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STATE OF OREGON

REPORT

STATE HIGHWAY COMMISSION

1919-1920

ERRATA SHEET

Page 6—Federal Funds for Post Roads. Third line in fourth paragraph should read $20,000,000.00 for the year ending June 30, 1920.

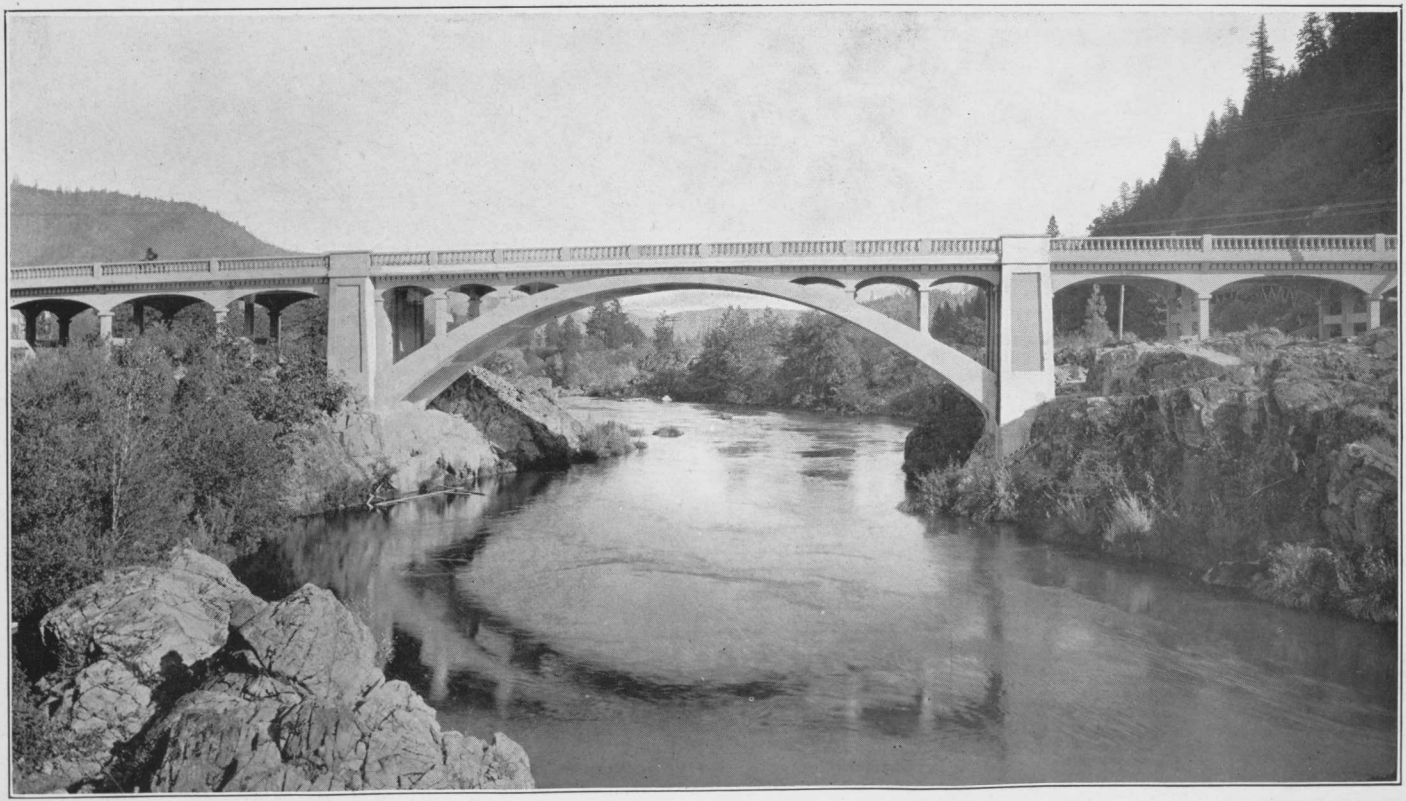
Page 7—Federal Funds Apportioned for Co-operative Work. Second total given as $638,870.00 should read $638,970.00.

Page 11—Financial Statement—Receipts. Sale of bonds, 1919, given as $6,737,509.16 should read $6,373,509.16.

Page 11—Financial Statement—Expenditures. State construction given as $12,556,209.98 should read $12,516,209.98.

Page 25—Proposals Received and Awards. Last line should read Nov. 6, 1920—(No contract number)—Salem Bridge—Salem-Dallas, etc. Seventh line from bottom should read Nov. 6, 1920.

Page 134—Table S—Coast Highway. Skipanon-Seaside Section given as Concrete Pavement should read Bituminous Pavement.



MAIN ARCH SPAN OF ROGUE RIVER BRIDGE IN JACKSON COUNTY. ON THE PACIFIC HIGHWAY BETWEEN GRANTS PASS AND MEDFORD. BUILT IN 1919.

Fourth Biennial Report

of the

Oregon State Highway Commission

Covering the Period December 1st, 1918

to November 30th, 1920

OREGON STATE HIGHWAY COMMISSION

R. A. Booth, Chairman

Ed E. Kiddle, Commissioner; J. B. Yeon, Commissioner.

S. Benson, Resigned

W. L. Thompson, Resigned

J. N. Burgess, Deceased

Herbert Nunn, State Highway Engineer

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(Arranged by Counties in Alphabetical Order)

LETTER OF TRANSMITTAL

Salem, Oregon, December 1, 1920.

HONORABLE BEN W. OLCOTT,
Governor of the State of Oregon.

Dear Sir:

In compliance with Section 5, Article II, Chapter 237, Laws of 1917, we have the honor to submit herewith the report of the State Highway Commission for the period December 1, 1918 to November 30, 1920.

The Commission desires at this time to express its appreciation of the courtesies and assistance rendered to it by you and other State officers and also to acknowledge the co-operation received from the various County officials in the work of the past two years.

Respectfully submitted,

OREGON STATE HIGHWAY COMMISSION,

R. A. Booth, Chairman
Ed E. Kiddle, Commissioner
J. B. Yeon, Commissioner

Attest:
Roy A. Klein, Secretary

Fourth Biennial Report

of the

State Highway Commission

of the

State of Oregon

1919-1920

The work of the present biennium was begun under good auspices. The continuation of the improvement of the State highway system, interrupted by the war, was made possible by the return of the service men, the release of men from the war industries, the availability of equipment, the removal of embargoes on roadbuilding materials, a more adequate supply of railroad cars and the removal of financial restrictions relating to the sale of bonds. There was also noted, with the increased use of automobiles and trucks, an unmistakable demand from the people of the State for improved roads and a demand for them immediately, in spite of the increased cost of road construction.

The 1919 legislature provided the means by generously voting a $10,000,000.00 bond issue and the 1920 special session made a further authorization of bonds to meet Federal Aid. Also at this session there was voted a second block of $10,000,000.00 bonds. This latter issue was dependent upon a measure proposed on the ballot increasing the constitutional debt limit for highway purposes from 2 to 4 per cent, which was carried by a very large majority at the May, 1920 election.

At the May, 1919 election, a constitutional amendment giving the Counties authority to bond themselves to a six per cent limitation for road building purposes was voted, which was taken advantage of by several of the counties. Since 1913, thirty-three counties have bonded themselves for road building to a total debt of $17,599.704.00. The work of several of the counties has been retarded by a recent Supreme Court decision affecting the bonds of six of these Counties,* but it is hoped that remedial legislation will be passed at the next session of the Legislature. The county co-operation secured by means of these County bond issues for grading and the construction of bridges on the State highway system has been an important factor in the work of the biennium. In many instances also the counties have used their tax funds for this purpose to supplement their bond issues.

* Later, the Supreme Court granted a re-hearing, and, on December 12, 1920, rendered a decision which validated these County bonds.

The personnel of the Commission continued unchanged from the previous biennium, with S. Benson, Chairman, W. L. Thompson and R. A. Booth, Commissioners, until October, 1919, when Mr. Thompson resigned on account of change of residence and Mr. J. N. Burgess of Pendleton was appointed to succeed him. Mr. Burgess served but one month, when he was removed from the service of the State by the hand of an assassin. Mr. Ed E. Kiddle of Island City then succeeded to the appointment. On the conclusion of Mr. Benson's three year term, during which he served as chairman, he was reappointed in April, 1920 and served until the date of his resignation. Mr. J. B. Yeon of Portland was appointed in November, 1920, as his successor. Herbert Nunn has served as State Highway Engineer during the biennium and Roy A. Klein as Secretary and Assistant Highway Engineer.

The Commission has held thirty-nine meetings, occupying sixty-three days, for the transaction of its business during the two-year period, as well as devoting a considerable amount of time to the study of local conditions and the necessary inspection.

The Commission early determined upon a comprehensive program looking toward the completion of the main trunk highways as well as providing for the improvement of the State highway system in every County in the State. The greater number of the contracts were let in the spring and early summer of 1919 before the increased prices which afterward became effective were reflected in the bids, and it is thought that a material saving to the State has resulted from this policy. The Commission has consistently encouraged local bidders by dividing the work into small units, thus enabling them to compete with larger construction companies, which has resulted in securing close competition. All projects have been extensively advertised with the result that a large number of bids have been secured on most of the projects. In the event that an insufficient number of proposals were received or when the bid prices seemed to be excessive the projects were readvertised, which generally resulted in reduced bids.

A policy of making partial payments on materials delivered, such as culvert pipe, asphalt, cement, rock, gravel, sand, steel, lumber, etc., has resulted, no doubt, in lower bids, and has encouraged shipping materials in the winter season when railroad cars are more plentiful thus insuring earlier completion. Each year the Commission has purchased large quantities of asphalt and cement which have been furnished to the contractors, thus securing the advantage of large purchases on markets which later advanced.

During the biennium, the Commission has expended, exclusive of market roads, the sum of $19,980,410.61, of which State funds amount to $17,819,790.00, County co-operation $839,741.68, and Federal Aid funds for Post Roads $1,320,878.93. The work accomplished totals 347.2 miles of paving, 369.4 miles of crushed rock or gravel macadam, 761.4 miles of grading. In addition, there are a large number of contracts awarded in 1920 which will carry over into the construction season of 1921. In addition to these expenditures, the Government has expended on the forest roads a total of $1,568,241.67, which cost has been divided to the State $802,108.97, to the Counties $102,271.45, and to the Government

$656,708.64, with 134 miles of standard graded roadbed including 57.6 miles of graveled roadbed completed or under construction.

In addition to the above, some counties have graded or improved sections of the State highway system with their own forces or by contract which they have handled direct and of which this Department does not have a complete record of expenditures.

The total mileage of pavement laid and under contract may be divided into 58.5 miles of concrete, 24.1 miles of non-patented bituminous pavement, 336.75 miles of bitulithic. The bitulithic or Warren patents expired on May 5, 1920 and up to that date 1,221,702.7 square yards had been laid or 38.65 per cent of the total of bitulithic pavement under contract during the biennium. No royalty has been paid on this pavement by the Department.

Standard bituminous construction consists of gravel or crushed rock macadam subbase, 3-inch bituminous base, and 2-inch bitulithic wearing surface. Standard concrete construction is from six to seven inches thick, the thickness depending upon the traffic to be carried and the character of the subgrade. Steel reinforcing is used where foundation conditions are unstable. The standard pavement section is 16 feet wide with extra width on curves and superelevation. Two foot shoulders of crushed rock or gravel have been constructed on all pavements.

It is necessary that all new grades be allowed to settle and be open for travel for at least a year and preferably longer before paving to secure the best results, which will explain why some gaps in the main highways have been left unpaved.

Macadam has, in general, been built 16 feet wide, though in some instances where lighter traffic is expected 14-, 12- and 8-feet widths have been used. The standard width of graded roadbed in average work has been 24 feet, including ditches, and this has been widened to 30 feet in open country where a grader section can be used, and narrowed to 16 feet, including ditches, in the sparsely settled districts and lesser traveled roads where a greater mileage with the funds available was advisable, leaving the widening to a future date when traffic demands.

The bridges which have been built are substantial structures of pleasing design. Concrete, steel and timber structures have been constructed as seemed best adapted to the location. All bridges on the main highways have been designed for 20-ton truck loading. A total expenditure of $1,311,300 has been made for bridges. The total number of bridges of 18-foot span or over, completed or under contract, is 162 and the total estimated cost is $2,047,460.00. The largest bridge under construction is the Young's Bay Bridge near Astoria, which is a double leaf trunnion bascule structure, the estimated cost of which is $348,500.00. Plans have been prepared for an arch bridge across the Willamette River at Oregon City, but arrangements for financing this project have not yet been completed.

The Commission has received from the Government, from surplus war material allotted to the States for road building purposes, 304 trucks, some of which were new, 33 passenger automobiles, 41 tractors, one asphalt paving plant, donkey engines, concrete mixers, clam shell buckets, one road roller, pumps, wagons, truck and tractor parts, barbed wire, steel fence posts, corrugated metal and other kinds of miscellaneous

equipment, having an approximate value of $1,400,000.00. Also there has been received 765,000 pounds of the high explosive TNT and 50,000 pounds of black powder, which has been used in construction work. The net cost has been the freight and handling charges. This equipment, in addition to being used on State force work has been rented to contractors and to the Counties. Also a portion in excess of the immediate needs of the Commission has been leased to the counties at such a rate as to cover the freight and handling charges.

For the purpose of providing storage sheds and repair shops for this equipment as well as other equipment, a tract of land owned by the State, having railroad sidetrack facilities, was secured just outside of the city limits of Salem opposite the State Penitentiary, and four buildings and three sheds have been constructed. The shops are well equipped to take care of repairs and maintenance of all equipment.

The legal work of the Commission has made it necessary to have constant legal assistance and Mr. J. M. Devers was appointed by the Attorney General to handle the work of the department, with the title of Assistant Attorney General. There has been a vast amount of legal work in connection with negotiations with the railroad companies in the matter of encroachments on their rights-of-way and particularly on the Columbia River Highway, hearings before the Public Service Commission on matters of grade crossing elimination and determination of proportionate costs, rights of way condemnation, securing of gravel pits, examination of contracts, etc., and litigation instituted by various parties seeking to embarrass and hinder the work of the Commission.

The citizens of Riddle attempted to enjoin the construction of the Riddle Cutoff between Canyonville and Myrtle Creek, which shortened the Pacific Highway 3 miles. To determine the rights of the Commission, it was necessary to take this case to the Supreme Court, whose decision held that the Commission had the right to make such local changes in the location of the State highways as appeared desirable and to the best interests of the state.

The Circuit Court of Multnomah County dismissed an injunction sought by the citizens of Dallas and Independence to enjoin the contractors from continuing work on the West Side Highway between Amity and Monmouth, Judge McCourt basing his opinion on the fact that in the discretion of the Commission the route being improved furnished the best route and was also in harmony with the standards adopted by the State Highway Commission for a system of State highways and was further based on the fact that an agreement had been effected between the people of Polk County and the Highway Commission relative to the location of the highway throughout Polk County, which agreement the Court said should be lived up to in view of all the attending circumstances.

The Circuit Court of Wasco County dismissed an injunction sought by private interests to prevent the Commission from constructing a connecting road to permit the early use of a new bridge across the Deschutes River. The plaintiff in that case contended that the connecting road was simply a local road and therefore the Commission had no authority to establish or improve it as a State highway, claiming that the Commission could only improve roads which would be more in the nature of State highways. The Court in dismissing the injunction suit, held that under

the authority and decision in the Riddle case the Commission had ample authority to establish the road regardless of its length, if in the judgment of the Commission it contributed to the State highway system.

There being doubt as to whether Chapter 175, Laws of 1917, (first co-operative State bonding act) authorized the sale of bonds in excess of the amount of funds made available by the Federal Government for Federal Aid at the time that act was passed, in order to settle that question, a suit was instituted in the Supreme Court. While the suit was pending and before being disposed of by the Supreme Court, the Legislature met in special session and enacted Chapter 31 of the Laws of 1920 (second co-operative bond act,) by which act the Board of Control was authorized to issue bonds in any amount to meet Federal Aid. When the Supreme Court decided the case, it held that in effect no further bonds could be sold under the first act but that all funds needed to meet Federal Aid should now be sold under this latter act.

The elimination of grade crossings on State highways has received serious consideration in the plans of the Commission. No new highways have been located involving grade crossings on main line railroad systems, and frequent changes have been made whereby two crossings have been eliminated by building a new section on one side; or, in some instances, the crossing is avoided by entirely new location, as in the case of the Pacific Highway between Dillard and Myrtle Creek where seven crossings are eliminated by building on the opposite side of the river. Nine overhead structures eliminating dangerous railroad crossings have been constructed during the biennium.

The unfavorable construction conditions prevailing throughout the biennium, the shortage of labor, lack of railroad cars, shortage of road-building materials, inability to secure prompt delivery of equipment has resulted in a general slowing up of construction progress so that nearly all contracts have overrun their time limits and resulted in the majority of instances in carrying the work into the second construction season. In view of these non-precentable conditions, it has been necessary to allow consistent extensions of time for completion, which has increased the engineering and supervisory expense to a considerable extent.

Despite the labor and material conditions of the period, it has been necessary in only two instances for the Commission to take over the work and finish with its own forces at the expense of the surety. One was the paving contract between Marshfield and Coquille, and the other the grading contract between Remote and Camas Valley on the Roseburg-Coos Bay Highway. These jobs are now being handled by a representative of the department using the contractor's equipment, and expenditures in connection with the work are charged against the contract price.

The total of all construction work done direct with State forces, excluding the two projects mentioned above, totaled in cost $447,850.18 or about 2½ per cent of the total cost of all work done. This work has consisted of grading, macadamizing and bridges, some of which were carried over from the 1918 season. All of these jobs were first advertised and the bids considered unsatisfactory.

The need for a standard, uniform and comprehensive system of road signs was early seen, and a beginning has been made in the marking and signing of the State highways. Where the highway has been finally

located and built, permanent metal signs have been erected, and on others temporary wooden signs have been placed. A numerical system has been found best adapted to the needs of the State and frequent markers bearing the highway number have been placed to guide the traveler, as well as distance and direction signs. Danger and caution signs will be placed where needed.

The year 1920 is the first year in which the market road appropriation has been available. The total State appropriation has been $990,435.46 which has been matched by an equal amount by the Counties. All of the Counties have accepted the provisions of the act and the Commission has made the apportionment and disbursement as provided by law. In some instances surveys have been made and construction supervision has been rendered by the Department but the majority of the engineering work has been done by engineess in the direct employ of the Counties under the general supervision of the State Highway Engineer.

The first Federal Aid Act was passed by Congress in July, 1916, and provided that the United States should aid the states in the construction of rural post roads.

There was appropriated $5,000,000.00 for the fiscal year ending June 30, 1917, $10,000,000.00 for the year ending June 30, 1918, $15,000,000.00 for the year ending June 30, 1919, $20,000.00 for the year ending June 30, 1920, $25,000,000.00 for the year ending June 30, 1921, for the purpose of carrying out the provisions of the act; also $1,000,000.00 for the year ending June 30, 1917 and the same amount for each fiscal year thereafter up to and including June 30, 1926, for the improvement of roads within or partly within the national forests.

Congress further, by subsequent legislation in February of 1919, made available the sum of $50,000,000.00 for the fiscal year ending June 30, 1919, $75,000,000.00 for the year ending June 30, 1920 and $75,000,000.00 for the year ending June 30, 1921 for post roads and also the sum of $3,000,000.00 per year for the fiscal years ending June 30, 1919, 1920 and 1921 for forest roads, making a grand total appropriation of $294,000,000.00 for Federal Aid.

It is a condition of the funds appropriated for post roads, that the State appropriate an equal amount and that if any State fails to participate in the benefits of the act, its share is divided among the other states. Thus far, no State has failed to take advantage of the Federal Act. A further important provision is that the States must agree to maintain such roads after construction. The amount allotted to any one State is determined in the following manner: one-third in the ratio which the area of the State bears to the total area of all the States, one-third in the ratio which the population of each State bears to the population of all the States, one-third in the ratio which the mileage of rural delivery routes and star routes in each state bears to the total mileage of the rural delivery routes and star routes in all the States.

Of the forest funds allotted, the amount of co-operation required from the local authorities is subject to the rules and regulations promulgated by the Secretary of Agriculture, but in this State, it has been generally on a 50 per cent or better co-operation on the part of the State and Counties. The first post road act provided that Federal Aid could not be extended in excess of $10,000 per mile, exclusive of bridges, but later

legislation raised the Federal limit to $20,000 per mile exclusive of bridges, also the first act limited Federal Aid to roads having actual carriage of the mails. This was later broadened to include roads of which the major portion can be used for the transportation of the mails or forms a connecting link not to exceed 10 miles in length between roads now used or hereafter to be used for the transportation of the mails.

Oregon early announced its acceptance of the act and made provision by adequate legislation to match federal funds made available, but due to the time necessary to formulate a working plan and the interruption caused by the war, actual participation in the benefits did not begin until the early part of 1919. The administration, engineering and award of contracts for post roads is in the hands of the State Highway Commission. Federal funds become available as reimbursement after expenditure in the first instance by the State. All projects are subject to the approval by the Bureau of Public Roads of plans and specifications. The administration, engineering and contracts for forest roads are handled by the Bureau of Public Roads acting for the Forest Service and payments are made by the local authorities to the Government on receipt of approved vouchers.

Unless Congress passes further legislation, Federal Aid will cease with the present fiscal year, but it is expected that an additional appropriation will be made at the coming session as Federal Aid has been successful to a marked degree throughout the whole country.

The following tables show the status of Federal Aid in this State:

FEDERAL FUNDS APPORTIONED FOR CO-OPERATIVE WORK

Periods During Which Funds are Available Act of July 11, 1916—	For Post Roads.	For Forest Roads.	Totals.
July 1, 1916, to June 30, 1921	$1,181,416.50	$ 638,970.00	$1,820,386.50
July 1, 1921, to June 30, 1926	.....	638,970.00	638.870.00
Amendment February 28, 1919—			
February 28, 1919, to June 30, 1921	3,150,761.77	596,681.00	3,747,442.77
Total Federal Funds Available	$4,332,178.27	$1,874,621.00	$6,206,799.27

POST AND FOREST PROJECTS UNDER CONTRACT

	Total Estimated Cost.	CO-OPERATION State.	County.	Government.
Post Road work under contract	$8,739,404.24	$3,758,875.85	$1,002,958.92	$3,977,569.47
Forest Road work under agreement	3,004,526.08	1,455,685.63	214,073.72	1,334,766.73
Total Funds Obligated	$11,743,930.32	$5,214,561.48	$1,217,032.64	$5,312,336.20

FEDERAL FUNDS UNMATCHED

	Post Roads.	Forest Roads.	Total.
Federal Funds available	$4,332,178.27	$1,874,621.00	$6,206,799.27
Federal Funds matched	3,977.569.47	1,334,766.73	5,312,336.20
Total Unmatched	$ 354,608.80	$ 539,854.27	$ 894,463.07

The Legislature of 1919 provided a revolving fund of $30,000.00 to meet payroll and emergency claims, which has been a great help in carrying on the work of the Commission. However, with the expansion of the work, a larger fund is needed to avoid frequent overdrafts at the bank. There has been handled through this fund during the biennial period approximately $1,900,000.00. An audit of the State Highway fund and also the State Highway Engineers payroll account has been ordered but is not complete at this date.

Advances to the Counties have been made in a number of instances in order to expedite grading and the construction of bridges and other obligations imposed on the Counties. In frequent instances, advances were made anticipating tax returns in order to start the work earlier, thus insuring completion of entire sections of the highway, units of which might otherwise have been delayed. The recent Supreme Court decision, affecting the validity of the bonds of six Counties, has made it necessary for the State to carry the obligations of these Counties in work which is being done in co-operation with the State until remedial legislation has been enacted. The co-operation received from the Counties in construction has taken various forms. In frequent instances the Counties have prepared the subgrade with their own forces under the supervision of the State Highway Department. In others, the Counties have done this by contract direct and in others the contract for grading has been awarded along with the paving by the State, the County agreeing to meet the estimates due the contractor on the grading portion.

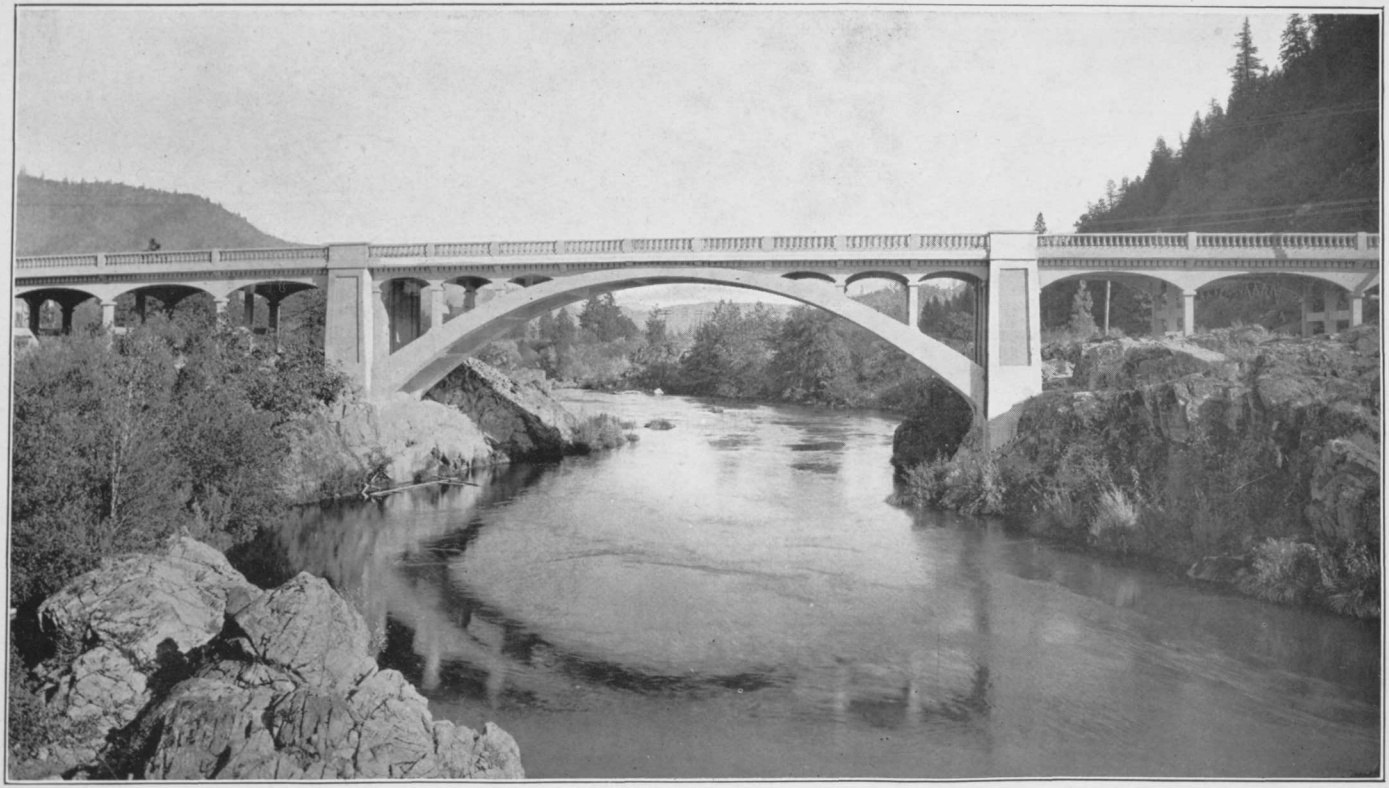
The matter of beautifying the highways has had consideration from the Commission and it is thought that this feature should be given more attention in the future. The proposal to plant trees along the highways as well as the plan to secure a belt of standing timber on each side of the roadway through the forests and thus preserve the natural beauties for later generations is heartily supported by the Commission. Also alongside of the highways are many ideal camping places. It is thought that some means should be taken to secure a reasonable number of these choice spots for camp sites which need not be large but sufficient in size to accommodate several camping parties.

The Commission has instructed its engineers to remove all advertising signs within the highway limits as provided by the law so that the highways themselves are free from advertising except of course those signs which are on private property.

The fact that the State of Oregon is exempt from payment of war tax on freight shipments has been taken advantage of in shipments on road-building materials which has effected a material saving. The State has enjoyed also a reduced rate of 10 cents per ton on sand, gravel and crushed rock under the commercial rate. The recent 25 per cent increase in freight rates as applying to road building materials in intra-state shipments has been protested by the Commission and a hearing has been held before the Public Service Commission but a decision has not yet been rendered.

Maintenance of our highways after they are built is a matter which requires unceasing vigilance. In no other work is the old adage more true, "A stitch in time saves nine." Maintenance begins as soon as the job is completed, keeping the ditches and culverts open for proper drainage, removing small slides which are inevitable, reshaping shoulders to pavement, patches in bituminous pavements, filling cracks in concrete pavements, dragging gravel or earth roads, repairing broken guard rails, tightening bolts and truss rods on bridges, etc., etc.

Most of the Counties have entered into maintenance agreements with the Commission to divide the maintenance costs on improved sections of the State highways. However, it is to be regretted that some Counties which have benefitted most by State highway construction have refused



MAIN ARCH SPAN OF ROGUE RIVER BRIDGE IN JACKSON COUNTY, ON THE PACIFIC HIGHWAY BETWEEN GRANTS PASS AND MEDFORD. BUILT IN 1919.

to co-operate, and the State to preserve its investment has been forced to absorb all maintenance costs in these few counties.

An interesting feature of the work along the Columbia River between The Dalles and Pendleton treated as a maintenance feature has been spraying of crude oil on the slopes of embankments and excavation as well as alongside the highway to keep down drifting blow sand. This work in connection with similar work by the railroad has been very successful.

The Commission in 1919 paved or otherwise improved the route of the highway through cities of less than 2500 inhabitants since in most cases cities of this class were without the means of raising funds for such improvement. During the present year, however, an opinion has been received from the Attorney General advising that the State highway system does not include city streets and consequently cannot be improved with State funds unless it can be shown that these streets within the city limits are County roads and that they have been maintained at the expense of the County. Consequently construction work in the cities affected has been stopped. Several of the larger cities have paved and improved their city streets connecting with the State highways, thus making attractive entrances into their cities, which is commendable. In others, much remains to be done.

The Legislature of 1919 authorized, empowered and directed the Commission to construct within two years approximately 15 miles of hard surface pavement in one continuous strip, of which one-third was to be of bituminous material, one-third of concrete and one-third wood block, provided that the lumbermen and other local interests pay the difference in cost of the wood block pavement over and above the cost of the concrete payment. These varied types of pavement have not been laid due to the fact that the lumber interests have not appropriated the necessary funds.

The sale of bonds has continued throughout the period in a rapidly changing market as funds were needed. An average of five bids has been received for each block of bonds sold. The best sale was made at 99.15 per cent of par, which equals a net interest rate of 4.58 per cent, and the lowest sale was 87.62 per cent of par, which equals a net interest rate of 5.80 per cent. The prices bid compare favorably with government securities sold during the same period. The average of all bonds sold from the authorized issues, including both the 4 per cent and 4½ per cent bonds, is 93.58 per cent.

STATE HIGHWAY BONDS AUTHORIZED AND SOLD

	Amounts Authorized	Sold to Date Nov. 30, 1920	Balance Unsold Nov. 30, 1920
State Co-operative Bonds, Chap. 175, Laws 1917*	$ 1,200,000.00	$ 1,200,000.00	$ 0.00
State Co-operative Bonds, Chap. 31, Laws 1920**	$ 5,006.799.27	2,500,000.00	2,506,799.27
Six Million Bonds, Chap 423, Laws 1917	6,000,000.00	3,940,000.00	2,060,000.00
Ten Million Bonds, Chap. 173, Laws 1919	10,000,000.00	10,000,000.00	0.00
Ten Million Bonds, Chap. 43, Laws 1920	10,000,000.00	1,500,000.00	8,500,000.00
	$32,206,799.27***	$19,140,000.00	$13,066,799.27

* Chapter 175, Laws 1917, authorized bonds total $1,819,280.55 to meet Federal Aid. Supreme Court held in case Benson vs. Olcott that future sales of Federal Aid bonds should be made under authority Chap. 31, Laws 1920.

** Authorizes bonds to meet Federal Aid offered—total $6,206,799.27 less previous sales under Chap. 175, Laws 1917.

*** Constitutional debt limit is 4 per cent of assessed valuation; equals $41,633,-561.96 based on valuation for year 1920 of $1,040,839,049.12.

The outstanding features of the work of the Commission have been: Pacific Highway constructed to standard width, alinement and grade throughout its entire length with a few small exceptions, and all graded portions either macadamized or paved, making possible through travel throughout the entire year. Columbia River Highway paved from Astoria through to Hood River, and graded and graveled on the river route from Hood River to Pendleton, including also the completion of a bridge across the Deschutes River eliminating a privately owned, dangerous toll structure. While the work on these two highways was being expedited in every way possible, simultaneously progress was being made on the other highways and some work has been done in every county in the state.

Expressed in figures including the Forest Projects handled by the U. S. Bureau of Public Road and County work, payments for which are made through the State, there has been placed under construction during the biennium 419.3 miles of pavement, 638.4 miles of macadam, 1000.6 miles of grading, including the necessary bridges at a total estimated cost of $28,479,980.94.

Oregon needs improved roads and needs them now. The Pacific Highway must be paved from Portland to the California line. The Old Oregon Trail must be graded and surfaced from Pendleton to Ontario. The Dalles-California Highway, the John Day Highway, the Coast Highway and many others need improvement to make them serve their purpose.

To the State Highway Commission has been entrusted the construction of the State highway system. It is gratifying to the Commission that the people have expressed their confidence both by popular vote at the polls in the first bond issue and later through their representatives in the Legislature by voting additional bonds and again at the general election last May in increasing the constitutional debt limit. The Commission has endeavored by the employment of every honorable expedient to secure the greatest return for the money expended and while much has been done, much more remains to be done to complete Oregon's ambitious road program.

The highways of the State are subject to constant abuse by heavily loaded, fast moving trucks and other motor driven vehicles. The State must protect its investment in its highways by legislation regulating the loading, speed, length and width of these trucks and vehicles.

The data contained herein and in the report of the engineer which follows giving a detailed statement of the work of the biennium may suggest legislatoin to remedy some of the defects in the present laws and any co-operation tending to the betterment of State highway construction will be appreciated by the Commission.

FINANCIAL STATEMENT

RECEIPTS AND DISBURSEMENTS—STATE HIGHWAY FUND DECEMBER 1, 1918, TO NOVEMBER 30, 1920

RECEIPTS

Balance on hand December 1, 1918			$ 673,532.89
Sale of bonds, plus accrued interest 1919	$6,737,509.16		
Sale of bonds, plus accrued interest 1920	9,170,197.00		
			$15,543,706.16
Motor vehicle license fees turnover April 1, 1919	$ 397,418.83		
Motor vehicle license fees turnover October 1, 1919	135,000.00		
Motor vehicle license fees turnover March 15, 1920	1,168,733.25		
Motor vehicle license fees turnover September 15, 1920	312,380.50		
			$ 2,013,541.58
Gasoline and distillate tax, 1919	$ 290,795.49		
Gasoline and distillate tax, 1920	404,050.16		
			$ 694,845.65
One-quarter mill tax, 1919	$ 246,883.47		
One-quarter mill tax, 1920	247,608.87		
			$ 494,492.34
Interest on bank balance, 1919	$ 15,006.60		
Interest on bank balance, 1920	17,375.77		
			$ 32,382.37
Federal aid post road payments, 1919	$ 224,851.60		
Federal aid post road payments, 1920	1,096,027.33		
			$ 1,320,878.93
County co-operative payments, 1919	$ 253,158.14		
County co-operative payments, 1920*	586,583.54		
			$ 839,741.68
Railroad co-operative payments			13,013.07
Reimbursement by Federal Government for work Three Rivers Forest Project, 1920	$ 48,072.91		
Reimbursement by Federal Government for work Three Rivers Forest Project, 1920	27,465.54		
			$ 75,538.45
State market road appropriation			$ 990,435.46
Revolving fund payroll account			30,000.00
Miscellaneous receipts, sale and rental equipment, 1919	$ 14,077.55		
Miscellaneous receipts, sale and rental equipment and supplies, 1920	57,249.80		
			$ 71,327.35
Total receipts, all sources			$22,793,435.93

EXPENDITURES

State construction	$12,556,209.98	
Post road construction	4,564,009.50	
Forest road construction, State share	802,108.97	
Expenditures on Three Rivers project reimbursed by Government	75,538.45	
Interest on bonds	653,051.70	
Administration and general supervision	350,687.16	
Surveys	414,811.34	
Engineering, county construction	91,168.20	
State expenditures on market roads	28,635.77	
Balance market road appropriation disbursed to counties	961,799.69	
Equipment and stock	293,600.60	
Expenditures for equipment, supplies, etc., credited in rentals and sales	71,327.35	
Maintenance	112,670.57	
Road signs	5,226.79	
To establish revolving fund	30,000.00	
Total expenditures		$20,970,846.07
Balance on hand December 1, 1920		$ 1,822,589.86

* City of Rainier bonds to the amount of $6,697.37 par value and Tillamook County warrants in amount of $14,550.00 par value are on deposit for safe keeping with State Treasurer, but not included in this statement as cash item.

MONTHLY STATEMENT OF RECEIPTS AND EXPENDITURES—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

RECEIPTS

One-Quarter Mill Tax Fund*—

Balance on hand December 1, 1918	$ 17,470.52	
December, January, February	.00	
Balance on hand March 1, 1919		$ 17,470.52

Motor Vehicle License Fees*—

Balance on hand December 1, 1918	$293,097.33	
December, 1918	.00	
January, 1919	.00	
February, 1919	.00	
Totals		$ 293,097.33

Six Million Dollar Bonds*—

Balance on hand December 1, 1918	$ 1,019.95	
Sale of bonds December 10, 1918	239,292.50	
Accrued interest	750.00	
Totals		$ 241,062.45

State Co-operative Bonds*—

Balance on hand December 1, 1918	$361,945.09	
Federal aid post road payment	1,785.00	
Totals		$ 363,730.09
Totals for all funds for period Dec., Jan., Feb.		$ 915,360.39

State Highway Fund—

March, 1919	$ .00
April, 1919	399,978.00
May, 1919	80,017.71
June, 1919	81,876.84
July, 1919	1,479,644.75
August, 1919	945,623.92
September, 1919	1,099,840.38
October, 1919	2,035,105.03
November, 1919	1,625,905.93
December, 1919	80,737.97

EXPENDITURES

		.00
December, 1918	$ 19,089.20	
January, 1919	19,951.45	
February, 1919	50,398.98	
	$ 89,439.16	
Credits by cancelled vouchers	13,160.54	
Total		$ 76,279.09
December, 1918	$102,958.24	
January, 1919	47,857.14	
February, 1919	21,744.59	
	$172,559.97	
Credits by cancelled vouchers	338.41	
Total		$ 172,221.56
December, 1918	$ 10,135.75	
January, 1919	17,910.48	
February, 1919	38,824.95	
Total		$ 66,871.18
		$ 315,371.83

March, 1919	$ 154,189.87
April, 1919	106,477.41
May, 1919	231,564.74
June, 1919	307,338.74
July, 1919	599,004.99
August, 1919	859,756.97
September, 1919	1,286,858.72
October, 1919	1,170,331.47
November, 1919	1,780,440.58
December, 1919	563,985.18

January, 1920	1,035,164.04
February, 1920	116,001.72
March, 1920	1,193,706.56
April, 1920	120,499.47
May, 1920	907,597.42
June, 1920	1,184,130.59
July, 1920	1,476,487.00
August, 1920	1,749,546.92
September, 1920	1,617,345.11
October, 1920	2,083,610.92
November, 1920	2,565,255.26
Grand totals	$22,793,435.93
Less expenditures	20,970,846.07
Balance on hand December 1, 1920	$ 1,822,589.86

January, 1920	733,856.21
February, 1920	528,504.45
March, 1920	1,065,859.75
April, 1920	829,632.65
May, 1920	907,820.63
June, 1920	932,926.09
July, 1920	1,479,207.90
August, 1920	2,288,216.86
September, 1920	1,965,092.05
October, 1920	1,397,318.44
November, 1920	1,467,090.54
Total	$20,970,846.07

* Chapter 173 of the Laws of 1919 provided for the combining of all funds into the State Highway Fund, which became effective March 1, 1919.

RECEIPTS FROM MOTOR VEHICLE AND MOTOR VEHICLE OPERATOR LICENSE FEES FOR THE PERIOD FROM JANUARY 1 TO SEPTEMBER 15, 1920

COUNTY	Net Receipts Jan. 1, 1920 to Mar. 15, 1920	Net Receipts Mar. 16, 1920 to Sept. 15, 1920	Total Net Receipts Jan. 1, 1920 to Sept. 15, 1920	County Share 25%	State Share 75%
Baker	$ 25,279.45	$ 11,077.33	$ 36,356.78	$ 9,089.19	$ 27,267.59
Benton	24,256.16	7,348.26	31,604.42	7,901.11	23,703.31
Clackamas	64,761.67	14,608.65	79,370.32	19,842.58	59,527.74
Clatsop	35,298.89	9,393.29	44,692.18	11,173.04	33,519.14
Columbia	15,692.60	4,405.71	20,098.31	5,024.58	15,073.73
Coos	25,320.19	10,561.73	35,881.92	8,970.48	26,911.44
Crook	8,773.07	2,381.58	11,154.65	2,788.67	8,365.98
Curry	3,015.53	1,568.81	4,584.34	1,146.08	3,438.26
Deschutes	21,934.14	5,960.95	27,895.09	6,973.77	20,921.32
Douglas	34,136.91	10,706.98	44,843.89	11,210.98	33,632.91
Gilliam	9,510.22	3,396.31	12,906.53	3,226.63	9,679.90
Grant	7,929.23	2,812.20	10,741.43	2,685.36	8,056.07
Harney	8,713.91	2,745.48	11,459.39	2,864.85	8,594.54
Hood River	20,780.88	6,084.84	26,865.72	6,716.43	20,149.29
Jackson	49,697.59	13,500.05	63,197.64	15,799.41	47,398.23
Jefferson	5,120.29	1,469.38	6,589.67	1,647.41	4,942.26
Josephine	15,372.51	5,136.64	20,509.15	5,127.29	15,381.86
Klamath	23,436.57	9,289.42	32,725.99	8,181.50	24,544.49
Lake	7,518.95	2,889.61	10,408.56	2,602.14	7,806.42
Lane	61,179.70	16,814.06	77,993.76	19,498.43	58,495.33
Lincoln	1,759.46	2,134.01	3,893.47	973.36	2,920.11
Linn	49,179.65	13,623.73	62,803.38	15,700.84	47,102.54
Malheur	20,217.35	6,889.60	27,106.95	6,776.74	20,330.21
Marion	97,277.81	26,280.54	123,558.35	30,889.59	92,668.76
Morrow	13,614.02	2,838.67	16,452.69	4,113.18	12,339.51
Multnomah	564,733.72	131,759.48	696,493.20	174,123.30	522,369.90
Polk	28,131.06	8,258.67	36,389.73	9,097.44	27,292.29
Sherman	15,022.37	4,496.23	19,518.60	4,879.65	14,638.95
Tillamook	21,904.07	4,746.25	26,650.32	6,662.58	19,987.74
Umatilla	74,408.66	17,415.30	91,823.96	22,956.00	68,867.96
Union	35,110.72	10,660.26	45,770.98	11,442.74	34,328.24
Wallowa	12,878.81	7,126.27	20,005.08	5,001.27	15,003.81
Wasco	28,440.47	8,596.76	37,037.23	9,259.31	27,777.92
Washington	50,362.00	14,682.06	65,044.06	16,261.01	48,783.05
Wheeler	4,005.84	2,374.24	6,380.08	1,595.02	4,785.06
Yamhill	41,420.16	12,485.99	53,906.15	13,476.54	40,429.61
Totals	$1,526,194.63	$416,519.34	$1,942,713.97*	$485,678.50	$1,457,035.47

* Administration expenses totaled $98,928.78; total gross receipts over period were $2,041,642.75.

