

CONSTRUCTION PROGRESS REPORT (1925)
TRANSMOUNTAIN HWY, GLACIER NATIONAL PARK
WEST SIDE PROJECT, CONSTRUCTION
EAST SIDE PROJECT, RELOCATION

Ass

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Engineer

by

339
Ryals

RV

UNITED STATES DEPARTMENT OF AGRICULTURE,

BUREAU OF PUBLIC ROADS,

DISTRICT No. 1.

March 26, 1926

IN YOUR REPLY PLEASE

REFER TO FILE No.

Glacier National Park

POST OFFICE BUILDING,
PORTLAND, OREG.

DEPARTMENT OF THE INTERIOR

MAR 27 1926

GLACIER NATIONAL PARK

Mr. C. J. Kraebel
Superintendent
Glacier National Park
Belton, Montana

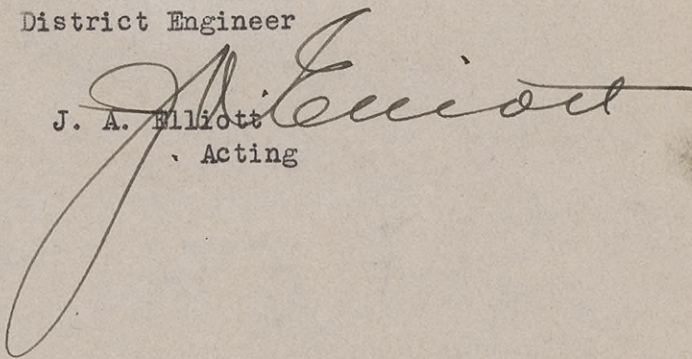
Dear Sir:

Attached is one copy of Construction Progress
Report for the year 1925 on Transmountain Highway,
Glacier National Park, West Side Construction and East
Side Relocation.

Very truly yours,

C. H. Purcell
District Engineer

J. A. Elliott
Acting





Transmountain Highway. View east from Logan Pass, Going-To-The-Sun Mountain, center. Route descends along side hills on left, rounding Sun Mountain on right. May 8, 1925.

#11383 - #11384 - # 11385 combined.

#12337.

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Vicinity Map

Tabulation of Bids

F. R. 58



#12338

General view from Logan Pass, west, showing Garden Wall on right, Haystack Butte in center and general route of West Side Project, which follows approximately the lower border of the view, from the right descending. May 8, 1925.

#11367 - #11368 - #11369 combined.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
District No. 1

CONSTRUCTION PROGRESS REPORT (1925)

on

TRANSMOUNTAIN HIGHWAY, GLACIER NATIONAL PARK,
WEST SIDE PROJECT, CONSTRUCTION,
EAST SIDE PROJECT, RE-LOCATION.

- - -

CO-OPERATIVE WORK WITH U. S. NATIONAL PARK SERVICE.
FLATHEAD AND GLACIER COUNTIES,
STATE of MONTANA.

- - -

W. G. PETERS,
ASSOCIATE HIGHWAY ENGINEER.

- - -

DESCRIPTION

The Transmountain Highway is primarily one designed to make the interior of Glacier National Park more easy of access to tourists and campers. With one terminal of the highway at Belton, Montana, the western railway entrance to the Park, on the National Parks Highway, the road follows along the east shore of Lake McDonald for ten miles and thence up McDonald Creek to Granite Creek where the ascent to Logan Pass begins. The topography of the country requires that the road loop at Mineral Creek before continuing on to the Pass.

From Logan Pass the road descends on the ruling grade, following the contour of the mountains, for a distance of 8.26 miles to Going-to-the-Sun Chalet on Lake St. Mary. This section is known as the East Side Project. From Sun Camp the highway skirts the north shore of the Lake to St. Mary, about twelve miles distant, where the main north and south highway on the east side of the park is reached. This section is known as the St. Mary's Section. By this north and south highway the eastern railway entrance of the Park, Glacier Park Station, may be reached in a distance of thirty-five miles.

It is thought that by the end of 1929 a complete road from the east to the west side of the Park will be finished, whereas at the time of contracting for the new work there was little more than twenty miles available of the total distance of about fifty-five miles.

Logan Pass, one of the most beautiful points on the highway, is about thirty-three miles from Belton and at an elevation of 6650 ft. It is exceptional in the extensiveness of the comparatively level surrounding territory. To the south are Mt. Clements, with its ever present snow and ice, Mt. Reynolds and Hidden Lake, any of which may be reached in a very short time.

A glacier on the side of Mt. Clements is a feature that will be of interest to everyone. In midsummer, when traffic on the highway will be the greatest, Logan Pass with its profusion of many varieties of mountain blooms is literally one huge flower garden. The view of the Garden Wall, the Continental Divide, the mountains on all sides, the flowers and the abundance of good water, without a doubt will make the Pass the most popular spot on the Transmountain Highway.

In addition to the great value of the highway from a scenic standpoint, there is the protective value of the road in the matter of fire fighting. A good highway gives ready access to much territory and allows quick transportation of men and equipment from the railway terminals and Park headquarters.



#11371 - View ahead
from Sta. 135, West Side
Project, into east fork
of Haystack Butte Creek.
Taken on inspection trip
of May 8, 1925.



#11378 - Making ascent
to Jones Flat on inspect-
ion trip of May 8, 1925.
Use of axe and shovel
necessary to cut steps in
frozen crust of snow in
order to climb steep slopes
Route of road above cliffs
in upper part of view.

Improved roads always open up the attractions to many people, while trails tend to limit the pleasures of sight seeing tours to a comparatively few.

The West Side Project, the first unit to be put under construction with cooperation of the Bureau of Public Roads and the National Park Service, has a great variety of scenic and recreational possibilities. Beginning at a point about twenty-one miles from Belton, the Park headquarters, the road traverses level country for two and a half miles along McDonald Creek, after which the climb to Logan Pass begins. Two miles further along the route on the mountain side, the first tunnel site is reached. Here a tunnel about 250 ft. in length is planned. This will give the traveler his first impression of the character and nature of the country through which he is passing. Open windows in the tunnel side will give fleeting views of the distant mountains and the valley below. About four and a half miles from the beginning of the road a sharp loop is made in order to start toward the Pass. Rather extensive widening at the loop is contemplated to provide for parking space, since this is a probable point of turning for those from the west entrance who do not desire to cross the divide. A fine view of the surrounding mountains and valleys below is to be obtained here. From the Loop the route is on a continuous climb along steep side hills and perpendicular cliffs, across steep gorges carrying tumbling streams, and through tunnels with an ever increasing range of view until Logan Pass is reached and the climax of scenery is attained.

