Tekoa, Washington. Very extensive explorations were made along this route, about 300 miles being covered.

Following is a summary of reconnoissance work in Idaho:

Nez Perces Pass, Selway Fork and Moose Lake -	100	Miles
Nez Perces Pass to Lewistown - - - - - - - - -	175	"
Fish Lake Pass and North Fork of Clearwater River - - - - - - - - - - - - - - - - -	125	"
Garfield Route - - - - - - - - - - - - - - - - -	125	"
Collins to St. Maries - - - - - - - - - - - - -	45	"
Main St. Joe River, Avery to Fish Lake - - - -	60	"
The adopted route - - - - - - - - - - - - - - -	300	"
Total	930	"

Practically all of these explorations were made in a wild uninhabited country. Pack horses, men packers, and boats were used for transportation. It was necessary to carry provisions for each trip as no stores existed in the country between the Bitter Root Mountains and the end of the railway at Kooskia. Lack of trails made it necessary for each party to hew its own way through the thick timber and brush, making progress slow. The greater portion of the territory had not been mapped, which added greatly to the difficulties of the work.

SURVEYS:

Preliminary surveys followed the reconnoissance reports, the following described routes being selected:

No.1-Lolo Pass westward down the Looksha,or Middle Fork

of the Clearwater River to the main river, thence down the main river to Lewistown, Idaho.

No. 2-From Fish Lake Pass on the Bitter Root Divide down a branch of the North Fork of the Clearwater River to the main North Fork, thence westerly through the Palouse River county to Garfield.

No. 3-From Superior westward via Cedar Creek, Wisdom Gulch and the St. Joe River to Avery.

No. 4-The adopted route from St. Paul Pass down the North Fork of the St. Jor River to the main river, thence west along the river to Benwah Lake, thence through Watts Summit to Tekoa.

Alternate routes were also surveyed in connection with the above four main courses, the principal one being from St.Maries to Tekoa via the St. Maries River and Hangman Creek.

Taking up these routes in order, work on No.1 was first begun in December, 1905. A party under an Engineer named Hays, started east from Kooskia with instructions to make a survey up the main Clearwater River and the Looksha, or Middle Fork until another party was met working toward them. Due to the uncertainty of supply transportation during the Winter a substantial depot was established up river as far as possible, to be drawn upon as the work progressed to the east. The establishment of this base of supplies cost $1400.00. Mr. Hays had a larger crew than the ordinary location party as he took boatmen, trail makers and extra axe men, and the cost of this survey was exceedingly expensive. About 50 miles of the country surveyed laid in the so-called Black Canyon and work was difficult and hazardous. In April while moving provisions up river by boat a boatman was drowned. Otherwise no serious accidents occurred on Hays party.

On March 2nd, 1906, Engineer Talcott and crew, who had just completed the preliminary survey between Lolo Pass and Lolo Hot Springs, as described on Valuation Section Montana 4, started a preliminary survey line west toward Hays party. Sufficient provisions for two or three months' work had previously been hauled by team, pack trains and sleds from Missoula and stored on the Divide. Talcott took all of these supplies with him as it was impossible to keep the trail open behind. The country was wild and rugged and survey work consisted of side hill development until the river elevation was reached, thence the line followed the river valley, which was a deep box canyon. Sleds were used for transporting camp and provisions as long as the snow lasted, after which rafts were built to convey them down the river. By May 18th,1906, this party had surveyed about 45 miles with contours for a projected location. On this date while moving camp on a raft it was capsized and all the outfit hopelessly lost. Talcott and his crew then worked their way down the river about 20 miles to Hays Camp where they obtained sufficient supplies to last them until they walked into Greer,Idaho, a distance of about 50 miles. Here they obtained funds and went to Spokane and were disbanded. Talcott's party averaged about one-half a mile per day in spite of all the adverse conditions. Hays party continued on up the river and connected with Talcott's survey in June. He ran 94 miles of preliminary for 68 miles of projected location. When this work was completed Hays party returned to Kooskia and commenced a survey down the river to the west, covering

about 25 miles of line between June 25th and July 20th.

This completed all the preliminary work on the Lolo Pass-Lewistown Route. The work covered practically eleven months' time of two parties, and 151 miles of preliminary survey was made, with an average of 23 men in each party. 130 miles of projected location was obtained from these surveys.

No extensive instrumental surveys were made on Route No. 2 in the Bitter Root Mountains except on the Divide to determine a tunnel location. An important survey was made from Garfield east via Jamestown and up the Palouse River to the Divide. Two parties worked on this survey a total of six months, covering 103 miles of line, or an average of .55 miles per day. Most of this work was through rough timber country.