ANTICIPATED INCOME AND OBLIGATED EXPENDITURES—1921 AND 1922

ANTICIPATED INCOME FOR 1921 AND 1922:

State Funds—		
Balance on hand December 1, 1920	$ 1,822,589.86	
Unsold portion Six Million Dollar Bonding Act, $2,060,000.00 at 90	1,854.000.00	
Unsold portion Ten Million Dollar Bonding Act, $8,500,000.00 at 94	7,990,000.00	
*Unsold portion Federal Co-operative Bonding Act, $2,123,417.27 at 94	2,006,012.23	
Quarter Mill Tax, 1921	260,209.76	
Quarter Mill Tax, 1922	260,209.76	
Gasoline and Distillate Tax, 1921	536,900.00	
Gasoline and Distillate Tax, 1922	633,540.00	
Motor Vehicle License Fees, 1921	1,710,000.00	
Motor Vehicle License Fees; 1922	1,923,750.00	
Repayment of Loans to Counties	600,000.00	
Interest on Treasurer's Balances	36,000.00	
Total State Funds Available	$19,633,210.61	
County Funds—		
Available under executed agreements	$ 2,224,383.58	
Federal Government Funds—		
Available under Post Road Act	3,011,299.34	
Railroad Funds—		
Available under executed agreements	53,351.37	
Grand Total Anticipated Income		$24,922,245.90
OBLIGATED EXPENDITURES—		
Interest on Bonds, 1921	$ 1,188,000.00	
Interest and Maturities on Bonds, 1922	1,529,000.00	
Obligated under Present State Contracts	4,963,294.18	
Obligated under Post Road Contracts	4,154,914.01	
Obligated under Forest Road Agreements	661,840.94	
For Maintenance Work	1,000,000.00	
For Eqipment	100,000.00	
For Road Signing	15,000.00	
For Administration and General Spervision	300,000.00	
For Surveys	300,000.00	
For Engineering County Work	100,000.00	
For Contingencies	500,000.00	
Total Obligated Expenditures		$14,812,049.13
Balance Available for New Contracts		$10,110,196.77

*This amount does not include bonds authorized to match Federal Forest Road Funds available during 1923-1924-1925, totaling $383,382.00.

Note: The amounts of anticipated revenue from counties and railroads include only such amounts as have already been definitely agreed to between the respective counties, and railroad companies and the State Highway Commission. In all probability considrable co-operation will come from these two sources during the two-year period concerned.

STATEMENT OF BOND SALES

STATE CO-OPERATIVE FUND (BEAN-BARRETT) CHAP. 175, LAWS 1917—4% BONDS

Date of Bid	Date of Bonds	Purchaser	Par Value	Amount Bid	Percent of Par	Net Interest	Accrued Interest	Total
Aug. 18, 1917	Sept. 1, 1917	E. H. Rollins & Sons	*$ 400,000.00	$ 387,640.00	96.91	4.50	$ 2,844.44	$ 390,484.44
July 15, 1919	Aug. 1, 1919	Henry Teal	** 800,000.00	762,320.00	95.29	4.58	1,511.11	763,831.11
		Totals	$1,200,000.00	$1,149,960.00	95.83		$ 4,355.55	$1,154,315.55

STATE CO-OPERATIVE FUND—CHAP. 31, LAWS 1920—4½% BONDS

Date of Bid	Date of Bonds	Purchaser	Par Value	Amount Bid	Percent of Par	Net Interest	Accrued Interest	Total
May 11, 1920	April 1, 1920	Lumbermens Trust Co.	$1,000,000.00	$ 890,900.00	89.09	5.60	$ 7,000.00	$ 897,900.00
June 15, 1920	April 1, 1920	Henry Teal	1,500,000.00	1,314,300.00	87.62	5.80	18,375.00	1,332,675.00
		Totals	$2,500,000.00	$2,205,200.00	88.21		$25,375.00	$2,230,575.00

SIX MILLION DOLLAR FUND—CHAP. 423, LAWS 1917—4% BONDS

Date of Bid	Date of Bonds	Purchaser	Par Value	Amount Bid	Percent of Par	Net Interest	Accrued Interest	Total
Aug. 7, 1917	Aug. 1, 1917	Lumbermens Trust Co.	$ 500,000.00	$ 471,300.00	94.26	4.53	$ 2,333.33	$ 473,633.33
Sept. 12, 1917	Sept. 1, 1917	E. H. Rollins	500,000.00	472,130.00	94.43	4.52	1,833.33	473,963.33
Mar. 15, 1918	April 1, 1918	Henry Teal	500,000.00	455,850.00	91.17	4.83	222.22	456,072.22
July 9, 1918	July 1, 1918	E. H. Rollins	690,000.00	643,770.00	93.30	4.62	2,606.54	646,376.54
Dec. 10, 1918	Dec. 1, 1918	Wm. Salmon	250,000.00	239,292.50	95.72	4.39	750.00	240,042.50
May 6, 1919	May 1, 1919	Lumbermen's Trust Co.	500,000.00	467,900.00	93.58	4.59	2,722.22	470,622.22
June 10, 1919	June 1, 1919	Carstens & Earles	1,000,000.00	942,600.00	94.26	4.53	4,333.33	946,933.33
		Totals	$3,940,000.00	$3,692,842.50	93.73		$14,800.97	$3,707,643.47

FIRST TEN MILLION DOLLAR BOND FUND—CHAP. 173, LAWS 1919—4½% BONDS

Date of Bid	Date of Bonds	Purchaser	Par Value	Amount Bid	Percent of Par	Net Interest	Accrued Interest	Total
Aug. 5, 1919	Aug. 1, 1919	Carstens & Earles and Associates	$ 1,000,000.00	$ 991,500.00	99.15	4.58	$ 3,875.00	$ 995,375.00
Sept. 20, 1919	Oct. 1, 1919	Carstens & Earles and Associates	2,000,000.00	1,965,600.00	98.28	4.66	.00	1,965,600.00
Nov. 4, 1919	Nov. 1, 1919	Freeman, Smith & Camp and Associates	1,000,000.00	988,230.00	98.82	4.62	2,875.00	991,105.00
Dec. 20, 1919	Dec. 1, 1919	Ralph Schneeloch and Associates	1,000,000.00	986,170.00	98.62	4.65	3,875.00	990,045.00
July 20, 1920	July 1, 1920	Henry Teal	1,500,000.00	1,340,100.00	89.34	5.58	6,000.00	1,346,100.00
Aug. 24, 1920	Aug. 1, 1920	Lumbermens Trust Co. and Associates	1,500,000.00	1,351,200.00	90.08	5.50	6,750.00	1,357,950.00
Sept. 28, 1920	Sept. 1, 1920	Ralph Schneeloch and Associates	2,000,000.00	1,822,202.00	91.11	5.41	1,250.00	1,823,452.00
		Totals	$10,000,000.00	$9,445,002.00	94.45		$24,625.00	$9,469,627.00

SECOND TEN MILLION DOLLAR BOND FUND—CHAP. 43, LAWS 1920—4½% BONDS

Date of Bid	Date of Bonds	Purchaser	Par Value	Amount Bid	Percent of Par	Net Interest	Accrued Interest	Total	
Nov. 6, 1920	Nov. 1, 1920	Henry Teal	$1,500,000.00	$1,418,700.00	94.58	5.03	$ 3,375.00	$1,422,075.00	$1,422,075.00

SUMMARY

	Par Value	Amount Bid	Discount	Percent of Par	Accrued Interest	Total
State Co-operative Bonds, Chap. 175, Laws 1917	$ 1,200,000.00	$ 1,149,960.00	$ 50,040.00	95.83	$ 4,355.55	$ 1,154,315.55
State Co-operative Bonds, Chap. 31, Laws 1920	2,500,000.00	2,205,200.00	294,800.00	88.21	25,375.00	2,230,575.00
Six Million Dollar Bonds, Chap. 423, Laws 1917	3,940,000.00	3,692,842.50	247,157.50	93.73	14,800.97	3,707,643.47
Ten Million Dollar Bonds, Chap. 173, Laws 1919	10,000,000.00	9,445,002.00	554,998.00	94.45	24,625.00	9,469,627.00
Ten Million Dollar Bonds, Chap. 43, Laws 1920	1,500,000.00	1,418,700.00	81,300.00	94.58	3,375.00	1,422,075.00
Totals	$19,140,000.00	$17,911,704.50	$1,228,295.50	93.58	$72,531.52	$17,984,236.02

*Maturities $100,000 annually, 1922-1925, inclusive. **Maturities $100,000 annually, 1926-1933, inclusive. All other issues mature one-twentieth each year after fifth year.

PROPOSALS RECEIVED AND AWARDS

Date	Contract Number	Project	Highway	Length Miles	Kind of Improvement	No. of Proposals	No. of Bidders	Contract Awarded to
Dec. 11, 1918	71	Hall Hill-Prairie City	John Day River	2.14	Grad. & Mac.	2	2	A. D. Kern
Jan. 7, 1919	72	Hood River-Mosier, Unit No. 1	Columbia River	1.37	Grading	9	9	A. D. Kern
Jan. 7, 1919	73	Hood River-Mosier, Unit No. 2	Columbia River	2.7	Grading	8	8	A. D. Kern
Jan. 7, 1919	74	Hood River-Mosier, Unit No. 3	Columbia River	2.3	Grading	5	5	A. D. Kern
Jan. 7, 1919	75	Salem-Aurora, Unit No. 1	Pacific	7.35	Paving	6	4	Blake-Compton Co.
Jan. 7, 1919	76	Salem-Aurora, Unit No. 2	Pacific	10.65	Paving	5	3	Oskar Huber
Jan. 7, 1919	77	Blalock-Arlington	Columbia River	8.84	Grading	2	2	Johnson Contract Co.
Feb. 4, 1919	78	Bee Ranch Section	Mc'ville-Tillamook	3.97	Grad. & Mac.	4	4	Elliott & Scoggin
Feb. 4, 1919	79	Stage Road Pass	Pacific	2.48	Grading	8	8	John Hampshire & Co.
Feb. 4, 1919	80	Divide Overhead	Pacific	.....	R. C. Bridge	8	8	Albert Anderson
Feb. 4, 1919	81	Yoncalla-Drain	Pacific	5.89	Grading	5	5	H. J. Hildeburn
Feb. 4, 1919	82	Hillsboro-Multnomah Co. Line	Tualatin Valley	11.2	Paving	10	5	A. Gufhrie & Co.
Feb. 4, 1919	83	Corvallis-Polk Co. Line	West Side	10.51	Paving	7	3	Oskar Huber
Feb. 4, 1919	84	Grants Pass-Jackson Co. Line	Pac fic	6.09	Grad. & Paving	13	6	S. S. Schell
Feb. 4, 1919	85	Morrow County	Columbia River	30.20	Grad. & Mac.	5	4	Porter & Conley
Mar. 6, 1919	.....	Wolf Creek-Grave Creek	Pacific	4.9	Macadam	5	5	All bids rejected
Mar. 6, 1919	87	Albany-Jefferson	Pacific	6.77	Grad. & Paving	7	4	A. D. Kern
Mar. 6, 1919	88	John Day Fisk Creek	John Day River	7.2	Grad. & Mac.	3	3	A. D. Kern
Mar. 6. 1919	.....	Grand Ronde	Mc-ville-Tillamook	2.7	Grad. & Mac.	2	2	All bids rejected
Mar. 26, 1919	89	Milton-Wash. State Line	Oregon-Wash.	6.2	Paving	4	2	Warren Construction Co.
Mar. 26, 1919	90	Adams-Athena	Oregon-Wash.	9.0	Paving	2	2	Warren Construction Co.
Mar. 26, 1919	91	Grand Ronde	McMinnville-Tillamook	3.47	Grad. & Mac.	3	3	W. N. Trent
Mar. 26, 1919	92	Divide Overhead Approaches	Pacific	0.19	Grading	4	4	Albert Anderson
Mar. 26, 1919	93	Sarvice Creek Summit	John Day River	1.7	Macadam	2	2	Copenhagen Bros.
Mar. 26, 1919	94	Echo-Morrow Co. Line	Columbia River	20.8	Grad. & Mac.	2	2	Porter & Conley
Mar. 26, 1919	95	The Dalles-Seufert	Columbia River	1.86	Paving	3	2	United Contracting Co.
April 15, 1919	96	Oakland-Yoncalla	Pac fic	10.12	Paving	5	2	Clark & Henery Constn Co.
April 15, 1919	97	Myrtle Creek-Dillard	Pacific	12.94	Paving	7	3	Oregon Hassam Paving Co.
April 15, 1919	98	Wolf Creek-Grave Creek	Pacific	4.92	Paving	2	1	Warren Construction Co.
April 15, 1919	99	Marshfield-Coquille	Coast	14.49	Paving	7	4	Perham,Brown,Dean & Hague
April 15, 1919	100	Central Point-Gold Hill	Pacific	8.9	Grad. & Paving	5	3	Clark & Henery Const'n Co.
April 15, 1919	101	Hemlock-Beaver	Coast	5.0	Paving	2	1	Warren Construction Co.
April 15, 1919	102	Jefferson-North	Pacific	6.76	Paving	4	2	A. D. Kern
April 15, 1919	103	Amity-Holmes Gap	West Side	8.3	Grad. & Paving	4	2	Oregon Ind. Paving Co.
April 15, 1919	104	Deer Island-Rainier	Columbia River	22.16	Paving	5	3	Warren Construction Co.

April 15, 1919	105	Sheridan-McMinnville	McMinnville-Tillamook	8.0	Paving	9	8	V. R. Dennis Const'n Co.
April 15, 1919	106	Rickreall-Monmouth-Ind.	West Side	7.8	Paving	4	2	Warren Construction Co.
April 15, 1919	107	Myrtle Creek-Dillard	Pacific	13.0	Slide removals	2	2	H. J. Hildeburn
April 15, 1919	108	Stage Rd. Pass-Wolf Cr.	Pacific	4.47	Grading	3	3	Joplin & Eldon
April 15, 1919	109	Baker-Middle Bridge	Baker-Cornucopia	18.75	Grad., 2.04 Mac.	3	3	J. A. Hoskins & Co.
April 15, 1919	110	Scappoose-Dear Island	Columbia River	10.85	Grading	7	7	L. O. Herrold
April 15, 1919	111	Deschutes River Bridge	Columbia River	.....	Stl. Dk. Girder	6	6	Lindstrom & Feigenson
April 15, 1919	112	John Day River Bridge	Columbia River	.....	2 Wd. Spans & Trsl.	7	4	Portland Bridge Co.
April 15, 1919	126	Walker-Cottage Grove	Pacific	3.07	Grading	1	1	Joplin & Eldon
April 15, 1919	127	Divide-Douglas Co. Line	Pacific	1.2	Grading	4	4	J. H. Hawley & Co.
May 6, 1919	.....	Arlington-Morrow Co. Line	Columbia River	12.8	Grading	1	1	Rejected
May 6, 1919	.....	Jacques Place-Johns Place	Pacific	7.2	Grad. & Mac.	1	1	Rejected
May 6, 1919	.....	Roseburg-Dillard	Pacific	6.7	Grad. & Mac.	....	....	No bids received
May 6, 1919	.....	Roseburg-Winchester	Pacific	2.0	Grad. & Mac.	1	1	Rejected
May 6, 1919	113	Monroe-Lane Co. Line	West Side	3.24	Grad. & Mac.	3	3	Benton County Court
May 6, 1919	114	Comstock-Pass Creek	Pacific	1.0	Grad. & Mac.	2	2	Albert Anderson & Co.
May 6, 1919	115	Oakland-South	Pacific	1.13	Grad. & Mac.	2	2	John Hakanson
May 6, 1919	.....	Leona-Drain	Pacific	3.25	Grad. & Mac.	....	....	No bids received
May 6, 1919	116	Gold Hill-Josephine Co. Line	Pacific	11.95	Grad. & Paving	13	7	Schell & Calvert
May 6, 1919	117	Ashland-Green Sprs. Mt. Rd.	Pacific	5.85	Grad. & Paving	4	3	Oskar Huber
May 6, 1919	118	Green Sprs. Mt. Rd.-Calif. Line	Pacific	14.8	Paving	4	3	Oskar Huber
May 6, 1919	119	Eugene-Goshen	Pacific	4.9	Paving	11	7	Guy F. Pyle
May 6, 1919	120	Junction City-Benton Co. Line	West Side	5.5	Grad. & Mac.	2	2	Washburn & Hall
May 6, 1919	121	Is. City-LaGrande-Hot Lake	Old Oregon Trail	6.0	Paving, 1.99 Grad.	6	4	Warren Construction Co.
May 6, 1919	122	Hillsboro-Forest Grove	Tualatin Valley	4.3	Paving	8	5	Warren Construction Co.
May 6, 1919	123-4-5	Sexton Mountain Section	Pacific	7.43	Grading	8	8	H. J. Hildeburn
May 27, 1919	173	Arlington-Morrow Co. Line	Columbia River	12.23	Grad. & Mac.	4	4	M. J. Conley
May 27, 1919	.....	Cabbage Hill-Kamela	Old Oregon Trail	.....	Grading	....	....	No bids received
May 27, 1919	128	Rainier-Clatskanie	Columbia River	12.3	Paving	6	5	Warren Construction Co.
May 27, 1919	129	Roseburg-Dillard	Pacific	6.64	Grad., 3.6 Mac.	2	2	G. E. Colby
May 27, 1919	.....	Leona-Drain	Pacific	3.25	Grad. & Mac.	....	....	No bids received
May 27, 1919	130	Oakland-Wilbur	Pacific	7.0	Grad. & Paving	4	3	Clark & Henery Const'n Co.
May 27, 1919	.....	Yoncalla	Pacific	7.7	Grad. & Mac.	....	....	No bids received
May 27, 1919	131	Jacques Place-Johns Place	Pacific	7.15	Grad. & Mac.	2	2	Joplin & Eldon
May 27, 1919	.....	Roseburg-Wilbur	Pacific	4.5	Grad. & Mac.	....	....	No bids received
May 27, 1919	132	Ruthton Hill-Hood River	Columbia River	1.7	Grading	....	....	G. E. Kibbe
May 27, 1919	133	Cascade Locks-Hood River	Columbia River	22.11	Paving	6	5	G. E. Kibbe
May 27, 1919	134	Benton Co. Line-North	West Side	1.64	Paving	1	1	Oskar Huber
May 27, 1919	135	The Dalles-Chenowith	Columbia River	0.5	Grad. & Paving	2	2	United Contracting Co.
May 27, 1919	136	Newberg-W. Dayton	West Side	5.9	Grad., 3.58 Mac.	2	2	E. E. Cummins
May 27, 1919	137	Yamhill-McMinnville	Tualatin Valley	9.8	Grad. & Paving	8	6	Northwestern Const'n Co.
May 27, 1919	139	Tide Creek Bridge	Columbia River	.....	R. C. Dk. Girder	7	7	Union Bridge Co.
May 27, 1919	140	Scappoose-Deer Island	Columbia River	.....	5 R.C. Bridges	5	5	Union Bridge Co.

PROPOSALS RECEIVED AND AWARDS—CONTINUED

Date	Contract Number	Project	Highway	Length Miles	Kind of Improvement	No. of Proposals	No. of Bidders	Contract Awarded to
May 27, 1919	141	Jefferson-Albany	Pacific	.....	3 Frame Trsls.	9	9	Linn County Court
May 27, 1919	142	Jefferson-Albany	Pacific	.....	42' Frame Trsl.	8	8	Linn County Court
June 10, 1919	.....	Yoncalla	Pacific	2.7	Grad. & 5.0 Mac.	1	1	Rejected
June 10, 1919	.....	Sarvice Cr.-Valades Ranch, No. 1	John Day River	13.0	Grad. & Bridges	2	2	All bids rejected
June 10, 1919	.....	Sarvice Cr.-Valades Ranch, No. 2	John Day River	12.5	Grad. & Bridges	1	1	Rejected
June 10, 1919	.....	Sarvice Cr.-Valades Ranch, No. 3	John Day River	12.0	Grad. & Bridges	2	2	All bids rejected
June 10, 1919	.....	Sarvice Cr.-Valades Ranch, No. 4	John Day River	11.45	Grad. & Bridges	1	1	Rejected
June 10, 1919	143	Bertha-Washington Co. Line	Tualatin Valley	2.76	Paving	3	3	Warren Construction Co.
June 10, 1919	144	Sag	Baker-Cornucopia	4.69	Grad. & Mac.	2	2	Morrison-Knudsen Co.
June 10, 1919	145	Monroe-North	West Side	9.15	Grad. & Paving	8	5	Pacific Bridge Co.
June 10, 1919	146	Canby-Aurora	Pacific	3.77	Grading	6	6	W. B. Tull
June 10, 1919	147	Marshfield-Cedar Point	Coast	.....	Removal of slides	1	1	Coos County Court
June 10, 1919	148	Hubbard Creek-Brush Creek	Coast	6.82	Grading	7	7	Moon & Co.
June 10, 1919	149	Cedar Point-Coquille	Coast	1.96	Garding	3	3	Moon & Co.
June 10, 1919	.....	Forest Grove-Gaston	Tualatin Valley	6.7	Grading	....	....	No bids received
June 10, 1919	150	Leona-Drain	Pacific	4.00	Grad. & Mac.	2	2	Albert Anderson & Co.
June 10, 1919	151	Roseburg-Wilbur	Pacific	4.10	Grading	1	1	H. J. Hildeburn
June 10, 1919	152	Gr. Sprs. Mt. Summit-Pac. Hwy.	Ashland-Kl'th Falls	10.09	Grading	7	7	A. Giebisch
June 10, 1919	153	Gr. Sprs. Mt.-Jenny Creek	Ashland-Kl'th Falls	8.71	Grading	2	2	Jackson County Court
June 10, 1919	.....	Cabbage Hill-Kamela	Old Oregon Trail	26.8	Grading	5	5	Umatilla County Court
June 10, 1919	156	Grand Ronde-Butlers Store	Mc'ville-Tillamook	1.85	Macadam	1	1	W. N. Trent
June 10, 1919	157	McMinnville-Bellevue	Mc'ville-Tillamook	.....	8 R.C. Bridges	7	6	Yamhill County Court
June 10, 1919	158	Rock Point Arch	Pacific	.....	R.C. Bridge	3	3	Parker & Banfield
June 10, 1919	196	Echo-Pendleton	Columbia River	21.88	Grading	10	10	Clifton, Applegate & Toole
July 8, 1919	159	Eugene-Jct. City, Unit No. 1	Pacific	6.2	Paving	2	2	Clark & Henery Const'n Co.
July 8, 1919	160	Eugene-Jct. City, Unit No. 2	Pacific	6.2	Paving	2	2	Clark & Henery Const'n Co.
July 8, 1919	161	Canyon	Baker-Cornucopia	4.42	Grading	1	1	Morrison-Knudsen Co.
July 8, 1919	162	Svensen-Rock Creek	Columbia River	8.0	Paving	2	2	Warren Construction Co.
July 8, 1919	163	Rock Creek-Westport	Columbia River	9.5	Paving	2	2	Warren Construction Co.
July 8, 1919	164	Westport-Clatskanie	Columbia River	10.5	Paving	2	2	Warren Construction Co.
July 8, 1919	165	Stage Road Pass	Pacific	2.48	Macadam	1	1	Joplin & Eldon
July 8, 1919	166	Comstock Overcrossing	Pacific	0.2	Struct. & Grad.	2	2	Curtis Gardner
July 8, 1919	167	Oregon City-Oswego	Pacific	6.3	Grading	7	7	Palmer & Young
July 8, 1919	168	Elgin-Minam	LaGrande-Joseph	.....	9 R.C. Culverts	1	1	Rhyner-Dicke Co.
July 8, 1919	169	Salem-Dallas	Salem-Dallas	13.07	Grad. & Paving	4	3	Oskar Huber

July	8, 1919	170	Seufert	Columbia River	.05	Grad. & Paving	1	1	Project cancelled
July	8, 1919	171	Beaverton-Mult. Co. Line	Canyon Road	3.89	Grad. & Paving	1	1	Warren Construction Co.
July	8, 1919	.....	Salem-Brooks	Pacific	4.16	Paving	4	3	All bids rejected
July	8, 1919	172	Sarvice Cr.-Valades Ranch, No. 1	John Day River	13.0	Grading	6	4	Copenhagen Bros. Co.
July	8, 1919	.....	Sarvice Cr.-Valades Ranch, No. 2	John Day River	12.5	Grad. & Bridges	4	4	All bids rejected
July	8, 1919	.....	Sarvice Cr.-Valades Ranch, No. 3	John Day River	12.0	Grad. & Bridges	2	2	All bids rejected
July	8, 1919	.....	Sarvice Cr.-Valades Ranch, No. 4	John Day River	11.45	Grad. & Bridges	3	3	All bids rejected
July	8, 1919	.....	Yoncalla	Pacific	2.7	Grad., 5.0 Mac.	1	1	Rejected
July	8. 1919	.....	Yamhill-Gaston	Tualatin Valley	7.9	Grad. & Mac.	2	2	All bids rejected
July	8, 1919	174	Burns-Lawen	Central Oregon	16.72	Grad. & Mac.	3	3	Pacific Bridge Co.
July	8, 1919	185	Stage Road Pass	Pacific	.....	3 Frame Trsls.	4	3	Union Bridge Co.
July	8, 1919	186	Stage Road Pass	Pacific	.....	R.C. Culvert	4	4	Union Bridge Co.
July	8, 1919	187	Cow Creek Bridge	Pacific	.....	6 70′ Wd. Spans	5	5	Union Bridge Co.
July	8, 1919	188	Pass Creek Bridge	Pacific	.....	R.C. Dk. Gdr.	1	1	Albert Anderson
July	8, 1919	189	Gold Hill-Central Point	Pacific	.....	2 Pile Trsls.	1	1	J. Hartman
July	8, 1919	190	Ashland-Gr. Sprs. Mt. Road	Pacific	.....	3 R.C. Bridges	1	1	Frank Jordan
July	8, 1919	*	Pendleton-Echo	Old Oregon Trail	.....	6 R.C. Bridges	3	3	All bids rejected
Aug.	5, 1919	175	The Dalles-Three Mile Cr.	The Dalles-Calif.	2.0	Paving	2	1	United Constracting Co.
Aug.	5, 1919	176	Lone Pine-Hot Lake	Old Oregon Trail	3.91	Macadam	2	2	Warren Construction Co.
Aug.	5, 1919	177	Baker-Haines	Old Oregon Trail	9.38	Grad. & Mac.	3	3	F. C. Oxman
Aug.	5, 1919	178	Yoncalla	Pacific	2.78	Grad., 8.67 Mac.	1	1	Albert Anderson
Aug.	5, 1919	.....	Walker-Cottage Grove	Pacific	3.0	Macadam	....	....	No bids received
Aug.	5, 1919	179	Athena-Milton	Oregon-Wash.	11.54	Paving	1	1	Warren Construction Co.
Aug.	5, 1919	180	Stage Road Pass-Wolf Cr.	Pacific	4.48	Macadam	2	2	Warren Construction Co.
Aug.	5, 1919	181	Salem-Brooks	Pacific	4.16	Paving	4	2	Blake-Compton Co.
Aug.	5, 1919	.....	Astoria-Seaside	Coast	14.8	Paving	3	3	All bids rejected
Aug.	5, 1919	182	Canyonville-Myrtle Creek	Pacific	9.18	Grading	3	3	H. J. Hildeburn
Aug.	5, 1919	.....	Divide-Douglas Co. Line	Pacific	1.4	Macadam	1	1	All bids rejected
Aug.	5, 1919	183	Butte Creek	John Day River	9.35	Grading	3	3	Jas. F. Clarkson
Aug.	5, 1919	184	Rainier City	Columbia River	0.9	Grading	1	1	Pacific Bridge Co.
Aug.	5, 1919	191	Sarvice Cr.-Valades Ranch, No. 1	John Day River	.....	3 Wd. Truss Spans	4	4	Jas. F. Clarkson
Aug.	5, 1919	192	Molalla River Bridge	Pacific	.....	Stl. Truss Spans	5	5	Portland Bridge Co.
Aug.	5, 1919	.....	Amity-Holmes Gap	West Side	.....	5 R.C. Bridges	1	1	Rejected
Aug.	5, 1919	.....	Bend-Jefferson Co. Line	The Dalles-Calif.	23.9	Grading	1	1	Rejected
Aug.	5, 1919	.....	Forest Grove-Gaston	Tualatin Valley	6.7	Macadam	....	....	No bids received
Aug.	5, 1919	193	Yamhill-Gaston	Tualatin Valley	7.9	Grading	2	2	Yamhill County Court
Aug.	5, 1919	194	Canyonville-Galesville	Pacific	11.04	Macadam	3	3	Warren Construction Co.
Aug.	14, 1919	195	Forest Grove-Gaston	Tualatin Valley	6.7	Macadam	2	2	Washington County Court
Sept.	2, 1919	237	Beaver Cr. Bridge No. 11	Columbia River	.....	35′ R.C. Gdr. Span	2	2	Warren Construction Co.
Sept.	9, 1919	197	Hood River-Mosier	Columbia River	6.4	Macadam	3	3	A. D. Kern
Sept.	9, 1919	198	Sherman County	Columbia River	14.78	Grading	8	8	Porter & Conley
Sept.	9, 1919	200	Quinton Tunnel	Columbia River	552′	Tunnel	9	9	Project cancelled
Sept.	9, 1919	201	Deer Island-Scappoose	Columbia River	10.85	Paving	3	2	Warren Construction Co.

PROPOSALS RECEIVED AND AWARDS—CONTINUED

Date	Contract Number	Project	Highway	Length Miles	Kind of Improvement	No. of Proposals	No. of Bidders	Contract Awarded to
Sept. 9, 1919	202	Walker-Cottage Grove	Pacific	3.07	Macadam	2	2	Hakanson & Corson
Sept. 9, 1919	203	McMinnville-W. Dayton	West Side	5.0	Grading	4	4	Palmer & Young
Sept. 9, 1919	238	John Day River-Blalock	Columbia River	14.94	Grad. & Tunnel	4	4	Oskar Huber
Sept. 9, 1919	.....	Klamath Falls-Algoma	The Dalles-Calif.	10.9	Grad., 5.6 Mac.	4	2	All bids rejected
Sept. 9, 1919	.....	Crow Creek Bridge	West Side	.....	40′ R.C. Span	1	1	Rejected
Sept. 9, 1919	.....	Amity-Holmes Gap	West Side	.....	5 R.C. Bridges	1	1	Rejected
Sept. 9, 1919	.....	Sand Creek Bridge	Pacific	.....	108′ R.C. Viaduct	5	5	All bids rejected
Sept. 20, 1919	204	Cairo-Nyssa	John Day River	8.98	Macadam	3	3	Porter & Conley
Sept. 20, 1919	.....	Bend-Jefferson Co. Line	The Dalles-Calif.	23.9	Grading	5	5	All bids rejected
Oct. 7, 1919	205	Mosier-Rowena	Columbia River	8.96	Grading	7	7	Johnson Contract Co.
Oct. 7, 1919	206	Rowena-The Dalles	Columbia River	7.76	Grading	4	4	A. D. Kern
Oct. 7, 1919	207	Remote-Camas Valley No. 1	Coos Bay-Roseburg	6.07	Grading	4	4	John Hampshire & Co.
Oct. 7, 1919	208	Remote-Camas Valley No. 2	Coos Bay-Roseburg	8.10	Grading	3	3	John Hampshire & Co.
Oct. 7, 1919	.....	Gilliam Co. Line-Heppner No. 1	Oregon-Wash.	10.0	Grading	2	2	All bids rejected
Oct. 7, 1919	.....	Gilliam Co. Line-Heppner No. 2	Oregon-Wash.	15.0	Grading	2	2	All bids rejected
Oct. 7, 1919	209	Gilliam Co. Line-Heppner	Oregon-Wash.	25.0	Grading	2	2	Oskar Huber
Oct. 7, 1919	210	Sarvice Cr.-Valades Ranch, No. 2	John Day River	12.1	Grading	1	1	Jas. F. Clarkson & Co.
Oct. 7, 1919	211	Sarvice Cr.-Valades Ranch, No. 3	John Day River	12.0	Grading	1	1	Jas. F. Clarkson & Co.
Oct. 7, 1919	212	Sarvice Cr.-Valades Ranch, No. 4	John Day River	10.92	Grading	2	2	A. D. Kern
Oct. 7, 1919	213	Bordner Hill & Wain Hill	Pacific	1.2	Macadam	3	3	Marion County Court
Oct. 7, 1919	214	Lakeview-New Pine Cr.	Lakeview-Calif.	1.78	Grad. & Mac.	1	1	Lake County Court
Oct. 7, 1919	215	Lakeview-Crooked Cr.	Lapine-Lakeview	11.09	Grad. & Mac.	1	1	Lake County Court
Oct. 7, 1919	216	Sucker Creek Arch	Pacific	.....	R.C. Structure	6	6	Pacific Bridge Co.
Oct. 7, 1919	217	Tyron Creek Bridge	Pacific	.....	228′ Frame Trsl.	8	8	E. D. Olds
Oct. 7, 1919	218	Depot Slough Bridge	Corvallis-Newport	.....	152′ Pile Trsl.	5	4	R. W. Pepin
Oct. 7, 1919	219	Sand Creek Bridge	Pacific	.....	108′ R.C. Bridge	2	2	Curtis Gardner
Oct. 7, 1919	220	Heppner Jct. Overcrossing	Columbia River	.....	146′ R.C. Viaduct	4	4	Rees & Davis
Oct. 7, 1919	221	Willow Creek Bridge	Columbia River	.....	Stl. & R. C. Spans	4	4	Rees & Davis
Oct. 7, 1919	222	Tolo Overcrossing	Pacific	.....	R.C. Structure	3	3	Albert Anderson
Oct. 7, 1919	223	Messner Overcrossing	Columbia River	.....	R.C. Via. Wd. Trsl.	4	4	Rees & Davis
Oct. 7, 1919	224	Baker-Middle Bridge	Baker-Cornucopia	7.9	Macadam	1	1	F. C. Oxman
Oct. 7, 1919	.....	Klamath Falls-Merrill	The Dalles-Calif.	14.68	Grad. & Mac.	1	1	Rejected
Oct. 7, 1919	.....	Merrill-California Line	The Dalles-Calif.	12.8	Grad. & Mac.	1	1	Rejected
Oct. 7, 1919	.....	Algoma	The Dalles-Calif.	2.3	Mac. & 8.92 Grad.	1	1	Rejected
Oct. 7, 1919	.....	Klamath Falls-Dairy	K'th Falls-Lakeview	13.91	Grad. & Mac.	1	1	Rejected

Nov. 4, 1919	226	Deer Island-Delena	Columbia River	0.83	Guard Fence	2	2	A. J. McGarry
Nov. 2, 1919	227	Algoma	The Dalles-Calif.	8.92	Grad. & Mac.	5	4	Oskar Huber
Nov. 4, 1919	228	Merrill-Calif. Line	The Dalles-Calif.	12.8	Mac., 9.35 Grad.	5	4	Oskar Huber
Nov. 4, 1919	229	Klamath Falls-Merrill	The Dalles-Calif.	14.68	Grad., 7.6 Mac.	6	5	Oskar Huber
Nov. 4, 1919	230	Klamath Falls-Dairy	K'th Falls-Lakeview	13.91	Grad. & Mac.	4	3	Oskar Huber
Nov. 4, 1919	231	Bend-Allen Ranch	The Dalles-Calif.	1.5	Grad., 5.1 Mac.	4	4	Oskar Huber
Nov. 4, 1919	232	Bend-Jefferson Co. Line	The Dalles-Calif.	24.2	Grading	4	4	Oskar Huber
Nov. 4, 1919	233	Prineville-Redmond	McKenzie	15.2	Grad., 7.2 Mac.	6	6	Oskar Huber
Nov. 4, 1919	234	Prineville-Davis Ranch	Crooked River	31.99	Grading	5	5	A. Guthrie & Co.
Nov. 4, 1919	235	Cow Valley-Brogan	John Day River	9.57	Grading	2	2	Morrison-Knudsen Co.
Nov. 4, 1919	236	Pendleton-Cabbage Hill	Old Oregon Trail	7.54	Grad. & Mac.	4	4	Clifton, Applegate & Toole
Nov. 4, 1919	.....	Canyon	Baker-Cornucopia	2.5	Macadam			No bids received
Dec. 20, 1919	239	Astoria-Svensen	Columbia River	0.49	Guard Fence	3	3	R. A. McClanathan
Dec. 20, 1919	.....	Canyon	Baker-Cornucopia	2.62	Macadam	4	4	All bids rejected
Dec. 20, 1919	*241	Chehalem Cr. Bridge	West Side	.....	323, Pile Trsl.	3	3	E. D. Olds
Dec. 20, 1919	*242	N. Yamhill R. Bridge	West Side	.....	300' R.C. Viaduct	3	3	Stebinger Bros.
Dec. 20, 1919	.....	Youngs Bay Bridge	Coast	.....	150' Dbl. Lf. Basc.	26	7	All bids rejected
Dec. 20, 1919	.....	Birdseye Cr. & Millers Gulch	Pacific	.....	2 R.C. Bridges	1	1	Rejected
Feb. 5, 1920	243	Canyon	Baker-Cornucopia	4.42	Macadam	6	5	F. C. Oxman
Feb. 5, 1920	244	Youngs Bay Bridge	Coast	.....	150' Bdl. Lf. Basc.	5	4	Gilpin Construction Co.
Feb. 5, 1920	*245	Kilchis River Bridge	Coast	.....	90' Stl. Truss	1	1	Pacific Foundation Co.
Feb. 5, 1920	*246	Adams-Athena	Oregon-Wash.	.....	2 R.C. Bridges	2	2	Rhyner-Dicke Co.
Feb. 5, 1920	*247	Athena-Milton	Oregon-Wash.	.....	60' Stl. Truss	2	2	Pacific Foundation Co.
Feb. 5, 1920	248	Mosier Creek Arch	Columbia River	.....	110' R.C. Arch	4	4	Lindstrom & Feigenson
Feb. 5, 1920	.....	Dry Canyon Arch	Columbia River	.....	75' R.C. Arch	3	3	All bids rejected
Mar. 23, 1920	249	Wallowa Canyon	LaGrande-Joseph	8.38	Grading	9	9	A. D. Kern
Mar. 23, 1920	250	Deschutes Co. Line-Madras	The Dalles-Calif.	16.30	Grad. & Mac.	4	4	Oskar Huber
Mar. 23, 1920	251	Blalock-Arlington	Columbia River	9.21	Macadam	7	7	Porter & Conley
Mar. 23, 1920	252	Echo-Pendleton	Columbia River	22.0	Macadam	7	7	Porter & Conley
Mar. 23, 1920	253	Seufert-Deschutes River	Columbia River	12.5	Grading	3	3	Jas. F. Clarkson & Co.
Mar. 23, 1920	254	Pole Cr. & Canyon Cr.	John Day River	.....	Trsl. & Wd. Truss	2	2	Curtis Gardner
Mar. 23, 1920	255	Big Eddy Overcrossing	Columbia River	.....	R.C. Via. & Trsl.	9	9	Lindstrom & Feigenson
Mar. 23, 1920	256	Dillon Overcrossing	Columbia River	.....	136' R.C. Via.	9	9	Colonial Building Co.
Mar. 23, 1920	257	Seufert Viaduct	Columbia River	.....	200' R.C. Via.	9	9	Colonial Building Co.
Mar. 23, 1920	258	Prineville Bridge	McKenzie	.....	24' R.C. Span	4	4	Oskar Huber
Mar. 23, 1920	*259	Mehama Bridge	County Road	.....	240' Stl. Span	12	8	Parker & Banfield
Mar. 23, 1920	*260	Nestucca River Bridge	Coast	.....	Stl. & R.C. Struc.	4	4	Pacific Foundation Co.
Mar. 23, 1920	.....	Prineville-Davis Ranch	Crooked River	.....	6 Wood Bridges	1	1	Rejected
April 27, 1920	261	Ashland Overcrossing	Pacific	.....	Trsl. & R.C. Via.	6	6	D. M. Stevenson
April 27, 1920	262	Birdseye Cr. & Millers Gulch	Pacific	.....	2 R.C. Bridges	7	7	F. S. Carter
April 27, 1920	263	Grave Creek Bridge	Pacific	.....	Wd. Span & Trsl.	5	5	J. Elmer Nelson
April 27, 1920	264	Barlow-Aurora	Pacific	1.97	Macadam	8	8	Washburn & Hall
April 27, 1920	*265	Toledo-Newport	Corvallis-Newport	5.3	Grading	2	2	Thos. E. Young

PROPOSALS RECEIVED AND AWARDS—CONTINUED

Date	Contract Number	Project	Highway	Length Miles	Kind of Improvement	No. of Proposals	No. of Bidders	Contract Awarded to
June 1, 1920	.....	Elgin-Minam	LaGrande-Joseph	9.35	Macadam	2	2	All bids rejected
June 1, 1920	266	Mayville-Thirtymile Cr.	John Day River	6.9	Grading	7	7	Copenhagen Bros. Co.
June 1, 1920	267	Ashland Overcrossing App.	Pacific	0.2	Grading	4	4	C. H. Natwick
June 1, 1920	268	Ontario-Snake River	Old Oregon Trail	0.89	Grad. & Paving	2	2	Gilmore & Ritchie
June 1, 1920	269	Youngs Bay-Miles Crossing	Coast	0.62	Paving	5	5	Northwestern Const. Co.
June 1, 1920	270	Pilot Rock-Pendleton	Oregon-Wash.	10.48	Grad. & Mac.	2	2	Umatilla County Court
June; 1, 1920	271	Spanish Gulch Bridge	Columbia River	.....	Wd. Span & Trsl.	6	6	Hord-Brooks Co.
June 1, 1920	.....	Prineville-Davis Ranch	Crooked River	.....	4 Wd. Bridges	6	6	All bids rejected
July 6, 1920	272	Bend-Jefferson Co. Line	The Dalles-Calif.	24.2	Macadam	3	3	Wickner, Sharpe & Chindahl
July 6, 1920	273	Roseburg-Wilbur	Pacific	4.10	Macadam	3	3	John Hakanson
July 6, 1920	274	Talent Reservoir	Pacific	0.64	Grading	3	3	C. H. Natwick
July 6, 1920	275	Grave Cr.-Pleasant Valley	Pacific	7.48	Macadam	4	4	D. M. Stevenson
July 6, 1920	276	Riverdale-Hobsonville	Coast	4.69	Macadam	1	1	Tillamook County Court
July 6, 1920	277	Moore Cut-off	Coast	3.0	Macadam	2	2	Tillamook County Court
July 6, 1920	278	Beaver-Hebo	Coast	4.72	Macadam	1	1	Tillamook County Court
July 6, 1920	279	Newberg-Dundee	West Side	1.58	Macadam	3	3	E. A. Palmer
July 6, 1920	280	Cedar Point-Coquille	Coast	1.96	Paving	2	2	Scandia Shipbuilding Co.
July 6, 1920	.....	Perry-La Grande	Old Oregon Trail	2.56	Grading	2	2	Pending
July 6, 1920	.....	Sherman County	Columbia River	14.8	Macadam	1	1	Rejected
July 6, 1920	.....	Yamhill Co. Line-Butlers Store	Mc'ville-Tillamook	7.6	Grad. & Mac.	3	3	All bids rejected
July 6, 1920	284	Salem-South	Pacific	7.20	Macadam	4	4	A. D. Kern
July 6, 1920	285	Albany-Tangent	Pacific	7.41	Macadam	4	4	A. D. Kern
July 6, 1920	286	Sheridan-Polk Co. Line	Mc'ville-Tillamook	4.5	Macadam	7	7	W. N. Trent
July 6, 1920	290	N. Powder-Telocaset	Old Oregon Trail	9.06	Grading	4	4	Oxman & Harrington
July 6, 1920	.....	Elgin-Minam	LaGrande-Joseph	9.35	Macadam	4	4	Pending
July 20, 1920	305	Goldson	Will. Valley-Florence	11.29	Grading	3	3	Washburn & Hall
July 20, 1920	281	Comstock-Lane Co. Line	Pacific	.....	Culvert Const.	1	1	Sherman L. Godard
July 20, 1920	282	Across Sherman Co.	Columbia River	14.78	Macadam	1	1	Porter & Conley
July 20, 1920	283	Yam. Co. Line-Butlers St.	Mc'ville-Tillamook	7.6	Grad. & Mac.	1	1	Elliott & Scoggin
Aug. 10, 1920	287	Grants Pass-Pleasant Valley	Pacific	9.84	Grad. & Mac.	5	5	Joplin & Eldon
Aug. 10, 1920	288	Cabbage Hill-Dead Man's Pass	Old Oregon Trail	12.82	Macadam	5	5	Security Construction Co.
Aug. 10, 1920	.....	Haines-North Powder	Old Oregon Trail	7.86	Grading	....	....	No bids received
Aug. 10, 1920	289	Mosier-Rowena	Columbia River	8.96	Macadam	5	5	A. D. Kern
Aug. 10, 1920	297	Gr. Sprs. Mt. Summit-Pac. Hwy.	Ashland-Kl'th Falls	5.91	Macadam	4	4	A. Giebisch
Aug. 10, 1920	.....	Toledo-Newport	Corvallis-Newport	7.25	Macadam	1	1	Rejected