HISTORY

On September 6, 1924, the Regional Office of the Bureau of Public Roads at San Francisco, received telegraphic instructions from Washington advising that cooperation had been arranged between the Bureau and the National Park Service for the purpose of making a survey, plans and estimate of cost of the Transmountain Highway through Glacier National Park.

Notwithstanding the mutually recognized fact that the lateness of the season would entail a large increase in the cost of surveys, cause much hardship to be endured and probably make it impossible to complete the work, the desire of the Park Service to let the contract for work early in 1925 made it necessary to start the survey at once regardless of conditions.

Mr. F. A. Kittredge, U. S. Highway Engineer, who was chosen to supervise the location survey, left San Francisco, September 7th, spent two days at Portland making the preliminary arrangements with the Chief Engineer of the Park Service, Mr. George E. Goodwin, and arrived at Glacier Park on the 11th of September.

SURVEYS, PLANS AND ESTIMATES

Two survey parties were organized, one operating on the East Side from Logan Pass to Going-to-the-Sun Chalet, and the other on the West Side working from the Pass to a connection with the Mt. Cannon Section near Trapper Creek.

The surveys began about September 15th, and were brought to a close about November 10, 1924. The report of Frank A. Kittredge, under date of February 5, 1925, gives a very complete and comprehensive account of the location surveys, the selection of route and standards, estimates, description of country and scenic features all supported by numerous photographs.

As guides in making the locations there were previous survey data available. These previous investigations, while not along the same standard as the line to be finally selected, served very well in reconnaissance and in the comparisons to determine the route chosen.

The locations were made with a ruling grade of 6% maximum, compensated at the rate of 1% reduction for each fifty feet decrease in radius below 200 ft. with 56° curvature as a minimum. A clear roadway width of 22 ft. on fills and 16 ft. in cuts with 3 ft. ditches was the standard finally agreed upon.

The East Side Project, from Logan Pass to Going-to-the-Sun Chalet was 8.26 miles in length and the West Side Project was 12.4 miles long. The East Side was located upon the ground but the additional length and greater difficulties encountered on the West Side prevented a complete location being made there. About three and a half miles of the West Side from the summit down was staked out. The balance being projected in the office from topography and notes taken from the base line survey.

After the completion of the field work the projections, plans and estimates were completed in the Portland Office by Mr. Kittredge. On the basis of a 16 ft. roadway, surfaced with crushed rock, the total cost of the West Side Project, including 10% for engineering and contingencies, was estimated at \$835,059.00 an average of \$67,260.00 per mile. In the same way the East Side was estimated to cost \$321,116.00, an average of \$38,840.00 per mile.

A later estimate of cost, based on the same standards, showed the following:

East Side	Length 8.26 miles	\$353,433.00	Average \$48,892.00
West Side	" 12.4 "	795,484.00	" 63,843.00



#11516 - Prospective bidders being provided for at Trapper Creek Camp, June 2, 1925.



#11479 - Contractors enroute to Logan Pass to look over upper portion of West Side Project. Nearing snow fields and the end of horse back travel. Note brushed out line of previous survey by National Park Service on left side hill. McDonald Creek Valley in center. June 3, 1925.

CONFERENCES

On April 21, 1925, a conference was held at Spokane, Washington, attended by Chas. J. Kraebel and T. C. Vint, of the Park Service, and C. H. Purcell, J. A. Elliott and F. A. Kittredge of the Bureau of Public Roads, at which the proposed plans and specifications were discussed in detail and agreements reached as to the methods of handling construction and providing of funds. There was also drawn up a "Suggestive Procedure for Co-operation Between the National Park Service and the Bureau of Public Roads in Major Traffic-Way Projects Within the National Parks".

On May 7th, J. A. Elliott, F. A. Kittredge and W. G. Peters, of the Bureau, and Chas. J. Kraebel, T. C. Vint and J. C. Fleming, of the Park Service, made a trip of inspection over the West Side Project in order to secure first hand information regarding construction difficulties and features which would facilitate the drafting of the specifications for the project, and give a proper view of the work to those who had as yet not been over the territory. May 7th, 8th, 9th and 10th, were spent on this work.

CALL FOR BIDS

On May 21st advertisements were published giving notice to contractors of the opening of bids on June 10th, for the construction of the West Side Project.

The length of the project to be constructed was given as 12.4 miles, and the principal items of work were as follows:

Clearing	90 Acres
Excavation	480,000 Cu.Yds.
Tunnels	16,000 "
Structures, masonry	2,200 "
Masonry rails, walls, etc.	7,000 "
Surfacing	14,500 "

Alternate bids were asked for on the use of either power shovels for excavation or excavation by hand methods.



#11482 - Contractors above Jones Flat, half mile from summit.
June 3, 1925.



#12331 - R-1 (Personal) Party of contractors to reach summit.
O+00 stake on extreme right foreground, 3-1/2 ft. snow, Mt.
Clements, 1 mile distant, 2114 ft. higher than Pass. Mr.
Williams of firm of successful bidders, 5th from right. J. A.
Elliott, Highway Engineer, B.P.R., 2d from left. June 3, 1925.

BIDDERS INSPECTION TRIP

In order to give prospective bidders a proper view of the work to be contracted, a meeting of contractors was arranged with Bureau and Park officials at Belton, Montana, on June 2d, and the work was looked over by the contractors in a body. On June 2d and 3d, about thirty-five representatives of contracting firms looked over the project accompanied by C. H. Purcell and J. A. Elliott of the Bureau of Public Roads, as well as other Bureau engineers and Park representatives. Both before and after this large general gathering other contractors looked at the work. All were provided for by special camps set up for that purpose, the expense of subsistence being borne by the contractors.

AWARD OF CONTRACT

At the opening of bids on June 10th, Williams & Douglas of Tacoma, Washington, submitted the lowest bid, which was for \$869,145.00, based on the use of power shovels for excavating. This bid was recommended for the award which was made on June 11, 1925.

The attached tabulation shows the bids received.

ENGINEERING

On May 20th, W. G. Peters, Associate Highway Engineer, and four men, left Portland for Belton, Montana, to start the construction engineering work of the project. Camp was established at Snow Shoe Cabin on Trapper Creek near Sta. 590. A few days later other men for the party arrived and on June 1st the camp cook arrived just in time to provide the meals for the thirty-five contractors who were to look over the work. On account of the necessity of establishing camp and looking after the welfare of the visiting contractors, not much could be accomplished in the way of engineering until after June 10th.

The staking of the line was started at Sta. 590 and run to Sta. 657+47, where a connection was made with the Mt. Cannon Section being constructed by the Park Service. Later the line was backed up from Sta. 590 to 263.