In connection with work on Route No. 3 a party started in April, 1906, westward from Wisdom Gulch down the head waters of the St. Joe River. Provisions were brought from Iron Mountain by pack trains and stored for further use. This was a wild rugged territory of steep mountain slopes and thick timber. The party, averaging 20 men, ran 54 miles of preliminary for 34 miles of projected location, and were in the field four months. Another party started working eastward from the Fork of the river at Avery in June, 1906, to meet the party just previously mentioned. Provisions were packed from St. Joe, Idaho over newly made trails. This party averaged 20 men, ran 21 miles of preliminary survey, and were in the field two months. As a whole the work on this route was hard, dangerous and expensive. High water and ice jams impeded the work as frequent crossings were necessary.

In taking up the work on Route No. 4 the nature of the territory is such that it might be well to make a division in the general description at Avery, the foot of the mountain grade. Between July, 1906, and March, 1907, twelve separate location parties were in the field, covering the territory between St. Paul Pass and Avery very thoroughly. The length of adopted line is 25 miles, so it can be seen that every prospect was investigated and careful surveys made, to obtain the present supported 1.7% gradient. Base of supplies for these parties was Saltese and pack trains were used for transportation.

A party started in January, 1906, working east from Saltese to St. Maries via Hangman Creek and the St. Maries River. Work on this route ceased after the party had been in the field four months and had surveyed 80 miles of preliminary and 20 miles of located line.

Several parties in the meantime had been put to work along the finally adopted route, as it had been decided as the most advantageous. The work over this entire course was slow. The territory was wild, rugged and mountainous. Many difficulties were encountered in the line of high water, ice jams and in making trails causing much lost time on the survey work. However, the work from Avery to Benwah Lake was confined to the banks of the St. Joe River and the problem to be solved was the adoption of one side or the other. Between Benwah Lake and the state line, the difficulty was

finding the best route through the Coeur d'Alene Mountains. Watts Summit with the half mile tunnel was the best that could be found.

Following is a summary of the survey work for all routes:

Average number of men in party	19
Total number of parties	20
" time - months	76
" miles of preliminary surveyed	790
" " " projected location	164
" " " located line	199
" " " adopted line	98
Ratio preliminary to adopted	8 to 1
" location " "	2 to 1

ENGINEERING ORGANIZATION:

This Valuation Section was built under two construction divisions. The East end between St. Paul Pass and Avery was under the jurisdiction of the Division Engineer in charge of Valuation Section Montana 4, this portion being under the direct supervision of a District Engineer with four Resident Engineers and parties. There was also a Tunnel Engineer with a force of assistants at St. Paul Pass tunnel, who reported direct to the Chief Engineer at Seattle.

The portion between Avery and the Idaho-Washington State Line was the major part of the Idaho Division and was under the supervision of a Division Engineer, three District Engineers and eleven Resident Engineers with parties.

The Division Engineers had their offices at convenient points in their territory and reported to the Chief Engineer in Seattle.

CONTRACTS:

The clearing, grading, bridge and culvert work, between St. Paul Pass and Avery was let by contract to Winston Bros. Company, who sublet the work to six other contractors. The territory between Avery and Idaho State Line was included in H. C. Henry's contract. He sublet to two other contractors. The first sub-contractors in turn sublet the work to nearly 100 different parties.

In considering the work under contract and the prices paid, the inaccessibility of the territory covered by the heavy mountain work along the west slope of the Bitter Root Mountains was a serious matter. While it is a fact that the contractors had the use of a wagon road that was constructed by the Railway Company it should be borne in mind that this road was necessarily of a rough nature with steep grades and might be called a slow freight road. As a rule it was located a considerable distance above or below the road bed, and equipment, tools, explosives, etc., were taken from the road to the work by men. These conditions existed along the entire line from St. Paul Pass to St. Joe. From St. Joe to Pedee Viaduct the line is quite favorably located for delivery of supplies, etc. by water. Between Pedee and the State Line the conditions as to accessibility were again difficult and expensive.

In addition to the difficulties of transportation the matter of obtaining men for the work was serious. A large amount of other construction work was in progress throughout the country and the men were very independent and high wages prevailed. In many cases men were shipped in over foreign lines of railroad or by boat or in any possible manner, at the expense of the employers.