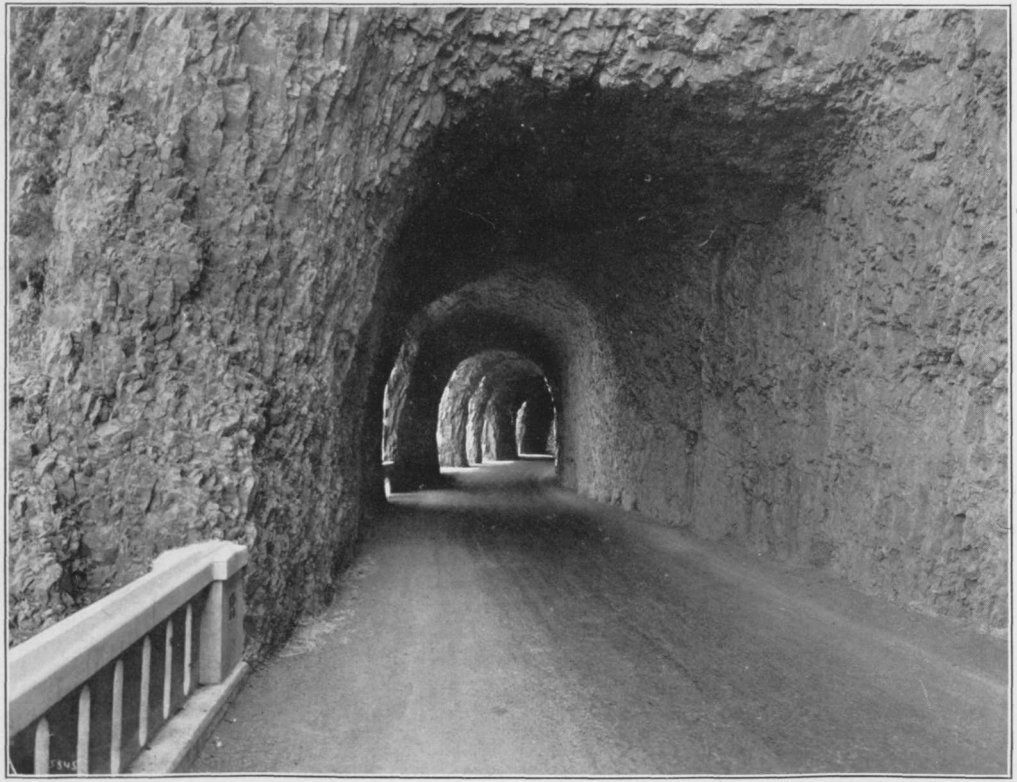
Aug. 10, 1920	.....	Benton Co. Line-West	Corvallis-Newport	5.0	Macadam	....	....	No bids received
Aug. 10, 1920	.....	John Day River-Blalock	Columbia River	15.0	Macadam	3	3	All bids rejected
Aug. 10, 1920	.....	Prineville-Davis Ranch	Crooked River	.....	4 Wd. Bridges	10	4	All bids rejected
Aug. 10, 1920	.....	Sarvice Cr. Valades Ranch	John Day River	.....	5 Wd. Bridges	7	1	All bids rejected
Aug. 10, 1920	.....	Haystack Creek Bridge	John Day River	.....	1 Wd. Bridge	2	2	All bids rejected
Aug. 24, 1920	.....	Sarvice Cr. Valades Ranch	John Day River	.....	5 Wd. Bridges	7	1	All bids rejected
Aug. 24, 1920	298	John Day River-Blalock	Columbia River	14.94	Macadam	2	2	A. D. Kern
Aug. 24, 1920	.....	Oregon City-Oswego	Pacific	6.3	Macadam	6	6	All bids rejected
Aug. 24, 1920	.....	Yamhill-Gaston	Tualatin Valley	7.9	Macadam	4	4	All bids rejected
Aug. 24, 1920	291	Butte Creek	John Day River	9.35	Macadam	4	*	Blake-Compton Co.
Aug. 24, 1920	292	Danby Ranch-Cole Bridge	John Day River	4.55	Macadam	3	3	Jim Ross
Aug. 24, 1920	293	Haines-North Powder	Old Oregon Trail	8.06	Grad. & Mac.	3	3	Oxman & Harrington
Aug. 24, 1920	294	McMinnville-West Dayton	West Side	4.94	Macadam	5	5	E. A. Palmer
Aug. 24, 1920	295	Haystack Creek Bridge	John Day River	.....	Wd. Span & Trsl.	2	2	Curtis Gardner
Aug. 24, 1920	296	Sarvice Cr.-Valades Ranch No. 2	John Day River	.....	5 Wd. Bridges	1	1	Curtis Gardner
Sept. 28, 1920	.....	Kamela-Hilgard	Old Oregon Trail	12.05	Grading	1	1	Rejected
Sept. 28, 1920	299	Ore. City-Mult. Co. Line	Pacific	5.7	Paving	7	7	Scandia Shipbuilding Co.
Sept. 28, 1920	300	Wren-Blodgett	Corvallis-Newport	4.86	Macadam	3	3	Washburn & Hall
Sept. 28, 1920	301	Newberg-West Dayton	West Side	.58	Guard Fence	5	5	Cancelled
Sept. 28, 1920	302	Hubbard Cr.-Brush Cr.	Coast	4.2	Macadam	2	2	J. W. Hillstrom
Sept. 28, 1920	303	Malheur River Bridge	John Day River	.....	180' Stl. Truss	9	5	Illinois Steel Bridge Co.
Sept. 28, 1920	304	Lawen-Crane	Central Oregon	10.46	Grad. & Mac.	6	6	Porter & Conley
Sept. 28, 1920	.....	Hood River-Mosier	Columbia River	.....	Tunnel Lining	....	....	No bids received
Nov. 6, 1920	306	Jamieson-Vale	John Day River	17.8	Macadam	5	5	Oxman & Harrington
Nov. 6, 1920	307	Agate-Trail Bridges	Medford-Crater L.	.....	4 R.C. Bridges	5	5	Albert Anderson
Nov. 6, 1920	308	Rogue River Bridge	Medford-Crater L.	.....	Stl. Structure	7	4	Portland Bridge Co.
Nov. 6, 1920	309	Miles Crossing-Warrenton	Coast	2.9	Sand Embankment	4	4	McClean & Williams
Nov. 7, 1920	310	Skipanon-Seaside	Coast	9.94	Paving	3	3	J. H. Tillman Co.
Nov. 6, 1920	311	Corvallis-South	West Side	7.96	Paving	5	5	Kibler & Bartlett
Nov. 6, 1920	312	Trail-Agate, Unit No. 1	Medford-Crater L.	2.44	Grading	3	3	Wm. von der Hellen
Nov. 6, 1920	313	Trail-Agate, Unit No. 2	Medford-Crater L.	7.22	Grading	2	2	Rhodes & Price
Nov. 6, 1920	314	Trail-Agate, Unit No. 3	Medford-Crater L.	4.69	Grading	3	3	W. B. Tull
Nov. 6, 1920	315	Newberg-West Dayton	West Side	5.9	Paving	5	5	Oregon Contract Co.
Nov. 6, 1920	310	Skipanon-Seaside	Salem-Dallas	.....	Repairs	....	....	No bids received

* Project advertised for the county.

SUMMARY OF STATE HIGHWAY WORK UNDER CONSTRUCTION DURING THE 1919-1920 PERIOD

This table covers projects awarded by the State Highway Commission and Forest Road Projects handled by the Bureau of Public Roads:

HIGHWAY	Paving Miles	Macadam Miles	Grading Miles	Estimated Cost
Pacific Highway	140.65	89.17	133.89	$ 7,022,041.03
Columbia River Highway	106.78	147.82	173.25	6,614,311.23
West Side Pacific Highway	51.26	18.84	46.53	1,969,842.42
Salem-Dallas Highway	13.07	.....	13.07	355,000.00
McMinnville-Tillamook Highway	8.00	31.69	25.34	765,207.00
John Day River Highway	.....	51.72	83.18	1,606,896.97
La Grande-Enterprise Highway	.....	.....	17.75	222,611.26
Tualatin Highway	31.95	6.75	21.59	841,921.46
Ashland-Klamath Falls Highway	.....	5.91	18.80	318,000.00
Coos Bay-Roseburg Highway	.....	.....	14.17	390,500.00
La Pine-Lakeview Highway	.....	12.87	12.87	154,000.00
Oregon-Washington Highway	26.74	10.48	39.48	1,070,625.99
Old Oregon Trail	6.89	41.71	42.05	891,342.48
Baker-Cornucopia Highway	.....	19.05	27.86	336,631.77
Crooked River Highway	.....	.....	31.99	331,500.00
McKenzie River Highway	.....	35.10	65.98	888,045.00
Crater Lake Highway	.....	7.00	39.55	597,200.00
Flora-Enterprise Highway	.....	6.00	13.00	123,000.00
Coast Highway	32.01	23.61	26.79	1,713,385.61
Corvallis-Newport Highway	.....	8.86	9.30	165,042.63
Mt. Hood Loop Highway	.....	.....	14.40	260,000.00
Grants Pass-Crescent City Highway	.....	2.40	2.40	75,300.00
Central Oregon Highway	.....	27.18	27.18	411,000.00
Klamath Falls-Lakeview Highway	.....	13.91	13.91	166,000.00
The Dalles-California Highway	2.00	78.34	74.95	1,008,576.09
Willamette Valley-Florence Highway	.....	.....	11.29	134,000.00
Mehama Bridge (County)	.....	.....	.....	48,000.00
Totals	419.35	638.41	1,000.57	$28,479,980.94



MITCHELL POINT TUNNEL. PAVED IN 1920.

Report of the

State Highway Engineer

to the

State Highway Commission

of the

State of Oregon

1919-1920

Herbert Nunn, State Highway Engineer

LETTER OF TRANSMITTAL

Salem, Oregon, December 1, 1920.

TO THE HONORABLE STATE HIGHWAY COMMISSION,
R. A. BOOTH, Chairman.
ED E. KIDDLE, Commissioner.
J. B. YEON, Commissioner.

Gentlemen:

I have the honor to submit herewith the Fourth Biennial Report of the State Highway Department for the fiscal years ending November 30, 1919, and November 30, 1920.

In reviewing the work of the past two years, I am well pleased with the progress which has been made. Many of the conditions vitally affecting highway construction have been unfavorable, but despite this fact a very considerable amount of work has been done. Probably the most serious of the adverse conditions was the shortage of labor, especially labor skilled in highway work. Other very important factors were the difficulties in securing equipment, the problems confronting contractors on account of the continuously rising material market, and the difficulty with which contractors were able to properly finance their work because of the general financial stringency, the last mentioned factor being particularly noticeable during the latter part of the 1920 season. Many of the contractors were barely able to tide themselves over these difficulties, and two contracts had to be taken over by the State on account of the contractor being unable to secure the necessary finances for his operations.

In many states difficulty has been experienced in securing competent contractors to handle state highway construction. Oregon has been fortunate in this respect, however, and our contractors have consistently handled their work in good faith and in as efficient a manner as was possible under the adverse conditions with which they were confronted.

The engineering organization has experienced in its operations some of the same difficulties faced by the contractors. The efficiency of the engineering corps has been excellent, but a number of conditions have combined to make the engineering costs somewhat higher than normal. On account of the impossibility of contractors carrying on their operations with the usual speed, nearly all of our jobs have taken a longer time for completion than would ordinarily be required. This has necessitated the maintenance of engineering crews upon the work for a longer period than usual with a corresponding increase in engineering expense.

Organization.

To handle the increasing work of the Department, it has been necessary to expand both the office space and the personnel. The offices have been enlarged to include the entire third floor of the south wing of the Capitol Building with the exception of two rooms, and the number of employees in the general office has been increased materially.

In order to keep in close touch with the details of the work, division offices have been established in central points throughout the State. The

following appointments and divisions of territory have been made: K. E. Hodgman, with headquarters at Medford, has supervision of the work in Jackson and Josephine Counties and Douglas County south of Galesville; J. C. McLeod, headquarters at Salem, Douglas County north of Galesville, Lane, Linn, Marion as far north as Salem, and Benton as far north as Corvallis; W. D. Clarke, with headsuarters at Salem, Benton County north of Corvallis, Lincoln, Polk, Tillamook, Marion County north of Salem, and Clackamas County; C. W. Wanzer, headquarters Portland, Clatsop, Columbia, Yamhill and Washington Counties; J. H. Scott, headquarters at The Dalles, Hood River, Wasco, Jefferson, Deschutes, Crook, Sherman, Gilliam, Wheeler and Grant Counties; R. H. Baldock, headquarters La Grande, Morrow, Umatilla, Union, Wallowa, Baker and Malheur Counties; E. B. Bishop, headquarters Klamath Falls, Klamath, Lake and Harney Counties; W. E. Chandler, headquarters Marshfield, Coos and Curry Counties.

The work in Tillamook and western Yamhill Counties was formerly handled by C. L. Grutze, who has now been placed in charge of the shops and equipment, and the engineering work formerly under his supervision included in Mr. Clarke's division. In 1919, M. O. Bennett handled all the Eastern and Central Oregon work, with the exception of Klamath and Lake Counties, with headquarters at Pendleton. Later, on account of the amount of work under construction, it was found necessary to divide the territory and R. H. Baldock was placed in charge of a division with headquarters at Baker, comprising Harney, Malheur, Grant and Baker Counties, and C. C. Kelley was appointed Division Engineer, with headquarters at The Dalles, to handle the work in Hood River, Wasco, Sherman, Jefferson, Crook and Deschutes Counties. Later it was found advisable to transfer Mr. Kelley to Salem, with headquarters in the general office, where he has served as Assistant State Highway Engineer, his assignment being field inspection throughout the State.

C. H. Whitmore has been appointed Assistant State Highway Engineer in charge of market road matters, working in an advisory capacity to the county courts and making general inspection of surveys and construction work being done under the market road act.

A department testing laboratory has been established at Salem and samples of roadbuilding materials and pavement are sent in from all parts of the State for test. With K. C. Hall in charge as Testing Engineer, approximately 3,300 samples have been handled during the season and a material saving has been effected over the commercial rates, as well as the advantage of handling the work quickly and directly, thus keeping in close touch with the field inspection forces.

During the 1919 season, prior to the establishment of the Department's own testing laboratory, the testing work was handled by the commercial laboratory of E. W. Lazelle. Mr. Lazelle also acted as consulting engineer and chemist during 1920.

A blueprint room has been fitted up in the Capitol Building so that necessary blueprinting in connection with the general office work is done conveniently and at a saving in time and money over work done outside.

C. B. McCullough has been appointed Bridge Engineer and under his direction the work of this department has expanded rapidly. Considerable favorable comment has been made on the structures completed.

It is thought that the engineering expenses for the years 1919 and 1920 will compare favorably with the costs in other states. The administration and supervision amounted to 1.76 per cent of the total expenditures; the surveys for State highways, 2.04 per cent; construction engineering, 5.11 per cent; engineering on county construction, 0.44 per cent; market road engineering, 0.14 per cent; or a total of 9.49 per cent for the two-year period. It will be noted that the county construction engineering and market road engineering are not offset by the corresponding expenditures for county construction and market road construction, so that engineering and overhead costs charged against the expenditures for the work accomplished make a net total of 8.91 per cent of the total expenditures.

Construction Features

On account of the rugged topography of the State, involving extremely heavy construction, alignment, gradient and width of roadbed are controlled within certain limits by the funds available. Every graded road in the State which carries a reasonable amount of traffic requires surfacing of some kind, and the more heavily traveled roads require paving to avoid excessive maintenance costs. Also, Oregon is a State of long distances, and to get mileage it has been necessary to use narrower widths of both macadam and pavement than are in some instances desirable. The problem which confronts us is not only to build a pavement which will carry the traffic, but one which can be economically constructed, using materials on hand, always keeping in mind to build well what we build.

It is a recognized fact that we have been building our pavements too soon after grading and that many of our difficulties have been caused by the desire to speed up improvements in response to the earnest solicitation of well meaning commercial bodies and public spirited citizens. Nearly every county road in preparation for paving requires numerous changes in grade and frequently changes in alignment, and these sections should not be paved until the subgrade has become thoroughly settled. The best results are obtained by graveling or macadamizing first, which serves as temporary surfacing and keeps the road open for travel as well as thoroughly compacting the roadbed and affording opportunity to correct drainage. It is thought that the desirability of gravel or macadam subgrade applies equally to bituminous or cement concrete pavement.

Traffic Regulation

I wish to call to the attention of the Commission the large number of auto stage and freight lines which have been established as fast as the highways are improved. These operate at high rates of speed which is both dangerous to other vehicle traffic and detrimental to the highway surfacing. The regulation of the widths of these vehicles as well as the loading, is necessary. It has been found, also, that regulation of trucks

carrying extremely long saw-logs and poles on trailers, is necessary for the safety of other traffic.

The uncertainty as to the loads and speed of the traffic which the pavement of the future may have to carry is the chief concern of those in charge of highway construction. Careful traffic studies show that not over five per cent of the traffic is trucks, and the question, then, is whether the State can afford to construct adequate highways for any loading the truck owners may choose to put on, or to regulate the loads within reasonable limits. The latter course seems consistent and logical.

It is necessary that the highways be classified according to the type of construction and the allowable loading and speed regulated by some central authority. Unless this is done, continued overloading and speeding on some of our lighter types of pavement will soon reduce them to ruin.

Maintenance

The present law provides that the counties may co-operate with the State in the maintenance of State highways. This method of maintenance, however, has not worked out in a practical manner because of the necessity for signing separate agreements with the several counties for each piece of work contemplated; and, because the authority is divided, there may be constant difference of opinion as to how the work should be handled. The purpose of our organization is to maintain all State highways in as good a condition as when the work was first completed, and in order to do this the patrol system must be used. This requires men experienced in this work who can be employed throughout the year.

It seems advisable at this time to recommend that all State highway maintenance be placed under the direct supervision of the State Highway Commission with the exception of those sections of the State highways which have not yet been graded or surfaced. The Commission should also be permitted to maintain such portions of the State highways which have not been improved by the State but which might be beneficial to the State at large.

I take this occasion to express my appreciation of the sincerity and earnestness of purpose of the members of the Commission in meeting the problems which come up in an impartial manner and my confidence in their judgment in directing the work to the best interests of the State at large, harmonizing and co-ordinating the conflicting factors which are met in work of this magnitude.

I also wish to acknowledge with appreciation the helpful co-operation of the Federal Bureau of Public Roads, the County Courts of the respective counties and the loyalty of the Department employees, as only by the co-ordination of forces has the result which we have obtained been possible.

Respectfully submitted,

HERBERT NUNN,
State Highway Engineer.

Report of the

State Highway Engineer

to the

Oregon State Highway Commission

December 1, 1918, to November 30, 1920

WORK ACCOMPLISHED

Since the last biennial report of the State Highway Department, there has been a very marked increase in the volume of work handled under the supervision of this Department. The actual mileage of pavement laid during the 1919-1920 biennium represents an increase of 600 per cent over the mileage of pavement laid during the previous biennium. The mileage of broken stone and gravel surfacing completed represents an increase of 220 per cent, and the mileage of grading, an increase of 450 per cent.

On the basis of actual disbursements, the work of the Department shows an increase of 460 per cent. However, this percentage does not truly represent the comparative obligation of the State in connection with completed work, due to the fact that a much larger proportion of the 1919-1920 obligations are being carried over as retained percentage under uncompleted contracts than was the case in the previous period.

Expressed in mileages of different classes of road improvement, the work completed during the years 1919 and 1920, under the supervision of the State Highway Department is as set forth in the following tabulation.

CLASS OF WORK	Miles of Completed Construction		
	1919	1920	Total
Concrete Pavements	18.5	16.4	34.9
Bituminous Pavements	144.6	167.7	312.3
Broken Stone and Gravel Surfacing	94.4	275.0	369.4
Grading	286.6	474.8	761.4

While the mileage basis for comparing volumes of highway construction is the common basis for such comparison, it does not neces-

sarily give a true comparison of the work involved. Different types in construction of the same general class represent widely different values, and should be given consideration in the comparison of mileages of work. In paving work, particularly, the types of construction used during 1919 and 1920 are, in general, heavier than the types used during the preceding biennium. This, of course, has operated to lessen the mileages of pavement constructed during the 1919-1920 period.

In addition to the grading and surfacing work referred to in the above tabulation, a very creditable showing has been made in the way of bridge construction. There have been completed 107 bridges of spans greater than eighteen feet, which bridges aggregate a total length of 10,700 feet, and represent a total expenditure of $837,000.00.

The work of the two-year period has been limited to the amounts stated above, not on account of a lack of funds to do more, but on account of the general shortage of labor, materials, equipment and other construction facilities. It is believed that the work done represents the maximum possible output of all highway contracting concerns in the state, for the period involved. All available labor and highway construction equipment was in use during the whole of each season, and the work was very materially delayed at times due to the inadequacy of transportation facilities and impossibility to secure materials as rapidly as they were needed.

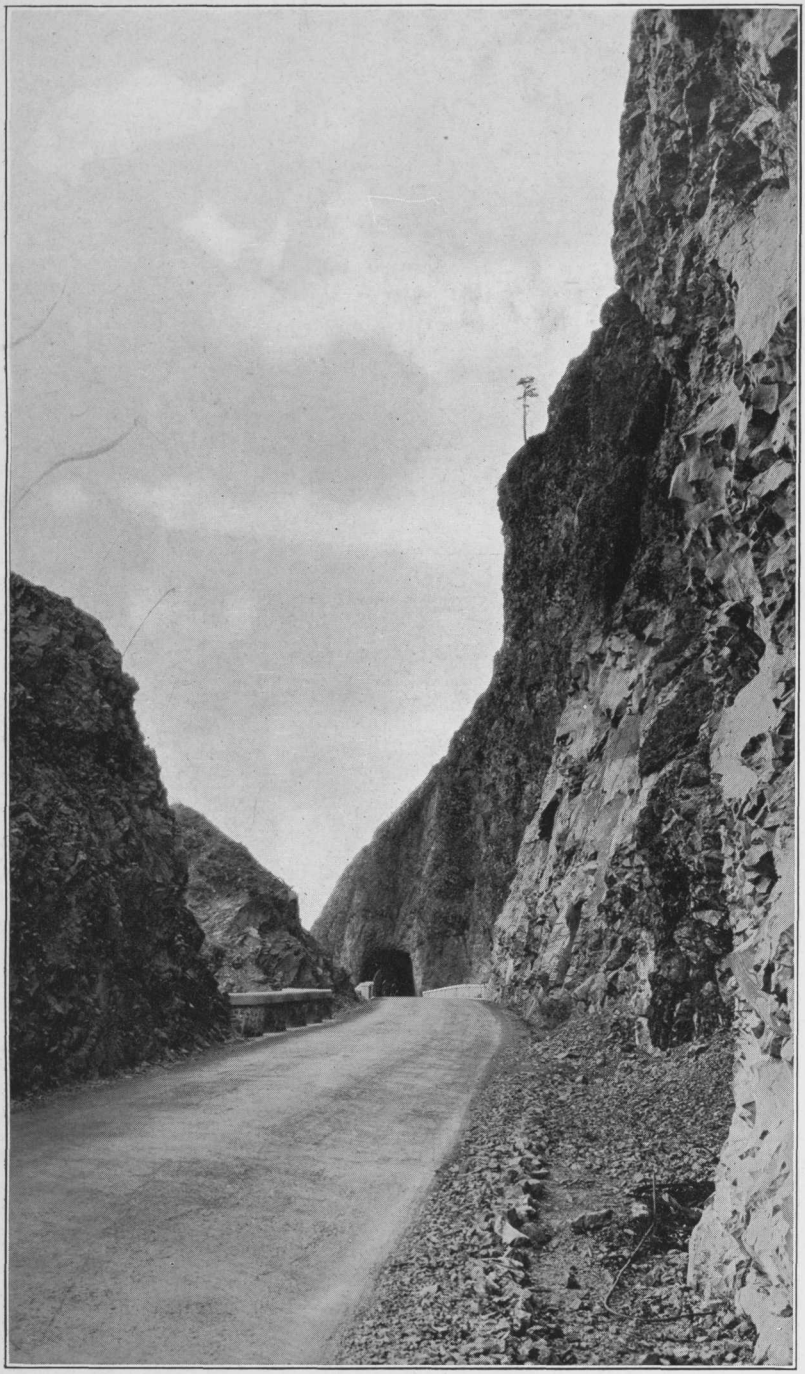
MONEYS AVAILABLE AND EXPENDED

Under the several bond issues that have been authorized, and from the several other sources of income, there has become available, since December 1, 1918, approximately $40,000,000.00 for expenditure under the supervision of the State Highway Commission, made up by $32,137,000.00 of State funds, $4,332,000.00 of Federal Government funds and $3,531,000.00 of County, City and Railroad funds. Of this amount $22,056,766.91 has been turned into Highway funds, and $20,234,177.05 has been expended. This expended total comprises the following amounts:

	1919	1920	Total
State Funds	$ 6,296,377.07	$11,362,169.83	$17,658,546.90
Federal Government Funds	224,851.60	1,096,027.33	1,320,878.93
County Funds	368,550.01	868,539.59	1,237,089.60
Railroad Funds		17,661.62	17,661.62
Totals	$ 6,889,778.68	$13,344,398.37	$20,234,177.05

This total expended amount is five and one-half times as great as the total amount expended during the 1917-1918 biennium, and is three and one-half times as great as the total amount expended for highway construction, under State jurisdiction, in all time prior to 1919.

More detailed statements of the receipts and expenditures of the Department appear in the section of this report devoted to financial statements.



APPROACHING MITCHELL POINT TUNNEL FROM THE WEST.

FUNDS AVAILABLE FOR 1921 AND 1922

Under the several authorized bond issues, there remains unsold a total par value of $13,066,799.27. Of this amount, $12,683,417.27 will be available during 1921 and 1922. This $12,683,417.27, it is estimated, will net approximately $12,000,000.00, which, together with the estimated net income from the quarter-mill tax, motor vehicle license fees, gasoline tax and all other sources of revenue, including federal government and county co-operation, will give during the years 1921 and 1922 a total amount available for expenditures for road purposes, under the supervision of the Highway Commission, of approximately $24,900,000.00.

Of this amount, there is obligated in connection with outstanding contracts, maintenance work, and general operating expense, a total of approximately $14,800,000. This leaves available for new contracts during the 1921-22 biennium, approximately $10,100,000.00.

In this connection it should be noted that during the 1919-1920 biennium, contracts were awarded by the Commission to the amount of $26,200,000.00, which amount is more than two and one-half times as great as the amount available for contracting during the coming biennium.

Of the $24,900,000.00 estimated to be available for expenditure during 1921 and 1922, $19,650,000.00 is State money, $3,000,000.00 is Federal Government money, $2,200,000.00 is County money, and $50,000.00 is railroad money. The amounts of County and railroad money include only funds which have been definitely agreed to by the authorities concerned, and do not include any amounts for anticipated future co-operation.

WORK UNDER CONTRACT

During the 1919-1920 biennium there were awarded contracts for 419 miles of paving, 638 miles of broken stone and gravel surfacing, 1,000 miles of grading and 162 bridges. Of this work there remains uncompleted on November 30, 1920, 72 miles of paving, 269 miles of broken stone and gravel surfacing, 239 miles of grading and 55 bridges, including forest road projects.

The total estimated cost of all work placed under contract is $28,500,000.00. Upon this work there has been expended approximately $18,750,000.00, leaving a total obligation under uncompleted contracts of approximately $9,750,000.00.

COLUMBIA RIVER HIGHWAY NEARING COMPLETION

The improvement of the Columbia River Highway from Astoria to Pendleton is rapidly nearing completion. During the two-year period covered by this report, 169 miles of this highway were graded, 108 miles surfaced with broken stone and gravel, and 103 miles paved. To complete this highway in accordance with present plans, there remains to be done only four miles of grading, 12.5 miles of broken stone and gravel surfacing and 25.3 miles of paving, these figures including 2.3 miles of paving within the limits of incorporated cities. Of the work remaining to be done, the four miles of grading is under contract and will be completed within a few weeks. Plans are in preparation for the remaining

sections of paving and broken stone and gravel surfacing, and contracts for this work will be awarded early in the coming year.

When these few remaining miles are completed, the Columbia River Highway will be surfaced over its entire length of 340 miles, the surfacing consisting of 204 miles of pavement and 136 miles of broken stone and gravel surfacing. The pavement will be continuous between Astoria and a point three miles east of The Dalles, and the broken stone and gravel surfacing will extend from this point to Pendleton.

At the close of the 1920 season, there is fully complete on this highway 178.7 miles of pavement and 123.5 miles of broken stone and gravel surfacing. All of this pavement is sixteen or more feet in width with an additional four feet of broken stone shoulders. All of the broken stone surfacing is sixteen feet in width. On the opposite page is given a diagram which shows in graphic form the present surfaced sections of this highway, together with those sections which remain to be improved.

While the surfacing of the Columbia River Highway has represented a task of considerable magnitude, the grading of this great highway has not only been much more costly than the surfacing, but has presented much greater difficulties. For many miles it has been necessary to construct the roadbed for this highway upon the rugged and almost vertical walls of the Columbia River Gorge, necessitating that the roadway be literally carved out of the solid rock. In many places the rock bluffs overhang the finished highway, and at no less than six places it has been necessary to tunnel through rock points which could not otherwise be overcome. For almost its entire length, the highway presents a series of concrete bridges, rock walls, overhanging rock bluffs, tunnels and other construction features of great interest from an engineering as well as from a scenic standpoint. The grading of this highway, now practically complete, represents what is probably the most difficult and costly piece of highway construction yet undertaken in America.

PROGRESS ON THE PACIFIC HIGHWAY

During the past two years the improvement of the Pacific Highway has gone forward as rapidly as the conditions encountered would permit. Although there still remains a large amount of paving work to be done before this highway will be paved over its entire length, it is now an all-year road, and may be traveled with ease at all seasons.

In bringing this highway to a condition suitable for paving, it has been necessary to relocate and regrade practically all of it, eliminating the many excessive grades, narrow roadbeds, crooked alignment, unnecessary distance, dangerous grade crossings, poor drainage, and other defective conditions which existed up to the time the surfacing of this highway was undertaken. The grading of many sections has taken as long as two years, and on account of the high fills and the character of the soil, many of the newly graded sections must be allowed two and three years for settlement before they are in a condition to receive pavement. All of the heavy grading, except a ten-mile section between Myrtle Creek and Canyonville, which, until recently, has been held up by injunction, has now been completed, however, and the placing of pavement can proceed as rapidly as permanent settlement of fills is reached.

COLUMBIA RIVER AND PACIFIC HIGHWAYS

Diagram showing status of surfacing on Nov. 30, 1920

LEGEND

- Paved
- Broken stone or gravel
- Not surfaced

SCALE OF MILES

COLUMBIA HIGHWAY
- Total Length of Highway 340.1 Miles.
- Miles Paved, to Nov 30, 1920, 178.7 Miles.
- Miles Surfaced with Gravel and Broken Stone, to Nov 30, 1920, 123 5 Miles.

COLUMBIA RIVER HIGHWAY

ASTORIA — City Limits — Road to Svensen — Road to Knappa — Road to Wauna — Westport — Co. Line, Columbia-Clatsop — Kerry — Marshland — Clatskanie — Delena — Rainier — Goble — Deer Isl. — Warren — Scappoose — County Line, Multnomah-Columbia — Linnton — PORTLAND — Troutdale — Sandy River — Springdale — Corbett — Bridal Veil — Multnomah Falls — Dodson — Warrendale — Bonneville — Eagle Creek — County Line, Multnomah-Hood River — Cascade Locks — Wyeth — Mitchell Pt Tunnel — HOOD RIVER

Miles 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Approx. 1 mile within City Limits, improved

0.9 mile within City Limits, improved

Within City Limits

Co. Line — Moser — Rowena — THE DALLES — Seufert — Big Eddy — Celilo — Deschutes River, Wasco-Shermans Line — Biggs — Rufus — Hell Roaring Canyon — Quinton — Blalock — Arlington — Co. Line — Castle Rock — Boardman — Irrigon — County Line, Morrow-Umatilla — Umatilla — Hermiston — Stanfield — Echo — Reith — PENDLETON

180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340.1

Temporarily surfaced with Broken Stone, until subgrade is in condition to pave

Grading under contract, will be surfaced with Gravel in 1921

WEST SIDE AND PACIFIC HIGHWAYS

WEST SIDE HIGHWAY
- Total Length of Highway, 113.3 Miles.
- Miles Paved, to Nov. 30, 1920, 58.5 Miles.
- Miles Surfaced with Gravel and Broken Stone, to Nov. 30, 1920, 25.5 Miles.

WEST SIDE HIGHWAY

PORTLAND — Js. West Side Hwy. and Beaverton-Bertha — Multnomah — Co. Line, Multnomah-Washington — Tualatin-Wilsonville Road — Tigard — Road to Durham — Road to Tualatin — Sin Corners — Co. Line, Washington-Yamhill — Kerr Sta. — Newberg — Dundee — Road to Dayton — Lafayette — Js. West Side and Tualatin Valley Hwys — McMINNVILLE — Whiteson — Amity — Rickreall — MONMOUTH — CORVALLIS — Monroe — JUNCTION CITY

Miles 0 10 20 30 40 50 60 70 80 90 100 110 113.3

Under Contract For Paving — Under Contract For Gravel surfacing — Requires Re-grading, will not be ready for Pavement before 1922 — Under Contract For Paving — Requires Re-grading, will not be ready for Pavement before 1922 or 23 — Requires Re-grading, will not be ready for Pavement before 1922 — Under contract for Paving. — Ready For Pavement in 1921

PACIFIC HIGHWAY

PORTLAND — Co. Line, Multnomah-Clackamas — Oswego — Bolton — OREGON CITY — New Era — Canby — Barlow — Aurora — Hubbard-Four Corners — Woodburn — Gervais-Four Corners — Scotts-Four Corners — SALEM — Liberty-Rosedale Rd — Jefferson — ALBANY — Tangent — Shedd — Halsey — Alford — Harrisburg — JUNCTION CITY — Santa Clara — EUGENE — Pacific Highway-McKenzie River Hwy — Goshen — Creswell — Walker — Saginaw — COTTAGE GROVE — Latham — Rd. to London Springs — Veatch — Divide — Co. Line, Lane-Douglas — Comstock — Leona — Drain — Yoncalla

Miles 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Under contract for Paving

About 1 mile of temporary surface to be done when Right of Way in City Limits

Temporarily surfaced with gravel. Road has small differences in road surface. Good detours

Temporarily surfaced with gravel. Road has small differences in road surface. Fair conditions to Pave.

Within City limits.

Temporarily surfaced with Gravel until sub-grade is in condition to Pave

One mile within City limits, not Gravel

Temporarily Surfaced with Gravel. Ready for Pavement in 1921

This section requires some Re-grading before it can be Paved. Old road between these points has Fair Gravel Surface.

To be Re-graded and graveled in 1921. Old road between these points has fair Gravel surface.

Ready for Pavement

To be Graded, Good detour

All good Macadam. Most of this ready for Pavement in 1921

Ready for Pavement in 1921

Oakland — Sutherlin — Wilbur — Winchester — ROSEBURG — Dillard — Myrtle Creek — Rd to Riddle — Canyonville — Galesville — Rd to Glendale — County Line, Douglas-Jackson — Wolf Creek — Sexton Mtn — GRANTS PASS — County Line, Josephine-Jackson — Gold Hill — Central Point — MEDFORD — Phoenix — Talent — ASHLAND — Steinman — Siskiyou — Summit — ORE.-CALIF. STATE LINE

170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 345.6

Ready For Pavement in 1921.

Under contract for Paving

Temporarily surfaced with gravel until sub-grade is in condition to Pave.

Ready for Pavement in 1921

1500 ft. ungraded within city limits of Roseburg. Fair detour.

Requires new bridge and some grading within City Limits. Fair detour.

Under contract for grading. Good detour

Surfaced with broken stone and gravel until sub-grade is in condition to Pave.

Surfaced with broken stone until in condition to Pave.

Under contract for broken stone surfacing. Old road passable between these points.

Under contract for Paving

Under contract for Paving.

Under contract for Paving

PACIFIC HIGHWAY
- Total Length of Highway, 345.6 Miles.
- Miles Paved, to Nov. 30, 1920, 173.8 Miles.
- Miles Surfaced with Gravel and Broken Stone.
- to Nov. 30, 1920, 115.8 Miles.

Note:- Wherever the Pacific Highway is shown unsurfaced, surfaced detour roads are available.

The total mileage of pavement laid on this 345-mile highway to November 30, 1920, aggregated 173.8 miles. In addition to this, 17.7 miles are under contract for paving, and it is estimated that an additional seventy miles will have reached settlement and be ready to pave during the 1921 season. It will probably be safe to complete the pavement of the entire highway during 1922.

The work done on the Pacific Highway during 1919 and 1920 consists of 121.8 miles of paving, 76.2 miles of broken stone and gravel surfacing, and 110.6 miles of grading. There remains to be done to complete the improvement between Portland and the California State line, 43 miles of grading, 56 miles of broken stone or gravel surfacing and 171.8 miles of pavement, of which nine miles of grading, thirteen miles of broken stone or gravel surfacing and 17.7 miles of paving are now under contract.

Adjacent hereto will be found a diagram showing in a graphical manner the present status of the surfacing of the Pacific Highway, and briefly describing the conditions of those sections which are still unpaved.

PROGRESS ON WEST SIDE HIGHWAY

What is generally called the West Side Pacific Highway from Portland, through Newberg, McMinnville, Monmouth and Corvallis, to a junction with the Pacific Highway at Junction City, is now slightly over half paved. The total length of this highway is 113.3 miles, of which 58.5 miles is paved and 25.5 miles surfaced with broken stone and gravel.

There remains to be brought to standard grade and alignment, three sections, aggregating 23.8 miles. Twenty-nine miles of temporary rock or gravel surfacing remain to be placed to facilitate traffic until the newly graded roadbeds are settled and ready to pave. And then, 54.8 miles of pavement will complete the improvement of this important State highway.

Of the work remaining to be done, 16.4 miles of paving and five miles of broken stone surfacing are under contract. Of the 38.4 miles of paving not yet contracted, the ten miles between Monroe and Junction City will be in a condition to pave during the 1921 season, but the balance should not be paved until 1922 or later.

Some delay in the improvement of this highway has resulted on account of the failure of the Polk County Court to proceed with the preparing of the grade across Polk County upon the location adopted by the Highway Commission. It was hoped that the paving across this county could be completed during the 1921 season, but this will not now be possible.

The present status of the surfacing on the West Side Highway is very clearly shown upon the accompanying diagram.

POST ROAD PROJECTS

During the 1919-1920 biennium no less than twenty per cent of the work of the Highway Department has been co-operative work with the Federal Government under the Federal Aid Post Road Act. In connection with these co-operative projects, all plans are prepared, contracts

awarded, and construction supervised by the State Highway Department subject to the approval and final acceptance of the Secretary of Agriculture acting through the United States Bureau of Public Roads. The Federal Government will co-operate on approved projects to the extent of fifty per cent of the cost with two limitations. The first limitation is that the government participation shall not exceed $20,000.00 per mile exclusive of bridges over twenty feet clear span, and the second is that their share shall not be in excess of the amount provided in the project agreement or in excess of fifty per cent of the final cost of construction based upon the itemized statement of quantities given in the project agreement estimate. An allowance of ten per cent of the construction cost for engineering and contingencies is made on all projects. This percentage is figured in the government co-operation and payment is allowed for all actual engineering and contingency items incurred up to the given limitation. In actual practice, however, it has been found impracticable to collect a government proportion of the full fifty per cent. Of the total projects put under way in this State, it is calculated that the government will pay 45.51 per cent and the State and County 54.49 per cent. This apparent failure to collect the full fifty per cent is occasioned by construction items occurring on the work which cannot be determined at the time of preparing the project agreement estimate. On June 30, 1920, the Secretary of Agriculture had approved post road projects in the United States to a total of $384,916.819.00. The Federal co-operation on these amounted to $163,841,503.00, or 42.56 per cent of the total. In view of this general average for the United States, it is felt that the State Highway Department of Oregon is securing as great a proportion of Federal aid as may reasonably be expected.

In the handling of Federal aid post road work, the Secretary of Agriculture has promulgated certain regulations with which the various states must comply. The first step in securing Federal aid on a project is the presentation to the Bureau of Public Roads of what is known as a project statement. This project statement sets out the proposed project in detail, giving the exact location of the work, the mileage involved, class of improvement contemplated, a detailed statement of quantities with their estimated costs, and a showing of the local authority funds which are available for the prosecution of the work. Upon the approval of the project statement, detailed plans are prepared and submitted. Upon award of the contract, the Bureau of Public Roads is furnished with a project agreement estimate which sets out all the various construction quantities and the contract unit prices applicable. This project agreement estimate is used as a basis for the preparation of the project agreement, which is executed by both the Secretary of Agriculture and the State Highway Commission. Upon execution of this agreement, the project is eligible for the payment of government funds as the work progresses. The State advances the funds required to carry on the work, and bills the Federal Government from time to time for its proportionate part of the cost.

Federal statutes require that all moneys be expended during the fiscal year for which they had been appropriated, but the Department of Agriculture has ruled that the execution of a formal project agreement and the setting aside of the funds in the Treasury of the United

States constitutes a definite obligation and is an expenditure within the meaning of the law, regardless of whether or not any construction on the project is actually accomplished within the particular fiscal year. The State of Oregon has fully met all Federal funds available to June 30, 1920, and has until June 30, 1922, to place the 1921 apportionment under project agreement, although the actual construction of the projects may continue for an indefinite period beyond that time. No difficulty is anticipated in fully meeting all the Federal aid allotted to Oregon as there only remains an amount of $354,608.80 unmatched at the present time.

During the biennium covered by this report, good progress has been made in securing Federal co-operation and in carrying out work under the Federal Aid Act. To date a total of fifty projects have been submitted for post road co-operation. Six of these projects have been withdrawn or rejected and the other forty-four have been placed under contract and are either completed or in the course of construction at the present time. Two jobs, the John Day-Fisk Creek and the Hall Hill-Prairie City sections, were contracted during 1918, the balance having been placed under way during the last two years.