Since the Loop at Sta. 410 and the tunnel site at Sta. 440 were controlling points on the project, the alignment staking was not made continuous but was stopped at a lower point and started again at Sta. 405 and brought



12339

#12339 - R-10 (above)
Rocky Mountain Sheep
(Big Horn) on talus rock
800 ft. north of
beginning of project,
Logan Pass. August 5,
1925.



#R-4 (Personal) View
shows summit of West
Side Project, Sta. 0+00
Logan Pass. Note vast
expanse of comparatively
level territory suitable
for resort or camp grounds.
Now reached only by foot
or on horseback. Note
closeness to Mt. Clements,
elevation 8764, and its
perpetual snow, small
glaciers, talus rock and
moraine.

#11662 - View shows camping area, Stas. 15 to 23, in snow patched area in center of view. Mt. Oberlin, 8100 ft. elevation in background. Mr. Thos. H. MacDonald, right, Dr. L. I. Hewes, center, Mr. C. H. Purcell, left, U.S.B.P.R.
July 2, 1925.



#11655 (below Lower and of Hidden Lake, 1-1/2 mi. south of Logan Pass. Note ice in lake. July 2, 1925.



down to the tunnel site. At the Loop it was found that an error had been made in the original projection, due to incorrect platting of contours, so that some difficulty was encountered and there was loss of time in making the revision. At the lower tunnel site, Stas. 440 to 446, the first cross-sectioning requiring the use of ropes by the men was done. Much of the alignment and cross-sectioning work along the cliffs from Sta. 387 to 350 required the use of ropes. Such work is necessarily slow and hazardous.

On September 21st the relocation party camped at Baring Creek on the East Side was moved to Jones' Flat on the West Side near Logan Pass, in order to stake out the line from 0+00 west. This was decided upon by Mr. Elliott at a conference with Superintendent Kraebel, when it was learned that there would be no possibility of construction on the East Side during 1926. Even at that time there was considerable snow at Logan Pass and conditions continued to grow worse so that very little was accomplished. The party was small, several of the men inexperienced, weather conditions were bad and new men were not to be obtained, so that on October 5th, the remaining members of the party were brought down to Trapper Creek camp and combined with the party there to help stake out the line ahead of the construction from Sta. 360 to 263. At the upper end, center line was run from Stas. 0 to 60, levels from 0 to 33, and cross-sections from 0 to 8+00.

During the latter part of October snow began falling so that work could not be carried on to advantage. On October 30th the contractors' camp and also that of the engineering force was closed and all work was stopped. The bulk of the engineering equipment was stored in the cabin at Trapper Creek, while the notes, plans, etc. were sent to the District Office at Portland.

At the beginning of the work a log cabin 16'x24' was constructed on Trapper Creek by the Park Service for the use of the engineering force, which was used by the resident engineer during the season and for storage at the close of the work. During the construction period assistance and cooperation were freely given by the Park Service whenever requested or required. Supplies for the mess house, lumber, saddle and pack horses were furnished by the Park Service from headquarters at Belton. Pack and saddle horses were contracted for by the Park Service at \$0.73 per horse day.

From June 30th to July 3d, Mr. Thos. MacDonald, Chief of the Bureau, Dr. L. I. Hewes, Deputy Chief Engineer, and Mr. C. H. Purcell, District Engineer, were in camp to make an inspection of the general conditions of the route of the highway. During this time a trip was made to Logan Pass, which gave them a good idea of the character of the country traversed by the upper part of the road. Another trip up the Granite Park trail to the upper crossing of it by route of the road gave a good conception of the topography of that part of the highway location. By these two trips and the one made to reach camp, practically the entire territory of the location was covered.

Inspection trips were made to the project by Mr. Elliott on September 10th and October 18th. At the latter time a second inspection was made also by Dr. L. I. Hewes and Mr. Purcell. This last trip was for the purpose of looking into the matter of rock blasting on the cliff section at Stas. 379 and 387 in an effort to devise some system to lessen the amount of destruction of timber by the rock going down the mountain side. No definite solution to the trouble was found.

A forest fire at the lower end of Lake MacDonald during the period from August 6th to 12th, took Peters and three of the men from the survey work on the West Side and all of the crew of men intended for the survey work on the East Side. The greater part of the contractors force was also taken, all of which slowed up and delayed the work to a great extent.

CONTRACTORS OPERATIONS

On June 22d the contractors' forces arrived at Belton and began the preliminary work of establishing camps and starting the construction. At this time materials and supplies could be trucked from Belton to Avalanche Creek, a distance of about eighteen miles. From there to the beginning of the project, about three and a half miles, it was necessary to use pack horses. This stretch of three and a half miles, the Mt. Cannon Section, was under construction by the Park Service.

The first camp of the contractor, headquarters, was built on McDonald Creek near Sta. 580, or about five miles from Avalanche Creek and twenty-three miles from Belton, the nearest railway station. By the end of the season a very good substantial camp had been installed here with well built combined office and commissary house, good



#12001 - Sta. 556 ahead, showing type of clearing, and stumps blown ready for grubbing and burning. July, 1925.



#P-3 - Camp equipment being packed in by contractor. Two camp ranges on one horse. Steel cots and mattresses for workmen. July, 1925. 12107.



#P-9 (above) 3/4 yd. Osgood Gasoline Power Shovel excavating. Sta. 618 back, dump wagons hauling. August, 1925. Light work. 12330.

#12010 (right) Trail road built by contractor along grade line of highway to haul compressors to site of heavy cliff work. Sta. 392 ahead. July, 1925.



sanitary mess house and sleeping tents, etc., sufficient to accommodate fifty to sixty men.

The second camp was built at Sta. 410 above the loop to accommodate the rock workers on the cliff sections from Stas. 379 to 390. To supply this camp packing was done from headquarters over the Waterton Trail to Mineral Creek, where a steep trail was built up the mountainside by the contractor. The construction of this camp began about July 3d.

The average working force and equipment in use during the season was about as follows:

Camp No. 1 - Headquarters

Equipment:

1	3/4-yd. Osgood gasoline power shovel, (wt. 64,000#; Cost \$10,800.00)
1	Sullivan compressor, single hammer
4	Dump wagons
2	Stick bottom wagons
6	Slips
4	Fresnoes
2	3-ton Plymouth Gas Locomotives (Not used in 1925)
2	2-yd. Western Dump Cars (Not used in 1925)
1	Western grader
10T	20-ft. steel rails (Not used in 1925)
1	1-1/2-ton truck

Force:

1	Superintendent - A. R. Douglas
1	Bookkeeper - E. F. Stewart
2	Foreman
1	Cook
1	Flunkie
1	Bull Cook
1	Saw Filer
1	Packer
1	Blacksmith
1	Power shovel operator
1	Powder man
1	Carpenter
1	Truck Driver
1	Compressor man
10	Laborers
7	Teamsters
7	Teams
8	Pack and saddle horses



(Above)

#P-17 - Sta. 379 ahead after blasting away of Cliff was 75% complete. Note size in which rock, a lime-stone, breaks. These large rocks, rolling down the mountain side destroy the forest growth on the steep slopes. Driller putting in plug hole for undercut or half tunnel. October, 1925. 12114.