CONSTRUCTED LINE

Leaving the west portal of the St. Paul Pass Tunnel the line descends on a 1.7% maximum gradient with development along the steep mountain slopes. The direction is generally east to the North Fork of the St. Jor River, thence with a sharp loop it runs west down the North Fork to Avery, which is the foot of the mountain grade. The general characteristics of this 21 miles are a sharp curvature maximum 10 degree, high trestles crossing side drainage, deep cuts, high embankments, and numerous tunnels. A large share of the excavated material was solid rock.

West from Avery the north side of the St. Joe River is followed on a .4% gradient for about 31 miles to a crossing of that river. This crossing is made on two steel truss spans. From here the south bank of the river is followed to Ramsdell. At St. Maries the St. Maries River is crossed on steel spans. Between St. Joe and Ramsdell the gradient is level. The grading work on this last 52 miles is extremely heavy for a valley line, solid rock being the predominating feature of the classification. Leaving Ramsdell a short tunnel is used to pierce a projecting rock point and a crossing of Benwah Lake is made on a long pile trestle. Here the ascent of the Coeur d'Alene Mountains is commenced and continues for about 16 miles on a 1% gradient to the tunnel at Watts summit. After passing through the tunnel a .4% gradient is used to gradually descend the west slope. The grading work in this last section is steep side hill development with largely solid rock classification and many deep ravines are encountered, requiring expensive bridges.

CLEARING AND GRADING:

Grading operations on this section commenced May 1st,1907, and were completed July 15th, 1909. Clearing and grubbing on this section was a heavy item, timber being encountered over the entire distance. Part of the work was in the Government Forest Reserve, where the usual extra precautions were enforced in regard to burning brush, and skidding logs. The solid rock work was all done by station men using trap tunnels wherever possible, and cars and horses to carry the material to the fills.

It was the policy of the Railway Company to hurry the grading all possible while work was being done under contract, and consequently many large temporary trestles were built which were filled either by the Railway Company forces or contract outfits after the track was laid. Many of the bridges in the Bitter Roots were filled with material obtained in daylighting and widening cuts for snow protection, and others were filled by the sluicing method. In connection with the latter, large areas of land were purchased from the Government and many miles of flumes were built to divert the mountain streams to the places where water was needed.

BRIDGES, TRESTLES AND CULVERTS:

As previously stated under grading, numerous temporary trestles were built on this section in order to prepare the line for track laying as soon as possible. 21 were built on the west slope of the Bitter Root Mountains and their total length was about 9800' with an average height of about 110', the maximum being 150' and the minimum 52'. These structures required the use of approximately 6,000,000 F.B.M. of timber and about 80 tons of iron. The timber, with the exception of the small dimension material such as bracing, guard rail and ties, was shipped from Coast points via foreign railroads to Taft, Montana, then conveyed by teams to East Portal, thence to the summit by the electric tramway, thence distributed by wagon road to the points closest to the sites. From the wagon road they were taken to the bridge erection with traveling blocks operated on ropes supported by the standing timber, or fastened to the rock cliffs. The small dimension lumber was cut in a portable saw mill which had been established in the Clear Creek Valley by the Railway Company. The iron for these bridges was shipped from the East.

The concrete foundations for the Kelly and Clear Creek viaducts were built during the early construction period, the equipment, cement, etc., being brought in by team from Taft, Montana. The steel work was fabricated in the East and shipped on foreign lines to Plummer, Idaho, from where it was taken to the bridge sites by work train. Clear Creek bridge is 165' high and Kelly Creek 205' high, and the steel erection was done during the winter of 1908, so the difficulties in the deep snow are obvious.

Along the St. Joe River, Avery to Ramsdell, there are several small Pile bridges. The important structures are the steel spans used in crossing Slate Creek, the St. Joe River and the St. Maries River. The concrete foundation for the St. Joe River crossing was placed during early construction, material being hauled from Ferrel, Idaho, by wagon. Ferrel is situated at the head of navigation on the St. Joe River. Material was delivered to that point by boat. The other steel spans were placed on timber foundation. False work for the St. Joe River crossing was built to carry traffic and track laying was not delayed for its construction. The other steel bridges required no false work, girders being erected when the track reached them.

The bridge at Ramsdell over Benwah Lake was about 2600' long and has seven piles per bent. Piles are 100' long, some of them being two 50' sticks spliced. Timber for this bridge was brought in by raft on the lake.

Between Ramsdell and the Watts summit several large temporary trestles were built, timber and piles being hauled by team to the sites.

The permanent structures at Chatcolet and Pedee Creeks were built during construction. Foundation material was delivered by boat. The super-structure was fabricated in the East and shipped to Plummer over foreign rails from where it was taken by work train to the points of erection.