The post road work as a whole is of considerable magnitude. The total length of the various projects aggregate 441 miles and the work involved consists of 369 miles of grading, 272.4 miles of macadamizing and 62.63 miles of paving. The total estimated cost of this work is $8,739,404.24, the State paying $3,758,875.85, the various counties $1,002,-958.92 and the Federal Government $3,977,569.47. Total expenditures to date amount to $4,584,490.23, leaving a cost to complete of $4,154.914.01. The total expenditures made comprise $3,043,902.60 from State funds, $219,708.70 from County funds and $1,320,878.93 from Federal Government funds. A complete detailed statement of these expenditures will be found in Table IX, which is published in another portion of this report.

FOREST ROAD PROJECTS

A very considerable amount of highway improvement has been acquired by the State by co-operation with the Federal Government under what is known as the Federal Forest Road Act. Under this act Federal money is appropriated for the improvement of roads in or adjacent to national forests. These forest road improvements are handled under the supervision of the United States Bureau of Public Roads representing the United States Forestry Department. By this Bureau the surveys are made, plans prepared, contracts awarded and construction supervised. The general location and type of construction is, of course, subject to the approval of the Highway Commission, but the detail of the work is entirely in the hands of the Bureau of Public Roads.

In connection with Forest Road Projects, the State usually co-operates to the extent of fifty per cent of the cost, and after the construction work is completed, the State becomes solely responsible for necessary maintenance work.

To date, co-operative forest road agreements have been entered into for nineteen separate projects, of which number thirteen call for construction work and six for surveys only. The total mileage amounts to

338 miles, comprising 217.6 miles of construction work and 120.4 miles of surveys. At the present time there are under construction or completed, 57.6 miles of grading and surfacing and 76.4 miles of grading only, leaving 83.6 miles upon which construction has not yet been commenced.

The total estimates for projects under the agreements now executed amount to $3,026,061.45, the State participating to the extent of $1,471,-102.52, the various counties $213,149.87 and the Federal Government $1,341,809.06. Total expenditures to date amount to $1,568,241.67. Of this amount the State has expended $809,261.58, including $7,152.61 expended during 1918, the various counties $102,271.45 and the Federal Government $656,708.64. The amounts given as expended by the counties and Federal Government are based upon figures furnished by the Portland office of the Bureau of Public Roads. The State has no part in the expenditures of these funds and they will not be found included in any of the State fiscal data given in this report.

An itemized statement of the status and expenditures on the various Forest Road Projects will be found in Table X, which is published in another portion of this report.

FEDERAL AID APPORTIONED TO OREGON

The following tabulation shows the funds that have been apportioned to the State of Oregon under the Federal Aid Acts of 1916 and 1919.

Period for Which Funds Are Appropriated	Post Roads	Forest Roads	Total
Act of July 11, 1916:			
July 11, 1916, to June 30, 1917	$ 78,687.00	$ 127,794.00	$ 206,481.00
July 1, 1917, to June 30, 1918	157,375.00	127,794.00	285,169.00
July 1, 1918, to June 30, 1919	236,332.85	127,794.00	364,126.85
July 1, 1919, to June 30, 1920	314,983.64	127,794.00	442,777.64
July 1, 1920, to June 30, 1921	394,038.01	127,794.00	521,832.01
July 1, 1921, to June 30, 1922	.....	127,794.00	127,794.00
July 1, 1922, to June 30, 1923	.....	127,794.00	127,794.00
July 1, 1923, to June 30, 1924	.....	127,794.00	127,794.00
July 1, 1924, to June 30, 1925	.....	127,794.00	127,794.00
July 1, 1925, to June 30, 1926	.....	127,794.00	127,794.00
Act of February 28, 1919:			
Feb. 28, 1919, to June 30, 1919	787,459.10	218,871.00	1,006,330.10
July 1, 1919, to June 30, 1920	1,181,188.65	218,871.00	1,400,059.65
July 1, 1920, to June 30, 1921	1,182,114.02	158,939.00	1,341,053.02
Totals	$4,332,178.27	$1,874,621.00	$6,206,799.27

CO-OPERATION WITH COUNTIES IN WORK ON STATE HIGHWAYS

During the 1919-1920 period co-operative agreements have been entered into with counties whereby $3,459,807.27 of County money has been obligated for expenditure upon State Highways under contracts awarded by the State Highway Commission. Of this amount $1,237,089.60 was disbursed during the two-year period, of which $397,347.92 was paid out by the counties upon vouchers drawn by the State Highway Department, and $839,741.68 was paid into the State Highway Fund for direct disbursment by the State. The details of

amounts obligated and amounts expended by each county, showing the particular pieces of work involved, will be found in the part of this report devoted to detailed financial statements.

In addition to the above, counties have obligated themselves to the extent of $213,149.87 in connection with Forest Road construction. This work is all on State highways, but is expended under the direction of the U. S. Bureau of Public Roads representing the Forestry Department. County expenditures during 1919-1920 on these Forest Roads amount to $100,731.39 in addition to $1,540.06 expended prior to this period.

COUNTY FORCE WORK ENGINEERED BY STATE HIGHWAY DEPARTMENT

The State Highway Department has engineered a very considerable amount of what is classed as strictly County work. This class of work is either done by County forces or under contracts let by the counties. All bills for construction items are paid directly by the counties and are not audited by the State Highway Department as are bills upon the county co-operative work described in the preceding article. No record is available of the amounts expended by counties upon work of this class, but it is estimated to be not less than $1,000,000.00 during the 1919 and 1920 seasons. Umatilla County, alone, expended more than $500,000.00 for work of this kind.

Engineering supervision for work of this kind, all of which is on State Highways, is furnished to the counties by the State, without charge.

RAILROAD CO-OPERATION IN GRADE CROSSING ELIMINATION

During the two year period covered by this report a number of agreements have been entered into whereby railroad companies co-operate with the State and Counties in the elimination of grade crossings. The total amount of railroad funds obligated under these agreements is $71,012.99 of which amount $17,661.62 was disbursed during 1919 and 1920.

The grade crossing eliminations involved in these agreements together with the estimated costs and amounts of State, County and railroad co-operation are as follows:

PROJECT	Estimated Total Cost	CO-OPERATION		
		State	County	Railroad
Douglas County—				
Comstock Overcrossing	$ 22,547.96	$ 9,932.93	$ 4,205.01	$ 8,410.02
Jackson County—				
Overcrossing South of Ashland	48,000.00	19,200.00	9,600.00	19,200.00
Tolo Overcrossing	32,431.87	12,972.75	6,486.37	12,972.75
Lane County—				
Grading to eliminate four grade crossings between Walker and Cottage Grove	49,602.38	1,686.25	28,485.91	19,480.22
Overcrossing near Divide	27,500.00	8,250.00	8,250.00	11,000.00
Totals	$180,082.21	$52,041.93	$57,027.29	$71,012.99

In addition to the grade crossing eliminations referred to in the above tabulation, a very large number of grade crossings have been eliminated as far as through traffic is concerned, as a result of the regrading and relocation of State highways. Many old roads which cross and recross railroad tracks have been replaced by highways continuing on one side of the tracks, and, where absolutely necessary to cross, doing so by means of overhead and undergrade crossings. As a result of this practice the State highways of Oregon are noticeably free from grade crossings as compared with the State highways of other states and the danger of grade crossing accidents has been very materially reduced.

MARKET ROADS

With a view to encouraging the improvement of county roads, there was enacted in 1919 a law creating a fund to be used in aiding counties in the construction of market roads. The act provides that this fund be apportioned to those counties which qualify for State aid under the market road act, in proportion to the amounts contributed by them, and only those counties are entitled to State aid which by special county tax raise an amount equal to a 1-mill levy upon all taxable property in the county, or an amount equal to the amount of the counties' apportionment from the State Market Road Fund. It further provides that no county be apportioned in any one year more than ten per cent of the total amount of the fund.

The distribution of the State Market Road Fund is made by the State Highway Commission. The funds are expended by the county courts upon work handled under their supervision with the provision that the work done be upon locations and grades approved by the State Highway Commission.

The fund for 1920, the year in which the Market Road Act became operative, amounted to $990,435.46, which amount was distributed among the counties of the State on the following basis:

The amount of the Multnomah County apportionment was fixed by the ten per cent limit on the amount to be apportioned to any one county. Multnomah County therefore received $99,043.55.

The sum of $633,155.89, which is the sum of the contributions of all counties excepting Multnomah, was apportioned by turning back to each county the amount which it had contributed.

The balance of the fund, $258,256.02, representing the excess of Multnomah County's contribution above the amount which could be apportioned to that county, was apportioned among the other counties in direct ratio to their original contributions, which, of course, is also in direct ratio to their assessed valuations.

The total of the amounts raised by the several counties to match the State apportionments for 1920, as shown by resolutions of their respective county courts, on file with the State Highway Commission, was $959,574.78, which, together with the $990,435.46 of State funds, makes $1,950,010.24, the total amount available for market road improvement for the year.

The first apportionment of State Market Road Funds was authorized by the State Highway Commission on June 1, 1920, the total of the

apportionments authorized at this time being $366,099.72. The apportionment of the remaining $595,699.97 was authorized on November 6. The amounts apportioned to each county are shown in the accompanying table.

The act provides that market roads shall be constructed only under the supervision and control of the county courts of the various counties; that the State Highway Commission shall furnish plans and specifications for the construction and shall supervise the surveys and establish the grades.

In 1920 most of the market road surveys and preparation of plans and estimates were made by County Engineers and Roadmasters, under the supervision of the State Highway Commission, the plans being sent to the office of the State Highway Engineer for approval.

The construction work accomplished during 1920 is probably less than may be expected in future years, because of the fact that funds were not available until late in the season and the details of the operation of the act were not thoroughly understood.

In spite of these conditions, however, a very considerable amount of work was done. Approximately 200 miles of road was graded, of which approximately fifty miles was new construction and 150 miles re-shaping and widening in preparation for surfacing. Approximately thirteen miles of pavement and 136 miles of crushed rock and gravel surfacing were constructed. See Table on page 46.

The total amount expended upon market road construction during the season was approximately $1,518,610.40, leaving a balance unexpended of approximately $421,399.80, which is in the hands of the various county courts for expenditure in 1921.

The details of the apportionment of funds to the different counties, the expenditures and the mileages of completed work are set forth in the following tables.

APPORTIONMENT OF 1920 STATE MARKET ROAD FUNDS

COUNTY	Paid Into State Market Road Appropriation	Pro rata Share of Multnomah County Surplus	Total Apportionment of State Market Road Funds	Turned Over to Counties in June 1920	Expended by Highway Commission in Connection With Market Road Work	Turned Over to Counties in November 1920
Baker	$ 23,470.21	$ 9,572.45	$ 33,042.66	$ 11,735.10	$ 77.39	$ 21,230.17
Benton	12,118.67	4,942.66	17,061.33	6,059.34	0.00	11,001.99
Clackamas	33,811.56	13,790.23	47,601.79	16,905.78	3,320.35	27,375.66
Clatsop	28,517.55	11,631.04	40,148.59	14,258.77	0.00	25,889.82
Columbia	14,514.11	5,919.66	20,433.77	7,257.06	21.29	13,155.42
Coos	22,125.68	9,024.08	31,149.76	11,062.84	0.00	20,086.92
Crook	6,021.32	2,455.83	8,077.15	3,010.66	184.95	5,281.54
Curry	3,767.72	1,536.68	5,304.40	1,883.86	852.52	2,568.02
Deschutes	10,079.20	4,110.86	14,190.06	5,039.60	953.23	8,197.23
Douglas	26,317.11	10,733.57	37,050.68	13,158.55	0.00	23,892.13
Gilliam	10,466.83	4,268.96	14,735.79	5,233.42	676.54	8,825.83
Grant	7,948.11	3,241.68	11,189.79	3,974.05	12.22	7,203.52
Harney	11,299.10	4,608.40	15,907.50	5,649.55	1,000.75	9,257.20
Hood River	9,777.04	3,987.61	13,764.65	4,888.52	715.72	8,160.41
Jackson	29,203.55	11,910.82	41,114.37	14,601.78	4,240.79	22,271.80
Jefferson	5,233.73	2,134.60	7,368.33	2,616.86	210.40	4,541.07
Josephine	8,046.01	3,281.60	11,327.61	4,023.01	3,666.47	3,638.13
Klamath	16,635.61	6,784.92	23,420.53	8,317.80	0.00	15,102.73
Lake	11,104.29	4,528.95	15,633.24	5,552.15	1,525.97	8,555.12
Lane	39,718.64	16,199.45	55,918.09	19,859.32	0.00	36,058.77
Lincoln	7,327.82	2,988.69	10,316.51	3,663.91	0.00	6,652.60
Linn	30,299.15	12,357.67	42,656.82	15,149.57	0.00	27,507.25
Malheur	14,783.84	6,029.66	20,813.50	7,391.92	1,807.24	11,614.34
Marion	41,521.29	16,934.70	58,455.99	20,760.65	0.00	37,695.34
Morrow	11,132.26	4,540.35	15,672.61	5,566.13	784.62	9,321.86
Multnomah	357,279.57	0.00	99,043.55	49,521.77	0.00	49,521.78
Polk	17,389.67	7,092.47	24,482.14	8,694.84	0.00	15,787.30
Sherman	10,948.94	4,465.58	15,414.52	5,474.47	134.19	9,805.86
Tillamook	16,121.40	6,575.20	22,696.60	8,060.70	0.00	14,635.90
Umatilla	44,369.21	18,096.22	62,465.43	22,184.60	0.00	40,280.83
Union	21,064.59	8,591.31	29,655.90	10,532.30	488.18	18,635.42
Wallowa	14,188.85	5,787.00	19,975.85	7,094.42	29.95	12,851.48
Wasco	16,487.40	6,724.48	23,211.88	8,243.71	0.00	14,968.17
Washington	29,302.48	11,951.18	41,253.66	14,651.24	1,446.87	25,155.55
Wheeler	5,189.42	2,116.53	7,305.95	2,594.71	234.98	4,476.26
Yamhill	22,853.53	9,320.93	32,174.46	11,426.76	6,251.15	14,496.55
Totals	$990,435.46	$258,236.02	$990,435.46	$366,099.72	$28,635.77	$595,699.97

STATEMENT OF MARKET ROAD FUNDS AVAILABLE AND EXPENDED DURING 1920

COUNTY.	County Levy in Mills as Reported by County Courts	County Fund Produced by Levy Shown in Col. 1	Amount Apportioned to Counties	Total Available to County for Expenditure	Approximate Amount Expended in 1920	Approximate Amount Unexpended
Baker	1.0	$ 26,760.38	$ 33,042.66	$ 59,803.04	$ 46,787.07	$ 13,015.97
Benton	1.0	11,054.02	17,061.33	28,115.35	16,000.00	12,115.35
Clackamas	1.25	36,623.86	47,601.79	84,225.65	34,000.00	50,225.65
Clatsop	1.3636	41,381.11	40,148.59	81,529.70	81,529.67	.....
Columbia	2.0	26,919.34	20,433.77	47,353.11	20,000.00	27,353.11
Coos	1.0	23,545.54	31,149.76	54,695.30	45,300.00	9,395.30
Crook	1.98	9,968.59	8,477.15	18,445.74	18,000.00	445.74
Curry	1.0	4,868.68	5,304.40	10,173.08	10,173.08	.....
Deschutes	1.0	8,887.27	14,190.06	23,077.33	23,077.33	.....
Douglas	1.0	28,005.94	37,050.68	65,056.62	20,797.80	34,258.82
Gilliam	1.57	22,493.89	14,735.79	37,229.68	676.54	36,553.14
Grant	2.0	16,674.66	11,189.79	27,864.45	27,864.45	.....
Harney	1.0	12,883.07	15,907.50	28,790.57	23,000.00	5,790.57
Hood River	1.3635	12,972.03	13,764.65	26,736.68	24,000.00	2,736.68
Jackson	2.0	55,051.78	41,114.37	96,166.15	96,166.15	.....
Jefferson	1.0	5,171.76	7,368.33	12,540.09	12,540.09	.....
Josephine	4.0	35,270.80	11,327.61	46,598.41	46,598.41	.....
Klamath	.....	17,703.16	23,420.53	41,123.69	7,874.99	33,248.70
Lake	1.0	12,323.32	15,633.24	27,956.56	27,956.56	.....
Lane	1.0	35,021.63	55,918.09	90,939.72	57,800.00	33,139.72
Lincoln	1.0	9,357.68	10,316.51	19,674.19	17,000.00	2,674.19
Linn	1.18	35,873.23	42,656.82	78,530.05	67,250.00	11,280.05
Marion	2.0	13,709.79	20,813.50	34,523.29	34,523.28	.....
Malheur	1.0	84,584.28	58,455.99	143,040.27	141,000.00	2,040.27
Morrow	1.0	14,046.73	15,672.61	29,719.34	29,719.34	.....
Multnomah	0.3	100,000.00	99,043.55	199,043.55	199,043.55	.....
Polk	.....	23,867.00	24,482.14	48,349.14	3,000.00	45,349.14
Sherman	1.3635	20,882.39	15,414.52	36,296.91	36,296.91	.....
Tillamook	1.3635	30,079.16	22,696.60	52,775.76	37,140.00	15,635.76
Umatilla	1.0	49,240.06	62,465.43	111,705.49	97,593.08	14,112.41
Union	1.0	25,938.93	29,655.90	55,594.83	55,594.83	.....
Wallowa	1.0	17,472.15	19,975.85	37,448.00	37,448.00	.....
Wasco	1.0	18,297.39	23,211.88	41,509.27	41,509.27	.....
Washington	1.54	34,987.21	41,253.66	76,240.87	35,000.00	41,240.87
Wheeler	1.0	6,390.25	7,305.95	13,696.20	1,000.00	12,696.20
Yamhill	1.5	31,267.70	32,174.46	63,442.16	45,350.00	18,092.16
Totals		$959,574.78	$990,435.46	$1,950,010.24	$1,518,610.40	$421,399.80

SUMMARY OF MARKET ROAD CONSTRUCTION DURING 1920

COUNTY	Miles Paved	Miles Surfaced with Broken Stone or Gravel	Miles Graded
Baker	.....	4.4	9.9
Benton	.....	1.9	1.9
Clackamas	.....	2.5	5.3
Clatsop	2.7	.....	2.7
Columbia	.....	.....	1.0
Coos	.....	1.7	4.3
Crook	.....	5.0	10.0
Curry	.....	.....	2.8
Deschutes	.....	2.9	6.9
Douglas	.....	7.7	1.0
Gilliam	.....	.....	.....
Grant	.....	.....	4.8
Harney	.....	.....	14.8
Hood River	0.4	.....	0.4
Jackson	.....	4.0	9.0
Jefferson	.....	1.9	2.9
Josephine	.....	10.0	11.0
Klamath	.....	.....	5.5
Lake	.....	.....	4.0
Lane	.....	5.7	5.7
Lincoln	.....	2.0	2.5
Linn	.....	16.7	16.7
Malheur	.....	1.5	5.0
Marion	6.0	19.8	19.8
Morrow	.....	.....	3.5
Multnomah	3.9	5.7	2.5
Polk	.....	.....	2.0
Sherman	.....	2.3	0.9
Tillamook	.....	1.8	1.6
Umatilla	.....	11.4	11.4
Union	.....	9.1	11.9
Wallowa	.....	.....	5.0
Wasco	.....	5.2	5.2
Washington	.....	9.0	1.5
Wheeler	.....	.....	.....
Yamhill	.....	4.0	11.0
Totals	13.0	136.2	204.4



EIGHTEEN-FOOT CONCRETE PAVEMENT ON THE COAST HIGHWAY SOUTH OF ASTORIA. LAID IN 1920.

PAVING

Following out the apparent intent of the Legislature as expressed in the several laws governing State highway work, the Highway Commission in awarding paving contracts has made it a practice to consider, on a competitive basis, two or more types of pavement for each paving job. Every job has been thrown open to competitive bidding on both concrete and bituminous pavements, and the award has always been made for the type upon which the lowest total bid was received. The thickness and general makeup of each type has necessarily varied with the condition of subgrade, the character of available materials, and the class of traffic to be carried, and there has been a gradual tendency toward heavier types of pavements to meet traffic conditions which are continually becoming more and more severe.

Except where subgrade conditions are unusually favorable, as on sections having heavy gravel or broken stone surfacing of sufficient width and at proper grade to form an absolutely rigid foundation, it is now standard practice to specify for bituminous pavement a thickness of 8 inches consisting of a 2-inch bituminous wearing surface, with a 3-inch bituminous base, on a 3-inch broken stone macadam sub-base, and for concrete pavements, a thickness of 7 inches. It is generally considered that there is little to choose between these two types of pavements, each type having advantages over the other under certain circumstances.

From the standpoint of cost, the two types of pavement are as nearly competitive as it is possible to obtain. While most of the pavement constructed by the Highway Commission has been of the bituminous type, no less than 55 miles of concrete pavement has been placed under contract during the past two years. The chief factor which has operated to throw the majority of contracts to bituminous types of pavement is that the paving contractors in this state have been better equipped to lay bituminous pavements than concrete, and for this reason only a very limited number of contractors have been in a position to bid on concrete pavements.

A factor which prevents concrete pavements from being laid more cheaply than bituminous pavement is the excess price which must be paid for cement in this State. For some reason not accounted for by higher cost of production, the price of cement in Oregon has been very materially higher than in either Washington or California. It is practically impossible to secure a basis for comparison of cement prices, but a conservative estimate places the discrimination against Oregon buyers at not less than twenty per cent.

The pavements laid by the Highway Commission during 1919 and 1920 have, with only two exceptions, been 16 feet in width with an additional 2 feet of rock or gravel shoulders along each side. The rock or gravel shoulders are considered to be an important feature in connection with pavements of all kinds as they protect the edge of the pavement, prevents the formation of a rut along the side of the pavement, and provides an extra width of surfacing in the event it becomes necessary to turn off the paved width in passing other vehicles.

As stated elsewhere in this report, there has been laid during the past biennium, 347.2 miles of pavement and there remains under contract on November 30, 1920, 72 miles of pavement. Of the pavement laid

during the two year period 34.9 miles were concrete and 312.3 miles bituminous.

Of the 347.2 miles of pavement laid, 121.8 miles were on the Pacific Highway, 103.0 miles on the Columbia River Highway, and 122.4 miles on other highways.

The average cost of pavements completed during 1919 and 1920, based upon final paid amounts under all completed pavement contracts, an aggregate of 189.1 miles, was $1,210.00 per mile per foot width. This average cost is for pavement and pavement base. It does not include the cost of grading, shoulder construction and engineering.

BROKEN STONE AND GRAVEL SURFACING

The work of the past biennium has demonstrated that very excellent road surfacing can be constructed from broken stone and gravel at a fraction of the cost of pavement. No less than 369.4 miles of this class of surfacing were constructed during 1919 and 1920, and in nearly every instance very good results were obtained.

It is the general practice of the Department to construct broken stone and gravel surfacing of materials having a maximum size of one and one-half inches. In most cases the materials are separated into two sizes, the base course of the surfacing being constructed from the size from three-fourths of an inch to one and one-half inches, and the top course from the size from three-fourths of an inch to dust. In general, the surfacing is not rolled, the compacting being effected by hauling over the materials as they are placed, with dragging at frequent intervals as the hauling progresses.

It has been found that the construction of waterbound macadam is not desirable, due to the difficulty with which it is maintained. The broken stone or gravel surfacing as laid by the Department, with fine materials on top, affords a very good traveling surface and can be easily maintained by dragging. The use of no materials larger than one and one-half inches in size, even in the base course, prevents any possibility of large stones coming to the surface as a result of maintenance operations.

This method of construction cannot, of course, be used under all conditions. Where the subgrade is unusually soft and unstable, it is frequently found to be desirable to use a somewhat larger size of material in the base or to construct a sub-base course of coarse material. It is occasionally found necessary, particularly in the construction of gravel surfacing, to sprinkle the materials as they are placed to assist in compacting.

Most of the broken stone and gravel surfacing laid by the Department during 1919 and 1920 was 16 feet in width with an average compacted thickness of 6 inches. In one or two instances, however, 20-foot surfacing has been constructed, and on other sections of road where the traffic is comparatively light some 12-foot surfacing has been placed.

Broken stone and gravel surfacing has cost on the average about $450.00 per mile per foot width.

GRADING

Of the 1,000 miles of grading work placed under contract during 1919 and 1920, 761.4 miles were completed. This grading work has ranged from very light work costing four and five hundred dollars per mile to the very heaviest of mountain work costing fifty and sixty thousand dollars per mile. While an exact average figure is not available, it is estimated that the average cost per mile of the grading work, exclusive of bridges, was approximately $12,500.00.

The width of roadbed used on State Highway work varies from 16 feet on the lighter traveled roads in mountainous country to 40 and 50 feet on heavy traveled roads in level country. On the more important State Highways through mountainous country the standard width is 22 feet between ditches in cut and 26 feet in embankment. The maximum gradient on the main highways is 5 per cent, and the minimum curve radius 200 feet. On highways of lesser importance, 6 and in extreme cases, 7 per cent grades are used and the minimum curve radius 100 feet.

It is usual practice, in connection with the grading work of the Department, to construct substantial guard fences on the outside of curves and along the shoulders of high embankments wherever such fences are required for the safety of motorists.

BRIDGES

During 1919 and 1920, contracts were let for the construction of 162 bridges, estimated to cost when completed, $2,047,600.00. Of these bridges, 107 were completed during this period. These 107 structures aggregated a total length of 10,700 feet and cost $837,000.00. Expenditures under uncompleted contracts totalled approximately $475,000.00.

The great majority of the bridges being constructed by the Department are reinforced concrete structures, the use of timber structures being confined almost entirely to highways of secondary importance. Probably the finest examples of concrete structures erected during the past two years are the Rock Point Bridge near Gold Hill in Jackson County, and the Sucker Creek Bridge near Oswego in Clackamas County. Views of both of these bridges accompany this report.

The most complicated and costly of all structures placed under contract is the Youngs Bay Bascule Bridge south of Astoria in Clatsop County. This bridge is 1,765 feet in length with a 150-foot double leaf trunnion bascule channel span. This structure will be completed about July of the coming year, and will cost complete about $365,000.00.

In compliance with the State law directing the State Highway Commission to furnish designs for County bridges when called upon by County Courts, designs were prepared for eleven County structures aggregating an estimated value of $245,000.00. Of these structures, two have been completed and three others are under construction. The estimated cost of the five structures completed and under contract is $76,000.00. The most noteworthy of the County bridge construction handled under the supervision of the Department is the 240-foot steel span structure over the Santiam River near Mehama. This is an inter-county bridge, and its cost of approximately $48,000.00 is being paid jointly by Marion and Linn counties.

At the request of the Multnomah County Court, an investigation was made of the Burnside and Morrison Street bridges over the Willamette River in Portland. The purpose of these investigations was to determine whether or not these bridges were still in condition to safely carry the traffic being put over them. As a result of the investigation, both structures are being repaired and strengthened, and an early replacement of the Burnside Street structure is being contemplated. This matter is more fully treated in the part of this report devoted to work in Multnomah County.

The work of preparing the designs for the bridges placed under contract and for a large number of other structures which it is planned to construct during the coming season, represents in itself a very considerable task. Altogether 238 designs were prepared for structures having spans in excess of eighteen feet. In addition to this, designs were prepared for seventy-nine structures having spans less than eighteen feet. The sum of the estimated costs of all structures designed during the two-year period is $4,850,000.

In another part of this report will be found complete tabulations showing the location, type of structure, estimated cost and present status for each structure designed.

SIGNING OF STATE HIGHWAYS

In response to a growing demand for a uniform and adequate system of road signs, the Highway Commission undertook, early in 1920, the signing of the more important of the State highways. This work had not been taken up earlier due to the fact that none of our State highways prior to 1920, had been definitely located over their entire lengths, making it impossible to determine the mileages between many important points with sufficient accuracy to warrant the showing of these mileages on permanent signs.

The general plan for the signing of State highways is to erect permanent signs at each crossroads and at such other points as a traveler might require guidance, these signs showing the direction and distance to the nearest town, to the nearest large town or city and to such large city or other point which might be considered the destination of the major portion of the through traffic. To indicate the route between these metal signs and to give assurance to the traveler that he is on the proper road, highway markers are provided at intervals not greater than one mile. These markers, as a rule, will consist of a distinctive design, painted upon telephone poles, the designs for different highways being of different colors, and all showing the highway number of the particular highway.

The permanent road signs at crossroads are, in general, enamel metal signs on hollow steel posts embedded in concrete pedestals. Their construction and appearance is clearly shown in the adjacent picture of one of the Pacific Highway signs located in the outskirts of Eugene.

During the 1920 season, the Pacific Highway, 345 miles in length, was completely signed, and complete mileages, sign locations and sign designs were worked out for the signing of the Columbia River Highway from Astoria to Pendleton, the Tualatin Valley Highway from Portland to



TYPE OF ROAD SIGN BEING USED FOR THE PERMANENT SIGNING OF STATE HIGHWAYS.

McMinnville, and the McMinnville-Tillamook Highway from McMinnville to Tillamook. The signing of all of these highways will be completed before the summer of 1921. In addition to this, plans have been worked out for the signing of some of the Eastern Oregon highways with temporary signs of wood, these to be replaced with permanent signs when the highways involved have been permanently located over their entire lengths. The erection of these temporary signs will be commenced within the next few weeks.

STATE EQUIPMENT

In the previous report, mention was made of the beginning made in securing equipment for maintenance and construction work which it was found necessary or advisable to do with State forces direct. The first building constructed in 1918 on the Penitentiary Brick Yard site proving inadequate and also the storage space adjacent too small in area, arrangements were made with the Warden of the Penitentiary and the Board of Control whereby the penitentiary relinquished the entire brick yard site, removing it to a plot of ground directly east on the condition that the department pay for the cost of extending the spur track and the necessary materials to put the new grounds in shape.

This arrangement has given the Department storage space several acres in extent just outside of the city limits of Salem with railroad facilities. The total plant now consists of one 40x80 warehouse and shop, one 70x80 shop, two two-story 60x80 warehouses, one shed 368x24 and another shed 80x24 and two loading platforms. The State Fair Board has also generously allowed the department the use of some of the Fair Buildings for winter storage purposes. The garage formerly occupied at 660 Capital Street was discontinued in 1920. To take care of repairs necessary to equipment in use in eastern Oregon a branch shop is maintained in Pendleton.

Helpful legislation was enacted by the Legislature in the 1919 session, enabling the Commission to dispose of obsolete or worn out equipment and has been taken advantage of and a return made to the State Highway Fund.

Equipment which has been purchased with State Highway Funds, some of which was purchased prior to 1919, includes the following:

5 5-ton trucks.
1 3½-ton truck.
4 1-ton trucks.
1 railroad paving plant.
3 steam rollers.
1 gasoline roller.
1 No. 5 gyratory crusher.
4 No. 2 jaw crushers.
1 24-inch Symons disc crusher.
2 gasoline locomotives.
87 Ford touring cars.
8 Buick touring cars.
4 Maxwell touring cars.
2 Chevrolet touring cars.
2 Jeffery roadsters.
1 Reo touring car.

Miscellaneous assortment of graders, scarifiers, fresnoes, wheelers, pumps, air compressors, drills, gas engines, small tools, messhouse equipment, etc. The total value of this equipment is estimated to be $143,000.00.

In February, 1919, Congress passed a bill which authorized the Secretary of War to transfer to the Secretary of Agriculture all available war material, equipment and supplies not needed for the purpose of the

War Department but suitable for use in the improvement of highways and provided that the same be distributed among the Highway Departments of the several states for use on the highways. The distribution of this equipment began in June, 1919, and has continued since that date as it became available. Subsequent legislation enacted in the spring of 1920 provided that equipment other than the trucks previously allotted should be appraised by the Secretary of Agriculture and that the States should be required to pay 20 per cent of the appraised value, provided, however, that freight cost to destination should be deducted from the 20 per cent valuation. Some equipment has been received under this clause, but no charges have been made, since the freight charges were in excess of the very reasonable appraised value.

Oregon has received from the Government as follows:

22 5-ton trucks.	1 16-ton road roller.
21 4-ton trucks.	18 wagons.
16 3½-ton trucks.	2 concrete mixers.
89 3-ton trucks.	15 Ford touring cars.
148 2-ton trucks.	3 Ford roadsters.
7 1½-ton trucks.	9 Ford ambulances.
1 ½-ton truck.	1 Oakland touring car.
1 5-ton Cleveland tractor.	1 Reo touring car.
38 120 H.P. Holt tractors.	2 Oldsmobile touring cars.
2 tractor trucks.	2 Willys Overland.
1 asphalt paving plant.	10 Cleveland motorcycles.
1 20-ton locomotive crane.	

Miscellaneous assortment of tanks, pumps, forges, ranges, truck repair parts, etc.

An estimate of the value of this equipment, some of which is new, is $1,400,000.00. This equipment cost only the packing and transportation charges. Most of the equipment came from eastern points, but some of the trucks were available at Fort Stevens, Camp Lewis and Camp Kearney. The trucks when received were equipped with box and ammunition bodies and had to be equipped with power hoists and dump bodies to adapt them for highway construction. To date, the Department has equipped 118 of these trucks with hydraulic hoists and dump bodies, all of the work having been done in our own shops, also the necessary overhauling of the used trucks.

Of the trucks received during 1919, the majority were equipped and ready for use during the entire season of 1920. Considerable delay was experienced, however, both years in securing hoisting equipment, due to the large demand for this kind of machinery, with the consequence that the trucks received during 1920 were not equipped until quite late in the season.

There being an excess of some items beyond the immediate needs of the Department, a portion of it has been turned over to the Counties on a lease basis substantially on the same terms as received from the Government. Under the Federal law, however, the title must remain with the State. To date, there has been turned over to the Counties 116 trucks and 15 120 H.P. Holt caterpillar tractors.

The department has also received from the Government 765,000 pounds of the high explosive T N T, 50,000 pounds of black powder and 250,000



STATE-OWNED SHOPS AND WAREHOUSES AT SALEM.

blasting caps. A portion of these explosives were used on work being done by State forces and by Counties doing work on a co-operative basis, also some has been turned over to the contractors at a fixed price per pound, or furnished free in consideration of reduced bids. About 200,000 pounds of T N T is in storage for 1921 construction.

To handle the increasing work of the Department, it has been necessary to purchase a large number of engineering instruments, and the following are now owned by the Department: 96 transits, 62 levels, 41 planimeters, of which 9 transits, 6 levels and 2 planimeters were received from the Government.

The repair shop is well equipped with sufficient machinery to handle all repair work necessary to maintain Department equipment in first class condition. Some work is also done for other State departments for which a reasonable charge is made. The entire cost of buildings, machinery and graveling the grounds has been $43,463.00. It is the intention to give each piece of equipment which has been used during the road building season a complete overhauling in the Department shops and this is followed out as far as practical. Suitable facilities are also provided for automobile repairs, painting, retopping, repairs of tires, etc. The entire plant is under the supervision of W. H. Burtis, Automotive Engineer.

The cost of operating the equipment department for the period is as follows:

Equipment—		
Purchase of equipment and machinery	$178,309.47	
Freight on equipment and materials received from the government	114,256.56	
Materials and parts used repairing and remodeling*	122,787.24	
Labor and general operating charges	120,819.26	
Construction of warehouses and shops	25,941.65	
Insurance on buildings and equipment	6,227.23	
Truck and automobile licenses	13,043.50	
Total of gross charges		$581,384.91
Credits account rentals and repairs charged out to jobs**	259,127.45	
Credits account disposal of materials and lease of equipment received from government	27,472.87	
Total credits		$286,600.32
Total net charges		$294,784.59
Material Stocks—		
Purchase of materials for stock		$ 20,845.31
Credits account of materials charged out to jobs		22,029.30
Total net credit		$ 1,183.99

* Includes dump bodies and hoists, also extra repair parts valued at $25,000.00
** Outstanding credits for rentals and repairs not included, $35,186.00.

The equipment department is on a self-supporting basis. All automobiles, trucks and other equipment are charged out to the project on which they are used at a rental rate which is sufficient to cover depreciation and interest. Trucks, tractors, rollers and other road building equipment are also rented out to the contractors on State work and to the Counties. Supplies and materials are purchased in bulk and charged out to the jobs as used. Small equipment such as tools, tents, stoves, cooking utensils, etc., are charged out to the jobs at an appraised value and credit given on return.

It is the purpose of the Department to convert the equipment received

from the Government into an equal value of good roads. To the Secretary of the Commission is assigned general supervision, with Mr. C. L. Grutze in immediate charge since September, 1920.

TESTING DEPARTMENT

The organizing of the Testing Department and the equipping of the testing laboratory was started September 22, 1919. On that date Kenneth S. Hall was appointed Testing Engineer and placed in charge of the department. Quarters were secured for the laboratory and office at 1260 State Street, Salem.

It was hoped at first that the laboratory would be able to handle the testing work toward the end of the 1919 working season, but, owing to delays in obtaining equipment, it was impossible to take over this work until January 1, 1920. Starting that date all testing work was turned over to this department and the Testing Engineer made responsible for the quality of all material used in highway work and for the quality and grading of all bituminous paving mixtures.

By far the greatest volume of work of the Testing Department was in connection with the bituminous mixtures of the various paving plants throughout the State. The field inspection at each plant was handled by a resident inspector whose duties were to see that the operation of mixing and the grading and proportioning in the mixture were according to specifications. Daily representative samples of the mixture were sent by him to the laboratory for analysis. Considerable difficulty was encountered in securing a sufficient number of experienced or capable men for plant inspectors but with careful instruction and frequent visits of the Testing Engineer to the various plants in the State and of his first assistant to those plants in the vicinity of Salem, the quality of the work was excellent and practically every plant was turning out a well controlled mixture within a few days of its starting operation. Of course, in some cases the varying quality of materials caused trouble but such cases were given an extra amount of care and attention.

In addition to the supervision of the paving plants, scores of sand and gravel deposits, rock quarries, and manufactured products were investigated by this department and advice given engineers on various branches of construction.

The laboratory and office were operated under the direct supervision of N. M. Finkbiner, Assistant Testing Engineer, and employed six men during the rush months of June, July, August and September. The work in the laboratory was reduced to an efficient and, wherever possible, to a routine basis so that the greatest possible amount of work was turned out per man per day. The prime importance of service, especially in the case of daily control samples, was constantly borne in mind. Without this service the effort exerted on paving plant control in the field is half wasted. To maintain this service the two men running "hot-stuff" samples turned out as high as forty analyses in a single day and with not more than a half dozen exceptions were "hot-stuffs" allowed to remain until the day following their receipt in the laboratory. With these exceptions the reports of the analyses were in the return mail at night.

During the month of July the laboratory turned out an average of 24.5 "hot-stuff" analyses per day.

Another important branch of the work of the department was that of control tests on concrete mixtures carried on in connection with the work of the Bridge Department. The purpose of this work was to adjust the mixtures to suit the conditions and quality of local concrete materials so that a maximum strength concrete can be obtained at a minimum cost, for in many cases the stereotype mixtures usually specified will not give the best results with the available materials. Concrete cylinders were cast on the work, sent to the laboratory and tested. The results then were compared with laboratory tests previously made and changes in mixture made if necessary. This year the concrete control work has been more or less in an experimental stage but it has shown such promise that in the coming year it will be applied to all concrete work of the State. It will necessitate the installation of some additional apparatus which will well pay for itself in service and improved quality of the work in the field. The other work of the laboratory has been the chemical and physical testing of rock, gravel, sand, cement, paints, pigments and in fact nearly all classes of materials used in highway construction.

The saving effected by the operation of a State-owned Testing Department has been considerable, as the accompanying table shows. The commercial rates used are in the majority of cases those paid by the State for tests prior to the taking over of the work by the Testing Department. The testing laboratory expense is its actual running expense plus 20% of the cost of apparatus and equipment. The total installation cost was $2,923.28.

Kind of Test—	No. of Tests.	Commercial Rates.	Total Cost.
Asphaltic concrete, top	1,272	$5.00	$ 6,360.00
Asphaltic concrete, base	841	5.00	4,205.00
Asphaltic concrete, cut	285	5.00	1,425.00
Rock and gravel	254	5.00	1,270.00
Concrete sand	121	5.00	605.00
Muck sand	51	3.00	153.00
Cement	271		
	(48,208 bbls)	.03 per bbl	1,446.24
Asphalt, complete analysis	27	5.50	148.50
Asphalt, penetration	67	1.50	100.50
Miscellaneous (G. I. pipe, paint, oil, etc.)	114	3.75	427.50
Total	3,303		$16,140.74
Total laboratory expense			7,076.27
Total saving			$ 9,064.47

The total expense of the testing department, including the field supervision, general inspection and laboratory expense plus 20% of installation cost, was $16,439.53. This means that we obtained all the tests, general field supervision and inspection and 20% of the first cost of a well-equipped laboratory for $298.79 more than the tests alone would have cost on the old basis. The average cost per test at commercial rates would have been $4.89. The actual average cost was $2.15.

The saving in cost, however, should not be considered as the only benefit derived from the Testing Department. It has rendered to the jobs in the field more efficient and speedy service than they have ever had before. It has enabled the keeping of a history of the jobs as they

progressed so that investigations in the future toward the improvement of the quality of construction will be greatly facilitated. In the future the department will be of great service in passing on local material before a job is advertised for bids, thereby leaving no doubt in the contractor's mind as to what materials will be acceptable. This, in the majority of cases, will tend to lower bid prices and give the best possible job for the money.

OFFICE ORGANIZATION

In the handling of the office detail in connection with the large volume of work which is being done under the supervision of the State Highway Commission, it has been found necessary and desirable to subdivide the office organization into departments, each handling a special class of work. In this way, it is possible to utilize specialized training and experience to the best advantage and to have the same features of the work always handled by the same persons, which, of course, tends to uniformity, fixed responsibility, and maximum efficiency.

The work of the several departments is centralized under what is called the General Office in such manner as to insure proper co-ordination and to avoid any duplication of effort. All dealings with the public are also handled through the General Office so that in effect the several departments operate as a single and centralized organization. The departments referred to comprise the Auditing Department, the Legal Department, the Office Engineering Department, the Bridge Department and the Purchasing and Equipment Department. The work of each of these departments is outlined in the following paragraphs.

General Office.—The General Office is under the direction of the Secretary of the Commission. All mail is received and distributed to the various departments through this office, as is also the collecting and combining of the outgoing mail, express, telegrams, etc.

All matters pertaining to the preparation, advertising, sale and delivery of bonds, and to the preparation of advertisements for construction projects and the execution of contracts, are handled in this office.

The Secretary has the custody of the seal of the Commission and the minutes of the meetings, and handles the Commission correspondence, and that of the State Highway Engineer in his absence. In the General Office are filed the original copies of contracts of all kinds, bids for construction projects, agreements, and all correspondence.

Auditing Department.—All payments to contractors, invoices for materials or supplies furnished, payroll and expense accounts of direct employes, and all claims of whatever nature against the Highway Commission, are handled by this department. Each claim is prepared in voucher form, checked, registered and after approval for payment by the Commission, is forwarded to the Secretary of State, who draws a warrant to cover, from the State Highway Fund. It is required that each claimant make affidavit that the charge is correct and covers material furnished or services rendered. Each claim is also O.K.'d by the person incurring the obligation and approved as to the propriety of the expenditure by the respective Division Engineers. All vouchers drawn on the Counties for co-operative work or projects over which the State has supervision are also audited by this department.

In 1919 there were 6208 State vouchers and 47 County vouchers passed, with a total expenditure of $6,811,335.32; and in 1920 there were 8167 State vouchers and 108 County vouchers, involving a total expenditure of $13,197,711.06, excluding Market Road disbursements to the Counties, or a total of 14,530 vouchers totalling $20,090,046.38.