#11989 (right) Sta. 380+50 ahead with preliminary benching work just starting. Note ropes for safety of engineers and contractors forces. Grade line about ten feet lower then bench in center of view. Crevice composition of rock shown. July, 1925.



Camp No. 2 - Loop Camp

Equipment:

2 Sullivan Compressors, Single Hammer
2 Jackhammers, Denver.

Force:

2 Foremen
1 Cook
1 Flunkey
2 Jackhammer men
1 Blacksmith
1 Compressor man
10 Laborers

During the season, from June 22d to October 30th, the following work was done by the contractor:

Advance Clearing	Stas. 379 to 405	2.387 Acres
	" 416 to 423	0.579 "
	" 446+45 to 657+47	19.845 "
	Total	22.811 "

Grubbing:	Stas. 379 to 405	1.791 Acres
	" 497 to 657+47	10.893 "
	Total	12.689 "

Excavation, Unclassified:	Stas. 379 to 405	12,645.7 CY
	" 497 to 657+47	14,633.8 CY
	Total	27,279.5 CY

Structure Excavation:	Stas. 509+30 to 653+35	66. CY
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Overhaul:	Stas. 559 to 585+50	718 Sta.Yd.
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Corrugated Metal Pipe, 18 inch:	Stas. 543+88 to 652+54	328 ft.
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Corrugated Metal Pipe, 24 inch:	Stas. 509+30 to 575	106 ft.
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The attached form, F.R. 58, under date of October 31, 1925, shows the costs to the contractor and to the Government.



#P-21 (above) Sullivan Compressors used to furnish air for Denver Jackhammers, one drill to each compressor Sta. 388 ahead. October, 1925. 12118.



#12012 (right) Taking pack string over Pass to move survey party from East Side Relocation at Baring Creek to West Side at Jones Flat. Snow 2 to 3 ft. deep on slide below Sta. 35, West Side. Necessary to break trail for horses. Near proposed tunnel site. September 20, 1925.



#P-20 General view of cliff work Stas. 379 to 382 (379 ahead)
Note air line running up cliff, then ahead to compressors.
Half tunnel effect to be attempted here. Point shows same
spot as in view #11989 before shooting. October 17, 1925.
12117.



#P-15 shows undercut or half tunnel effect being accomplished.
Drill with handkerchief attached shows direction of drill hole
for plug-shot in undercutting. Closeup of #P-20. 12112.

Explosives were furnished to the contractor by the Government at the following prices, f.o.b. Belton, Montana; 20% at \$0.1165 and 40% at \$0.139 per lb. During the season the contractor used 9,600 lbs. of 20% and 5,500 lbs. of 40%.

The only station contracts sublet by the contractor in 1925 were for clearing from Station 446+45 to 537, 8.304 acres, let to Martin Anderson & Co. at \$200.00 per acre, and from Station 641 to 658, 1.56 acres, let to Martin and Valentine at \$150.00 per acre. The clearing was medium in character and consisted of fir, birch, hemlock, cottonwood and small brush.

From Station 653 to 657+47 just enough grading was done to let the teams and shovel through. From Sta. 653 back the shovel did the major portion of the grading as far as station 530, from which station to 497 only a roadway for itself was excavated, the object being to endeavor to get to the higher parts of the work. On October 19th, permission was received by the contractor from the Park Service to divert the shovel from the right-of-way at Station 497 and follow along the Waterton trail to a point below the Loop from where it was intended that the shovel would be taken to the Loop for the opening of work in 1926. When the work was brought to a close in October, 1925, the shovel had reached a point opposite Station 435. From this point it is intended by the contractor to work up the mountain to the Loop at Station 410 with the shovel.

Some team work, using slips and fresnoes, was done on the flat country from Station 640 to 537.

The rock work between Stations 379 and 390 was done by the use of air driven jackhammers and "mucking" the rock out by hand. It was at these stations that the rock, in being blasted and going over the side of the mountain, did considerable damage to the forest growth which, while being much regretted by all concerned, could not be prevented.

C O N C L U S I O N

While the amount of work done in 1925 shows only 5% of the total estimated amount of work completed, the contractors feel that as much or even more was accomplished than was anticipated. With the completion of the Mt. Cannon Section of the highway by the Park Service, the contractor is now enabled to truck supplies and equipment directly from the

railway at Belton to the beginning of his work, and after the season has advanced sufficiently to make the new grade passable, he can truck directly to his headquarters camp. The contractors plan on making the year 1926 the big year of their rough grading and preparations for surfacing and other incidental operations.

Attached are photographs which show the various stages of the work from the preliminary inspection trip to the close of the season.



#P-5 (above) Sta. 383 back showing way rock breaks after shooting. Garden Wall in background and Haystack Butte at right. Route of road passes around to right of latter. Man on left near center line and 17 ft. above grade. October, 1925. 12108.

#P-2 (right) Sta. 381+50 back showing undercut. Center line 2' to 4' right of air line. Grade 10' more or less below. Man at right in background near grade at outer edge of roadway. October 4, 1925. 12106.



EAST SIDE RELOCATION

Due to a desire of the Park Service for a revision in the location of the East Side Project made by F. A. Kittredge in 1924 in the vicinity of Going-to-the-Sun Chalet, engineers were sent out from Portland and Missoula by the Bureau of Public Roads to undertake the relocation.

On August 6th seven men arrived in Belton for this work but, on account of a forest fire then raging in the Park near Belton on which all available men were wanted, it was not until August 12th, that the party finally left there to get established in camp on Baring Creek at Lake St. Mary.

The preliminary line was begun at Station 356 of the Kittredge location, crossed Baring Creek well above the falls, passed over the "Vint" saddle near the Balanced Rock and continued on to join at Station 454+38.6 with the "Hill" location at Sta. 517+27.2. Thence the line followed the "Hill" location to Station 535+56.5, which equals "Hill" Station 607+00, the end of the McGovern Contract on the St. Mary Section. A spur line was also run from Sta. 454+38.6 for 2375 ft. to the proposed terminal grounds near the saddle horse camp north of the main buildings of Sun Camp.