Few piles were used on the Bitter Root structures, while

those along the St. Joe River were practically all pile bridges.

The culverts on this section were largely built of hewn logs obtained along the right of way, although a small amount of squared timber was used where desirable logs could not be found. Preparation of foundation for the culverts under the high embankments was a matter of care and expense.

TUNNELS:

On the Bitter Root slope west from Roland there are sixteen tunnels varying in length from 183' to 1516'. The total length is 8464'. Some of these required timber lining, a few being through self-sustaining solid rock. Timber used in lining was approximately 2,000,000 F.B.M., with about 1800 cords of lagging.

A small part of the lining timber was obtained locally from the Clear Creek mill, but most of it was shipped in from other points. Between Avery and the state line on the west there are 3 tunnels varying in length from 341 feet to 2550 feet, the last being Watts Tunnel near Sorrento. All of these tunnels were timber lined, involving the use of about 2,000,000 F.B.M. of timber.

Tunnel #37, near Herrick, caved in at the portals soon after track was laid and it was necessary to construct a run around track for the operation of trains while the tunnel was made safe by placing a concrete lining.

Concrete lining has been placed in the other tunnels that require it since the line was opened for traffic.

SPECIAL FEATURES:

Special features pertaining to construction on this Valuation Section can be enumerated briefly as follows:

An electric power plant was built at Taft, Mont., with transmission line to the St. Paul Pass Tunnel. This is more fully described in the history of Valuation Section Montana 4.

A portable saw mill was set up and operated at the expense of the Railway Company in the Bitter Root Mountains for cutting small dimension lumber for bridges, tunnel lining, and culverts. This mill was located about a quarter of a mile from the line up Clear Creek valley. The machinery was hauled from Taft, Montana, where it had been shipped by rail.

As previously indicated by the description of the reconnoissance, the territory in the Bitter Root Mountains was unsurveyed and no roads or trails were in existence, consequently it was necessary to construct a main wagon road between Taft, Mont., and St. Joe, Idaho before construction could be undertaken. The part between St. Joe and Avery was built by H. C. Henry, and the part between Avery and Taft, by Winston Brothers. All the work was done on a force account basis, and cost the Railway Company about

$335,000.00. The major portion of this road lies in the state of Idaho and is therefore chargeable to this Valuation Section.

An electrically operated five ton cable tramway was built from the east portal of the St. Paul Pass Tunnel to the summit of the Bitter Roots for handling bridge timber, rail, etc. for the west slope. This was about 5000' long and was built of native hewn timber.

The forest fire of 1910 which burned up cars, construction material, camps, equipment, buildings, bridges, etc., between Avery and Saltese and so damaged the line that operation was suspended for sixteen days, represents a large item of construction cost. The bridge filling by sluicing was in progress at the time of the fire and many miles of timber flumes were burned, which were reconstructed to complete the work. This is more fully described in the Historical Sketch on Valuation Section, Montana 4.

Serious slides have occurred practically over the entire length of this section. Some were taken out by the contractors' forces during early construction, and some by the Railway Company's forces after track was laid. Some of the more important will be mentioned as follows:

A slide occurred at a point about one and one-half miles west of Calder which suspended traffic and necessitated a run around track. The alignment was afterward changed at this point to alleviate future trouble.

A sand cut about two miles east of St. Joe has given trouble ever since traffic was started. Steam shovels have been installed four or five times and thousands of yards of material excavated, and the alignment has been changed several times. Trouble is still experienced here, however, and it is necessary to clean the ditches several times a year with a ditching machine.

A Shoo Fly was built through the St. Joe station grounds pending the completion of the big cut just east of the depot. This cut is very wet in the west end and has given considerable trouble. A large amount of material has been excavated with a steam shovel here and the material used for widening and raising embankments between St. Joe and Ramsdell.

At a point one-half mile east of Omega a slide occurred of approximately 26,000 cubic yards, which necessitated the use of a Shoo Fly. A steam shovel was used in clearing this slide and a permanent change of alignment made.

Continuous slides before track laying at the so-called Little Plummer Cut about one and one-half miles east of Karnac necessitated the construction of a temporary line on 14 degree curves. In 1910 a contract was let for filling the bridge over Little Plummer Creek, the material to be taken from this cut. The cut filled up almost faster than it could be excavated and the embankment spread out and settled taking the bridge with it and seriously damaging the concrete culvert. An entire new bridge was

built and work was temporarily suspended. In 1911-12 a Railway Company steam shovel was operated in this cut and the material hauled for bridge filling. From this work it developed that it would be impossible to obtain a safe line through the cut and a permanent line change was made using 11 degree curves. The bridge has been a continual source of trouble and has just recently been replaced by a substantial fill.