Direct employes of the Commission are paid with bank checks drawn on the $30,000.00 revolving fund. Payrolls covering payments made to employes are prepared in voucher form, certified to as correct by the State Highway Engineer and the warrants which are drawn against these vouchers are deposited in the revolving fund to reimburse it to the extent of advances made. Claims paid to secure the advantage of trade discounts, and small emergency claims which it is desired to pay promptly, are also paid from this fund. The total number of payroll and other checks drawn on the revolving fund in 1919 was 10,689 amounting to $746,052.00; the total number of checks drawn in 1920 was 12,630 amounting to $1,164,986.49 or a total number of 23,319 checks and a total amount of $1,911,038.49 handled through the revolving fund in the biennium.

The cost of the auditing department is as follows:

	1919	1920	1919 and 1920
Salaries	$ 10,225.07	$ 14,812.59	$ 25,037.66
Printing	285.73	224.74	510.47
Equipment	1,607.18	542.28	2,149.46
Material and supplies	128.76	55.23	183.99
Travel expense	290.45	118.17	408.62
Telephone and telegraph	9.70	2.05	11.75
Freight and express	7.44		7.44
Totals	$ 12,554.33	$ 15,755.06	$ 28,309.39

On jobs where the Commission is doing work with its own forces or contract work which has been taken over, the necessary bookkeeping and auditing of the detail records has been handled by this department. Also records are kept in detail of cement and asphalt purchased and furnished to the contractors.

The work of the Auditing Department was under the charge of Mr. L. C. Elwell until June of 1920 when he resigned and the work has since been under the charge of Mr. C. E. Lytle, formerly field auditor. The general supervision of the Auditing Department is under the Secretary of the Highway Commission.

Legal Department.—The duties of the Legal Department consist of the procurement of rights-of-way, gravel pits and rock quarries required for the construction of highways when Counties fail to procure same; the preparation of special contracts and agreements; the settlement of disputes and claims for damages; the defense of the Highway Commission in cases of litigation; and other duties of like nature.

This department is headed by J. M. Devers, Assistant Attorney General and Attorney for the State Highway Commission. The work of the Legal Department during the past biennium is fully covered in the "Report of the Legal Department" given in a subsequent article.

Office Engineering Department.—In the Office Engineering Department are handled those office details of an engineering nature which pertain to surveys, grading, macadamizing and paving. The more important of the duties of this office are the working up of plans and specifications for projects to be contracted; the checking of monthly and final estimates upon which payments under contracts are based; the handling of details in connection with Federal co-operation on Post Road projects; the filing of engineering records; the distribution of costs; and the compilation of reports, statistics and other data.

Working in conjunction with and as a part of the Office Engineering Department, is the drafting room, the blueprinting room and the cost office. In the drafting room the necessary maps, profiles, and other drawings are prepared from the data obtained by the field forces. In the blueprinting room are prepared such blue prints as are required in connection with the advertising for bids and for the direction of contractors and field employees. In the cost office is kept a complete and detailed segregation of all expenditures made on work under the supervision of the Highway Commission.

The work of the Office Engineering Department is in charge of S. H. Probert, Office Engineer, with J. W. DeSouza, Chief Assistant, and E. A. Skelley, Chief Draftsman.

Bridge Department.—The Bridge Department handles all matters pertaining to bridges and similar structures. By this department the designs, plans and specifications are prepared; the construction work supervised; the monthly and final estimates checked; and all other work pertaining to bridges taken care of.

This department consists of a general bridge office, a drafting office and a staff of field engineers and assistants. The work of the department during the past biennium is fully outlined in a preceding article devoted to "Bridges."

The Bridge Department is in charge of C. B. McCullough, Bridge Engineer, assisted by Merle Rosecrans, Assistant Bridge Engineer, P. A. Franklin, Chief Designer, and L. P. Campbell, Chief Field Assistant.

Purchasing and Equipment Department.—Materials and supplies of all kinds are purchased through this office. All purchases over $2,000.00 are advertised and bids received, and on lesser amounts where it is practical to do so. Materials purchased in this way include asphalt, cement, crushed rock, gravel, sand, timber, steel, etc. Such equipment as crushers, shop machinery, automobiles, engineering instruments and supplies are also purchased as needed. To supply the field parties with stationery and engineering supplies, purchases are made in bulk and quantities sent out as required.

All materials, supplies and equipment purchased, except that purchased for a definite project, is first charged into the equipment account and then charged out as materials are used or in the form of rental in the case of equipment and proper credit given the equipment account. Records of materials on hand and equipment both in use and in storage are kept, showing location, condition and name of responsible person, so that full information is available at all times and such transfers as seem advisable may be readily made.

Field men are required to submit complete reports each month show-

ing the amount and condition of State property in their charge. A record is kept also of each piece of equipment showing first cost, from whom purchased, brief description, jobs where used and dates, rentals charged off, repairs made, etc. Accurate records are kept of the cost of automobile operation and the mileage run so that the cost of operating each car in the department may be determined at any time. It is required also that the mileages received from tires be recorded on special forms which are provided so that, in the event of defects, these records may be used in securing replacements.

This office handles also the bookkeeping work in connection with charges for equipment rented to Counties and contractors.

FREIGHT RATE INVESTIGATIONS

The results of freight rate investigations carried on under the direction of Mr. C. E. Lytle, Traffic Agent for the State Highway Commission, have been very gratifying. Some very material reductions in freight rates on road building materials have already been secured and further reductions will probably be obtained. These reductions have operated and will continue to operate to the benefit of the State, Counties, Municipalities and others financially concerned in highway construction, and it is estimated that the net saving during the past two years is not less than one hundred thousand dollars. Sixty-two thousand dollars have already actually been deducted from amounts payable under State Highway contracts, on account of reductions in rates obtained by the Department, these deductions having been made possible by a clause in all contracts which provides that savings on account of freight rate reductions after the date of contract award, accrue to the benefit of the State rather than to that of the contractor.

Detailed checking of freight bills has brought to light many overcharges resulting from misinterpretation of tariffs, and has enabled the State to demand and receive reimbursement for these overcharges, which have aggregated many thousands of dollars.

The investigations conducted by Mr. Lytle and the results thereof are set forth in detail in the paragraphs which follow.

Estimated Weights:

Where shipments do not pass over track scales there is a tariff provision specifying estimated weights on the more common commodities, among which is included sand at 2500 pounds per cubic yard, gravel 3000 pounds per cubic yard. There is a clause in the preamble, however, that reads in part: "When the weights are not otherwise obtainable." Using that clause as a basis, very careful measurements of gravel shipped were made, followed by a series of test weights of varying units; by which means an average weight of 2600 pounds per cubic yard was obtained for Eugene gravel shipped to Curtin and Anlauf, Oregon. Claim was made for overcharge on such shipments, which was finally adjusted by refund of $570.00 by the Southern Pacific Company.

Reduction in Rates:

Early in 1919 application was made through the Public Service Commission and the United States Railroad Administration, Portland District, for reduction in rates on sand, gravel and crushed rock. On the early application, a reduction of one-half cent per 100 pounds was granted. The reduction did not seem adequate under the circumstances, and an application for further reduction followed immediately through the same channel. This second application was rejected by tho Portland District officials. However, the application was again renewed and started over the same course, and at the same time duplicate papers in the complaint were filed with Senator McNary at Washington, with the request that they be filed with the Adminisration Director of Traffic, explaining that there was reason to believe these applications were being dismissed in the Portland office without deserved investigation and consideration.

About ten days later, and on the same date on which the Department was advised of the final rejection by the Portland District office, advice was received from the Washington office to the effect that rates would be reduced forty to fifty cents per ton, effective June 16, 1919.

Anticipating the final result, a guaranty clause was carried in all contracts protecting the contractor against a rise in freight rates and reserving the advantages of a possible decrease to the Department. From the estimates on 1919 contracts carrying such guaranty clause there have been deducted $62,400.00 on account of rate reduction and $9,700.00 on account of war tax. The foregoing figures represent the savings to the State only, and do not include amounts saved to Counties, Municipalities and others.

Claims of the Department for additional reduction in freight rates on road building materials are now pending before the Public Service Commission.

Interpretation of Tariffs:

It has not been the purpose of the Department to rest content with the matter of checking charges against published tariffs, but so far as practicable and with available facilities to check the tariff against authorized lawful regulations, general construction and application. By research it was discovered that in a decision on the application of the Southern Pacific Company to the Interstate Commerce Commission for relief from the provisions of the fourth section of the Act to regulate commerce, under date of June 15, 1915, certain commodity rates were established to apply between port terminals, and at the same time a maximum scale was established governing rates applicable between intermediate points. As a result of erroneous tariff construction, the rates named in the tariff on asphalt between Richmond and Oleum, Calif., and points on the Southern Pacific Company's lines in Oregon, intermediate to Portland, were found to be in excess of the maximum rates prescribed. Application to the carrier for relief was denied, but on application to the Interstate Commerce Commission, the carrier was ordered to make such adjustment as demanded by the original order, dated June 15, 1915. That order was complied with, and on this basis the Department has claims pending which aggregate $11,000.

General:

The probable tonnage of materials to be transported by rail in connection with the 1921 highway program, will be approximately 350,000 tons, which is equal to 50 per cent of the tonnage of all grain products of the State, and to 20 per cent of the tonnage of forest products transported by rail. It probably exceeds the total tonnage transported by any one branch railway line in the State.

No record has been made of small claims collected during the two year period, 1919-1920, but the more important claims, adjustments, and deductions accruing to the State Highway Commission through the operations of the railway traffic department, aggregate approximately $90,000.00 for that period, and the benefits of the rate adjustments will continue indefinitely.

HIGHWAY IMPROVEMENT IN OTHER STATES

In connection with a review of State Highway work in Oregon, it is instructive to compare the activities of this State with those of other States.

During the year, 1919, only five States constructed more miles of paved highways than did Oregon. During the same year only four States expended more State money for road purposes, although in several other States, the combined amount of State, Federal Government and local funds expended under the direction of the State authorities was greater than the combined amount for Oregon.

For the year, 1920, complete statistics of expenditures and completed mileages are not available, but it is quite certain that Oregon will rank as high, if not higher, than in 1919. In amounts of State funds available for highway work during 1920, Oregon stood fourth among all the States.

It appears, however, that during 1921 and 1922, Oregon will be unable to retain her rank among other states, due to the fact that a number of States have recently authorized bond issues far in excess of the amounts available in Oregon. In the amounts of bonds authorized for highway improvement since 1918, Oregon ranks eighth, being led by seven States which have authorized bonds in amounts from twenty-five million to as high as seventy-five million dollars.

The following tables are prepared from statistics furnished by the U. S. Bureau of Public Roads, and show in some detail the amounts being expended and the mileages of pavement being constructed in some of the more progressive States.

STATE MONEY EXPENDED FOR ROAD PURPOSES DURING 1919

(Includes all States in which expenditures exceeded $5,000,000.00)

Pennsylvania	$16,719,267.44
New York	13,714,312.32
California	6,568,093.39
New Jersey	6,320,000.00
OREGON	6,296,377.07

STATE MONEY AVAILABLE FOR ROAD PURPOSES DURING 1920

(Includes all States having available $10,00,000.00 or over)

New York	$34,775,667.00
Pennsylvania	25,000,000.00
Illinois	12.497,502.00
OREGON	11,362,169.83
California	10,000,000.00
Texas	10,000,000.00

MILES OF PAVED ROADS CONSTRUCTED DURING 1919

(Includes all States paving more than 100 miles)

New York	564 miles
Michigan	246 miles
Texas	238 miles
Ohio	224 miles
Illinois	177 miles
OREGON	163 miles
Wisconsin	151 miles
New Jersey	126 miles
California	111 miles

BOND ISSUES AUTHORIZED SINCE 1918

(Includes all States in which more than $20,000,000.00 have been authorized)

Minnesota	$75,000,000.00
Illinois	60,000,000.00
Missouri	60,000,000.00
Pennsylvania	50,000,000.00
Michigan	50,000,000.00
West Virginia	50,000,000.00
California	40,000,000.00
OREGON	25,006,799.27
Alabama	25,000,000.00

INCREASED COST OF HIGHWAY CONSTRUCTION

A study of the average wage for labor and the average prices upon the principal materials entering into highway construction, shows that from 1915 to 1920 the daily wage for labor has advanced 150 per cent and that the prices for such materials as cement, asphalt, steel, sand, gravel and broken stone have advanced anywhere from 40 to 150 per cent, averaging not less than 90 per cent. From these figures it would appear that highway construction cost had advanced during that period about 120 per cent. As a matter of fact, however, the actual cost of highway construction has advanced even more than would be indicated by the increases in wages and prices, due to the shortage during the last two or three years of capable laborers and due to the lessened efficiency of all classes of labor as the result of the plentiful amount of work and the lack of competition among laborers.

The increased cost of labor and materials have, of course, been reflected in the contract prices upon all classes of highway work. Grading prices in particular have shown a very marked increase, excavation prices having increased in the neighborhood of 150 per cent.

Paving prices do not show as great a proportional increase as the grading prices, the increase being approximately 80 per cent. This is as would be expected, due to the fact that a very large percentage of

paving costs are truck hauling and equipment costs, which costs have not increased in the same ratio as labor and materials.

The rapid increase in wages and prices during the years 1915 to 1920 is very clearly shown in the tabulation which appears below. These prices are all strictly comparative and represent average prices on materials F. O. B., Portland, Ore., and average wages paid on highway work in the immediate vicinity of Portland.

ITEM	Unit	1915	1916	1917	1918	1919	1920	Percentage Increase 1915 to 1920
Labor	Day	2.00	2.50	3.00	3.50	4.50	5.00	150
Man and Team	Day	5.00	5.50	6.00	8.00	9.00	11.00	120
Trucks	Hour	2.50	3.00	3.25	3.50	3.50	3.50	40
Cement	Net Bbl.	1.90	1.95	2.79	2.79	2.79	3.60	90
Asphalt	Net Ton	~~12.85~~	~~14.35~~	~~17.50~~	~~23.70~~	~~26.70~~	~~30.65~~	~~140~~*
Steel (Reinforcing)	Cwt.	3.30	4.50	6.00	4.90	4.40	5.00	50
Lumber	M-FBM	32.00	38.00	40.00	50.00	65.00	65.00	100
Powder (40%)	Cwt.	14.00	16.43	21.50	22.25	19.75	21.05	50
Sand	Cu. Yd.	.60	.75	1.00	1.10	1.25	1.50	150
Gravel	Cu. Yd.	.70	.90	1.00	1.10	1.25	1.50	115
Broken Stone	Cu. Yd.	1.15	1.15	1.25	1.45	1.85	2.00	75
Freight (25-mile haul)	Ton	1.20	1.20	1.20	1.50	1.50	1.90	60

REPORT OF LEGAL DEPARTMENT

During the early history of highway construction in this State, under the Highway Commission as now organized, all necessary legal services and counsel were furnished by the Attorney General's office, and the Commission then looked to the Attorney General's office for all such necessary assistance the same as do the other departments of State Government, but the large road program authorized by the State of Oregon soon made necessary more attention than the Attorney General's office found it possible to give, considering the number of assistants which the office was allowed by provision of law.

The Legislature, realizing the vast amount of highway construction which had been outlined for the Highway Commission by the Legislature, and realizing the many legal problems which a program of such dimensions would occasion, the natural and consequent litigation which would often times unavoidably result, and the constant need for the counsel and services of an attorney, authorized the Highway Commission, under the direction of the Attorney General, to employ counsel and provide for his compensation. This legislative provision was made possible by an amendment to Section 5 of Chapter 237 of the Laws of Oregon for 1917, and was enacted by the Legislative Assembly of the State of Oregon in the year 1919.

Pursuant to said statutory authority J. M. Devers was appointed an Assistant Attorney General and was assigned to the Highway Commission, and since said appointment he has had charge of all of the legal work for said Commission. His duties and labors have had to do with the procurement of rights-of-way, whether by condemnation or by agreement; the procurement of gravel pits or bars, or other tracts of land upon

* Prices for asphalt per net ton should read: 1915—$14.50; 1916—$14.00; 1917—$15.55; 1918—$19.50; 1919—$23.50; 1920—$24.00. Percentage increase in asphalt prices from 1915 to 1920, 65 per cent.

or under which there is road building material which was needed for highway construction; the preparation and examination of numerous contracts made necessary by reason of said highway program and the resulting highway construction; the settlement of disputes for damages to property claimed to be chargeable to the acts of contractors having contracts with the State for highway construction; the defense of the Highway Commission in litigation forced upon the Commission by various persons for one cause or another, and the prosecution of other cases instituted by the Highway Commission and occasioned by the interest and demands of the State in the furtherance of its road program.

This in general, together with the writing of thousands of letters, is a brief and general statement of the nature of the work handled by the Highway Commission's attorney during the past year.

Rights-of-Way.—The Legislature in the enactment of Chapter 423 of the Laws of 1917 made a general outline for a State highway system, and in said act designated as State highways many roads distributed throughout the State, and then authorized and directed the Highway Commission to improve such roads as a part of the highway system of the State of Oregon; the roads so designated for improvement by the Legislature comprise in total mileage approximately 4,300 miles. In addition to these roads, under the authority of said act, the Highway Commission has added to the system several other roads which it has been found necessary to improve as State highways in order to make a more completed system. Other roads yet are necessary in order to accommodate the entire State, and various localities in the State.

The standard width of rights-of-way for State highways has been fixed at sixty feet. When we consider the 4,300 miles of State highways designated for improvement by the Legislature, and consider that the average or standard width for all of these roads is sixty feet, it will be noted that there is involved in the highway system designated by the Legislature, necessary right-of-way in the aggregate amount of 30,000 acres.

There is now under construction approximately 2,200 miles; the construction of which mileage has made necessary the procurement of approximately 15,000 acres for right-of-way purposes. In most instances old existing highways have been used, and where new right-of-way has been made necessary the Counties have, in most cases, procured the same; but in a number of cases, on account of the failure of the County, through which the highway was located, to procure the right-of-way, it has been necessary for the State Highway Commission to procure the right-of-way either by agreement and purchase, or by condemnation. The effort has always been to procure the right-of-way by an agreement and purchase, but where this was impossible condemnation suits were filed.

During the past year the Highway Commission has found it necessary to institute fifteen cases for the purpose of procuring by condemnation, land for right-of-way purposes. Most of these cases have been disposed of, but a few are still pending. It is to be noted that thus far each case has terminated on the basis of compensation previously offered by the Highway Commission.

Railroad Crossings.—In the location and permanent improvement of State highways it has been the effort of the Commission to, so far as possible, eliminate all grade crossings in order to afford the greatest possible safety to the traveling public, both as to the use of the highways for vehicular travel and the use of the railroads for passenger and freight traffic. To that end and for that purpose relocations have been made in the highways, and many hazardous grade crossings have thereby been eliminated. Where it has become necessary in the location of the highway to cross a railroad track the crossing has been effected either by a viaduct, by which the traffic is carried over the track, or an under crossing by which the traffic passes beneath the railroad. It has not been possible for the Commission to eliminate all grade crossings, but unless the hazard presented by a grade crossing is reduced to the minimum, grade separations have been adhered to.

The Railroad Companies recognize the advantage to be gained by the elimination of grade crossings and have quite readily and generously shared in the expense of the construction of the overhead or undergrade crossing: The Laws of the State of Oregon require that before a public highway can cross a railroad, or a railroad can cross a public highway, application must be first made to the Public Service Commission, and after a hearing the Public Service Commission determines whether or not the crossing shall be permitted; the type of crossing and the terms and conditions upon which the same shall be built, and also determines the division of costs. While it is left to the Public Service Commission ultimately to determine the division of costs, the Railroad Companies, as a result of negotiations carried on between the Highway Commission and the Railroad Companies, have reached an understanding to the effect that where, as a result of the installation of an overhead or an undergrade crossing a grade crossing is eliminated, the Railroad Company will stand 40% of the cost of the construction for installation of the overhead or undergrade crossing, the remaining 60% of the costs to be borne by the State and the County in which the crossing is located. Unless there are some peculiar circumstances making such division inequitable, the Public Service Commission has been distributing the costs as follows: 40% to be borne by the Railroad Company; 30% by the State and 30% by the County.

During the past year the Highway Commission, through its Legal Department, has made application to the Public Service Commission for the right to install approximately thirty overhead or undergrade crossings. The cost of each of such crossings ranges from $1,200.00 to $30,000.00, of which cost the Railroad Company, on the condition stated herein, meets 40% of the same. A little reflection will at once reveal that the co-operation here disclosed results in considerable saving and financial gain to the State, at the same time we do not lose sight of the fact that there is a like advantage and gain to the Railroad Company.

Condemnation Suits for Road Material.—It often develops that in certain localities the only available road building material is located on land, the owners of which, demand a price for the material which is out of reason and beyond that which the Commission feel justified in paying. To meet this situation the 1919 Legislative Assembly of Oregon amended Section 9 of Chapter 237 of the Laws of Oregon for 1917, by which act

the Highway Commission is authorized to condemn lands upon or under which there is gravel, sand, rock or other road building material, for the purpose of acquiring the same for road construction.

The Commission has found occasion to institute four suits for the purpose of acquiring, by condemnation, land upon or under which there was such road building material, all of which suits terminated with satisfaction to the Commission; three of the suits being settled without the necessity of a trial; the fourth suit was tried out, but a judgment entered upon stipulation; the defendants accepting the offer which the Commission had made previous to the trial of the case. Thus far all of the suits commenced, either for right-of-way or highway material, have terminated favorably to the Commission.

Encroachments on Railroad Right-of-Way.—In many instances in the location of the highways it has been found necessary to encroach upon the right-of-way of Railroad Companies; the necessity for such encroachment is due to the physical conditions or topography of the country through which the highway passes which some times limits the Commission to a location of the highway paralleling the railroad. These encroachments on railroad property number approximately 200; most of which have been on the right-of-way of the O.-W. R. & N. It is but fair to say in this report that in every instance the officials of the various railroads have done everything possible to meet the needs of the highway and co-operate with the Commission in highway construction, and in no instance has any railroad asked or required a compensation for any right-of-way which the Company has permitted to be used for highway construction, and we desire at this time to recognize the gracious and generous co-operation that the Commission has received from the Railroad Companies toward highway construction.

Patented Pavement.—There has been much controversy over the type of pavement known as bitulithic, which pavement has for some time been protected by patent rights owned and controlled by the Warren Brothers; the Legislative Assembly for the year 1919 authorized the Highway Commission to relieve contractors from the payment of royalties on bitulithic pavements, and directed the Commission to pay such royalties direct to the patentee in the event that any royalty should be collectible.

The same Legislature directed the Attorney General to investigate the validity of any such patent. The Commission has been advised that an investigation of the Warren patent was made by the Attorney General's office but without further litigation the Attorney General was unable to advise the Commission with reference to the validity of the patent. No royalties, however, have been paid upon bitulithic pavement by the State on any pavements contracted since the month of March, 1919, either through the contractor or otherwise.

Lawsuits Against the Commission.—While it might be desired, it is not to be presumed, that so large a program of highway construction as the Commission has had under way for the past year could be carried to completion without some litigation; especially when one considers the questions which may arise because of location of the highways; the awarding of contracts and the many problems and difficulties that are made possible by reason of so many contractural relations. The Commission has been made defendant along with other parties in a number of

suits, all of which thus far, however, have terminated with advantage and profit to the Commission. We think this litigation and its results of enough importance to warrant specific mention in this report.

The first case instituted or commenced in which the members of the Commission were named as defendants was a case in which the Aetna Casualty & Surety Company was the plaintiff and Hall & Soleim, highway contractors, The First National Bank of Eugene and the members of the Highway Commission were defendants; the object of the suit was to recover for some loss which the surety company claimed it sustained by reason of the default of the contractor; and the members of the Commission were made defendants because a balance due the contractor was still in the hands of the Commission. The Highway Commission filed its answer and paid the money into court to be disposed of as the court might determine, and the suit was dismissed as to the Highway Commission, and was afterwards settled as to all parties.

The next and probably the most important suit was one entitled S. H. Rockhill vs. S. Benson and others; this suit was commonly known as the Riddle case because it involved the location of the State Highway in Douglas County, and particularly that portion which would either place Riddle on the road or some distance off the highway. The plaintiff challenged the right of the Highway Commission to change the location and challenged the right of the Highway Commission to locate a State highway over original territory where no highway had heretofore existed; it also challenged the right of the Commission to let a contract before all of the right-of-way had been procured. The contention was likewise advanced by the plaintiff that only the County Court of a county had the right to locate and lay out a highway, and that the Commission could improve only roads where highways previously existed; many other issues and contentions were advanced in this case of which time and space will not permit an enumeration at this time. The case was tried in Roseburg and a decision adverse to the State was rendered by the trial judge; the Commission appealed from the order and judgment of the trial court to the Supreme Court; the Supreme Court reversed the trial court and in the opinion of the case declared the rights and authority of the Commission and decided with the Commission on every point. The opinion is of great value because of its generous and liberal construction of the statute creating the Highway Commission and defining its powers.

The next case was the case of State ex. rel E. C. Kirkpatrick vs. S. Benson and others, which was prosecuted in the Circuit Court of Multnomah County, but was concerning a controversy arising in Polk County. In this case the plaintiff contended that the Legislature had fixed and defined one route for the West Side Pacific Highway in Polk County and that the Commission had ignored that location and were constructing a different highway. The plaintiff in this mandamus suit asked that the Commission be required to build immediately the West Side Pacific Highway in Polk County on the location which the plaintiff claimed had been determined by the Legislature. This suit was determined adversely to the plaintiff by his Honor Judge John McCourt, from which order and judgment the plaintiff appealed to the Supreme Court where the case is now pending.

At the time of filing the said mandamus suit another suit was commenced in Multnomah County by the City of Dallas, represented by its Mayor, the City of Independence, represented by its Mayor, and several citizen taxpayers of Polk County against the members of the Highway Commission and certain highway contractors, by which suit the plaintiffs sought to enjoin the construction of the West Side Pacific Highway in Polk County as located by the Highway Commission.

It appears that considerable controversy existed among various citizens and localities in Polk County in regard to the location of the West Side Pacific Highway, and with a view to reconciling the different views and demands and with the hope of making possible a location which would harmonize with the standard of highway construction adopted by the Commission, an arrangement was made whereby the West Side Pacific Highway was located as recommended and desired by the Commission, which location received the approval of a large majority of the people of Polk County. The prosecution of said suit in effect repudiated the approval given to the Highway Commission's location and repudiated the agreement. The case was tried out before his Honor Judge McCourt in Portland and a decision favorable to the Highway Commission resulted. The suit was dismissed and the Commission authorized to proceed with its program of highway construction in Polk County. No appeal was taken from the order of the trial court and by reason thereof the judgment and decree is final.

Shortly after the trial and disposition of the last above mentioned suit the same interests, through other citizen taxpayers of Polk County as plaintiffs, instituted a like suit in which the members of the Commission and the County Court of Polk County and the Warren Construction Company and the Oregon Independent Paving Company, contractors, were named as defendants; the same issues were involved in this suit that were involved in the two suits disposed of by Judge McCourt. This suit was commenced in Polk County and is still pending, no trial having yet been had; therefore, the issues are still undetermined and the results of the suit cannot be given in this report.

During the fall of 1920 the Highway Commission instituted a suit in Wasco County against Malcolm A. Moody for the purpose of procuring sufficient right-of-way to connect an existing highway with the new State highway bridge constructed across the Deschutes River so as to make available the use of the bridge for people living along the route not accommodated by the Columbia River Highway between the Deschutes River and The Dalles, and also to permit of the use of the bridge for traffic between The Dalles and points east of the Deschutes River until such time as the Columbia River Highway can be completed from said bridge to The Dalles.

After this suit had been commenced and construction work was in progress on the said connecting road Mr. Moody instituted an injunction proceedings whereby he sought to enjoin the Highway Commission from constructing said connecting road, on the ground, among other reasons advanced, that the Highway Commission is without authority to build anything but through State highways; that the Commission has no authority to build a short connecting road, and that any road located by the Highway Commission over territory where no road had previously

existed must terminate either by connecting with some well defined public highway, or in some municipality.

This suit was tried out before his Honor Judge Wilson of The Dalles, who dissolved the temporary restraining order previously made and dismissed the suit. The opinion and decision of Judge Wilson is very valuable in the fact that it further outlines and defines the jurisdiction and authority of the Commission to lay out, locate and establish State highways wherever and whenever in the judgment and discretion of the Commission such action will result in benefit to the public.

The case of Henley vs. the Highway Commission, the County Court of Klamath County and others, is a case which was commenced in Klamath County for the purpose of enjoining the County Court from spending County funds on the improvement of the Klamath Falls-Merrill Highway in co-operation with the Federal Government and the State, and for the purpose of preventing the Highway Commission from expending State funds on said road.

It was contended by the plaintiff that funds derived by a County through the sale of bonds under Chapter 103 of the Laws of 1913 could be expended only upon roads improved under the exclusive jurisdiction of the County Court, and that because this road was being improved under a co-operative agreement between the County, the State and the Federal Government no funds from the bond sale could be expended thereon.

It was also claimed by the plaintiff that Chapter 31 of the Laws of 1920, which authorized the sale of bonds by the State to meet Federal aid and from which source the State was procuring its portion of the costs of the Klamath Falls-Merrill Highway, because of the fact that such highway was improved as a post road, was unconstitutional. It was likewise urged by the plaintiff that Chapter 295 of the Laws of 1917, by authority of which act portions of the right-of-way for the Klamath Falls-Merrill Highways were being procured by condemnation proceedings then pending, was unconstitutional. In addition to these questions several other issues were raised by the plaintiff.

The Court made a temporary restraining order against the County prior to the trial of the cause. The case was tried in Klamath County before Judge Kuykendall, with the result that the temporary restraining order was dissolved and vacated; the suit was dismissed and the construction work allowed to proceed under the co-operative agreement between the County, the State and the Federal Government.

The case of The Deschutes Reclamation & Irrigation Company vs. the Highway Commission was a case prosecuted by the plaintiff in Deschutes County, in which case the plaintiff sought to enjoin the Highway Commission from constructing a highway across the irrigation ditches of the plaintiff company unless the Commission would build bridges of the type and character demanded by the plaintiff company.

The Commission's engineers contended that the type of structure proposed by the Commission would be adequate to accommodate the needs of the plaintiff company and would not interfere with the operations of said company, and would in every particular serve the purposes of the highway. It was decided to employ the type of structure recommended by the Commission for the reason that approximately $40,000.00

could be saved considering the many crossings or bridges which would be required.

The cause is still pending, but the Court has permitted the Highway Commission to install the type of bridge or crossing proposed by the Commission's engineers with the provision that should such type fail to be adequate, that a hearing will be had at a subsequent time to determine a type of structure which should be installed.

The present disposition of the case is quite satisfactory to the Commission, for the engineers are quite confident that the type of structure offered and proposed by the Commission will be adequate and sufficient for all purposes.

Defaulting Contractors.

Notwithstanding the fact that many miles of highway have been under construction during the past year, and labor conditions have been most uncertain and most unfavorable, and material prices have had a fluctuating character with an upward tendency, very few contractors have failed or defaulted in their contracts. The Commission has been required to take over only two jobs resulting from defaulting contractors. These two jobs are now being carried to completion under the supervision of the State Highway Engineer. The State is amply protected against loss, having required of the contractors in the first instance sufficient bonds to indemnify the State against possible loss.

Corporate Surety Bonds.

The law governing the actions of the Highway Commission in the letting of contracts requires that the Commission must exact from each contractor a bond in at least fifty per cent of the amount of his contract, conditioned on the faithful performance of the contract, and as an assurance that all claims for labor and material will be paid. While it is true that in some instances personal surety might be given, most of the contracts are supported by a corporate surety bond. The surety company charges a premium of three per cent of the amount of the bond, or one and one-half per cent of the face of the contract. This premium, of course, the contractor takes into consideration when he bids on the work. It is, therefore, a matter of note that in the expenditure of $20,000,000.00 on road construction work the State would pay as premium on bonds in support of such construction work $300,000.00, and when it is remembered that out of the great amount of highway construction carried on during the past year only three contractors have failed, the State does not realize a great deal of benefit for the $300,000.00 paid out as premium on bonds. It appears, therefore, that some method should be devised whereby this $300,000.00 should go into highway construction rather than into premiums for protection. In this connection it should be borne in mind that the State Highway Commission withholds fifteen per cent of the amount of each contract until the job is completed, and in addition to this, always has retained the last estimate, besides, under our standard form of contract the Commission can take possession of all of the equipment on a job and all of the supplies whenever a contractor defaults.

Freight Rates.

The Highway Commission has realized for some time that road building material such as sand, rock, gravel, cement, asphalt and other like commodities have been subjected to a disproportionate freight rate and a freight rate much in excess of that required for other commodities under similar conditions. With the hope of obtaining a more equitable rate for road building material an application was filed with the Public Service Commission asking for a hearing upon the matter of freight rates as applied to road building materials. A time was fixed and a hearing had, but not completed, for the reason that some of the interested parties were not prepared, at that time, to submit their side of the controversy, and the matter has been continued for the further hearing at a later date.

It is the contention of the Department that if the relief for which the Commission is asking is granted, there will be saved to the State during the coming season alone, approximately $140,000.00 for freight transportation of road building materials.

As stated above, this matter is still pending before the Public Service Commission and will be urged strenuously by this department as soon as a further hearing can be had.

Suggested Legislation.

The experiences of the Highway Commission have developed the fact that some additional legislation is needed to take care of situations which could not have been foreseen when existing legislation was enacted, and we take the liberty at this time to suggest some matters for the consideration of the members of the Legislature and for legislative expression thereon.

Under the old highway system where we had but county highways, telephone and telegraph companies and gas and power companies were authorized to use county or public highways under such terms and conditions as might be agreed upon between the respective companies and the County Courts, but now that we have State highways which are under the jurisdiction and control of the State Highway Commission, and there is a question as to whether or not the County Court has any right to permit the use of a State highway by a telephone, telegraph, gas or power company, it would appear that there should be some legislation that would place the control of State highways with reference to their use for such purposes under the State Highway Commission.

It often develops that State highways could be made more convenient and more beautiful and their scenic features improved if the State Highway Commission or some other department of State government had the authority to acquire by purchase, agreement or by the exercise of the power of eminent domain, additional land for parking privileges and purposes. This matter, it appears to us, is a matter worthy of consideration by the Legislature.

Closely related to the subject just mentioned is the matter of preserving the trees along the highways for a certain distance back from the right-of-way. There should be some legislation which would make this possible; such legislation would, of course, necessitate the appro-

priation of private property for the purpose of beautifying or otherwise adding to public highways, and therefore, some means or measures would be necessary to compensate the owners of the property.

There is some doubt as to whether or not the provision of law making eight hours constitute a day's labor applies to persons employed by the State Highway Commission in State highway construction. It would appear, therefore, that in order to avoid controversy over this matter that some legislation should be enacted which would remove all doubt.

A law was enacted by the Legislative Assembly for the year 1919 authorizing co-operation between counties and towns of less than a specified population in the improvement of streets within the incorporated town, and roads without the incorporated town. It is quite generally believed that the State Highway Commission may improve streets of incorporated towns of less than 2,500 inhabitants; this belief is, however, erroneous, for we find no statute authorizing the Commission to spend State funds on anything but a State highway, and a State highway is defined as not to include streets of incorporated towns or cities.

It often occurs that the State highways pass through small towns where it is financially impossible for the towns to pave, and unless the Commission is given authority to lend aid to such towns in the pavement of the street over which the highway is located, there will necessarily be breaks in the improved highway.

It appears that existing legislation, the object of which is to control traffic upon the highways, is inadequate. Considerable uncertainty exists as to the construction and meaning of the language employed to define the weight of loads permitted upon the public highways, and because of this manifest uncertainty some consideration should be given the statute as now written with a view of removing all doubt and uncertainty and so framing the act as to afford more adequate protection to the public highway.

Conclusion.

Space limits prevent a more detailed report at this time, but we believe that enough has been given here to reflect the character and scope of the work covered by this department during the past year.



BUGBY LOOPS. TWENTY MILES EAST OF ASTORIA ON THE COLUMBIA RIVER HIGHWAY. PAVED IN 1920.

Financial Report

Covering the Fiscal Period

December 1, 1918, to November 30, 1920

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TABLE I

STATE HIGHWAY FUND

The below statement of receipts and expenditures under the State Highway Fund is arranged with a view to setting out particularly the net receipts and expenditures of strictly State Moneys, as differentiated from Federal Government, County and Railroad Moneys expended through the State Highway Fund, and from certain State Moneys handled through the State Highway Fund as a matter of convenience, which do not represent receipts and expenditures in connection with State Highway work.

It should be noted, also, that not all Federal Government, County and Railroad Moneys expended upon State Highway work are handled through the State Highway Fund. For a more representative and complete statement of receipts and expenditures for State Highway work, see Table II, and for a more detailed statement of the State Highway Fund, see page 11.

Receipts—			
Balance on hand Dec. 1, 1918	$ 673,532.89		
Bonds Sold	15,543,706.16		
Motor Vehicle License Fees	2,013,541.58		
Gasoline and Distillate Tax	694,845.65		
Quarter Mill Tax	494,492.34		
Interest on Bank Deposits	32,382.37		
Reimbursement for Expenditures on Market Roads	28,635.77		
Net Receipts of State Funds Only		$19,481,136.76	
Federal Aid Post Road Payments	1,320,878.93		
County Co-operative Payments*	839,741.68		
Railroad Co-operative Payments	13,013.07		
Reimbursement by Federal Government for Work on Three Rivers Project	75,538.45		
State Market Road Appropriation (Part to be turned over to Counties)	961,799.69		
Revolving Fund Payroll Account	30,000.00		
Miscellaneous Receipts, Sale and Rental of Equipment, etc.	71,327.35		
Receipts of other than Net State Funds		3,312,299.17	
Grand Total Receipts in State Highway Fund			$22,793,435.93
Expenditures—			
State Construction Work	$11,883,163.93		
Post Road Construction	3,023,421.87		
Forest Road Construction	802,108.97		
Maintenance	112,670.57		
Road Signs	5,226.79		
Interest on Bonds	653,051.70		
Equipment and Stock	293,600.60		
Administration and General Supervision	350,687.16		
Surveys	414,811.34		
Engineering County Construction	91,168.20		
Expenditures on Market Roads	28,635.77		
Net Expenditures of State Funds		$17,658,546.90	

Federal Aid on Post Roads	1,320,878.93		
County Funds on Co-operative Work	839,741.68		
Railroad Funds on Co-operative Work	13,013.07		
Federal Government Funds on Three Rivers Forest Project	75,538.45		
Turnover Market Road Funds to Counties	961,799.69		
To Establish Revolving Fund	30,000.00		
Paid out and later credited back account rental and sale of Equipment	71,327.35		
Other Funds Expended Through State Highway Fund		3,312,299.17	
Grand Total Expenditures from State Highway Fund			$20,970,846.07
Balance on Hand December 1, 1920			$ 1,822,589.86

* In addition to the amount shown under receipts as "County Co-operative Payments" the State Highway Commission has received Tillamook County warrants in the amount of $14,550.00 par value, and City of Rainier bonds in the amount of $6,697.37, par value, which warrants and bonds are held in safe keeping by the State Treasurer.

TABLE II

GRAND SUMMARY OF RECEIPTS, EXPENDITURES AND BALANCES ON HAND PERIOD DECEMBER 1, 1918, TO NOVEMBER 30, 1920.

This table shows the grand total amounts of transactions by or under the direct supervision of the State Highway Commission during the 1919-1920 fiscal period. It includes County and Federal Government funds insofar as these have been expended upon work directly supervised by the Commission. County and Government expenditures upon Forest Road Projects, and County expenditures upon work, which although engineered by the Highway Department, is paid for directly by the County upon its own vouchers, are not included.

FUNDS	Grand Total Receipts	Grand Total Expenditures	Balance on Hand December 1, 1920
State Funds	$19,481,136.76	$17,658,546.90	$1,822,589.86
County Funds	1,237,089.60	1,237,089.60	.....
Federal Government Funds	1,320,878.93	1,320,878.93	.....
Railroad Cooperative Funds	17,661.62	17,661.62	.....
Grand Totals	$22,056,766.91	$20,234,177.05	$1,822,589.86

For detailed statement of receipts see Table III.
For detailed statement of expenditures see Table IV.

TABLE III

DETAILED SUMMARY OF NET RECEIPTS FROM ALL SOURCES
DECEMBER 1, 1918, TO NOVEMBER 30, 1920

STATE FUNDS:		
Balance on hand December 1, 1918	$ 673,532.89	
From Quarter Mill Tax, 1919	246,883.47	
From Quarter Mill Tax, 1920	247,608.87	
From Motor Vehicle Licenses, 1919	532,418.83	
From Motor Vehicle Licenses, 1920	1,481,122.75	
From Motor Fuel Tax, 1919	290,795.49	
From Motor Fuel Tax, 1920	404,050.16	
From Bond Sales under Six Million Dollar Bonding Act of 1917	1,657,598.05	
From Bond Sales under State and Federal Cooperative Bonding Act of 1917 and 1920	2,994,406.11	
From Bond Sales under Ten Million Dollar Bonding Act of 1919	9,469,627.00	
From Bond Sales under Ten Million Dollar Bonding Act of 1920	1,422,075.00	
From Interest on Bank Balances, 1919	15,006.60	
From Interest on Bank Balances, 1920	17,375.77	
From Market Road Appropriation	28,635.77	
Total Receipts of State Funds		$19,481,136.76
COUNTY FUNDS:		
Reimbursement for Expenditures made by State under Cooperative Agreements	839,741.68	
Funds Disbursed by Counties under Vouchers Drawn by State Highway Commission	397,347.92	
Total Receipts of County Funds		$ 1,237,089.60
FEDERAL GOVERNMENT FUNDS:		
Reimbursement for Expenditures made by State under Cooperative Agreements	1,320,878.93	
Total Receipts of Federal Government Funds		$ 1,320,878.93
RAILROAD FUNDS:		
Reimbursement for Expenditures made by State in connection with Grade Crossing Eliminations	13,013.07	
Funds Disbursed by Railroad Companies Direct	4,648.55	
Total Receipts of Railroad Funds		$ 17,661.62
Grand Total Receipts from all sources		$22,056,766.91

TABLE IV

SUMMARY OF EXPENDITURES—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

CLASSIFICATION	Table to be Referred to for Details	EXPENDITURES					Engineering and Administration (Included in Preceding Columns)
		Grand Totals	From State Funds	From County Funds	From Government Funds	From Railroad Funds	
For Grading, Bridges, Macadamizing and Paving exclusive of work under Post and Forest Roads	VII	$12,504,362.30	$11,494,337.20	$ 992,363.48	.....	$17,661.62	$ 709,541.20
To Complete Work under 1918-1919 Contracts	VIII	412,178.24	388,826.73	23,351.51	.....	.....	13,840.45
For Work under Post Road Projects	IX	4,564,009.50	3,023,421.87	219,708.70	$1,320,878.93	.....	313,536.43
For Work under Forest Road Projects	X	802,108.97	802,108.97	.....	.....	.....	.....
For Maintenance Work	XI	114,336.48	112,670.57	1,665.91	.....	.....	.....
For Road Signing	XV	5,226.79	5,226.79	.....	.....	.....	.....
For Interest on Bonds, etc.	XV	653,051.70	653,051.70	.....	.....	.....	.....
For Equipment and Stocks	XV	293,600.60	293,600.60	.....	.....	.....	.....
For Surveys of State Highways	XIV	414,811.34	414,811.34	.....	.....	.....	414,811.34
For Engineering County Construction	XIII	91,168.20	91,168.20	.....	.....	.....	91,168.20
For Market Road Engineering	XII	28,635.77	28,635.77	.....	.....	.....	28,524.17
For Administration and General Supervision	XV	350,687.16	350,687.16	.....	.....	.....	350,687.16
Totals		$20,234,177.05	$17,658,546.90	$1,237,089.60	$1,320,878.93	$17,661.62	$1,922,108.95

TABLE V

EXPENDITURES OF THE STATE HIGHWAY COMMISSION SUMMARIZED BY COUNTIES—DECEMBER 1, 1918, TO NOVEMBER 30, 1920.