Level and topography notes were taken over the preliminary lines so that a projected location and estimate may be made to cover the route.

The route will result in easy grades and will satisfy the conditions desired by the Park Service, which are, that the road be kept away from the lake and the trail from Sun Camp west.

A total of 3.83 miles of preliminary line, levels and topography was run with an engineering cost of \$2126.65, or about \$555.00 per mile. This is a rather high cost, but transportation, camp installation and maintenance for a short piece of work necessarily increases the unit cost. Much time was lost in organizing the party which was small and several of the men had little previous experience in the kind of work to be done. As a general thing the weather was unfavorable for field work, rain first hindering the work and later snow did likewise.

When it was learned from the Park Service that there would be no construction work on the East Side Project in 1926, instructions were given to transfer the survey party to the West Side. This was done on September 21st, when the remaining members of the party were moved to Jones' Flat near Logan Pass to work on the West Side Project.



#P-9 (above) Sta. 45+00
back. View shows slide of
ice and snow from cliffs
above which made survey work
hazardous. High winds,
sleet and snow made surveying
impractical. West Side
Project. October 5, 1925,
near Logan Pass. 12334.

#P-8 (right) Engineering
party coming down from
Logan Pass with instruments
and equipment preparatory
to moving out. Note ice
on cliff in background. Also
on equipment. Note rope for
safety of engineering work
on cliff sections.

October 5, 1925.
12333

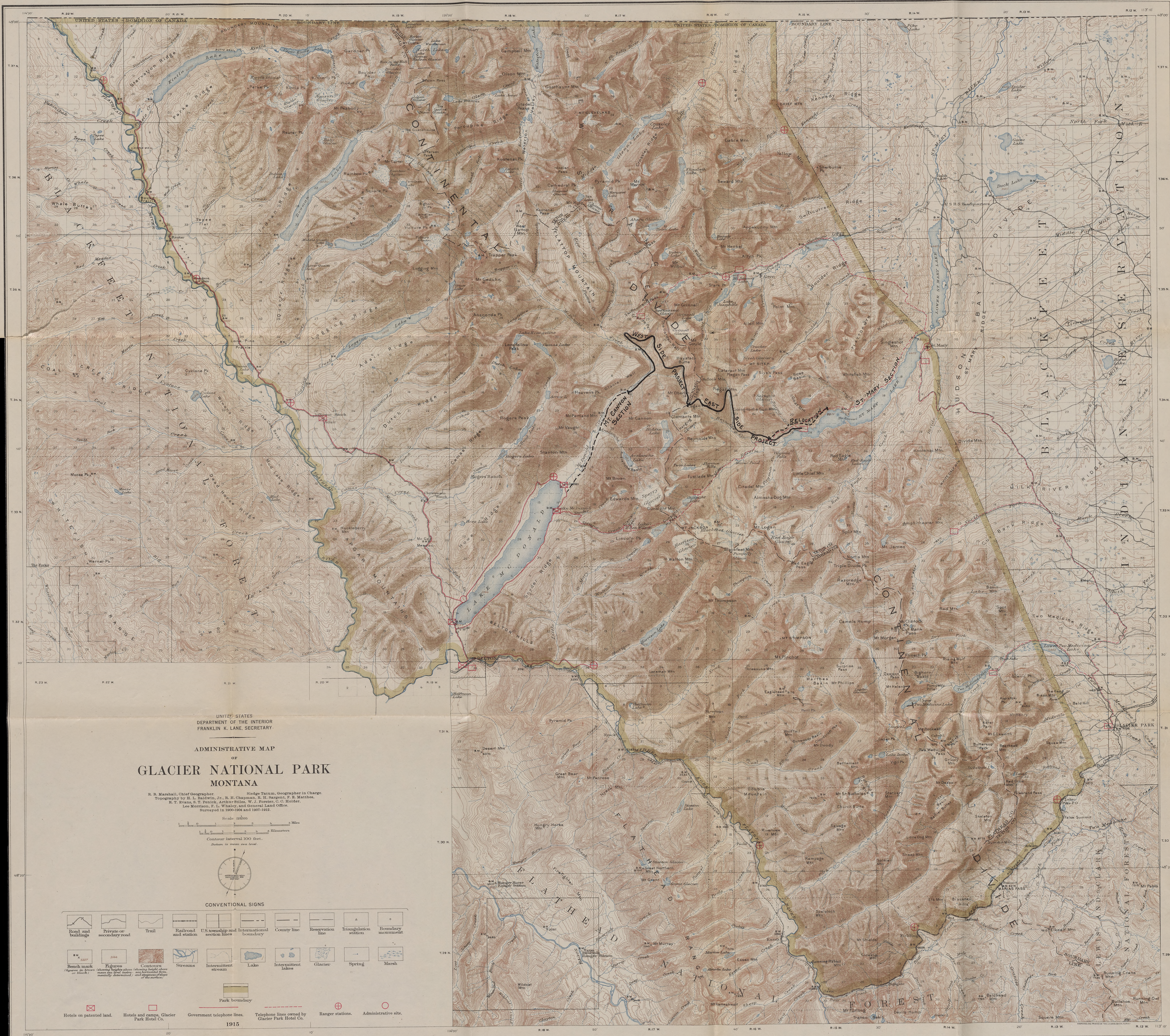




#R-2 - Pack train moving
engineering party from Logan
Pass to Trapper Creek.
October 5, 1925. 12335.



#R-3 - (right) Streams and
falls frozen. Falls at
south Haystack Butte Creek.
Engineers with pack train
moving from Logan Pass to
Trapper Creek. October 5,
1925. 12336.

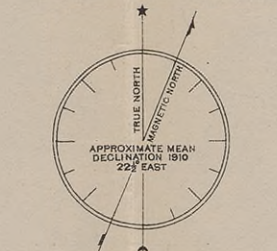


UNITED STATES
DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, SECRETARY.

ADMINISTRATIVE MAP
OF
GLACIER NATIONAL PARK
MONTANA

R. D. Marshall, Chief Geographer.
Sledge Tamm, Geographer in Charge.
Topography by H. L. Baldwin, Jr., R. H. Chapman, R. H. Sargent, F. E. Matthes,
R. T. Evans, R. F. Penick, Architects, W. J. Forney, C. C. Holder,
Lee Morrison, F. L. Whaley, and General Land Office.
Surveyed in 1906-1908 and 1907-1912.

Scale: 1 inch = 1 mile
Contour interval 100 feet.
Datum is mean sea level.