These few cases only mention the more serious troubles due to these causes. During the years of 1910-11-12 several extra gangs were employed on this section removing dangerous rock, widening and daylighting cuts, revising the alignment and clearing slides. Their work was in connection with construction of the line.

Embankment subsidence along the St. Joe River is an item of importance, especially between St. Joe and Ramsdell.

An unusual amount of shrinkage occurred on the fill between Sorrento and the state line, necessitating train hauling a large amount of material to keep the track in condition for operation.

TRACK LAYING AND BALLASTING:

The track material on this section with the exception of that on a few miles in the Bitter Root Mountains was all stored in a material yard at Plummer, Idaho, where a connection with the O.W.R.& N. Railway was made and several storage tracks laid to facilitate operations.

Beginning on April 24th, 1908, track was laid east from Plummer reaching Pedee viaduct on June 6th. The erection of the steel on Pedee and Chatcolet viaduct delayed work until July 10th, when work was resumed and continued east reaching Clear Creek viaduct, Mile 118, on September 30th. Track was laid from Plummer west to the state line in November.

Track between St. Paul Pass Tunnel and Clear Creek Viaduct was laid by hand in the fall of 1908. The ties had been made locally and previously distributed by team along the road bed. The rail and fastenings were shipped to Taft, Montana, thence hauled by team to East Portal where they were transferred to the tramway and taken to the summit. At the summit they were transferred to wagons for distribution along the line. The difficulty and expense of these operations are obvious, but it was imperative that this track be laid as the snow season was coming and it was needed for the erection of Kelly and Clear Creek viaducts. A delay in the erection of these bridges meant a subsequent delay in the opening of the line for traffic.

New 85 pound 33 foot rail was used with native ties. The original ballasting was done in 1908-09 when about a four inch lift was made, gravel being taken from four pits. That part of the line between St. Paul Pass and Avery was ballasted with material taken from gravel pit at Haugan, Montana. That part between Avery and Ramsdell was ballasted from the Pyle gravel pit located between Calder and Herrick. That part between Ramsdell and the state line was ballasted with material from the pit at Malden, Washington.

Stripping was required at the Pyle gravel pit. The track between Avery and the state line on the west was given a final dressing with gravel from the pit at Kenova, Washington. A second lift has been placed over the entire line, some work being done yearly.

WATER SUPPLY:

Water supply during construction was obtained from various natural resources along the line which have in many cases been further developed and established as permanent stations. A deep well was drilled at Sorrento for a permanent supply.

FENCES AND SNOW PROTECTION:

Right of way fence with the necessary crossing facilities was built after track was laid, the material being distributed by work train.

The daylighting and widening of cuts were done in many cases for snow protection. Snow sheds were built at the tunnel portals in the Bitter Root Mountains.

BUILDINGS:

An engine terminal consisting of a twelve stall round house, fuel oil storage, turn table, sand storage, clinker pit, coal storage, ice house, etc., were built at Avery. The topographic features here required a large amount of expensive filling in the river valley for the construction of these buildings. The locality is not a desirable one and it was necessary to construct apartment houses and a hotel for the convenience of the employes in order to keep efficient help at this point.

Combination passenger and freight depots were built at Avery, St. Joe, St. Maries and Sorrento. A small depot was built at Herrick. At Plummer Junction a very artistic bungalow depot was built with extensive platforms. A freight house is maintained at Plummer. Engine terminals for the branch line trains are maintained at St. Maries and buildings for Division Offices were built there.

Buildings for section facilities were built at places convenient to the work.

TELEGRAPH:

The telegraph material was distributed by work train. Telephones were installed in booths at blind sidings and in the depots.

SIGNALS:

Automatic signals were installed as soon as practicable after the line was in operation.

ELECTRIFICATION:

The east end of this section from Montana State Line to Avery is electrically operated. A substation has been built at Avery. Power is obtained from the Montana Power Company's plant at Thompson Falls, being transmitted to the substation at 100,000 volts alternating current, where it is transformed and regenerated to 3000 volts direct current for train operation.

OPERATION AND MANAGEMENT:

The part of this Valuation Section between St. Paul Pass and Avery is included in the Missoula Operating Division, the offices being in Missoula. The remainder, or the part between Avery and the state line on the west, is a part of the Idaho Division, with offices in Spokane.