The amounts given in this table do not include expenditures for general administration, supervision and other overhead which do not represent direct charges against particular jobs. They include only expenditures upon work under direct supervision of the State Highway Department.

COUNTIES	State Funds	County Funds	Railroad Funds	Government Funds	Totals
Baker	$ 326,280.34	$ 72,628.04	$.....	$ 77,936.18	$ 476,844.56
Benton	376,325.92	5,965.79	.....	.....	382,291.71
Clackamas	387,563.76	5,857.66	.....	.....	393,421.42
Clatsop	629,797.06	.....	.....	54,651.13	684,448.19
Columbia	1,216,035.75	* 1,702.63	.....	106,058.93	1,323,792.31
Coos	477,239.97	8,938.44	.....	30,875.88	517,054.29
Crook	242,087.95	65,000.00	.....	.....	307,087.95
Curry	120,669.02	.....	.....	.....	120,669.02
Deschutes	162,531.44	45,240.10	.....	.....	207,771.54
Douglas	1,986,053.42	1,509.28	5,968.52	38,816.81	2,032,348.03
Gilliam	676,779.67	49,325.64	.....	90,207.59	816,312.90
Grant	164,697.63	15,000.00	.....	112,544.01	292,241.64
Harney	111,995.91	33,000.00	.....	71,122.70	216,118.61
Hood River	874,567.35	4,031.51	.....	.....	878,598.86
Jackson	1,399,062.38	28,334.14	.....	.....	1,427,396.52
Jefferson	57,283.84	.....	.....	.....	57,283.84
Josephine	607,779.41	5,000.00	.....	.....	612,779.41
Klamath	189,182.79	23,550.72	.....	57,134.20	269,867.71
Lake	85,367.93	17,462.23	.....	.....	102,830.16
Lane	604,957.11	14,874.46	11,693.10	.....	631,524.67
Lincoln	39,148.83	27,067.55	.....	.....	66,216.38
Linn	188,400.01	27,963.50	.....	.....	216,363.51
Malheur	156,699.03	10,000.00	.....	66,030.87	232,729.90
Marion	503,616.33	13,217.60	.....	238,050.11	754,884.04
Morrow	278,235.13	125,695.46	.....	.....	403,930.59

Multnomah	13,581.16	61,503.72			75,084.88
Polk	397,924.92	10,000.00		66,128.53	474,053.45
Sherman	170,076.65	25,000.00		69,250.81	264,327.46
Tillamook	340,389.51	6,349.44			346,738.95
Umatilla	762,068.72	300,447.71		33,225.48	1,095,741.91
Union	324,233.08	1,347.88		35,575.50	361,156.46
Wallowa	81,640.76	18,385.69			100,026.45
Wasco	839,295.07	29,000.00		47,475.20	915,770.27
Washington	508,267.99	12,522.60			520,790.59
Wheeler	258,763.88	39,687.85		120,212.76	418,664.49
Yamhill	797,160.69	131,479.96		5,587.24	934,227.89
Miscellaneous	220.24				220.24
Totals	$16,355,980.65	$ 1,237,089.60	$ 17,661.62	$ 1,320,878.93	$18,931,610.80
General Expenditures not pro-rated	1,302,566.25				1,302,566.25
Grand Totals	$17,658,546.90	$ 1,237,089.60	$ 17,661.62	$ 1,320,878.93	$20,234,177.05

* $1,702.63 paid by the City of Rainier.
A complete detailed statement of these expenditures will be found in Table VI.

TABLE VI

DETAILED DISTRIBUTION BY COUNTIES OF EXPENDITURES MADE BY THE STATE HIGHWAY COMMISSION—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

This table gives a detailed distribution of the expenditures made by the State Highway Commission upon work performed in each County. In it are shown the amounts of State, County, Government, and the Railroad funds expended upon each of several distinctive classes of work, as well as the total amounts expended from each of the four classes of funds. The amounts shown do not include expenditures for general administration, supervision and other overhead which do not represent direct charges against particular jobs.

COUNTY	To Complete 1917-1918 Jobs	Post Roads	Forest Roads	1919-1920 Jobs	Surveys	Constructing Engineering	Maintenance	Market Road Surveys	Total	Total for County
Baker County:										
State Funds	$	$ 228,385.53	$	$ 68,173.13	$ 29,644.29	$	$	$ 77.39	$ 326,280.34	
County Funds		30,910.06		42,817.98					72,628.04	
Government Funds		77,936.18							77,636.18	$476,844.56
Benton County:										
State Funds				360,992.69	12,178.75	3,154.48			376,325.92	
County Funds				5,965.79					5,965.79	382,291.71
Clackamas County:										
State Funds	36,363.89	513.52	86,670.35	230,700.17	17,997.01	337.30	11,661.17	3,320.35	387,563.76	
County Funds	5,857.66								5,857.66	393,421.42
Clatsop County:										
State Funds	177,336.50	109,480.28		333,779.17	2,450.57	214.23	6,536.31		629,797.06	
Federal Funds		54,651.13							54,651.13	684,448.19
Columbia County:										
State Funds	11,802.20	146,213.97		1,054,753.85	1,309.40		1,935.04	21.29	1,216,035.75	
County Funds				*1,702.63					1,702.63	
Federal Funds		106,053.93							106,053.93	1,323,792.31
Coos County:										
State Funds		68,577.69		401,509.21	6,063.24	942.71	147.12		477,239.97	
County Funds									8,938.44	
Federal Funds		30,875.88							30,875.88	517,054.29
Crook County:										
State Funds		21,727.45	41,338.19	162,622.10	16,215.26			184.95	242,087.95	
County Funds		5,000.00		60,000.00					65,000.00	307,087.95
Curry County:										
State Funds				111,753.25	8,063.25			852.52	120,669.02	120,669.02
Deschutes County:										
State Funds			57,129.97	84,848.16	18,185.93	339.33	1,074.82	953.23	162,531.44	
County Funds				45,000.00			240.10		45,240.10	207,771.54
Douglas County:										
State Funds	29,682.76	99,441.31	156,557.01	1,661,569.13	8,976.32		29,826.89		1,986,053.42	
County Funds	1,509.28								1,509.28	
Railroad Funds				5,968.52					5,968.52	
Federal Funds		38,816.81							38,816.81	2,032,348.03
Gilliam County:										
State Funds	13,124.62	185,686.12		460,295.80	15,992.22	21.08	983.29	676.54	676,779.67	
County Funds	3,391.54			45,000.00			934.10		49,325.64	
Federal Funds		90,207.59							90,207.59	816,312.90
Grant County:										
State Funds		148,335.69		3,676.21	4,976.35	6,076.57	1,620.59	12.22	164,697.63	
County Funds		15,000.00							15,000.00	
Federal Funds		112,544.01							112,544.01	292,241.64
Harney County:										
State Funds		102,390.08			8,605.08			1,000.75	111,995.91	
County Funds		33,000.00							33,000.00	
Federal Funds		71,122.70							71,122.70	216,118.61
Hood River County:										
State Funds	43,972.60			797,163.80	13,337.73		19,377.50	715.72	874,567.35	
County Funds	4,031.51								4,031.51	878,598.86
Jackson County:										
State Funds	438.22		91,626.75	1,280,857.77	16,005.65		5,893.20	4,240.79	1,399,062.38	
County Funds				28,334.14					28,334.14	1,427,396.52
Jefferson County:										
State Funds		51,700.33			5,373.11			210.40	57,283.84	57,283.84
Josephine County:										
State Funds	74.40		36,250.00	554,964.53	4,907.08	3,178.32	4,788.61	3,666.47	607,779.41	
County Funds				5,000.00					5,000.00	612,779.41
Klamath County:										
State Funds		105,432.87	4,836.33	34,429.48	44,484.11				189,182.79	
County Funds	23,550.72								23,550.72	
Federal Funds		57,134.20							57,134.20	269,867.71
Lake County:										
State Funds		61,911.79			21,930.17			1,525.97	85,367.93	
County Funds		17,462.23							17,462.23	102,830.16

COUNTY	To complete 1917-1918 Jobs	Post Roads	Forest Roads	1919-1920 Jobs	Surveys	Constructing Engineering	Maintenance	Market Road Surveys	Total	Total for County
Lane County:										
State Funds			38,345.22	552,886.01	12,224.10	745.09	756.69		604,957.11	
County Funds				14,874.46					14,874.46	
Railroad Funds				11,693.10					11,693.10	631,524.67
Lincoln County:										
State Funds			16,780.78	3,613.21	5,265.39	11,040.02	2,449.43		39,148.83	
County Funds				27,067.55					27,067.55	66,216.38
Linn County:										
State Funds				175,580.59	10,711.42	2,108.00			188,400.01	
County Funds				27,963.50					27,963.50	216,363.51
Malheur County:										
State Funds		130,717.68		1,370.53	15,402.22	7,401.36		1,807.24	156,699.03	
County Funds		10,000.00							10,000.00	
Federal Funds		66,030.87							66,030.87	232,729.90
Marion County:										
State Funds		296,345.86		193,985.21	112.46	13,057.51	115.29		503,616.33	
County Funds				13,217.60					13,217.60	
Federal Funds		238,050.11							238,050.11	754,884.04
Morrow County:										
State Funds				273,555.76	1,815.80	768.81	1,310.64	784.62	278,235.13	
County Funds				125,695.46					125,695.46	403,930.59
Multnomah County:										
State Funds				1,906.43	11,674.73				13,581.16	
County Funds				61,503.72					61,503.72	75,084.88
Polk County:										
State Funds		92,362.05		299,639.33	5,498.50	348.54	76.50		397,924.92	
County Funds		10,000.00							10,000.00	
Federal Funds		66,128.53							66,128.53	474,053.45
Sherman County:										
State Funds		122,130.19		30,919.02	7,521.11		9,372.14	134.19	170,076.65	
County Funds				25,000.00					25,000.00	
Federal Funds		69,250.81							69,250.81	264,327.46
Tillamook County:										
State Funds	13,731.72		175,587.89	129,820.84	11,064.93	7,110.56	3,073.57		340,389.51	
County Funds	6,349.44								6,349.44	346,738.95
Umatilla County:										
State Funds		91,873.02		623,669.01	16,662.71	26,991.99	2,871.99		762,068.72	
County Funds		17,000.00		283,447.71					300,447.71	
Federal Funds		33,225.48							33,225.48	1,095,741.91
Union County:										
State Funds		103,345.80		200,793.15	16,558.84	3,047.11		488.18	324,233.08	
County Funds				878.77			469.11		1,347.88	
Federal Funds		35,575.50							35,575.50	361,156.46
Wallowa County:										
State Funds		33,586.14	40,943.05		7,081.62			29.95	81,640.76	
County Funds		18,385.69							18,385.69	100,026.45
Wasco County:										
State Funds		540,846.33		274,565.33	22,642.95		1,240.46		839,295.07	
County Funds		4,000.00		25,000.00					29,000.00	
Federal Funds		47,475.20							47,475.20	915,770.27
Washington County:										
State Funds	55,372.24			448,933.14	1,621.97	138.06	755.71	1,446.87	508,267.99	
County Funds	500.00			12,000.00			22.60		12,522.60	520,790.59
Wheeler County:										
State Funds	6,064.71	239,697.89		10,130.92	2,096.66	538.72		234.98	258,763.88	
County Funds	1,516.49	36,000.00		2,171.36					39,687.85	
Federal Funds		120,212.76							120,212.76	418,664.49
Yamhill County:										
State Funds	862.87	42,720.28	56,043.43	670,660.03	10,160.41	3,608.91	6,853.61	6,251.15	797,160.69	
County Funds	195.59			131,284.37					131,479.96	
Federal Funds		5,587.24							5,587.24	934,227.89
Miscellaneous:										
State Funds				220.24					220.24	220.24
Total State Funds	388,826.73	3,023,421.87	802,108.97	11,494,337.20	414,811.34	91,168.20	112,670.57	28,635.77	16,355,980.65	
Total County Funds	23,351.51	219,708.70		*992,363.48			1,665.91		1,237,089.60	
Total Railroad Funds				17,661.62					17,661.62	
Total Federal Funds		1,320,878.93							1,320,878.93	
Grand Total—All Funds	$ 412,178.24	$ 4,564,009.50	$ 802,108.97	$12,504,362.80	$ 414,811.34	$ 91,168.20	$ 114,336.48	$ 28,635.77	$18,931,610.80	$18,931,610.80

*Includes $1,702.63 paid by City of Rainier.

TABLE VII.

EXPENDITURES FOR CONSTRUCTION WORK BY JOBS—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

This table covers all expenditures for grading, bridges, macadamizing, and paving except expenditures on jobs held over from the previous biennium, Post Roads and Forest Roads, which expenditures are detailed in Tables VIII, IX and X.

JOBS	Length of Project Miles	TOTALS		STATE FUNDS		COUNTY FUNDS		Construction Engineering Expenditures (Included in preceding columns)
		Estimated Total Cost of Job	Expended to Date	State's Share of Estimated Cost	Expended from State Funds to Date	County's Share of Estimated Cost	Expended from County Funds to Date	
Baker County:								
Macadam and Grading, Baker to Haines	9.38	$ 103,151.71	$ 101,556.21	$ 68,395.09	$ 66,799.59	$ 34,756.62	$ 34,756.62	$ 8,600.50
Macadam and Grading, Haines to North Powder	8.06	116,500.00	8,934.90	63,000.00	1,373.54	53,500.00	7,561.36	1,373.54
Benton County:								
Paving, Corvallis to Polk County Line	10.51	308,500.00	223,400.04	308,500.00	223,400.04	.....	.....	13,345.31
Paving and Grading, Monroe North	9.15	264,000.00	124,616.07	242,500.00	118,650.28	21,500.00	5,965.79	8,347.33
Macadam, Monroe to Lane County Line	3.2	16,942.37	18,942.37	18,942.37	18,942.37	.....	.....	2,196.04
Macadam, Wren to Blodgett	4.86	29,200.00	.....	29,200.00	.....	.....	.....	.....
Clackamas County:								
Paving, Canemah Hill	0.1	2,004.48	2,004.48	2,004.48	2,004.48	.....	.....	.....
Macadam, Oregon City to Oswego	0.3	2,482.34	2,482.34	2,482.34	2,482.34	.....	.....	24.83
Macadam, Canby to Aurora	1.97	11,450.98	11,450.98	11,450.98	11,450.98	.....	.....	680.73
Grading, Canby to Aurora	3.77	35,818.37	35,818.37	2,639.79	35,818.37	32,678.58	.....	2,639.79
Grading, Oregon City to Oswego	6.3	60,300.00	57,461.82	6,000.00	57,461.82	54,300.00	.....	5,274.70
Bridge, Molalla River	.....	61,200.00	46,015.14	4,200.00	46,015.14	57,000.00	.....	3,586.29
Bridge, Sucker Creek	.....	69,589.21	69,589.21	3,738.07	69,589.21	65,851.14	.....	3,738.07
Bridge, Tryon Creek	.....	9,349.45	6,377.88	851.47	6,377.88	8,497.98	.....	851.47
Clatsop County:								
Paving, Svenson to Clatskanie	28.0	715,000.00	461,026.06	715,000.00	461,026.06	.....	.....	18,390.62
Paving, Young's Bay to Miles Crossing	0.6	28,268.72	19,428.13	28,268.72	19,428.13	.....	.....	1,024.40
Paving, Skipanon to Seaside	9.94	271,000.00	.....	206,000.00	.....	65,000.00	.....	.....
Macadam, Necanicum to Tillamook County Line (State share)	7.0	20,000.00	1,711.70	20,000.00	1,711.70	.....	.....	.....
Grading, Young's Bay to Miles Crossing	0.2	23,430.49	23,430.49	23,430.49	23,430.49	.....	.....	110.58
Grading, Miles Crossing to Warrenton	2.9	20,600.00	.....	20,600.00	.....	.....	.....	.....
Guard Fence, Astoria to Svenson	0.6	3,334.24	3,334.24	3,334.24	3,334.24	.....	.....	.....
Columbia County:								
Paving, Rainier to Clatskanie	12.3	242,841.19	242,841.19	242,841.19	242,841.19	.....	.....	8,609.05
Paving, Deer Island to Rainier	22.16	465,500.00	458,620.13	465,500.00	458,620.13	.....	.....	12,855.60
Grading, Scappoose to Deer Island	10.85	62,468.41	62,468.41	60,171.60	62,468.41	* 2,296.81	.....	4,272.43
(*County to pay for Honeyman and Hegele cattle passes.)								
Grading, Rainier City	0.9	48,659.99	48,659.99	36,659.99	46,957.36	* 12,000.00	* 1,702.63	1,489.32
(*City of Rainier co-operates $7,000.00, County $5,000.00. Payment of $1,702.63 made by Rainier.)								
Guard Fence, Deer Island to Delena	1.11	5,833.91	5,833.91	5,833.91	5,833.91	.....	.....	96.36
Bridge, Tide Creek	.....	14,454.98	14,454.98	14,454.98	14,454.98	.....	.....	1,255.24
Bridges, 5 on Scappoose to Deer Island Section	.....	41,469.42	41,469.42	41,469.42	41,469.42	.....	.....	2,128.23
Bridge, Beaver Creek No. 11	.....	6,957.00	6,957.00	6,957.00	6,957.00	.....	.....	153.81
Coos County:								
Paving, Marshfield to Cedar Point	14.49	388,000.00	375,604.34	388,000.00	375,604.34	.....	.....	13,945.81
Paving, Cedar Point to Coquille	1.96	70,000.00	25,251.91	70,000.00	25,251.91	.....	.....	1,675.94
Grading, Cedar Point to Coquille	1.96	9,591.40	9,591.40	652.96	652.96	8,938.44	8,938.44	652.96
Crook County:								
Grading, Prineville to Davis Ranch	31.99	307,000.00	213,883.27	204,087.73	153,883.27	102,912.27	60,000.00	17,586.59
Bridge, Prineville to Davis Ranch (State Forces)	.....	24,500.00	8,788.88	24,500.00	8,788.88	.....	.....	676.49
Curry County:								
Macadam, Hubbard Creek to Brush Creek	4.2	28,500.00	.....	28,500.00	.....	.....	.....	.....
Grading, Hubbard Creek to Brush Creek	6.82	171,500.00	111,753.25	141,500.00	111,753.25	30,000.00	.....	8,193.25
Deschutes County:								
Macadam, Bend to Allen Ranch	17.1	31,346.31	31,346.31	31,346.31	31,346.31	.....	.....	2,585.11
Macadam, Bend to Jefferson County Line	24.2	147,000.00	19,234.70	147,000.00	19,234.70	.....	.....	1,041.98
Grading, Bend to Jefferson County Line	24.2	108,000.00	79,267.15	48,000.00	34,267.15	60,000.00	45,000.00	8,961.98

JOBS	Length of Project Miles	TOTALS		STATE FUNDS		COUNTY FUNDS		Construction Engineering Expenditures (Included in preceding columns)
		Estimated Total Cost of Job	Expended to Date	State's Share of Estimated Cost	Expended from State Funds to Date	County's Share of Estimated Cost	Expended from County Funds to Date	
Douglas County:								
Paving, Oakland to Yoncalla	10.12	338,000.00	249,800.53	338,000.00	249,800.53	.....	.....	10,138.57
Paving, Myrtle Creek to Dillard	12.94	470,000.00	386,642.26	470,000.00	386,642.26	.....	.....	15,797.27
Paving and Grading, Oakland to Wilbur	7.0	361,000.00	190,875.66	351,000.00	190,875.66	10,000.00	.....	10,602.96
Macadam, Stage Road Pass	2.48	19,628.82	19,628.82	19,628.82	19,628.82	.....	.....	1,404.51
Macadam, Canyonville to Galesville	11.04	117,993.14	117,993.14	117,993.14	117,993.14	.....	.....	5,667.31
Macadam, Comstock Section	0.2	1,650.00	621.68	1,650.00	621.68	.....	.....	.....
Macadam, Roseburg to Wilbur	4.10	42,000.00	7,625.20	42,000.00	7,625.20	.....	.....	589.03
Macadam and Grading, Comstock to Pass Creek	1.0	15,170.80	15,170.80	15,170.80	15,170.80	.....	.....	694.46
Macadam and Grading, Oakland South	1.13	26,397.34	26,021.64	26,397.34	26,021.64	.....	.....	1,643.69
Macadam and Grading, Roseburg to Dillard	6.64	132,000.00	98,073.28	132,000.00	98,073.28	.....	.....	7,407.82
Macadam and Grading, Jacque's Place to John's Place	7.15	111,600.00	104,917.92	111,600.00	104,917.92	.....	.....	7,780.33
Macadam and Grading, Leona to Drain	4.0	95,000.00	74,442.12	95,000.00	74,442.12	.....	.....	4,680.68
Macadam and Grading, Yoncalla Section	8.67	120,000.00	75,829.42	120,000.00	75,829.42	.....	.....	4,507.69
Macadam and Grading, Lane County Line to Comstock	0.76	17,200.00	11,540.11	17,200.00	11,540.11	.....	.....	1,257.64
Grading, Roseburg to Wilbur	4.10	37,000.00	28,893.58	37,000.00	28,893.58	.....	.....	3,946.07
Grading, Stage Road Pass	2.48	46,424.60	46,424.60	46,424.60	46,424.60	.....	.....	2,243.46
Grading, Drain to Yoncalla	5.89	75,500.00	73,182.93	75,500.00	73,182.93	.....	.....	7,562.87
Grading, Canyonville to Myrtle Creek	9.18	87,000.00	5,109.51	87,000.00	5,109.51	.....	.....	3,438.65
Slides, Myrtle Creek to Dillard	13.0	37,172.02	37,172.02	37,172.02	37,172.02	.....	.....	280.58
Comstock Overcrossing and Approaches	0.2	22,547.96	22,547.96	9,932.93	16,579.44	4,205.01	.....	1,328.67
(S. P. Ry. Co. co-operates in cost of this project to amount of $8,410.02, of which amount $5,968.52 has been paid.)								
Bridge, Stage Road Pass	.....	3,803.80	3,803.80	3,803.80	3,803.80	.....	.....	84.94
Bridge, Cow Creek	.....	21,265.19	21,265.19	21,265.10	21,265.10	.....	.....	1,242.39
Bridge, Pass Creek	.....	8,382.86	8,382.86	8,382.86	8,382.86	.....	.....	633.30
Bridge, Sand Creek	.....	13,500.00	9,578.12	13,500.00	9,578.12	.....	.....	1,881.67
Culverts, Comstock to Lane County Line	.....	7,000.00	5,073.08	7,000.00	5,073.08	.....	.....	204.04
Right-of-Way Purchased for Douglas County	.....	26,921.42	26,921.42	.....	26,921.42	26,921.42	.....	.....
Gilliam County:								
Macadam and Grading, Arlington to Morrow County Line	12.23	243,500.00	193,094.92	243,500.00	193,094.92	.....	.....	14,257.81
Grading, Blalock to Arlington	8.84	248,304.83	248,304.83	183,304.83	198,304.83	60,000.00	45,000.00	11,607.22
Bridge, Heppner Overcrossing	.....	18,500.00	17,016.39	13,875.00	17,016.39	4,625.00	.....	1,378.43
Bridge, Willow Creek	.....	20,450.45	20,450.45	20,450.45	20,450.45	.....	.....	1,638.30
Bridge, Lang Canyon Slope Protection	.....	1,241.35	1,241.35	1,241.35	1,241.35	.....	.....	31.46
Oiling, Columbia River Highway	.....	20,000.00	14,864.48	20,000.00	14,864.48	.....	.....	.....
Gilliam and Sherman Counties:								
Bridge, John Day River	.....	30,646.77	30,646.77	30,646.77	30,646.77	.....	.....	1,214.43
Grant County:								
Macadam, Cole Bridge to Danby Ranch	4.55	30,000.00	3,676.21	30,000.00	3,676.21	.....	.....	510.81
Hood River County:								
Paving, Cascade Locks to Hood River	22.11	662,000.00	587,353.78	662,000.00	587,353.78	.....	.....	17,404.68
Grading, Hood River to Mosier, Unit No. 1	1.37	38,997.52	38,997.52	38,997.52	38,997.52	.....	.....	2,253.20
Grading, Hood River to Mosier, Unit No. 2	2.7	118,500.00	112,823.34	118,500.00	112,823.34	.....	.....	5,762.09
Grading, Ruthton Hill to Hood River	1.7	37,137.89	37,137.89	37,137.89	37,137.89	.....	.....	1,909.54
Hood River and Wasco Counties:								
Macadam, Hood River to Mosier	6.37	32,588.07	32,588.07	32,588.07	32,588.07	.....	.....	617.82
Jackson County:								
Paving, Green Springs Mountain Road to California Line	14.8	550,000.00	388,596.44	550,000.00	388,596.44	.....	.....	13,157.84
Paving and Grading, Central Point to Gold Hill	8.9	223,062.72	223,062.72	223,062.72	223,062.72	.....	.....	6,749.77
Paving and Grading, Gold Hill to Josephine County Line	11.95	410,000.00	191,181.07	410,000.00	191,181.07	.....	.....	14,770.68
Paving and Grading, Ashland to Green Springs Mountain Road	5.85	230,000.00	159,261.99	230,000.00	159,261.99	.....	.....	8,089.71
Macadam, Green Springs Mountain to Pacific Highway	5.91	26,000.00	7,987.85	26,000.00	7,987.85	.....	.....	313.78
Grading, Green Springs Mountain to Pacific Highway	10.09	182,000.00	115,683.64	98,000.00	115,683.64	84,000.00	.....	11,068.65
Grading, Green Springs Mountain to Jenny Creek	8.71	110,000.00	75,691.65	60,000.00	75,691.65	50,000.00	.....	4,815.37
Grading, Talent Reservoir Section	0.64	9,600.00	5,338.34	800.00	4.20	8,800.00	5,334.14	4.20
Bridge, Birdseye Creek and Miller's Gulch	.....	12,250.00	10,220.07	12,250.00	10,220.07	.....	.....	1,100.39
Ashland Overcrossing and Approaches	0.2	48,000.00	37,052.67	19,200.00	37,052.67	9,600.00	.....	1,755.71
(Sou. Pac. Ry. Co. to co-operate in cost to amount of $19,200.00.)								
Bridge, Rock Point Arch	.....	48,393.91	48,393.91	24,928.85	25,393.91	23,465.06	23,000.00	1,463.78
Bridges, 2 Trestles near Central Point	.....	3,680.70	3,680.70	3,680.70	3,680.70	.....	.....	96.58
Bridges, 3 over Niel Creek near Ashland	.....	12,108.99	12,109.99	12,108.99	12,109.99	.....	.....	512.70
Bridge, Tolo Overcrossing and Approaches	0.2	32,431.87	30,931.87	12,972.75	30,931.87	6,486.37	.....	1,484.85
(Sou. Pac. Ry. Co. to co-operate in cost to amount of $12,972.75.)								

TABLE VII—Continued

JOBS	Length of Project Miles	TOTALS		STATE FUNDS		COUNTY FUNDS		Construction Engineering Expenditures (Included in preceding columns)
		Estimated Total Cost of Job	Expended to Date	State's Share of Estimated Cost	Expended from State Funds to Date	County's Share of Estimated Cost	Expended from County Funds to Date	
Josephine County:								
Paving, Grants Pass to Jackson County Line	6.09	128,685.50	128,685.50	128,685.50	128,685.50	.....	.....	5,931.44
Paving, Wolf Creek to Grave Creek	4.92	141,978.49	141,978.49	141,978.49	141,978.49	.....	.....	7,110.12
Macadam, Stage Road Pass to Wolf Creek	4.48	69,315.49	69,315.49	69,315.49	69,315.49	.....	.....	2,521.34
Macadam, Sexton Mountain Section	7.48	96,000.00	15,012.73	96,000.00	15,012.73	.....	.....	1,274.21
Macadam and Grading, Grants Pass to Pleasant Valley	9.84	125,000.00	5,679.40	125,000.00	5,679.40	.....	.....	1,886.47
Grading, Stage Road Pass to Wolf Creek	4.47	51,072.15	51,072.15	51,072.15	51,072.15	.....	.....	2,987.85
Grading, Sexton Mountain Section	7.43	153,000.00	131,663.07	143,000.00	126,663.07	10,000.00	5,000.00	8,640.77
Bridge, Grave Creek	.....	21,500.00	16,557.70	11,800.00	16,557.70	9,700.00	.....	1,173.19
Klamath County:								
Grading and Macadam, Klamath Falls North (State share)	3.42	39,000.00	34,429.48	39,000.00	34,429.48	.....	.....	3,472.71
Lane County:								
Paving, Eugene to Goshen	4.9	101,325.02	101,325.02	92,137.26	101,325.02	9,187.76	.....	6,313.41
Paving, Eugene to Junction City	12.4	272,264.81	272,264.81	257,466.25	272,264.81	* 14,798.56	.....	9,275.54
(*City of Junction City to pay $3,129.62; County to pay $11,668.94. The sum of $12,500.00 has been deducted from County share for work done on Eugene-Blue River Section, on which the State co-operates to this amount)								
Macadam, Divide to Douglas County Line	1.38	26,771.03	26,771.03	26,771.03	26,771.03	.....	.....	957.21
Macadam, Walker to Cottage Grove	3.07	38,059.85	38,059.85	38,059.85	38,059.85	.....	.....	1,425.29
Macadam and Grading, Junction City to Benton County Line	5.5	53,056.27	53,056.27	37,858.76	53,056.27	15,197.51	.....	3,139.70
Grading, Walker to Cottage Grove	3.07	49,602.38	49,602.38	1,686.25	44,004.38	28,485.91	1,963.12	2,788.91
(Sou Pac. Ry. Co. co-operates to amount of $19,430.22, of which $3,634.88 has been paid.)								
Divide Overhead Crossing and Approaches	0.2	27,500.00	23,766.24	8,250.00	15,708.02	8,250.00	.....	1,457.68
(Sou. Pac. Ry. Co. co-operates to amount of $11,000.00, of which $8,058.22 has been paid.)								
Grading, Divide to Douglas County Line	1.2	14,607.97	14,607.97	1,696.63	1,696.63	12,911.34	12,911.34	1,618.63
Grading, Goldson Section	11.29	134,000.00	.....	73,000.00	.....	61,000.00	.....	.....
Lincoln County:								
Grading, Toledo to Newport	5.3	64,000.00	30,680.76	5,000.00	3,613.21	59,000.00	27,067.55	3,213.21
Linn County:								
Paving and Grading, Albany to Jefferson	6.77	210,000.00	174,721.19	179,000.00	159,975.29	31,000.00	14,745.90	12,601.27
Macadam, Albany to Tangent	7.41	46,000.00	14,745.93	46,000.00	14,745.93	.....	.....	1,105.95
Malheur County:								
Macadam, Vale to Jamieson	17.8	68,200.00	.....	68,200.00	.....	.....	.....	.....
Bridge over Malheur at Vale	.....	45,000.00	1,370.53	24,250.00	1,370.53	20,750.00	.....	1,370.53
Marion County:								
Paving, Jefferson North	6.76	237,000.00	170,520.28	237,000.00	170,520.28	.....	.....	5,373.01
Macadam, Bordner Hill and Wain Hill	1.2	1,802.82	1,802.82	1,802.82	1,802.82	.....	.....	195.09
Macadam, Salem South	7.2	48,000.00	20,802.73	48,000.00	20,802.73	.....	.....	1,189.79
Marion and Linn Counties:								
Bridge over Santiam River	.....	48,000.00	28,153.95	.....	1,718.75	* 48,000.00	26,435.20	1,702.75
(*Marion County's share $24,000.00. Linn County's share $24,000.00.)								
Morrow County:								
Macadam and Grading across County, Unit No. 1	20.80	154,201.54	154,201.54	131,590.27	131,590.27	22,611.27	22,611.27	12,830.05
Macadam and Grading across County, Unit No. 2	9.40	106,376.83	106,376.83	106,376.83	106,376.83	.....	.....	7,195.65
Grading, Heppner to Gilliam County Line	25.0	172,000.00	126,745.81	39,000.00	23,661.62	133,000.00	103,084.19	19,771.51
Bridge, Messner Overcrossing	.....	17,500.00	11,927.04	13,125.00	11,927.04	4,375.00	.....	756.10
Multnomah County:								
Paving, Bertha to Washington County Line	2.76	61,261.47	61,261.47	8.50	8.50	61,252.97	61,252.97	8.50
Repairs to Portland Bridges	.....	* 2,500.00	2,148.68	.....	1,897.93	2,500.00	250.75	2,148.68
(* Covers construction engineering only. Total to be refunded by County.)								
Polk County:								
Paving and Grading, Rickreal to Monmouth to Independence	7.80	267,000.00	214,547.82	243,000.00	214,547.82	24,000.00	.....	12,447.83
Paving and Grading, Benton County Line North	1.64	53,500.00	15,946.87	38,500.00	15,946.87	15,000.00	.....	1,292.83
Macadam and Grading, Yamhill County Line to Butler's Store	7.6	108,000.00	368.56	108,000.00	368.56	.....	.....	368.56
Rocking Temporary Road, Bentley to Grand Ronde	1.0	2,385.60	2,385.60	2,385.60	2,385.60	.....	.....	29.50
Polk and Yamhill Counties:								
Paving and Grading, Amity to Holmes Gap Crossing	8.3	289,000.00	209,399.45	275,500.00	203,595.73	13,500.00	5,803.72	11,655.48
Bridges, Amity to Holmes Gap Crossing	.....	* 21,132.72	23,032.76	721.48	23,032.76	20,411.25	.....	721.48
(*Credits due for materials and equipment of $1,900.03.)								
Sherman and Wasco Counties:								
Bridge, Deschutes River	.....	81,191.26	81,191.26	31,191.26	31,191.26	* 50,000.00	* 50,000.00	4,751.11
(*Sherman County co-operates $25,000.00, Wasco County $25,000.00.)								

TABLE VII—Continued

JOBS	Length of Project Miles	TOTALS		STATE FUNDS		COUNTY FUNDS		Construction Engineering Expenditures (Included in preceding columns)
		Estimated Total Cost of Job	Expended to Date	State's Share of Estimated Cost	Expended from State Funds to Date	County's Share of Estimated Cost	Expended from County Funds to Date	
Tillamook County:								
Paving, Hemlock to Beaver	5.0	166,000.00	105,911.14	166,000.00	105,911.14	.....	.....	8,190.35
Macadam, Riverdale to Hobsonville	4.69	33,000.00	5,907.86	33,000.00	5,907.86	.....	.....	277.80
Macadam, Moore Cutoff	3.0	31,000.00	3,821.80	31,000.00	3,821.80	.....	.....	695.16
Macadam, Beaver to Hebo	4.7	34,000.00	1,173.95	34,000.00	1,173.95	.....	.....	638.45
Bridge, Kilchis River	.....	28,500.00	3,485.52	1,500.00	3,485.52	27,000.00	.....	291.56
Bridge, Nestucca River North of Hebo	.....	46,500.00	9,520.57	3,500.00	9,520.57	43,000.00	.....	304.01
Umatilla County:								
Paving, Adams to Athena	9.0	230,000.00	188,893.92	165,000.00	138,893.92	65,000.00	50,000.00	14,800.02
Paving, Athena to Milton	11.54	379,000.00	136,795.56	269,000.00	136,795.56	110,000.00	.....	9,708.22
Paving, Milton to Washington State Line	6.2	139,329.59	139,329.59	89,329.59	89,329.59	50,000.00	50,000.00	10,618.64
Macadam, Cabbage Hill to Deadman's Pass	12.82	106,000.00	28.03	106,000.00	28.03	.....	.....	28.03
Macadam and Grading, Echo to Morrow County Line	20.8	193,578.14	193,578.14	73,578.14	103,578.14	120,000.00	90,000.00	13,866.32
Grading, Echo to Pendleton	21.88	277,500.00	233,947.12	157,500.00	153,576.62	120,000.00	80,370.50	28,635.14
Bridges, Adams-Athena Section	.....	15,250.00	12,316.48	1,391.20	1,190.49	13,858.80	11,125.99	1,190.49
Bridges, Athena-Milton Section	.....	11,600.00	2,282.88	1,100.00	281.66	10,500.00	1,951.22	281.66
Union County:								
Paving, Island City to La Grande to Hot Lake	6.0	226,000.00	159,765.22	216,000.00	158,886.45	10,000.00	878.77	9,140.14
Macadam, Lone Pine to Hot Lake	3.91	69,000.00	35,262.25	65,000.00	35,262.25	4,000.00	.....	2,200.80
Grading, North Powder to Telocaset	9.06	46,000.00	6,644.45	4,500.00	6,644.45	41,500.00	.....	2,274.60
Wasco County:								
Paving, The Dalles to Seufert	1.86	44,670.10	44,670.10	44,670.10	44,670.10	.....	.....	1,889.49
Paving and Grading, The Dalles to Chenowith	0.5	12,900.93	12,900.93	12,900.93	12,900.93	.....	.....	709.07
Grading, Hood River to Mosier, Unit No. 3	2.3	197,599.14	184,600.07	197,599.14	184,600.07	.....	.....	7,563.69
Grading and Macadam, Toll Bridge Cutoff	0.54	2,226.55	2,226.55	2,226.55	2,226.55	.....	.....	109.32
Lining Tunnel No. 1	.....	12,000.00	2,835.25	12,000.00	2,835.25	.....	.....	484.40
Washington County:								
Paving, Hillsboro to Multnomah County Line	11.2	234,969.98	228,110.87	234,969.98	228,110.87	.....	.....	5,206.94
Paving, Hillsboro to Forest Grove	4.3	83,690.01	83,690.01	83,690.01	83,690.01	.....	.....	3,331.36
Paving and Grading, Beaverton to Multnomah County Line	3.89	126,000.00	104,670.45	109,000.00	92,670.45	17,000.00	12,000.00	6,077.95
Macadam, Forest Grove to Gaston	6.7	47,500.00	44,462.31	47,500.00	44,462.31	.....	.....	2,830.02
Wheeler County:								
Macadam, Sarvice Creek Summit	1.7	12,302.28	12,302.28	10,130.92	10,130.92	2,171.36	2,171.36	667.21
Yamhill County:								
Paving, Sheridan to McMinnville	8.0	240,000.00	169,308.65	217,000.00	165,643.63	23,000.00	3,665.02	9,491.24
Paving, Newberg to West Dayton	5.9	185,000.00	.....	185,000.00	.....	.....	.....	.....
Paving and Grading, Yamhill to McMinnville	9.8	245,000.00	217,035.31	200,000.00	181,501.80	45,000.00	35,533.51	9,612.24
Macadam, Grand Ronde to Butlers Store	1.85	16,000.00	8,864.00	16,000.00	8,864.00	.....	.....	415.00
Macadam, McMinnville to West Dayton	4.9	26,000.00	8,575.64	26,000.00	8,575.64	.....	.....	626.53
Macadam, Sheridan to Polk County Line	4.5	35,500.00	5,554.34	35,500.00	5,554.34	.....	.....	1,189.81
Macadam, Newberg to Dundee	1.5	9,500.00	8,898.94	9,500.00	8,898.94	.....	.....	382.38
Macadam, Yamhill North	0.5	3,500.00	328.29	3,500.00	328.29	.....	.....	46.29
Macadam and Grading, Bee Ranch Section	3.97	81,000.00	69,800.54	76,000.00	69,800.54	5,000.00	.....	5,659.41
Macadam and Grading, Newberg to West Dayton	5.9	38,148.45	38,148.45	14,874.40	24,267.67	23,274.05	13,880.78	5,275.15
Grading, McMinnville to West Dayton	5.0	91,500.00	76,097.46	7,000.00	30,766.37	84,500.00	45,331.09	6,380.22
Grading, Yamhill to Gaston	7.9	40,000.00	20,704.18	4,000.00	3,712.19	36,000.00	16,991.99	3,712.19
Bridge, Chehalem River	.....	10,902.60	10,902.60	824.34	824.34	10,078.26	10,078.26	824.34
Bridges, 8 Reinforced Structures	.....	1,684.27	1,684.27	1,336.17	1,684.27	348.10	.....	1,336.17
Miscellaneous Charges in State	.....	220.24	220.24	220.24	220.24	.....	.....	178.44
Totals	.....	$17,467,656.48	$12,504,862.30	$14,963,146.65	$11,494,337.20	$2,433,496.84	$ 992,863.48	$709,541.20

SUMMARY

	Estimated Total Cost	Expended to Date	Cost to Complete
State Funds	$14,963,146.65	$11,494,337.20	$3,468,809.45
County Funds	2,433,496.84	992,363.48	1,441,133.36
Railroad Funds	71,012.99	17,661.62	53,351.37
Grand Total All Funds	$17,467,656.48	$12,504,862.30	$4,963,294.18

TABLE VIII

EXPENDITURES TO COMPLETE PAYMENT FOR WORK UNDER 1917-1918 CONTRACTS—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

This table covers expenditures upon jobs which were completed or practically completed under the previous biennium, but for which complete payment was not made during that biennium. See tables covering Post Roads and Forest Roads for the only other expenditures on back work.