CONVENTIONAL SIGNS

- | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
| | | | | | | | | | |
- Hotels on patented land. Hotels and camps, Glacier Park Hotel Co. Government telephone lines. Telephone lines owned by Glacier Park Hotel Co. Ranger stations. Administrative site.

1915

U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS, DIST. No. 1Transmountain Road
Project: F.A.R. 12
National Forest Road, Project No. 1
Class: National Forest, State, Montana
Length: 12.4 Miles, Width: 16 Ft. Special
Class of Work: Gen'l Construction, Structures,
Rem.
Checked by: W. J. Scottfield
Waddell & SwanOpened at
Portland, Oregon

Sheet 1 of 2 Sheets

TABULATION OF BIDS

Year 1925
Index Number T.M. Road

Item No.	Description	Approx. Quant.	Unit	Williams & Douglas		J. S. Haley		G. F. Atkinson		Grant Smith & Co.		Morrison-Knudsen		Jas. F. Clarkson		H. H. Boomer		Pioneer Constr. Co.		Siems & Carlson		Stevens Bros.	
				Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	Advance Clearing	50	Acre	230.00	11,500.00	275.00	13,750.00	250.00	12,500.00	325.00	16,250.00	300.00	15,000.00	300.00	15,000.00	175.00	8,750.00	600.00	30,000.00	250.00	12,500.00	400.00	20,000.00
2	Grubbing	50	Acre	250.00	12,500.00	300.00	15,000.00	250.00	12,500.00	350.00	17,500.00	350.00	17,500.00	280.00	14,000.00	100.00	5,000.00	400.00	20,000.00	275.00	13,750.00	400.00	20,000.00
3	Excavation (Unclassified) with power shovels	420,000	Cu. Yd.	1.14	478,800.00	1.14	478,800.00	1.20	504,000.00	1.45	609,000.00	1.55	651,000.00	1.50	630,000.00	1.60	672,000.00	1.50	630,000.00	1.70	714,000.00	1.70	714,000.00
4	" " " without power shovels	420,000	"	No Bid		No Bid		1.40	576,000.00	1.45	609,000.00	1.25	525,000.00	1.50	630,000.00	2.50	1,050,000.00	1.50	630,000.00	1.70	714,000.00	1.70	714,000.00
5	" " " (Structures)	1100	"	2.00	2,200.00	1.00	1,100.00	3.00	3,300.00	2.50	2,750.00	2.00	2,200.00	2.50	2,750.00	2.00	2,200.00	2.00	2,200.00	4.00	4,400.00	5.00	5,500.00
6	Completion of Clearing	30	Acre	230.00	6,900.00	225.00	6,750.00	300.00	9,000.00	325.00	9,750.00	250.00	7,500.00	100.00	3,000.00	175.00	5,250.00	500.00	15,000.00	350.00	10,500.00	400.00	12,000.00
7	Overhaul	5000	Sta. Yd.	10	500.00	08	400.00	10	500.00	06	300.00	15	750.00	05	250.00	12	600.00	20	1,000.00	10	500.00	20	1,000.00
8	Subbase	50	Cu. Yd.	2.00	100.00	1.00	50.00	3.50	175.00	3.25	162.50	2.50	125.00	4.00	200.00	2.00	100.00	1.50	75.00	6.00	300.00	5.00	250.00
9	Finishing	12.5	Station	750.00	9,375.00	250.00	3,125.00	700.00	8,750.00	200.00	2,500.00	300.00	3,750.00	250.00	3,125.00	00	00	250.00	3,125.00	500.00	6,250.00	200.00	2,500.00
10	Crushed Rock or Gravel Base	2000	Cu. Yd.	2.35	4,700.00	3.00	6,000.00	4.00	8,000.00	3.25	6,500.00	3.00	6,000.00	3.00	6,000.00	2.50	5,000.00	2.50	5,000.00	1.50	3,750.00	2.50	5,000.00
11	" " " " Top	10000	"	2.50	25,000.00	3.00	30,000.00	4.00	40,000.00	3.25	32,500.00	3.00	30,000.00	1.00	3,000.00	2.75	27,500.00	2.50	25,000.00	3.50	35,000.00	2.50	25,000.00
12	" " " " " "	1000	"	1.00	1,000.00	1.50	1,500.00	2.00	2,000.00	1.00	1,000.00	1.00	1,000.00	1.50	1,500.00	2.00	2,000.00	1.50	1,500.00	1.50	1,500.00	1.00	1,000.00
13	Bladder	All	Lump																				
14	Water Plant	500	M. Gal.	3.00	1,500.00	3.00	1,500.00	7.00	3,500.00	3.50	1,750.00	2.50	1,250.00	4.50	2,250.00	5.00	2,500.00	2.50	1,250.00	2.50	1,250.00	2.00	1,000.00
15	Watering	500	M. Gal.	3.00	1,500.00	3.00	1,500.00	7.00	3,500.00	3.50	1,750.00	2.50	1,250.00	4.50	2,250.00	5.00	2,500.00	2.50	1,250.00	2.50	1,250.00	2.00	1,000.00
16	Crushed Rock or Gravel Maintenance	2500	Cu. Yd.	2.50	6,250.00	3.00	7,500.00	4.00	10,000.00	3.00	7,500.00	2.50	6,250.00	2.75	6,875.00	2.00	5,000.00	2.50	6,250.00	1.50	3,750.00	2.50	6,250.00
17	Cushion Material	7000	"	1.00	7,000.00	1.00	7,000.00	3.00	21,000.00	1.50	10,500.00	1.00	7,000.00	1.50	10,500.00	1.00	7,000.00	2.25	15,750.00	1.00	7,000.00	1.00	7,000.00
18	Tunnel Excavation	6000	"	6.00	36,000.00	16.00	96,000.00	5.00	30,000.00	5.50	33,000.00	5.00	30,000.00	6.00	36,000.00	7.00	42,000.00	6.00	36,000.00	6.00	36,000.00	12.00	72,000.00
19	Half Tunnel Excavation	10000	"	1.50	15,000.00	8.00	80,000.00	3.00	30,000.00	5.00	50,000.00	4.50	45,000.00	2.50	25,000.00	1.00	10,000.00	3.00	30,000.00	3.00	30,000.00	5.00	50,000.00
20	Cem. Rub. Mas. in Abut. & Rails 20' Bridge	80	"	16.00	1,280.00	14.00	1,120.00	20.00	1,600.00	16.50	1,320.00	15.00	1,200.00	20.00	1,600.00	30.00	2,400.00	28.00	2,240.00	25.00	2,000.00	30.00	2,400.00
21	Trcl. Rubble, wing walls & drop inlets	800	"	18.00	14,400.00	16.00	12,800.00	25.00	20,000.00	20.00	16,000.00	18.00	14,400.00	20.00	16,000.00	30.00	2,400.00	28.00	2,240.00	25.00	2,000.00	30.00	2,400.00
22	Cement Rubble Mas. in Culverts	190	"	15.00	2,850.00	10.00	1,900.00	25.00	4,750.00	14.00	2,660.00	14.00	2,660.00	20.00	3,000.00	20.00	3,000.00	20.00	3,000.00	20.00	3,000.00	20.00	3,000.00
23	Cement Rubble Mas. "Small Rubble Culverts"	650	"	20.00	13,000.00	16.00	10,400.00	22.00	14,300.00	18.00	11,700.00	16.00	10,400.00	20.00	13,000.00	20.00	13,000.00	27.00	17,550.00	20.00	13,000.00	25.00	16,250.00
24	Dry Rubble Mas. "Small Rubble Culverts"	530	"	15.00	7,950.00	9.00	4,770.00	10.00	5,300.00	7.00	3,710.00	6.00	3,180.00	10.00	5,300.00	15.00	7,950.00	10.00	5,300.00	12.00	7,560.00	6.00	3,180.00
25	Cement Rub. Mas. Culvert Headwalls	250	"	15.00	3,750.00	14.00	3,500.00	22.00	5,500.00	16.50	4,125.00	14.00	2,100.00	20.00	3,000.00	25.00	3,750.00	20.00	3,000.00	20.00	3,000.00	20.00	3,000.00
26	Class A Concrete in Box Culverts	100	"	40.00	4,000.00	16.00	1,600.00	45.00	4,500.00	50.00	5,000.00	45.00	4,500.00	45.00	4,500.00	45.00	4,500.00	50.00	5,000.00	60.00	6,000.00	50.00	5,000.00
27	Class B Concrete	10	"	39.00	390.00	36.00	360.00	50.00	500.00	50.00	500.00	45.00	450.00	55.00	550.00	45.00	450.00	50.00	500.00	50.00	500.00	50.00	500.00
28	Class C Concrete	10	"	38.00	380.00	36.00	360.00	50.00	500.00	50.00	500.00	45.00	450.00	55.00	550.00	45.00	450.00	50.00	500.00	50.00	500.00	50.00	500.00
29	Class D Concrete	10	"	37.00	370.00	36.00	360.00	50.00	500.00	50.00	500.00	45.00	450.00	55.00	550.00	45.00	450.00	50.00	500.00	50.00	500.00	50.00	500.00
30	Class E Concrete in curbs and gutters	10	"	40.00	400.00	32.00	320.00	50.00	500.00	50.00	500.00	45.00	450.00	55.00	550.00	50.00	500.00	60.00	600.00	50.00	500.00	50.00	500.00
31	Reinforcing Steel in box culverts	10000	Lb.	10	100.00	10	100.00	10	100.00	10	100.00	12	120.00	15	150.00	12	120.00	15	150.00	12	120.00	10	100.00
32	Cement Rubble Masonry in retaining walls	1420	Cu. Yd.	15.00	21,300.00	12.00	17,040.00	25.00	35,500.00	16.50	23,430.00	17.00	24,140.00	20.00	28,400.00	30.00	42,600.00	25.00	37,500.00	16.00	24,480.00	25.00	37,500.00
33	Dry Rubble Masonry in retaining walls	500	"	10.00	5,000.00	6.00	3,000.00	10.00	5,000.00	7.00	3,500.00	6.00	3,000.00	10.00	5,000.00	15.00	7,500.00	10.00	5,000.00	12.00	6,000.00	6.00	3,000.00
34	18" Reinforced Concrete pipe in place	4000	Lin. Ft.	6.00	24,000.00	4.50	18,000.00	6.00	24,000.00	6.00	24,000.00	6.00	24,000.00	4.00	16,000.00	7.95	31,800.00	8.00	32,000.00	10.00	40,000.00	4.00	16,000.00
35	24" Reinforced Concrete pipe in place	950	"	8.00	7,600.00	6.50	6,175.00	10.00	9,500.00	8.40	7,980.00	10.00	9,500.00	6.00	5,700.00	10.20	9,690.00	10.00	9,500.00	15.00	14,250.00	5.00	4,750.00
36	30" Reinforced Concrete pipe in place	400	"	12.00	4,800.00	8.00	3,200.00	14.00	5,600.00	11.50	4,600.00	12.00	4,800.00	8.00	3,200.00	13.40	5,360.00	18.00	7,200.00	20.00	8,000.00	7.00	2,800.00