JOBS	Length in Miles	TOTALS FOR ALL FUNDS			STATE FUNDS			COUNTY FUNDS			CONSTRUCTION ENGINEERING		
		Expended During 1917-1918 Biennium	Expended This Biennium 1919-1920	Total Cost of Project	Expended During 1917-1918 Biennium	Expended This Biennium 1919-1920	Total State Funds	Expended During 1917-1918 Biennium	Expended This Biennium 1919-1920	Total County Funds	Expended During 1917-1918 Biennium	Expended This Biennium 1919-1920	Total Engineering
Clackamas County:													
Paving, Oregon City-Canby	7.5	$ 102,114.85	$ 29,739.37	$ 131,854.22	$ 102,114.85	$ 29,739.37	$ 131,854.22	$	$	$	$ 2,444.57	$ 385.83	$ 2,830.40
Grading, Canemah Hill	2.0	24,037.20	8,935.79	32,972.99	1,944.67	3,154.23	5,098.90	22,092.53	5,781.56	27,874.09	1,944.67	138.19	2,082.86
Grading and Rock Crushing at New Era	2.5	63,047.79	3,546.39	66,594.18	47,287.88	3,470.29	50,758.17	15,759.91	76.10	15,836.01	3,552.82	.....	3,552.82
Clatsop County:													
Paving, Macadam and Grading, Astoria-Svenson	9.0	96,955.97	168,250.75	265,206.72	96,955.97	168,250.75	265,206.72	.....	.....	.....	5,906.19	7,739.25	13,645.44
Macadam, Svenson-Columbia Co. Line	18.9	210,079.16	4,660.14	214,739.30	210,079.16	4,660.14	214,739.30	.....	.....	.....	4,443.13	.....	4,443.13
Bridge, John Day River	.....	21,051.52	4,425.61	25,477.13	21,051.52	4,425.61	25,477.13	.....	.....	.....	734.91	147.74	882.65
Columbia County:													
Macadam, Clatsop Co. Line-Clatskanie	8.6	118,922.90	1,979.24	120,902.14	118,922.90	1,979.24	120,902.14	.....	.....	.....	554.62	.....	554.62
Macadam, Clatskanie-Delena	9.0	136,560.40	5,100.66	141,661.06	136,560.40	5,100.66	141,661.06	.....	.....	.....	5,998.96	452.26	6,451.22
Bridges, Beaver Valley	.....	29,808.58	4,722.30	34,530.88	29,808.58	4,722.30	34,530.88	.....	.....	.....	922.54	.....	922.54
Douglas County:													
Macadam and Grading, Comstock-Leona	4.6	79,082.39	4,327.13	83,409.52	4,733.90	2,817.85	7,551.75	74,348.49	1,509.28	75,857.77	4,766.13	442.44	5,208.57
Grading, Myrtle Creek-Dillard	12.8	88,376.99	16,969.55	105,346.54	88,376.99	16,969.55	105,346.54	.....	.....	.....	7,499.22	1,015.45	8,514.67
Grading, Oakland-Yoncalla	10.4	101,096.12	Cr.13,131.92	*87,964.20	19,015.10	Cr.13,131.92	5,883.18	82,081.02	.....	82,081.02	5,864.31	18.87	5,883.18
* $13,131.92 still unpaid. Total cost will be $101,096.12													
Bridges, Umpqua River	.....	24,802.85	23,027.28	47,830.13	24,802.85	23,027.28	47,830.13	.....	.....	.....	839.18	664.93	1,504.11
Gilliam County:													
Macadam, Condon-Thirtymile Creek	5.7	31,096.05	16,516.16	47,612.21	31,096.05	13,124.62	44,220.67	.....	3,391.54	3,391.54	1,292.39	.....	1,292.39
Hood River County:													
Macadam, Cascade Locks-Hood River	18.0	62,895.48	4,849.29	67,744.77	62,895.48	4,849.29	67,744.77	.....	.....	.....	826.18	377.75	1,203.93
Grading, Cascade Locks Section	8.2	152,904.85	161.42	153,066.27	152,904.85	161.42	153,066.27	.....	.....	.....	8,744.41	20.83	8,765.24
Grading, Viento Section	3.6	86,933.00	17,108.87	104,041.87	86,933.00	17,108.87	104,041.87	.....	.....	.....	4,513.24	115.85	4,629.09
Grading, Ruthton Hill Section	2.4	90,257.53	17,112.16	107,369.69	90,257.53	17,112.16	107,369.69	.....	.....	.....	4,074.19	41.15	4,115.34
Bridge, Hood River	.....	40,528.29	8,772.37	49,300.66	36,559.80	4,740.86	41,300.66	3,968.49	4,031.51	8,000.00	1,410.63	394.16	1,804.79
Jackson County:													
Paving, Ashland Hill	0.8	15,908.03	438.22	16,346.25	15,908.03	438.22	16,346.25	.....	.....	.....	630.87	.....	630.87
Josephine County:													
Grading, Wolk Creek-Grave Creek	4.9	68,301.53	74.40	68,375.93	68,301.53	74.40	68,375.93	.....	.....	.....	4,872.94	74.40	4,947.34
Tillamook County:													
Paving and Grading, Tillamook South	5.0	89,213.74	20,081.16	109,294.90	63,203.90	13,731.72	76,935.62	26,009.84	6,349.44	32,359.28	6,391.47	805.38	7,196.85
Washington County:													
Paving and Grading, Multnomah Co. Line-Newberg	15.7	278,976.93	55,872.24	334,849.17	269,581.93	55,372.24	324,954.17	9,395.00	500.00	9,895.00	9,445.56	945.64	10,391.20
Wheeler County:													
Macadam, Cummins Hill Section	3.5	32,465.44	1,939.20	34,404.64	32,465.44	1,939.20	34,404.64	.....	.....	.....	1,313.82	16.00	1,329.82
Re-Surfacing Cummins Hill Section	5.05	444.88	5,621.06	6,065.94	444.88	4,104.57	4,549.45	.....	1,516.49	1,516.49	.....	.....	.....
Grading, Bridge Creek Section	0.9	24,235.45	20.94	24,256.39	14,235.45	20.94	14,256.39	10,000.00	.....	10,000.00	635.30	20.94	656.24
Yamhill County:													
Paving, Sheridan Section	2.2	40,065.61	839.48	40,905.09	37,945.17	839.48	38,784.65	2,120.44	.....	2,120.44	1,166.85	.....	1,166.85
Grading, Rex-Newberg	3.2	6,153.05	218.98	6,372.03	.....	23.39	23.39	6,153.05	195.59	6,348.64	.....	23.39	23.39
Totals	.....	$2,116,316.58	$ 412,178.24	$2,528,494.82	$1,864,387.81	$ 388,826.73	$2,253,214.54	$ 251,928.77	$ 23,351.51	$275,280.28	$ 90,789.10	$ 13,840.45	$104,629.55

TABLE IX

EXPENDITURES ON POST ROAD PROJECTS DETAILED BY JOBS—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

This table shows the expenditures made to November 30, 1920, upon all Federal Aid Post Road Projects. Except as noted, all expenditures were incurred during the 1919-1920 fiscal period.

PROJECT	Post Road Project Number	Length in Miles	TOTALS		STATE FUNDS		COUNTY FUNDS		FEDERAL FUNDS		Construction Engineering Expenditures Included in Preceding Columns
			Estimated Total Cost of Project	Expended to Date	State Share of Estimated Cost	Expended From State Funds to Date	County Share of Estimated Cost	Expended From County Funds to Date	Government Share of Estimated Cost	Expended From Government Funds to Date	
Baker County:											
Macadam and Grading Sag Section	9	4.69	$ 79,840.14	$ 79,840.14	$ 51,311.73	$ 51,311.73	$ 6,000.00	$ 6,000.00	$ 22,528.41	$ 22,528.41	$ 3,852.82
Macadam and Grading Baker-Middle Bridge	10	18.75	145,064.32	145,064.32	61,572.17	91,831.19	26,222.97	15,000.00	57,269.18	38,233.13	10,041.50
Grading and Macadam Canyon Section	11	4.42	111,727.31	111,727.31	39,429.29	85,242.61	23,856.55	9,310.06	48,941.47	17,174.64	8,996.25
Benton County:											
Paving Corvallis-South	50	7.96	268,000.00	.....	134,000.00	.....	.....	.....	134,000.00	.....	.....
Clackamas County:											
Paving Oregon City-Multnomah County Line	49	5.70	242,800.00	513.52	128,800.00	513.52	.....	.....	114,000.00	.....	513.52
Clatsop County:											
Bridge—Young's Bay	22	.....	348,500.00	164,131.41	62,592.00	109,480.28	116,166.67	.....	169,741.33	54,651.13	10,771.90
Columbia County:											
Paving Deer Island-Scappoose	27	10.85	313,000.00	252,267.90	156,500.00	146,218.97	.....	.....	156,500.00	106,053.93	10,240.77
Coos and Douglas Counties:											
Grading Remote to Camas Valley	29	14.17	390,500.00	237,711.69	196,849.01	168,019.00	.....	.....	193,650.99	69,692.69	14,529.56
Crook County:											
Grading and Macadamizing Prineville-Redmond	43	15.20	166,400.00	26,727.45	41,112.27	21,727.45	42,087.73	5,000.00	83,200.00	.....	2,576.48
Gilliam County:											
Grading and Macadamizing John Day River-Blalock	24	14.94	387,650.00	206,151.10	196,556.85	115,943.51	.....	.....	191,093.15	90,207.59	15,738.21
Macadam Blalock-Arlington	44	9.21	60,500.00	89,374.12	34,980.00	89,374.12	.....	.....	25,520.00	.....	3,710.90
Grading and Macadamizing Mayville-Thirtymile Creek	41	6.90	180,790.00	30,368.49	15,711.00	30,368.49	75,000.00	.....	90,079.00	.....	4,107.65
Grant County:											
Grading and Macadamizing John Day-Fiske Creek	13	7.20	107,313.43	107,313.43	54,224.50	54,224.50	.....	.....	53,088.93	53,088.93	4,364.55
Grading and Macadamizing Hall Hill-Prairie City	14	2.14	41,169.03	41,169.03	21,132.74	21,132.74	.....	.....	20,036.29	20,036.29	3,054.90
Grant and Wheeler Counties:											
Grading and Bridges Service Creek-Valades Ranch. *Grant County share $50,000.00, Wheeler County $36,000.00; paid by Grant county $15,000.00, Wheeler County $36,000.	6	48.92	822,900.00	447,297.48	372,881.70	257,228.21	*86,000.00	*51,000.00	364,068.30	189,069.27	46,170.02
Harney County:											
Grading and Macadam Burns-Lawen	15	16.72	241,000.00	206,302.55	99,118.15	102,179.85	33,000.00	33,000.00	108,881.85	71,122.70	18,506.36
Grading and Macadam Lawen-Crane	48	10.46	170,000.00	210.28	75,946.25	210.28	20,000.00	.....	74,058.75	.....	210.28
Jackson County:											
Grading Trail-Agate	47	14.85	530,000.00	.....	198,750.00	.....	132,500.00	.....	198,750.00	.....	.....
Jefferson County:											
Grading and Macadamizing Deschutes County Line-Madras	89	16.30	174,000.00	51,700.33	37,000.00	51,700.33	50,000.00	.....	87,000.00	.....	5,178.48
Klamath County:											
Grading and Macadamizing Algoma Section	26	8.92	145,000.00	47,303.92	36,467.04	24,333.35	36,375.00	6,037.77	72,157.96	16,932.80	5,635.75
Grading and Macadamizing Klamath Falls-Dairy	30	13.91	166,000.00	26,943.96	44,195.52	24,100.80	41,500.00	2,843.16	80,304.48	.....	4,173.34
Grading and Macadamizing Klamath Falls-Merrill	31	14.68	180,000.00	99,388.73	49,732.38	47,821.17	45,000.00	14,669.79	85,267.62	36,897.77	5,146.51
Grading and Macadamizing Merrill-California State Line	34	12.80	137,000.00	12,481.18	39,180.51	9,177.55	34,250.00	.....	63,569.49	3,303.63	1,766.06

PROJECT	Post Road Project Number	Length in Miles	TOTALS		STATE FUNDS		COUNTY FUNDS		FEDERAL FUNDS		Construction Engineering Expenditures Included in Preceding Columns
			Estimated Total Cost of Project	Expended to Date	State Share of Estimated Cost	Expended From State Funds to Date	County Share of Estimated Cost	Expended From County Funds to Date	Government Share of Estimated Cost	Expended From Government Funds to Date	
Lake County:											
Grading and Macadamizing Lakeview-New Pine Creek	23	1.78	20,000.00	11,347.49	10,332.98	8,765.98	5,000.00	2,581.51	4,667.02	.....	1,021.47
Grading and Macadamizing Lakeview-Crooked Creek	32	11.09	134,000.00	68,026.53	33,500.00	53,145.81	33,500.00	14,880.72	67,000.00	.....	8,503.63
Malheur County:											
Grading Cow Valley-Brogan	17	9.57	115,894.80	113,288.53	51,069.80	67,357.46	10,000.00	10,000.00	54,825.00	35,931.07	6,977.44
Macadamizing Cairo-Nyssa	28	8.98	68,777.43	68,777.43	34,401.65	38,677.63	.....	.....	34,375.78	30,099.80	1,456.83
Paving and Grading Ontario-Snake River	46	0.89	32,000.00	24,682.59	16,627.67	24,682.59	.....	.....	15,372.33	.....	1,941.44
Marion County:											
Paving Salem-Aurora	7	18.00	418,693.21	418,693.21	212,963.88	212,963.88	.....	.....	205,729.33	205,729.33	16,921.28
Paving Salem-Brooks	19	4.16	115,702.76	115,702.76	59,237.23	83,381.98	.....	.....	56,465.53	32,320.78	6,420.32
Polk County:											
Paving and Grading Salem-Dallas	18	13.07	355,000.00	168,490.58	149,341.63	92,362.05	29,250.00	10,000.00	176,408.37	66,128.53	11,630.94
Sherman County:											
Grading and Graveling across Sherman County	25	14.78	380,300.00	191,381.00	202,355.89	122,180.19	.....	.....	177,944.11	69,250.81	14,162.69
Umatilla County:											
Grading and Macadamizing Pendleton-Cabbage Hill	38	7.54	116,000.00	77,745.14	4,086.51	27,519.66	58,000.00	17,000.00	53,968.49	33,225.48	8,204.64
Macadamizing Pendleton-Echo	42	22.00	139,200.00	64,858.36	74,300.00	64,858.36	.....	.....	64,900.00	.....	4,112.34
Union County:											
Grading and Bridges Elgin-Minam	5	9.37	82,711.26	*82,711.26	62,135.76	62,135.76	.....	.....	20,575.50	20,575.50	5,924.46
(*During 1918 the State expended $3,838.44, which is included in the above figures.)											
Grading Union-Telocaset	8	6.02	76,690.77	*76,690.77	61,690.77	61,690.77	.....	.....	15,000.00	15,000.00	4,286.88
(*During 1918 the State expended $16,642.29, which is included in the above figures.)											
Wallowa County:											
Grading Wallowa Canyon	40	8.38	140,000.00	51,971.83	8,215.15	33,586.14	70,000.00	18,385.69	61,784.85	.....	8,360.35
Wasco County:											
Paving The Dalles-Threemile Creek	16	2.00	47,229.78	47,229.78	19,861.01	19,861.01	4,000.00	4,000.00	23,368.77	23,368.77	1,076.74
Grading, Macadamizing and Bridges Mosier-Rowena	35	8.96	387,200.00	290,190.88	221,388.02	290,190.88	.....	.....	165,861.98	.....	13,754.23
Grading Rowena-The Dalles	36	7.76	150,000.00	84,748.62	99,449.31	60,642.19	1,350.00	.....	49,200.69	24,106.43	4,331.88
Grading and Bridges Seufert-Deschutes	37	12.50	338,700.00	170,152.25	174,697.80	170,152.25	*14,400.00	.....	149,602.20	.....	9,075.38
(*Wasco County cooperates $10,500.00 and the Railroad $3,900.00 on Big Eddy and Dillon Overcrossings.)											
Wheeler County:											
Grading and Surfacing Butte Creek Section	4	9.35	154,900.00	76,010.41	88,071.15	55,448.13	.....	.....	66,828.85	20,562.28	8,349.68
Yamhill County:											
Grading and Macadamizing Grand Ronde Section	12	3.47	57,250.00	48,807.52	27,256.53	42,720.28	10,000.00	.....	19,993.47	5,587.24	4,299.77
Grand Totals			$8,739,404.24	$4,584,490.23	$3,758,875.85	$3,043,902.60	$1,002,958.92	$219,708.70	$3,977,569.47	$1,320,878.93	$315,097.45
Expended Prior to December 1, 1918			20,480.73	20,480.73	20,480.73	20,480.73	.....	.....	.....	.....	1,561.02
Totals for 1919-1920			$8,718,923.51	$4,564,009.50	$3,738,395.12	$3,023,421.87	$1,002,958.92	$219,708.70	$3,977,569.47	$1,320,878.93	$313,536.43

TABLE X

EXPENDITURES ON FOREST ROADS DETAILED BY JOBS—TO NOVEMBER 30, 1920

This table shows the expenditures by the State, County and Federal Government upon Federal Aid Forest Road Projects. Except as noted, all State expenditures were made during the 1919-1920 fiscal period. Forest Road work is handled under the supervision of the United States Bureau of Public Roads and the County and Government expenditures shown herein are based upon information received from that source. They are not included in any showing of funds in any other part of this report.

PROJECT	Length in Miles	TOTALS		STATE FUNDS		COUNTY FUNDS		FEDERAL FUNDS	
		Agreement Estimate Cost of Project	Expended to Date	State Share of Estimated Cost	Expended from State Funds to Date	County Share of Estimated Cost	Expended from County Funds to Date	Government Share of Estimated Cost	Expended from Government Funds to Date
Baker and Grant Counties:									
Prairie City-Unity Survey	48.0	$ 7,000.00	$	$ 2,500.00	$	$ 2,000.00	$	$ 2,500.00	$ .....
Clackamas and Hood River Counties:									
Mt. Hood Loop	37.2	910,000.00	172,602.52	455,000.00	*87,097.65	.....	.....	455,000.00	85,504.87
* Includes $427.30 expended in 1918.									
Coos County:									
Douglas County Line-Hauser	10.0	50,000.00	1,667.77	.....	.....	.....	.....	50,000.00	1,667.77
Crook County:									
Ochoco Canyon	9.7	111,145.00	111,123.03	39,635.00	*44,684.17	26,875.00	21,875.00	44,635.00	44,613.86
(* Includes $3,295.88 expended in 1918. The sum of $5,000.00 has been advanced to the County which is to be repaid.)									
Douglas County:									
Tiller Trail	15.0	100,000.00	2,268.36	33,334.00	.....	33,333.00	.....	33,333.00	2,268.36
Canyonville-Galesville Unit No. 1	9.9	211,000.00	211,000.00	94,000.00	*94,000.00	23,000.00	23,000.00	94,000.00	94,000.00
* Includes $442.99 expended in 1918.									
Canyonville-Galesville Unit No. 2	1.1	96,900.00	72,492.33	86,900.00	62,000.00	.....	.....	10,000.00	9,492.33
Deschutes and Lane Counties:									
Sisters-Blue River	53.8	408,000.00	218,020.82	184,000.00	91,742.37	20,000.00	11,588.31	204,000.00	114,690.14
Grant County:									
Bear Gulch Survey	7.5	2,000.00	1,743.43	.....	.....	.....	.....	2,000.00	1,743.43
Jackson County:									
Crater Lake-Prospect	22.2	246,000.00	197,830.50	121,250.00	91,626.75	3,500.00	2,097.65	121,250.00	104,106.10
Josephine County:									
Hayes Hill	2.4	79,500.00	65,166.83	39,250.00	36,250.00	11,000.00	3,175.57	29,250.00	25,740.76
Oregon Caves Survey	11.0	3,200.00	2,739.29	.....	.....	.....	.....	3,200.00	2,739.29
Klamath County:									
Anna Creek	3.0	15,000.00	9,405.18	7,500.00	*4,230.82	.....	.....	7,500.00	5,174.36
* Includes $144.49 expended in 1918.									
Lapine-Lakeview Survey	16.3	4,000.00	2,229.08	2,000.00	750.00	.....	.....	2,000.00	1,479.08
Klamath and Lake Counties:									
Lakeview-Klamath Falls Survey	7.6	1,600.00	897.10	.....	.....	.....	.....	1,600.00	897.10
Lane County:									
Eugene-Florence Survey	30.0	8,000.00	7,329.51	4,000.00	3,732.82	.....	.....	4,000.00	3,596.69
Lincoln County:									
Alsea River	19.9	192,000.00	47,544.68	72,000.00	16,780.78	48,000.00	8,452.73	72,000.00	22,311.17
Tillamook County:									
Three Rivers	10.3	224,116.45	224,116.45	163,746.52	*177,664.67	20,808.87	16,411.14	39,561.06	30,040.64
* Includes $2,076.78 expended in 1918. Due from Federal Government for contract work $13,918.15.									
Wallowa County:									
Flora-Enterprise	13.0	125,000.00	103,799.58	51,687.00	*41,708.13	19,733.00	15,671.05	51,630.00	46,420.41
* Includes $765.07 expended in 1918.									
Wheeler County:									
Ochoco Canyon	10.1	233,600.00	116,265.71	114,350.00	56,043.43	4,900.00	.....	114,350.00	60,222.28
Grand Totals	.....	$3,026,061.45	$1,568,241.67	$1,471,102.52	$809,261.58	$213,148.97	$102,271.45	$1,341,809.06	$656,708.64
Expended prior to December 1, 1918	.....	39,443.87	39,443.87	7,152.61	7,152.61	1,540.06	1,540.06	30,751.20	30,751.20
Totals for 1919-1920	.....	$2,986,617.58	$1,528,797.80	$1,463,949.91	$802,108.97	$211,609.81	$100,731.39	$1,311,057.86	$625,957.44

TABLE XI

EXPENDITURES FOR MAINTENANCE DETAILED BY COUNTIES—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

County—	Total.	County—	Total.
Clackamas	$11,661.17	Lincoln	$ 2,449.43
Clatsop	6,536.31	Marion	115.29
Columbia	1,935.04	Morrow	1,310.64
Coos	147.12	Polk	76.50
Deschutes (of this amount $240.10 was paid by the County)	1,314.92	Sherman	9,372.14
Douglas	29,826.89	Tillamook	3,073.57
Gilliam (of this amount $934.10 was paid by the County)	1,917.39	Umatilla	2,871.99
Grant	1,620.59	Union (of this amount $469.11 was paid by the County)	469.11
Hood River	19,377.50	Wasco	1,240.46
Jackson	5,893.20	Washington (of this amount $22.60 was paid by the County)	778.31
Josephine	4,738.61	Yamhill	6,853.61
Lane	756.69		

Total expenditures	$114,336.48
Paid by State	$112,670.57
Paid by Counties	1,665.91
Grand total	$114,336.48

TABLE XII

EXPENDITURES ON MARKET ROADS—FISCAL PERIOD 1919-1920

In this table are listed all expenditures made by the State Highway Commission in connection with work under the State Market Road Act. In general the expenditures are for surveys and other engineering service furnished to the respective counties, but in some instances they represent rental and repairs on State equipment used in construction. The amounts of expenditures in each County as shown in this table have been deducted from the apportionments of State Market Road Funds to the respective counties.

COUNTY AND ROAD	Amounts.	Total for Each County
Baker County:		
Richland to Robinette	$ 16 29	
Muddy Creek Schoolhouse East	36.10	
Lockhart Market Road	25.00	
Total for Baker County		$ 77.39
Clackamas County:		
Firwood Market Road	471.65	
Colton No. 1, Swede Stump to Meadow Brook	951.36	
Eagle Creek to Dover	1,887.13	
Estacada to Firwood	10.21	
Total for Clackamas County		3,320.35
Columbia County:		
Pittsburg to St. Helens	21.29	
Total for Columbia County		21.29

TABLE XII—Continued

COUNTY AND ROAD	Amounts	Total for Each County
Crook County:		
Prineville to Jap Creek	184.95	
Total for Crook County		184.95
Curry County:		
Elk River Market Road	852.52	
Total for Curry County		852.52
Deschutes County:		
Bend to Fish Hatchery	334.94	
Redmond to Williams Corner	618.29	
Total for Deschutes County		953.23
Gilliam County:		
Wehrlie Canyon Market Road	676.54	
Total for Gilliam County		676.54
Grant County:		
Ritter Hill Section	12.22	
Total for Grant County		12.22
Harney County:		
Wright's Point Market Road	840.07	
Well Hill Market Road	160.68	
Total for Harney County		1,000.75
Hood River County:		
Odel Market Road	715.72	
Total for Hood River County		715.72
Jackson County:		
Blue Ledge Road-Jacksonville-Ruch	2,042.10	
Butte Falls Road-Rees Creek School-Butte Falls	907.70	
Dead Indian Road-Cascade-Summit Section	1,092.92	
Foots Creek Road-Pacific Highway-Foots Creek	198.07	
Total for Jackson County		4,240.79
Jefferson County:		
Grizzley to Madras	28.20	
Madras to Ashwood	84.70	
Madras to Mecca	36.40	
Culver to Grand View	61.10	
Total for Jefferson County		210.40
Josephine County:		
Williams Creek Road	2,720.27	
Grants Pass down Rogue River	946.20	
Total for Josephine County		3,666.47
Lake County:		
Lakeview to Adel	1,521.57	
Lakeview to Warner Valley	4.40	
Total for Lake County		1,525.97
Malheur County:		
Jordan Valley Market Road	1,807.24	
Total for Malheur County		1,807.24

TABLE XII—Continued

COUNTY AND ROAD	Amounts	Total for Each County
Morrow County:		
Jordan south down Rhea Creek	754.78	
Lexington to Columbia River	29.84	
Total for Morrow County		784.62
Sherman County:		
Grass Valley Market Road	134.19	
Total for Sherman County		134.19
Union County:		
Ladd Canyon Market Road	46.97	
Union High Valley Market Road	26.02	
North Powder down North Powder River	415.19	
Total for Union County		488.18
Wallowa County:		
Wallowa-Powwatka Market Road	10.47	
Lostine Market Road	6.47	
Enterprise to Omnah	6.49	
Joseph to Armon	6.52	
Total for Wallowa County		29.95
Washington County:		
Hammelman's Place to Luck Quarry	36.84	
One mile north of Beaverton to Buxton	230.81	
Scholls and Bertha-Beaverton Road to A. Hill's Place	474.86	
Hillsboro toward Sherwood via Scholls	80.73	
Greenville to Hillside Quarry	64.78	
Garden Home to Metzger	3.74	
North Plains to Pumpkin Ridge	3.74	
Forest Grove to Gales Creek	551.37	
Total for Washington County		1,446.87
Wheeler County:		
Mitchell to Sarvice Creek	234.98	
Total for Wheeler County		234.98
Yamhill County:		
Newberg to Yamhill	2,373.77	
Chehalem to Wapato	1,763.21	
Newberg-Butteville River Road	943.48	
Gopher Valley	933.55	
Hopewell to Amity	237.14	
Total for Yamhill County		6,251.15
Grand total for all counties		$28,635.77

TABLE XIII

EXPENDITURES FOR CONSTRUCTION ENGINEERING ON COUNTY WORK DECEMBER 1, 1918, TO NOVEMBER 30, 1920

The expenditures included in this table are for engineering work in connection with construction work by County forces or under County contracts. This engineering service is furnished by the State without charge to the counties. As the construction costs are paid direct by the counties, no record is available of the amounts expended for construction work of this class.

COUNTY AND JOB	Amount Expended
Benton County:	
Corvallis to Lincoln County Line	$ 2,210.67
County Bridges	943.81
Clackamas County:	
County Brdiges	337.30
Clatsop County:	
County Bridges	214.23
Coos County:	
County Bridges	942.71
Deschutes County:	
Bend-Horse Ridge	21.29
Redmond-Sisters	269.03
County Bridges	49.01
Gilliam County:	
County Bridges	21.08
Grant County:	
Fisk Creek-Hall Hill	1,232.05
Canyon Creek-Danby Ranch	2,337.16
Danby Ranch-Cole Bridge	2,507.36
Josephine County:	
Merlin Hill Section	3,178.32
Lane County:	
Goshen-2nd Crossing South	82.52
Creswell-Walker	253.13
County Bridges	409.44
Lincoln County:	
Newport-Toledo	1,401.46
Benton County Line West to Thornton Creek	9,291.79
Thornton Creek to Toledo	73.35
County Bridges	273.42
Linn County:	
County Bridges	2,108.00
Malheur County:	
Cairo-Nyssa	3,478.65
Vale-Brogan	3,859.02
County Bridges	63.69
Marion County:	
Salem-Jefferson	12,368.55
County Bridges	688.96
Morrow County:	
Oregon-Washington Highway	768.31
Polk County:	
County Bridges	348.54
Tillamook County:	
Coast Highway	2,711.25
County Bridges	4,399.31
Umatilla County:	
Pendleton-Echo	678.34
Cabbage Hill-Kamela	8,745.61
Pendleton-Poor Farm	25.87
Athena Milton	11,090.76
Pendleton-Pilot Rock	2,054.83
County Bridges	1,948.72
Bridges, Pendleton-Echo	2,447.86

TABLE XIII—Continued

COUNTY AND JOB	Amount Expended
Union County:	
La Grande-Hot Lake	2,934.03
Hilgard-La Grande	113.08
Washington County:	
County Bridges	138.06
Wheeler County:	
Sarvice Creek Summit	538.72
Yamhill County:	
Newberg Bridge	2,800.04
County Bridges	808.87
Total Expenditures for Engineering on County Construction	$91,168.20

TABLE XIV

EXPENDITURES FOR SURVEYS DETAILED BY JOBS DECEMBER 1, 1918, TO NOVEMBER 30, 1920

COUNTY AND JOB	Expenditures All State Funds
Baker County:	
Middle Bridge-Emigrant Creek, Baker-Cornucopia Highway	$ 12,430.10
Canyon Section of Baker-Cornucopia Highway	445.07
Sag Section of Baker-Cornucopia Highway	288.35
Baker-Haines	64.52
Baker City-Malheur County Line	15,421.97
Union County Line-Haines	994.28
Benton County:	
Monroe-Corvallis	1,184.18
Corvallis-Toledo	10,994.57
Clackamas County:	
Oregon City-Oswego	1,159.24
Oregon City Bridge	3,749.05
Canby-Aurora	1,423.47
Canemah-Oregon City	2,039.81
Sandy-Forest Reserve Boundary	7,137.99
Sandy-Gresham	2,487.45
Clatsop County:	
Railway Bridge over Young's Bay	86.87
Astoria-Seaside Section of Coast Highway	2,174.27
Lewis and Clark Bridge	189.43
Columbia County:	
Columbia City-Scappoose	1,309.40
Coos and Douglas County:	
Myrtle Point-Roseburg	13,964.44
Crook County:	
Crooked River Section	10,370.14
Prineville-Redmond	3,774.84
Prineville-Wheeler County Line	2,070.28
Curry County:	
Hubbard-Mussel Creek	4,986.42
Port-Orford-Hubbard Creek	327.84
Port Orford north to Curry County Line	1,321.12
Gold Beach-Brookings	1,427.87
Deschutes County:	
Harney County Line-West Seven Miles	208.27
Bend-Horse Ridge	4,002.10
Bend-Jefferson County Line	6,046.31
Bend-Sisters	2,248.02
Redmond-Sisters	3,667.01
Allen Ranch-Klamath County Line	2,014.22

TABLE XIV—Continued

COUNTY AND JOB	Expenditures All State Funds
Douglas County:	
Roseburg-Dillard	936.71
Roseburg-Sutherlin	138.41
Gilliam County:	
John Day River-Blalock	1,899.53
Mayville-Thirtymile Creek	5,898.59
Arlington-Morrow County Line	1,642.19
Heppner Junction-Morrow County Line	305.54
Blalock-Arlington	3,246.37
Grant County:	
Danby Ranch-Cole Bridge	1,309.48
Dayville-Iron Bridge	3,393.73
John Day-Canyon Creek	273.14
Harney County:	
Burns-Lawen	1,987.10
Burns-Suntex	4,828.91
Deschutes County Line-East Seven Miles	62.78
Lawen-Crane	1,726.29
Hood River County:	
Ruthton Hill-Hood River	627.37
Mt. Hood Loop	12,710.36
Jackson County:	
Central Point-Josephine County Line	2,522.26
Ashland-South Section	838.12
Medford-Prospect	12,645.27
Jefferson County:	
Deschutes County Line-Madras	3,862.38
Madras-Wasco County Line	1,510.73
Josephine County:	
Sexton Mountain Section	543.11
Grants Pass-Crescent City Highway	4,363.97
Klamath County:	
Klamath Falls-Ashland Section	9,067.84
Klamath Falls-Sand Creek	13,259.70
Klamath Falls-Lakeview	16,659.13
Klamath Falls-California Line via Merrill	3,186.48
Deschutes County Line-Crescent	2,310.96
Lake County:	
Lakeview-Lapine	19,385.06
Lakeview-Pine Creek	2,545.11
Lane County:	
Cottage Grove-Walker	1,025.26
Goshen-Walker	371.68
Eugene-Goshen	917.13
Junction City-Monroe	1,190.00
Junction City-Eugene	1,483.90
Pacific Highway-Blachly	5,540.83
Harrisburg-Junction City	1,695,30
Lincoln County:	
Newport-Toledo	5,265.39
Linn County:	
Albany-Harrisburg	6,303.61
Lebanon-Cascadia	3,764.04
Tangent-Lebanon	643.77
Malheur County:	
Cow Valley-Brogan	2,428.74
Burrell Ranch-Vale	1,673.03
Vale-Brogan	2,412.48
Baker County Line-Ontario	5,546.66
Ontario-Vale	1,492.06
Ontario East to Snake River	384.72
Ironside-Cow Valley	1,380.98
Vale-Riverside	83.55
Marion County:	
Fairground Grade Separation, Salem	112.46

TABLE XIV—Continued

COUNTY AND JOB	Expenditures All State Funds
Morrow County:	
Oregon-Washington Highway	1,742.43
Columbia River Highway	73.37
Multnomah County:	
Investigation of Portland Bridges	10,138.52
Plans for Burnside Street Bridge	1,536.21
Polk County:	
Salem-West Seven Miles	1,934.21
Amity-Rickreall	1,546.68
Rickreall-Independence via Monmouth	667.27
Monmouth-South	1,350.34
Sherman County:	
Columbia River Highway	7,521.11
Tillamook County:	
Tillamook-Hebo	1,000.75
Neskowin-Hebo	2,142.21
Neskowin-Salmon River	2,478.43
Tillamook-Nehalem	5,443.54
Umatilla County:	
Saxe Overcrossing	54.10
Pendleton-Poor Farm	1,418.83
Echo-Reith Section	3,414.41
Athena-Milton	2,612.07
Pendleton-Cabbage Hill	1,305.45
Pendleton-Morrow County Line via Pilot Rock	753.73
Pendleton-Cold Springs	4,646.15
Ukiah-Grant County Line	2,177.25
Meacham-Kamela	10.97
Umatilla-Washington State Line	269.75
Union County:	
Wallowa Hill Section	707.83
La Grande-Kamela	9,522.29
Hot Lake-Union	1,668.59
Telocaset-North Powder	2,177.57
La Grande-Elgin	2,482.56
Wallowa County:	
Union County Line-Joseph	7,081.62
Wasco County:	
Seufert-Deschutes River	6,892.87
The Dalles-Threemile Creek	475.42
Antelope Grade Section	119.11
Chenowith-Dalles-Seufert	387.73
Deschutes River Bridge	515.92
Mosier-The Dalles	8,045.71
Threemile Creek-Dufur	6,206.69
Washington County:	
Forest Grove-Gaston	411.59
Forest Grove-Hillsboro	371.36
Canyon Road Beaverton-Multnomah County Line	889.02
Wheeler County:	
Wheeler County Unit of Sarvice Creek-Valades Ranch	1,178.50
Sarvice Creek Section	766.16
Ochoco National Forest Boundary-North Two Miles	152.00
Yamhill County:	
Newberg-West Dayton	1,609.62
McMinnville-Sheridan	1,421.61
McMinnville-Gaston	1,614.31
Grand Ronde-Polk County Line	1,273.80
McMinnville-West Dayton	258.69
McMinnville-Amity	1,143.49
Sheridan-Butlers Store	2,838.89
Total Expenditures for Surveys	**$414,811.34**

TABLE XV

GENERAL EXPENDITURES—DECEMBER 1, 1918, TO NOVEMBER 30, 1920

In this table are listed all expenditures which are not included in preceding tabulations. These expenditures cover interest on bonds, purchase of equipment and stock materials, administrative and general supervision charges, and other items of a general and miscellaneous nature.

Administration and General Supervision—		
General Administration		$ 45,361.58
State Highway Commissioners		10,957.32
Legal Department		10,211.18
Auditing Department		28,309.39
Bureau of Geology		1,343.27
Purchasing and Equipment Department		9,679.87
Testing Department		2,870.38
Office Engineering Department		47,667.45
Bridge Engineering Department		16,868.29
Pendleton Division Office		13,295.75
Medford Division Office		4,058.10
Klamath Falls Division Office		2,803.78
Coquille Division Office		2,801.09
Baker Division Office		4,069.34
The Dalles Division Office		5,240.20
La Grande Division Office		774.06
State Highway Engineer, Assistant and Division Engineers		144,376.10
Total		$350,687.15
B Interest and Expense—		
Interest on bonds		$644,827.97
Expense engraving and issuing bonds		8,593.76
Total		$653,421.73
Road Signing—		
Total for this item		$ 5,226.79
Industrial Insurance—		
Deductions from payrolls account industrial accident insurance, for which turnover to Industrial Accident Commission was not completed this biennium (credit)		$ 370.03
Equipment—		
Purchase of Equipment	$178,309.47	
Freight on Equipment received from U. S. War Dept.	114,256.56	
Materials and Parts used Repairing and Remodeling	122,787.24	
Labor and General Operating Charges	120,819.26	
Construction of Warehouses	25,941.65	
Insurance on Buildings and Equipment	6,227.23	
Truck and Automobile Licenses	13,043.50	
Total of Gross Charges		$581,384.91
Credits Account Rentals and Repairs charged out to jobs	$259,127.45	
Credits Account Disposal of Materials and Equipment received from War Department	27,472.87	
Total Credits		$286,600.32
Total Net Charges		$294,784.59
Material Stocks—		
Purchase of Materials for Stock		$ 20,845.31
Credits account of Materials charged out to jobs		22,029.30
Total Net Credit		$ 1,183.99



CLATSOP CREST ON THE COLUMBIA RIVER HIGHWAY IN CLATSOP COUNTY. 725 FEET ABOVE THE RIVER. PAVED IN 1920.

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TABLE A

RECORD OF MILEAGES OF NEW CONSTRUCTION UNDER SUPERVISION OF STATE HIGHWAY COMMISSION

The mileages given in this table include all State and County co-operative work, all Post Road and Forest Road projects, and such County work on State highways as is paid for on vouchers drawn by the Highway Department. Work by County forces and under County contracts is not included.

YEAR	Miles Bituminous Pavement	Miles Concrete Pavement	Miles Broken Stone or Gravel Surfacing	Miles Grading
1913-16	7.3	14.3	19.8	160.2
1917-18	45.2	4.8	111.8	134.5
1919	144.6	18.5	94.4	286.6
1920	167.7	16.4	275 0	474.8
Totals	364.8	54.0	501.0	1,056.1

TABLE B

STATE FUNDS RECEIVED AND EXPENDED BY THE STATE HIGHWAY COMMISSION 1913 TO 1920

YEAR	Net Receipts (State Funds Only)	Net Expenditures (State Funds Only)
1913-1914	$ 248,570.60	$ 200,686.09
1915	228,798.34	216,331.51
1916	233,623.76	199,556.96
1917	1,707,772.08	674,249.61
1918	1,759,600.15	2,214,007.87
1919	7,504,862.01	6,296,377.07
1920	11,302,741.86	11,362,169.83
Totals	$22,985,968.80	$21,163,378.94
Balance on hand December 1, 1920		1,822,589.86
		$22,985,968.80

TABLE C

TOTAL YEARLY EXPENDITURES UPON WORK HANDLED UNDER THE SUPERVISION OF THE STATE HIGHWAY DEPARTMENT 1913 TO 1920

YEAR	State Funds	County Funds	Government Funds	Railroad Funds	Totals
1913-14 ..	$ 200,686.09	*$1,000,000.00	.....	.....	$ 1,200,686.09
1915	216,331.51	358,645.94	.....	.....	574,977.45
1916	199,556.96	96,471.90	.....	.....	296,028.86
1917	674,249.61	270,162.37	.....	.....	944,411.98
1918	2,214,008.07	439,562.42	.....	.....	2,653,570.49
1919	6,296,377.07	368,550.01	$ 224,851.60	.....	6,889,778.68
1920	11,362,169.83	868,539.59	1,096,027.33	$17,661.62	13,344,398.37
Totals..	$21,163,379.14	$3,401,932.23	$1,320,878.93	$17,661.62	$25,903,851.92

*Expenditure of County Funds during 1913 and 1914 is approximate only.

TABLE D

MILES OF DIFFERENT TYPES OF ROAD IN EACH COUNTY

Except for concrete and bituminous pavements, these mileages are in most instances, only roughly approximate, as accurate data is obtainable in very few Counties.

COUNTY	All Public Roads	Concrete Pavement	Bituminous Pavement	Plank Roads	Rock & Gravel Surfacing	Improved Earth Roads	Unimproved Roads
Baker	4,270.0	.....	.....	.....	70.0	4,000.0	200.0
Benton	570.0	.....	16.6	2.0	150.0	251.4	150.0
Clackamas	1,400 0	.....	26.0	90.0	400.0	504.0	380.0
Clatsop	270.5	8.5	50.0	32.0	120.0	40.0	20.0
Columbia	554.0	.....	59.5	10.0	141.0	43.5	300.0
Coos	728.0	14.0	.....	60.0	116 0	108.0	430.0
Crook	1,050.0	.....	.....	.....	30.0	720.0	300.0
Curry	150.0	.....	.....	.....	31.0	89.0	30.0
Deschutes	1,650.0	.....	.....	.....	45.0	405.0	1,200.0
Douglas	962.0	1.0	25.0	25.0	305.0	396.0	210.0
Gilliam	1,505.0	.....	.....	.....	32.0	43.0	1,430.0
Grant	1,020.0	.....	.....	.....	18.5	851.5	150.0
Harney	1,000.0	.....	.....	.....	25.0	125.0	850.0
Hood River	320.0	0.2	24 0	.....	112 0	113.8	70.0
Jackson	1,250.0	12.0	45.0	.....	425.0	318.0	450.0
Jefferson	1,550.0	.....	.....	.....	55.0	525.0	970.0
Josephine	652 0	.....	11.0	.....	62.0	279.0	300.0
Klamath	1,200.0	.....	1.0	.....	30.0	319.0	850.0
Lake	1,700.0	.....	.....	.....	19.0	121.0	1,560.0
Lane	1,490.0	.....	17.5	7.5	575.0	10.0	880.0
Lincoln	335.0	.....	.....	5.5	15.0	14.5	300.0
Linn	2,400.0	.....	6.7	.....	500.0	993.3	900.0
Malheur	2,000.0	0.9	.....	.....	60.0	439.1	1,500.0
Marion	1,340.0	.....	50.0	.....	660.0	295.0	335.0
Morrow	1,050.0	.....	.....	.....	40.0	50.0	960.0
Multnomah	429.2	10.5	93.7	.....	125.0	100.0	100.0
Polk	1,100.0	.....	20.0	.....	340.0	280.0	460.0
Sherman	550.0	.....	.....	.....	4.0	246.0	300.0
Tillamook	340.0	5.6	10.4	20.0	191.0	73.0	40.0
Umatilla	3,000.0	.....	32.0	.....	168.0	700.0	2,100.0
Union	1,246.0	.....	6.0	.....	11.0	29.0	1,200.0
Wallowa	374.0	.....	.....	.....	4.0	20.0	350.0
Wasco	1,300.0	.....	5.0	.....	32.5	1,252.5	10.0
Washington	985.0	11.2	24.2	42.7	302.7	494.2	110.0
Wheeler	700.0	.....	.....	.....	10.0	360.0	330.0
Yamhill	1,385.0	17.0	15.5	2.5	350.0	500.0	500.0
Totals	41,825.7	80.9	539.1	297.2	5,574.7	15,108.8	20,225.0

TABLE E

YEARLY EXPENDITURES OF STATE FUNDS IN COUNTIES—1914, 1915, 1916, 1917, 1918, 1919, 1920

(This table does not include administration or other general charges which are not direct expenditures in any county.)