Continued on Sheet 2

Totals

Totals

Recommended for Award:

On Basis of:

TABULATION

A. Guthrie & Co.		Hanser Constr. Co.		Engineer's Estimate	
Portland, Ore.		Portland, Ore.		Portland, Ore.	
Cert. Ch. \$21,000.		Cash, Ch. \$75,000.		Deposit	
Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
300.00	18,000.00	250.00	15,000.00	225.00	13,500.00
250.00	15,000.00	150.00	9,000.00	215.00	12,900.00
1.90	912,000.00	No Bid		1.25	600,000.00
1.90	912,000.00	2.00	960,000.00	1.35	648,000.00
3.50	3,500.00	3.00	3,300.00	3.00	3,300.00
325.00	9,750.00	200.00	6,000.00	300.00	9,000.00
08	400.00	05	250.00	06	300.00
4.50	225.00	3.00	150.00	3.00	150.00
600.00	7,500.00	200.00	2,500.00	300.00	3,750.00
3.75	37,500.00	3.50	35,000.00	3.35	33,500.00
3.75	37,500.00	3.50	35,000.00	3.35	33,500.00
4.50	4,500.00	2.50	2,500.00	3.00	3,000.00
Lump	1,000.00	Lump	500.00	Lump	300.00
4.50	2,250.00	6.00	3,600.00	3.00	1,800.00
3.75	37,500.00	3.00	7,500.00	3.25	32,500.00
4.50	31,500.00	2.25	1,575.00	3.00	21,000.00
7.50	4,500.00	6.00	3,600.00	8.00	4,800.00
4.00	40,000.00	3.50	35,000.00	3.00	30,000.00
35.00	2,800.00	25.00	2,000.00	20.00	1,600.00
32.00	25,600.00	24.00	19,200.00	22.00	17,600.00
22.00	4,180.00	24.00	4,560.00	19.00	2,850.00
22.00	18,200.00	24.00	15,600.00	19.00	9,750.00
12.00	7,560.00	12.50	7,875.00	7.00	4,410.00
28.00	7,000.00	24.00	6,000.00	18.00	4,500.00
58.00	5,500.00	50.00	5,000.00	39.00	3,900.00
50.00	500.00	47.00	470.00	40.00	400.00
50.00	500.00	45.00	450.00	40.00	400.00
58.00	580.00	52.00	520.00	40.00	400.00
58.00	1,740.00	40.00	1,200.00	40.00	1,200.00
14.00	1,400.00	15.00	1,500.00	10.00	1,000.00
25.00	35,500.00	24.00	34,080.00	16.00	22,720.00
10.00	5,000.00	12.50	6,250.00	8.00	4,000.00
2.00	320,000.00	No Bid		4.75	19,000.00
11.40	10,850.00	No Bid		5.00	5,700.00
14.40	57,600.00	No Bid		8.00	3,200.00

ITEM No.	CONSTRUCTION ITEM	WORK DONE		Per Cent Completed	COSTS					QUANTITIES		TOTAL UNIT COST TO DATE	TOTAL PROBABLE		
		Station to Station			Labor	M. & S.	Total this Period	Previous Report	Total Cost to Date Labor + M. & S.	Unit Cost to Date Labor + M. & S.	Since Last Report		Total to Date	Quantity	Amount
1	Advance Clearing	379	657	38	-1238.63	-1238.63	4925.	3694.17	100.70	2.18	22.811	176.77	60.	10,606.80	
2	Grubbing	379	657	26	-482.91	-482.91	3411.	1325.09	262.05	0.258	12.604	288.25	60.	17,295.00	
3	Exc. Channels with Power shovel	379	657	5.7	5219.43	5219.44	10430.	13372.	32802.89	0.87	11794.	27279.5	0.96	48000.00	
6	Exc. Structures	509	653	6	13.90	13.90	52.	63.90	1.00	13.5	66.	1.10	1100.	1,210.00	
7	Concl. Clearing											2.09	30.	6,270.00	
8	Overhaul	599	585	14	57.44	57.44		57.44	0.08	718.	718.	0.09	5000.	490.00	
9	Sub-base											1.82	50.	91.00	
10	Finishing											682.	12.5	8,525.00	
12	Crushed Rock or Gravel Base											2.14	2000.	4,280.00	
13	Crushed Rock or Gravel Top											2.55	10000.	25,500.00	
14	Binder											0.91	1000.	910.00	
15	Water Plant											455.411	1 amp	455.00	
16	Watering											2.73	600.	1,638.00	
19	Crushed Rock or Gravel Maintenance											2.55	2500.	6,375.00	
21	Cushion Material											0.91	7000.	6,370.00	
22	Tunnel Excavation											9.45	6000.	52,700.00	
23	Half Tunnel Exc.	381	382	24	600.	590.	1150.	1351.	2501.	1.04	1951.	2397.	1.15	10000.	11,500.00
29	Con. Sub. Iha. Abut. & Rail 20' Bridge											14.55	80.	1,164.00	

4	Proratable Factor this Report:	7	LIABILITIES AND EXPENDITURES TO DATE	8	TOTAL PROBABLE LIABILITIES
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[illegible]

Total Cost to Date (Labor + M. & S.)		Construction
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[illegible]

	Survey and Plans		Survey and Plans	
--	------------------	--	------------------	--

[illegible]

Agreement Amount		Agreement Amount	
------------------	--	------------------	--

Days Allowed	Days Consumed	Apparent Balance	Balance or Deficit

PROGRESS CHART OF

192

WORK DONE DURING MONTH OF

- 192

(Re

PRE

(Red) AND PREVIOUSLY (Black)

Kind of Work

[illegible]

Stations or Miles.

COMPARISON OF WORK COMPLETED AND COST

(10)

[illegible]

* Net increase or decrease.

Lumped Items:

11

FUNDS AVAILABLE

ALLOTMENTS

[illegible]

REMARKS:

12

TOTAL COST TO DATE

Construction	\$44,721.46
Construction Engineering	10,086.51
Survey and Plans†	1,125.59
Other Liabilities	2,000.34
U.S.N.P.S. Charges	
Total Liabilities	\$58,933.90
Agreement Amount	
Apparent Balance or Deficit	

† If included in same allotment.

PROGRESS CHART OF DEC., 192

WORK DONE DURING MONTH OF DEC., 192 (Red) AND PREVIOUSLY (Black)

Kind of Work

Stations or Miles.

COMPARISON OF WORK COMPLETED AND COST

Construction Items	21	22	23	29	30	31	35	36	37	38	39	40	41	42	TOTAL
Quantities of work completed to date			2397.												
Unit price (bld)	1.00	6.00	1.50	16.	18.	15.	15.	40.	39.	38.	37.	40.	0.10	15.	
Cost to date			3595.50												
Total probable cost	7000.	36000.	15000.	1280.	14400.	2850.	3750.	4000.	390.	380.	370.	1200.	1000.	21300.	
Engineer's estimated cost	7000.	36000.	15000.	1280.	14400.	2850.	3750.	4000.	390.	380.	370.	1200.	1000.	21300.	
Probable increase															
Probable decrease															
Total probable quantities	7000.	6000.	10000.	80.	800.	190.	250.	100.	10.	10.	10.	30.	10000.	1420.	
Engineer's estimated quantities	7000.	6000.	10000.	80.	800.	190.	250.	100.	10.	10.	10.	30.	10000.	1420.	
Difference, + increase - decrease *															
Per cent complete			24.												

* Net increase or decrease.

Lumped Items:

11

FUNDS AVAILABLE

ALLOTMENTS

Date	Federal	Local	Total

REMARKS:

12

TOTAL COST TO DATE

Construction

Construction Engineering

Survey and Plans †

Other Liabilities

Total Liabilities

Agreement Amount

Apparent Balance or Deficit

† If included in same allotment.

PROGRESS CHART OF DEC., 192

WORK DONE DURING MONTH OF DEC., 192 (Red) AND PREVIOUSLY (Black)

Kind of Work

Stations or Miles.

COMPARISON OF WORK COMPLETED AND COST

~~Construction Items~~

Quantities of work completed to date

Unit price ~~XXXXXX~~ bid

Cost to date

Total probable cost.

Engineer's estimated cost

Probable increase ...**Probable decrease**—

Total probable quantities.

Engineer's estimated quantities

Difference, + increase — decrease *

Per cent complete.

* Net increase or decrease.

Lumped Items:

(11)

FUNDS AVAILABLE

ALLOTMENTS

Date _____

Federal

Local

Total

(12)

TOTAL COST TO DATE

Construction

Construction Engineering

Survey and Plans †.

Other Liabilities

Total Liabilities

Agreement Amount

Apparent Balance or Deficit.

REMARKS:

† If included in same allotment.