COUNTIES	1914	1915	1916	1917	1918	1919	1920	Total
Baker			$ 802.74	$ 1,214.01	$ 6,364.67	$ 129,250.32	$ 197,030.02	$ 334,661.76
Benton		$ 181.50	727.14	47.56		94,814.36	281,511.56	377,282.12
Clackamas	$ 587.74		1,013.37	12,519.70	143,341.40	105,463.20	282,100.56	545,025.97
Clatsop	64,587.44	35,110.03	20,823.44	54,294.83	290,092.40	164,169.81	465,627.25	1,094,705.20
Columbia	13,384.87	92,069.72	11,143.48	76,424.91	411,877.24	620,371.94	595,663.81	1,820,935.97
Coos			375.81	16,703.28	264.40	166,528.82	310,711.15	494,583.46
Crook		57.17	12,052.32		3,053.72	43,850.69	198,237.26	257,251.16
Curry				79.91	5,549.33	29,532.97	91,136.05	126,298.26
Deschutes				7,244 37	13,472.00	11,183.38	151,348.06	183,247.81
Douglas		15,701.12	25,188.08	8,803.50	150,966.08	615,811.17	1,370,242.25	2,186,712.20
Gilliam			7.42	4,443.52	31,555.96	186,248.81	490,530.86	712,786.57
Grant			26.95	2,980.16	4,488.62	72,459.19	92,238.44	172,193.36
Harney					1,873.45	8,593.22	103,402.69	113,869.36
Hood River	1,077.24	47,927.84	4,317.17	61,326.69	372,601.53	426,614.51	447,952.84	1,361,817.82
Jackson	59,569.82	31,954.91	25,774.49	54,476.20	32,143.68	376,353.07	1,022,709.31	1,602,981.48
Jefferson						2,466.69	54,817.15	57,283.84
Josephine		2,230.81	5,590.03	5,297.73	72,700.41	310,165.29	297,614.12	693,598.39
Klamath				27.75	791.48	36,686.51	152,496.28	190,002.02
Lake				15,215.57	176.10	12,926.19	72,441.74	100,759.60
Lane		61.11	4,639.07	12,247.61	2,281.91	270,006.64	334,950.47	624,186.81
Lincoln		11.95	12.88	2,054.05	943.42	5,378.43	33,770.40	42,171.13
Linn		208.81	37.32	287.67	503.40	45,693.52	142,706.49	189,437.21
Malheur			189.61	93.02	773.63	6,427.18	150,271.85	157,755.29
Marion	414.76	79.79	712.55	479.41	4,604.18	266,568.74	237,047.59	509,907.02
Morrow			105.18	4,200.72	6,662.38	163,433.54	114,801.59	289,203.41
Multnomah	1,068.08	107.03				61,252.97	Cr. 47,671.81	14,756.27
Polk	414.15	74.54	6,614.53	137.78	665.14	153,139.31	244,785.61	405,831.06
Sherman	44,523.20	993.26	188.87	48.87	3,003.27	36,129.66	133,946.99	218,834.12
Tillamook		116.59	1,735.01	5,213.34	63,060.95	146,123.61	194,265.90	410,515.40
Umatilla			13.49	100,608.75	73,333.75	243,343.95	518,724.77	936,024.71
Union			42.20	5,975.15	26,213.02	190,205.75	134,027.33	356,463.45
Wallowa					765.07	43,095.31	38,545.45	82,405.83
Wasco		134.91	10.34	286.02	4,027.77	193,090.34	646,204.73	843,754.11
Washington	4,998.14	14,321.44	4,975.48	70,139.95	176.629.10	264,534.18	243,733.81	779,332.10
Wheeler			5.64	13,081.26	56,130.52	64,184.33	194,579.55	327,984.30
Yamhill	408.34	108.37	2,106.03	38,714.45	86,244.39	175,579.35	621,581.34	924,742.27
Miscellaneous						198.62	21.62	220.24
Totals	$191,033.78	$241,450.90	$129,230.64	$574,670.74	$2,047,154.37	$5,741,875.57	$10,614,105.08	$19,539,521.08

TABLE F

COUNTY DISBURSEMENTS FOR ROAD PURPOSES FOR THE YEARS 1914 TO 1920, INCLUSIVE

This tabulation was compiled from information supplied by the officials of the respective Counties, supplemented in a very few instances by information from other sources. They are not represented to be more than approximate figures although for many Counties they are probably exact. For expenditures during the years 1903 to 1913, inclusive, refer to the 1914 report of the State Highway Engineer.

COUNTY	1914	1915	1916	1917	1918	1919	1920 To Nov. 30
Baker	$ 39,469.19	$ 48,379.10	$ 76,388.43	$ 23,003.51	$ 53,244.98	$ 91,729.04	$ 121,268.82
Benton	67,088.01	65,962 52	58,541.54	61,824.18	111,121.38	158,719.43	139,862.79
Clackamas	352,692.59	300,941.81	325,126.31	365,151.90	405,298.79	449,637.68	445,374.05
Clatsop	500,123.63	296,533.29	323,113.00	206,070.00	342,704.00	368,652.52	420,000.00
Columbia	383,551.00	201,637.00	194,631.00	186,429.00	215,511.00	222,411.00	189,538.00
Coos	244,979.00	236,321.00	175,515.00	428,920.00	313,448.00	224,413.00	252,039.00
Crook	30,800.66	29,748.22	103,877.97	45,034.15	15,509.97	134,165.50	252,585.49
Curry	20,179.06	29,260.86	47,579.43	40,816.48	44,425.16	50,683.05	23,247.11
Deschutes	.....	.....	.....	14,663.48	31,834.30	32,778.47	*
Douglas	133,227.96	*	*	*	103,607.75	205,437.22	165,577.54
Gilliam	34,692.60	44,173.66	63,460.49	66,402.51	70,500.00	74,535.94	58,500.00
Grant	23,990.65	22,951.15	33,748.38	32,470.45	44,025.29	48,599.32	**33,434.37
Harney	*	*	*	*	*	*	*
Hood River	46,000.00	43,000.00	47,194.16	60,731.96	38,260.20	48,217.64	60,000.00
Jackson	441,741.46	109,736.23	97,583.84	83,319.47	103,419.36	187,692.85	200,000.00
Jefferson	.....	.....	13,500.00	25,000.00	25,000.00	25,000.00	31,764.24
Josephine	44,753.20	47,754.93	38,242.42	37,222.00	46,000.73	80,959.21	135,057.13
Klamath	53,019.65	19,001.23	50,579.12	51,252.14	96,474.99	85,301.74	80,000.00
Lake	20,000.00	30,000.00	30,000.00	25,000.00	27,784.00	30,000.00	31,000.00
Lane	132,278.49	142,719.82	110,000.00	282,556.45	280,913.55	349,591.78	146,260.59
Lincoln	53,008.00	75,802.00	60,471.00	12,632.00	33,788.00	125,044.00	**52,065.00
Linn	164,663.13	137,599.40	168,379.25	184,335.26	166,807.04	289,835.09	**429,745.12
Malheur	30,781.14	*	*	*	50,912.82	54,049.93	68,548.99
Marion	224,000.00	261,000.00	182,000.00	267,000.00	442,000.00	449,000.00	475,000.00
Morrow	32,435.39	32,192.33	29,629.40	58,897.95	57,864.95	91,605.75	153,893.85
Multnomah	742,117.94	1,060,416.89	690,457.60	586,338.51	479,764.92	493,995.86	531,181.28
Polk	104,265.68	95,170.75	137,123.09	62,201.73	118,902.18	69,663.28	83,000.00
Sherman	54,000.00	55,000.00	56,000.00	58,000.00	60,000.00	65,000.00	100,000.00
Tillamook	18,446.00	174,017.38	174,017.38	188,150.00	188,150.00	204,595.00	187,000.00
Umatilla	*	*	*	*	*	*	*
Union	38,664.82	*	*	*	*	*	40,000.00
Wallowa	43,090.77	25,549.48	55,557.77	53,986.96	37,733.58	71,070.17	56,756.82
Wasco	37,400.00	43,104.73	80,553.73	110,327.98	194,654.86	82,358.95	93,688.97
Washington	221,189.58	192,967.28	259,057.94	235,624.84	266,140.51	461,363.27	395,000.00
Wheeler	18,804.81	20,256.37	16,660.79	26,810.93	65,836.11	24,120.50	68,325.00
Yamhill	50,000.00	50,000.00	50,000.00	50,000.00	60,000.00	300,000.00	340,000.00
Totals	$4,401,454.42	$3,891,197.35	$3,748,989.04	$3,930,173 84	$4,591,638.42	$5,650,227.19	$5,859,714.16

* Data not available.

** Not complete to November 30.

TABLE G

COUNTY ROAD CONSTRUCTION—1919 AND 1920

This tabulation was compiled from information supplied by officials of the respective Counties. The mileages are intended to include all new construction handled by each County except such work as may have been done on State highways and under the supervision of the State Highway Department. The accuracy of the information here given cannot be vouched for.

COUNTY	1919				1920			
	Concrete Pavement	Bituminous Pavement	Broken Stone or Gravel Surfacing	Grading	Concrete Pavement	Bituminous Pavement	Broken Stone or Gravel Surfacing	Grading
Baker	.....	.....	16.0	16 0	.....	.....	12.0	12.0
Benton	.....	.....	20.0	35.0	.....	.....	20.0	30.0
Clackamas	.....	4.73	8.0	5 0	.....	3.5	6.0	10.0
Clatsop	.....	7.25	25.0	5.0	4.5	.....	26.0	11.0
Columbia	.....	.....	10.0	10.0	.....	0.3	9.0	10.0
Coos	.....	.....	5.0	6.0	.....	.....	8.0	19.0
Crook	.....	.....	2.0	10.0	.....	.....	5.0	10.0
Curry	.....	.....	4.0	2.0	.....	.....	4 0	1.0
Deschutes **	.....	.....	.....	.....	.....	.....	3.0	6.0
Douglas**	.....	.....	.....	.....	.....	.....	17.0	20.0
Gilliam	.....	.....	.....	20.0	.....	.....	.....	.....
Grant	.....	.....	2.0	3.5	.....	.....	3.65	6.5
Harney	*	*	*	*	*	*	*	*
Hood River	.....	.....	2.0	6.0	0.16	.....	7.0	4.0
Jackson	.....	.....	8.0	9.0	.....	.....	25.0	15.0
Jefferson	.....	.....	2.0	5.0	.....	.....	5.0	10.0
Josephine	.....	.....	7.0	9.0	.....	.....	25.0	20.0
Klamath	.....	.....	12.0	10.0	.....	.....	.....	6.0
Lake	*	*	*	*	*	*	*	*
Lane	.....	.....	11.0	11.0	.....	.....	12.0	12.0
Lincoln	.....	.....	2.5	1.5	.....	.....	4.0	7.0
Linn	.....	.....	5.0	2.5	.....	.....	9.0	5.0
Malheur	.....	.....	10.0	50.0	.....	.....	16 0	42.0
Marion	.....	5.0	50.0	.....	.....	9.0	45.0	.....
Morrow	.....	.....	6.75	37.0	.....	.....	.....	.....
Multnomah	.95	9.0	.....	2.0	.80	3.2	10.5	2.0
Polk	*	*	*	*	*	*	*	*
Sherman	.....	.....	2.0	.75	.....	.....	1.0	3.25
Tillamook	.....	.....	2.5	9.8	0.2	.....	2.5	14.1
Umatilla	*	*	*	*	*	*	*	*
Union	.....	.....	.....	.....	.....	.....	7.0	14.0
Wallowa	.....	.....	.....	13.0	.....	.....	4.0	6.5
Wasco	.....	.....	5.0	6.0	.....	.....	6.0	4.0
Washington	.....	.....	27.0	37.0	.....	.....	36.84	30.0
Wheeler	*	*	*	*	*	*	*	*
Yamhill	4.0	.....	20.0	10.0	.....	.....	29.0	20.0
Totals	4.95	25.98	264.75	332.05	5.66	16.00	358.49	350.35

* Data not available. ** Data for 1919 not available.

TABLE H

COUNTY BONDS FOR HIGHWAY PURPOSES—1913-1920

This tabulation is believed to be a complete list of all County bonds voted for highway purposes to and including the year 1920.

COUNTY	Amount	Date Voted
Baker	$ 500.000.00	June 3, 1919
Benton	220,000.00	June 3. 1919
Clackamas	1,700,000.00	Nov. 24, 1919
"	250,000.00	Nov. 2, 1920
Clatsop	400,000.00	Nov. 4, 1913
"	100,000.00	Nov. 2, 1920
Columbia	360,000.00	Feb. 1914
Coos	362,000.00	June 1916
Crook	95,000.00	May 17, 1918
"	220,000.00	Nov. 7, 1919
Curry	98,000.00	June 3, 1919
Deschutes	125,000.00	June 3, 1919
Douglas	550,000.00	Aug. 1917
Gilliam	250,000.00	June 3, 1919
Grant	140,000.00	June 4, 1917
Harney	.....	.....
Hood River	75,000.00	July 15, 1914
Jackson	500,000.00	Sept. 9, 1913
"	500,000.00	May 21, 1920
Jefferson	100,000.00	June 3, 1919
Josephine	.....	.....
Klamath	347,704.00	June 3, 1919
Lake	200,000.00	June 3, 1919
Lane	2,000,000.00	May 21, 1920
Lincoln	180,000.00	June 3, 1919
Linn	600,000.00	June 3, 1919
Malheur	230,000.00	June 3, 1919
Marion	850,000.00	June 3, 1919
Morrow	290,000.00	June 3, 1919
Multnomah	1,250,000.00	Mar. 1915
Polk	265,000.00	June 3, 1919
Sherman	300,000.00	April 5, 1919
Tillamook	430,000.00	June 3, 1919
Umatilla	1,050,000.00	Mar. 4, 1919
Union	1,498,000.00	Oct. 11, 1919
Wallowa	300,000.00	June 3, 1919
Wasco	260,000.00	Nov. 1916
"	100,000.00	Nov. 2, 1920
Washington	.....	.....
Wheeler	80,000.00	Nov. 1916
"	44,000.00	June 3, 1919
Yamhill	360,000.00	June 3, 1919
"	420,000.00	May 21, 1920
Total	$17,599.704.00	

TABLE I

REGISTRATION OF MOTOR VEHICLES—JANUARY 1, 1920, TO NOVEMBER 30, 1920

The automobile, truck and motorcycle registrations shown in this table are to November 30 only, and do not represent the total registration for the year 1920. The figures for automobiles, motorcycles, motor bicycles, and fees collected are correct for the period covered, having been obtained from the registration department of the Secretary of State's Office. The number of trucks and the classification thereof, are based upon a count of 97,921 registrations to September 1, it having been assumed that the registration since September 1 maintained the same proportion of trucks of different capacities as was found in the registration prior to that date.

COUNTIES	Total Number Automobiles and Trucks	Number of Persons per Auto and Truck	CLASSIFICATION OF AUTOMOBILES AND TRUCKS									Motor-cycles	Motor Bi-cycles	for Motor Fees Collected Vehicle and Drivers Licenses
			Auto-mobiles	Trucks	CLASSIFICATION OF TRUCKS									
					5 Tons	4 Tons	3½ Tons	2 to 3 Tons Inc.	1 to 1½ Tons Inc.	½ to ¾ Tons Inc.	Fords With Truck Bodies			
Baker	1,881	9 5	1,729	152	0	0	8	31	29	30	54	53	1	$ 39,166.50
Benton	1,858	7.3	1,688	170	2	1	12	25	30	37	63	61	0	34,007.50
Clackamas	4,289	8.8	3,794	495	12	7	49	83	80	79	185	143	5	84,422.00
Clatsop	2,223	10.4	1,811	412	10	5	21	54	66	118	138	64	2	47,746.25
Columbia	1,169	13.6	1,048	121	0	0	5	23	23	22	48	66	0	21,715.00
Coos	1,965	11.3	1,686	279	4	0	17	31	65	60	102	49	0	38,293.75
Crook	637	5.4	577	60	0	1	0	9	15	16	19	2	1	11,875.00
Curry	274	11.0	231	43	0	1	3	5	6	4	24	0	0	4,962.75
Deschutes	1,639	5.9	1,480	159	0	1	10	26	18	27	77	16	0	29,863.75
Douglas	2,481	8 6	2,212	269	3	0	21	37	48	52	108	95	1	48,598.75
Gilliam	681	5.9	616	65	0	0	6	32	4	2	21	3	0	14,077.75
Grant	620	8.9	575	45	0	0	3	17	8	3	14	6	0	11,460.75
Harney	615	6.5	543	72	0	0	10	20	6	1	35	7	0	12,179.00
Hood River	1,400	5.9	1,178	222	1	0	8	54	37	27	95	21	0	28,944.50
Jackson	3,750	5.5	3,384	366	7	3	22	44	66	66	158	61	4	67,824.75
Jefferson	422	7.6	392	30	0	1	0	7	1	1	20	4	0	7,114.75
Josephine	1,205	6.4	1,074	131	4	6	12	14	29	16	50	27	0	22,392.00
Klamath	1,822	6.3	1,654	168	5	1	8	25	25	30	74	30	2	35,292.50

Lake	628	6.3	592	36	0	0	1	3	5	3	24	4	0	11,064.75
Lane	4,593	7.9	4,222	371	4	0	14	50	63	64	176	229	10	83,767.50
Lincoln	257	23.7	223	34	0	0	0	0	0	3	31	4	0	4,246.25
Linn	3,666	6.7	3,365	301	0	4	22	58	64	38	115	83	2	67,040.25
Malheur	1,578	6.9	1,448	130	0	0	0	28	18	19	65	8	0	28,937.00
Marion	6,732	7.0	5,993	739	17	23	61	178	141	80	239	221	3	132,901.25
Morrow	885	6.3	834	51	0	0	2	17	6	3	23	8	0	17,634.00
Multnomah	34,078	8.1	28,822	5,256	139	58	251	825	854	1,023	2,106	1,745	50	744,958.50
Polk	2,120	6.8	1,917	203	2	6	14	30	26	11	114	38	0	38,957.25
Sherman	970	3.9	868	102	0	0	4	26	8	30	34	5	0	20,987.25
Tillamook	1,414	6.2	1,220	194	4	1	12	36	41	28	72	28	0	28,308.25
Umatilla	4,837	5.4	4,387	450	0	2	20	96	63	109	160	43	2	98,107.50
Union	2,506	6.6	2,324	182	2	0	7	19	30	44	80	92	0	48,829.50
Wallowa	1,143	8.6	1,096	47	0	0	0	2	1	1	43	18	0	21,595.50
Wasco	2,047	6.7	1,805	242	0	0	4	41	29	39	129	31	0	39,951.75
Washington	3,505	7.5	3,241	264	7	0	11	54	34	27	131	97	1	69,576.50
Wheeler	364	7.7	320	44	0	0	2	11	7	5	19	3	0	7,053.00
Yamhill	3,164	6.5	2,941	223	2	0	15	42	32	29	103	61	0	57,937.00
Totals	103,418	7.6	91,290	12,128	225	121	655	2,053	1,978	2,147	4,949	3,426	84	$2,081,790.25

TABLE J

POPULATION, AREA, ASSESSED VALUATION AND BONDING LIMITS FOR ALL COUNTIES

COUNTY	Population by 1920 Census	Area in Acres	Assessed Valuation	Road Bonding Limit Based on 6% Limitation	Bonds Voted to Nov. 30, 1920
Baker	17,929	1,958,400	$ 26,562,013.94	$ 1,593,720.84	$ 500,000.00
Benton	13,744	440,320	11,480,065.12	688,803.91	220,000.00
Clackamas	37,698	1,192,960	29,690,673.11	1,781,440.39	1,950,000.00
Clatsop	23,030	525,440	41,550,735.26	2,493,044.11	500,000.00
Columbia	15,960	423,680	13,936,185.61	836,171.14	360,000.00
Coos	22,257	1,041,920	24,459,411.38	1,467,564.68	362,000.00
Crook	3,424	1,916,160	4,986,799.63	299,207.98	315,000.00
Curry	3,025	958,720	4,926,328.47	295,579.71	98,000.00
Deschutes	9,622	1,928,080	8,755,241.27	525,314.48	125,000.00
Douglas	21,332	3,150,080	34,173,386.28	2,050,403.18	550,000.00
Gilliam	3,960	768,640	16,167,828.05	970,069.68	250,000.00
Grant	5,496	2,892,800	8,983,894.70	539,033.68	140,000.00
Harney	3,992	6,357,120	12,880,969.06	772,858.14	.....
Hood River	8,315	347,520	9,955,875.50	597,352.53	75,000.00
Jackson	20,405	1,815,040	27,347,172.47	1,640,830.35	1,000,000.00
Jefferson	3,211	1,133,680	5,566,114.87	333,966.89	100,000.00
Josephine	7,655	1,120,640	8,184,215.04	491,052.90	.....
Klamath	11,413	3,839,360	21,038,873.25	1,262,332.40	347,704.00
Lake	3,991	5,068,800	12,027,317.04	721,639.02	200,000.00
Lane	36,166	2,951,680	34,873,272.97	2,092,396.38	2,000,000.00
Lincoln	6,084	645,120	11,000,224.47	660,013.47	180,000.00
Linn	24,550	1,435,520	31,068,472.86	1,864,108.37	600,000.00
Malheur	10,907	6,325,120	16,218,732.32	973,123.94	230,000.00
Marion	47,117	764,160	41,782,605.24	2,506,956.31	850,000.00
Morrow	5,617	1,296,000	13,864,571.03	831,874.26	290,000.00
Multnomh	275,898	288,640	338,190,784.62	20,291,447.07	1,250,000.00
Polk	14,181	453,760	13,303,518.76	798,211.13	265,000.00
Sherman	3,826	535,040	19,618,909.67	1,177,134.58	300,000.00
Tillamook	8,776	720,000	22,808,593.05	1,368,515.58	430,000.00
Umatilla	25,946	2,030,720	57,994,683.39	3,479,681.00	1,050,000.00
Union	16,636	1,335,680	28,020,756.93	1,681,245.42	1,498,000.00
Wallowa	9,778	2,012,800	17,528,658.14	1,051,719.49	300,000.00
Wasco	13,648	1,499,520	20,157,877.44	1,209,472.65	360,000.00
Washington	26,376	467,840	23,296,933.20	1,397,815.99	.....
Wheeler	2,791	1,090,560	6,574,601.92	394,476.12	124,000.00
Yamhill	20,529	456,960	21,862,753.06	1,311,765.18	780,000.00
Totals	783,285	61,188,480	$1,040,839,049.12	$62,450,342.95	$17,599,704.00

TABLE K

STATE HIGHWAYS, TENTATIVELY ADOPTED TERMINI AND ROUTES

No. 1. Pacific Highway—
From the Interstate Bridge over the Columbia River Highway north of Portland, south via Portland, Oswego, Oregon City, Salem, Albany, Junction City, Eugene, Roseburg, Grants Pass, Medford and Ashland to the Oregon-California State line.

No. 2. Columbia River Highway—
From Astoria, east via Rainier, Portland, Hood River, The Dalles, Arlington and Umatilla, to Pendleton.

No. 3. West Side Highway—
From a point on Highway No. 1 at Portland, thence south through Newberg, McMinnville, Monmouth and Corvallis to a junction with Highway No. 1 at Junction City.

No. 4 The Dalles-California Highway—
From a point on Highway No. 2 at The Dalles, south via Madras, Redmond, Bend, Klamath Falls and Merrill to the Oregon-California State Line.

No. 5. John Day River Highway—
From a point on Highway No. 2 at Arlington, south and east through Condon, Fossil, Dayville, Prairie City and Vale to the Oregon-Idaho State Line near Nyssa.

No. 6. Old Oregon Trail—
From Pendleton southeasterly through La Grande, Baker, Huntington and Ontario to the Snake River Bridge east of Ontario.

No. 7. Central Oregon Highway—
From a point on Highway No. 4 at or near Bend, easterly through Millican, Riley, Burns, Crane and Junction to a junction with Highway No. 5 at or near Vale.

No. 8. Oregon-Washington Highway—
From a point on Highway No. 2 at or near Willows, through Ione, Heppner, Pendleton and Freewater to the Oregon-Washington State Line.

No. 9. Coast Highway—
From Astoria south via Tillamook, Toledo, Florence, Marshfield and Gold Beach to the Oregon-California State Line.

No. 10. La Grande-Enterprise Highway—
From a point on Highway No. 6 at or near La Grande, through Elgin and Enterprise to Joseph.

No. 11. Enterprise-Flora Highway—
From a point on Highway No. 10, at or near Enterprise, north to Flora.

No. 12. Baker-Cornucopia Highway—
From a point on Highway No. 6 at Baker, east through Palmer, Pine and Halfway to Cornucopia.

No. 13. Baker-Unity Highway—
From a point on Highway No. 6, at or near Baker, southwest to a junction with Highway No. 5, at or near Unity.

No. 14. Antelope-Mitchell Highway—
From a point on Highway No. 4, at or near Antelope, to a junction with Highway No. 15, at or near Mitchell.

No. 15. McKenzie River Highway—
From a point on Highway No. 1, at or near Eugene, easterly through the McKenzie Valley and through Sisters, Redmond, Prineville and Mitchell to a junction with Highway No. 5, at or near Dayville.

No. 16. Albany-Sisters Highway—
From a point on Highway No. 1 at or near Tangent, southeasterly to a junction with Highway No. 15 near Sisters.

No. 17. Bend-Sisters Highway—
From a point on Highway No. 4 near Bend, northwesterly to a junction with Highway No. 15, at or near Sisters.

No. 18. Lakeview-Burns Highway—
From a point on Highway No. 19, near Lakeview, northeasterly to a junction with Highway No. 7, at or near Burns.

No. 19. Lapine-Lakeview Highway—
From a point on Highway No. 4, at or near Lapine, southeasterly through Fort Rock, Silver Lake, Paisley and Lakeview to the Oregon-California State Line.

No. 20. Klamath Falls-Lakeview Highway—
From a point on Highway No. 4 near Klamath Falls, east through Olene and Dairy to a junction with Highway No. 19 at or near Lakeview.

No. 21. Ashland-Klamath Falls Highway—
From a point on Highway No. 1 south of Ashland, east via the Green Springs Mountain Summit to a junction with Highway No. 4, at or near Klamath Falls.

No. 22. Medford-Crater Lake Highway—
From a point on Highway No. 1 at Medford, northesterly through Trail and the Rogue River Valley to a junction with Highway No. 24 near Crater Lake.

No. 23. Klamath-Crater Lake Highway—
From a junction with Highway No. 22 near Crater Lake, southeasterly to a junctoin with Highway No. 4, at or near Forth Klamath.

No. 24. Rim Highway—
A highway encircling Crater Lake and connecting with Highway No. 22 near Crater Lake Lodge.

No. 25. Grants Pass-Crescent City Highway—
From a point on Highway No. 1 at Grants Pass, southwesterly through Kerby and Waldo to the Oregon-California State Line.

No. 26. Mount Hood Loop Highway—
From Portland through Gresham, Sandy and Government Camp, and thence through the Hood River Valley to a junction with Highway No. 2, at or near the city of Hood River.

No. 27. Alsea River Forest Road—
A forest road in the Alsea River Valley, extending from Waldport to the Lincoln-Benton County Line.

No. 28. Pendleton-John Day Highway—
From a point on Highway No. 8, at or near Pilot Rock, through Albee, Ukiah and Susanville to a junction with Highway No. 5, at or near John Day.

No. 29. Tualatin Valley Highway—
From a point on Highway No. 3 at Bertha, through Beaverton, Hillsboro, Forest Grove and Carlton to a junction with Highway No. 3 about three miles north of McMinnville.

No. 30. Salem-Dallas Highway—
From a point on Highway No. 1 at Salem, west through Rickreall to Dallas.

No. 31. Albany-Corvallis Highway—
From a point on Highway No. 1 at Albany, west to a junction with Highway No. 3, at or near Corvallis.

No. 32. McMinnville-Tillamook Highway—
From a point on Highway No. 3 at McMinnville, through Sheridan, Willamina and Grand Ronde to a junction with Highway No. 9 at Hebo.

No. 33. Corvallis-Newport Highway—
From a point on Highway No. 3 at Corvallis, west through Blodgett, Wren and Toledo to a connection with Highway No. 9, at or near Newport.

No. 34. Willamette Valley-Florence Highway—
From a point on Highway No. 1 between Eugene and Junction City, west through Blachly and Deadwood to a junction with Highway No. 9, at or near Florence.

No. 35. Coos Bay-Roseburg Highway—
From a point on Highway No. 9, at or near Coquille, easterly up the Middle Fork of the Coquille River, through Remote, Camas Valley and Brockway to a junction with Highway No. 1 north of Dillard.

No 36. Pendleton-Cold Springs Highway—
From a point on Highway No. 2, at or near Pendleton, northwest to Cold Springs.

No. 37. Crooked River Highway—
From a point on Highway No. 15 at Prineville, thence up the Crooked River Valley to Paulina.

No. 38. Tiller Summit Forest Road—
A forest road from Tiller southeasterly to the Douglas-Jackson County Line.

No. 39. Deschutes River Highway—
From a point on Highway No. 2 at the west end of the Deschutes River Bridge, thence south to a connection with the old county road at the west end of the Moody Toll Bridge.

No. 40. Canyon Road—
From Portland southwesterly via Tanner Creek Canyon to a junction with Highway No. 29 at Beaverton.

TABLE L

STATE HIGHWAYS—NAMES, NUMBERS AND MILEAGES

No.	Name—	Length Miles.
1.	Pacific Highway	345.6
2.	Columbia River Highway	340.1
3.	West Side Highway	113.3
4.	The Dalles-California Highway	351
5.	John Day River Highway	317
6.	The Old Oregon Trail	190
7.	Central Oregon Highway	270
8.	Oregon-Washington Highway	148
9.	Coast Highway	430
10.	La Grande-Enterprise Highway	78
11.	Enterprise-Flora Highway	35
12.	Baker-Cornucopia Highway	77
13.	Baker-Unity Highway	42
14.	Antelope-Mitchell Highway	43
15.	McKenzie River Highway	220
16.	Albany-Sisters Highway	100
17.	Bend-Sisters Highway	27
18.	Lakeview-Burns Highway	150
19.	Lapine-Lakeview Highway	159
20.	Klamath Falls-Lakeview Highway	94
21.	Ashland-Klamath Falls Highway	57
22.	Medford-Crater Lake Highway	78
23.	Klamath-Crater Lake Highway	20
24.	The Rim Highway	39
25.	Grants Pass-Crescent City Highway	46
26.	Mount Hood Loop Highway	105
27.	Alsea River Forest Road	26
28.	Pendleton-John Day Highway	105
29.	Tualatin Valley Highway	50.9
30.	Salem-Dallas Highway	15
31.	Albany-Corvallis Highway	11
32.	McMinnville-Tillamook Highway	48
33.	Corvallis-Newport Highway	60
34.	Willamette Valley-Florence Highway	62
35.	Coos Bay-Roseburg Highway	80
36.	Pendleton-Cold Springs Highway	30
37.	Crooked River Highway	71
38.	Tiller-Summit Forest Road	16
39.	Deschutes River Highway	0.5
40.	Canyon Road	8
	Total mileage State highways	4,458.4

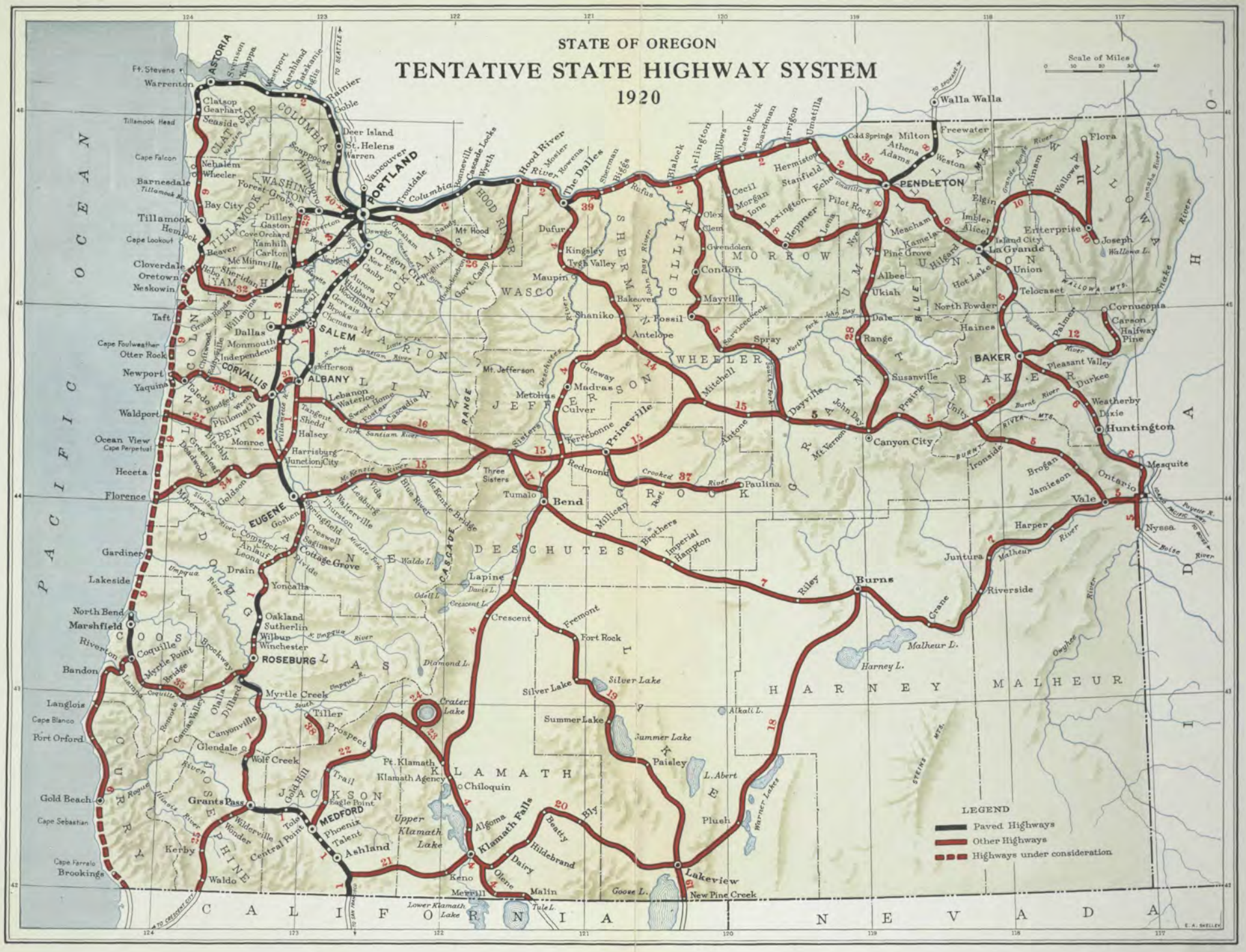

STATE OF OREGON
TENTATIVE STATE HIGHWAY SYSTEM
1920
Scale of Miles
0 10 20 30 40
LEGEND
Paved Highways
Other Highways
Highways under consideration
PACIFIC OCEAN
CALIFORNIA
NEVADA
IDAHO
ASTORIA
PORTLAND
SALEM
EUGENE
CORVALLIS
ALBANY
ROSEBURG
MEDFORD
PENDLETON
BAKER
LA GRANDE
BEND
PRINEVILLE
BURNS
LAKEVIEW
KLAMATH FALLS
GRANTS PASS
COOS BAY
NEWPORT
TILLAMOOK
HOOD RIVER
THE DALLES
WALLA WALLA
HUNTINGTON
ONTARIO
VALE
NYSSA
CANYON CITY
JOHN DAY
MADRAS
REDMOND
LAPINE
CRESCENT
SUMMER LAKE
PAISLEY
ALBEE
ENTERPRISE
JOSEPH
IMBLER
ELGIN
MILTON
FREEWATER
WESTON
ADAMS
ATHENA
UMATILLA
HERMISTON
STANFIELD
ECHO
PILOT ROCK
HEPPNER
LEXINGTON
IONE
CECIL
MORGAN
CONDON
GWENDOLEN
OLEX
ARLINGTON
BLALOCK
RUFUS
SHERMAN
WASCO
MORROW
GILLIAM
UMATILLA
UNION
WALLOWA
BAKER
WHEELER
JEFFERSON
CROOK
DESCHUTES
LAKE
HARNEY
MALHEUR
KLAMATH
JACKSON
JOSEPHINE
DOUGLAS
COOS
CURRY
LINCOLN
TILLAMOOK
CLATSOP
COLUMBIA
WASHINGTON
CLACKAMAS
MARION
POLK
YAMHILL
BENTON
LINN
LANE
Mt. Hood
Mt. Jefferson
Three Sisters
Diamond L.
Crater Lake
Silver Lake
Summer Lake
Upper Klamath Lake
Lower Klamath Lake
Tule L.
Goose L.
Malheur L.
Harney L.
Alkali L.
L. Abert
Warner Lakes
Steens Mts.
Wallowa Mts.
Blue Mts.
Owyhee R.
Malheur R.
Snake R.
Columbia R.
Deschutes R.
John Day R.
Crooked R.
Willamette R.
Rogue R.
Umpqua R.
Klamath R.
Pit R.
Powder R.
Burnt R.
Grande Ronde R.
Imnaha R.
Wallowa R.
Minam R.
Owyhee R.
Malheur R.
Boise R.
Payette R.
Siuslaw R.
Coquille R.
Chetco R.
Illinois R.
Applegate R.
Umpqua R.
Siletz R.
Yaquina R.
Alsea R.
Nestucca R.
Tillamook Head
Cape Falcon
Cape Lookout
Cape Foulweather
Cape Perpetual
Cape Arago
Cape Blanco
Cape Sebastian
Cape Ferrelo
Port Orford
Gold Beach
Brookings
Bandon
Coquille
Marshfield
North Bend
Florence
Reedsport
Winchester
Oakland
Sutherlin
Wilbur
Drain
Yoncalla
Cottage Grove
Creswell
Springfield
Thurston
Walterville
Leaburg
Vida
McKenzie Bridge
Sisters
Redmond
Tumalo
Bend
Millican
Brothers
Imperial
Hampton
Lapine
Crescent
Fremont
Fort Rock
Silver Lake
Summer Lake
Paisley
Plush
Lakeview
New Pine Creek
Merrill
Malin
Keno
Dairy
Olene
Hildebrand
Beatty
Bly
Algoma
Klamath Falls
Chiloquin
Klamath Agency
Pt. Klamath
Trail
Gold Hill
Eagle Point
Central Point
Phoenix
Talent
Ashland
Wolf Creek
Glendale
Canyonville
Prospect
Tiller
Myrtle Creek
Riddle
Days Creek
Wilderville
Kerby
Waldo
Grants Pass
Myrtle Point
Coquille
Riverton
Langlois
Port Orford
Gold Beach
Brookings
Florence
Yachats
Waldport
Newport
Yaquina
Toledo
Siletz
Otter Rock
Ocean View
Heceta
Gardiner
Lakeside
North Bend
Marshfield
Bandon
Langlois
Cape Blanco
Cape Sebastian
Cape Ferrelo
Brookings
Taft
Cloverdale
Oretown
Neskowin
Tillamook
Hemlock
Barnesdale
Nehalem
Wheeler
Manzanita
Rockaway
Garibaldi
Bay City
Gaston
Dilley
Cove Orchard
Hillsboro
Forest Grove
Cornelius
Banks
Gales Creek
Timber
Mist
Vernonia
Scappoose
St. Helens
Deer Island
Warren
Clatskanie
Westport
Knappa
Svensen
Astoria
Ft. Stevens
Warrenton
Seaside
Clatsop
Gearhart
Rainier
Goble
Longview
Kelso
Vancouver
Troutdale
Bonneville
Cascade Locks
Wyeth
Hood River
Mosier
Rowena
The Dalles
Sherman
Biggs
Rufus
Blalock
Arlington
Willows
Castle Rock
Boardman
Irrigon
Umatilla
Cold Springs
Milton
Freewater
Weston
Athena
Adams
Pendleton
Elgin
Imbler
Alicel
Meacham
Kamela
Pine Grove
Hilgard
Island City
La Grande
Union
Hot Lake
Telocaset
North Powder
Haines
Baker
Pleasant Valley
Durkee
Weatherby
Dixie
Huntington
Cornucopia
Carson
Halfway
Pine
Palmer
Powder
Burnt River
Mt. Vernon
Canyon City
Dayville
Prairie
Unity
Susanville
Range
Spray
Service Creek
Mitchell
Antelope
Fossil
Shaniko
Bakeoven
Maupin
Kingsley
Tygh Valley
Dufur
Mt. Hood
Sandy
Gresham
Oswego
Lake Oswego
Tualatin
Sherwood
Newberg
Dundee
Carlton
Yamhill
McMinnville
Lafayette
Amity
Dallas
Monmouth
Independence
Rickreall
Willamina
Grand Ronde
Sheridan
Dayton
Lafayette
Aurora
Hubbard
Woodburn
Gervais
Brooks
Clackamas
Oregon City
New Era
Canby
Molalla
Estacada
Government Camp
Rhododendron
Zigzag
Welches
Wemme
Sandy
Corbett
Troutdale
Columbia

TABLE M

MILEAGE TABLE

Shows mileage between important points by main traveled automobile roads; to be used in connection with the automobile road map on opposite page.

	Albany	Ashland	Astoria	Baker	Bend	Corvallis	Crater Lake	Eugene	Grants Pass	Klamath Falls	La Grande	Marshfield	Medford	Ontario	Ore.-Cal. State Line (Pacific Hwy)	Pendleton	Portland	Roseburg	Salem	The Dalles	Tillamook
Albany	.....	247	181	413	*170	11	317	48	202	311	361	‡212	234	505	269	308	75	124	24	166	106
Ashland	247	.....	428	660	†219	239	96	199	45	64	608	198	13	†465	22	555	322	123	271	413	347
Astoria	181	428	.....	444	359	192	498	229	383	492	392	‡393	415	536	450	339	106	305	157	197	76
Baker	413	660	444	.....	258	424	478	461	†522	413	52	‡625	639	92	682	105	338	537	389	247	445
Bend	*170	†219	359	258	.....	*162	120	*122	†264	155	357	‡*286	†232	294	†225	304	253	*198	*194	162	360
Burns	313	†314	502	171	143	*305	263	*265	†359	250	221	†512	†327	151	†320	195	396	†437	*337	305	503
Canyon City	*312	†385	415	96	166	*304	286	*264	†430	321	148	‡*428	†398	188	†387	120	317	*340	*336	226	424
Corvallis	11	239	192	424	*162	.....	303	40	194	305	372	‡204	226	516	261	319	86	116	35	177	108
Crater Lake	317	96	498	378	120	309	.....	269	115	61	477	268	83	414	118	424	392	193	341	282	417
Eugene	48	199	229	461	*122	40	269	.....	154	263	409	‡164	186	*416	221	356	123	76	72	214	148
Grants Pass	202	45	383	†522	†264	194	155	154	.....	109	563	153	32	†510	67	510	277	78	226	368	302
Huntington	463	†507	494	50	336	474	428	*406	665	443	102	‡*570	†520	42	†513	155	388	*482	439	297	495
Klamath Falls	311	64	492	413	155	305	61	263	109	.....	465	262	77	401	70	459	386	187	335	317	411
La Grande	361	608	392	52	357	372	477	409	563	465	.....	‡573	595	144	630	53	286	485	337	195	393
Lakeview	411	164	532	319	173	†403	†161	†363	†209	100	371	†362	†177	301	†170	345	426	†287	*367	335	533
Marshfield	212	198	‡393	‡625	‡*286	‡204	268	‡164	153	262	‡573	.....	185	†663	220	‡520	‡287	88	‡236	‡378	‡322
Medford	‡234	13	415	639	†232	226	83	186	32	77	595	185	.....	†478	35	542	309	110	258	300	334
Ontario	505	†465	536	92	294	516	414	*416	†510	401	144	†663	†478	.....	†471	197	430	†588	481	339	537
Ore.-Cal. State Line.. (On Pacific Hwy.)	269	22	450	682	†225	261	118	221	67	70	630	220	35	†471	.....	577	344	145	293	435	369
Pendleton	308	555	339	105	304	319	424	356	510	459	53	‡520	542	197	577	.....	233	432	284	142	340
Portland	75	322	106	338	253	86	392	123	277	386	286	‡287	309	430	344	233	.....	199	51	91	107
Prineville	183	†256	329	221	37	*175	157	*135	*289	192	279	‡*299	*321	*304	*356	226	223	*211	*207	132	330
Roseburg	124	123	305	537	*198	116	193	76	78	187	485	88	110	†588	145	432	199	.....	148	290	224
Salem	24	271	157	389	*194	35	341	72	226	335	337	‡236	258	481	293	284	51	148	.....	142	91
The Dalles	166	413	197	247	162	177	282	214	236	317	195	‡378	400	339	435	142	91	290	142	.....	198
Tillamook	106	347	76	445	360	108	417	148	302	411	393	‡322	334	537	369	340	107	224	91	198	.....
Walla Walla	354	601	385	151	350	365	470	402	556	505	99	‡566	588	243	623	46	279	478	330	188	386

*Via Eugene and McKenzie River Highway. †Via Klamath Falls. ‡Via Roseburg (to Marshfield).

SOLID BLACK indicates pavement.
SOLID RED indicates rock or gravel surfacing.
NUMBERS are mileages between important points.

AUTOMOBILE ROAD MAP

Showing Main Traveled Roads of Oregon

NOTE: This map shows all broken stone and gravel roads constructed by the State Highway Commission on State highways, and continuous stretches of rock and gravel surfacing on other roads as far as information is available. No attempt has been made to show short, isolated sections of rock and gravel surfacing on County roads.

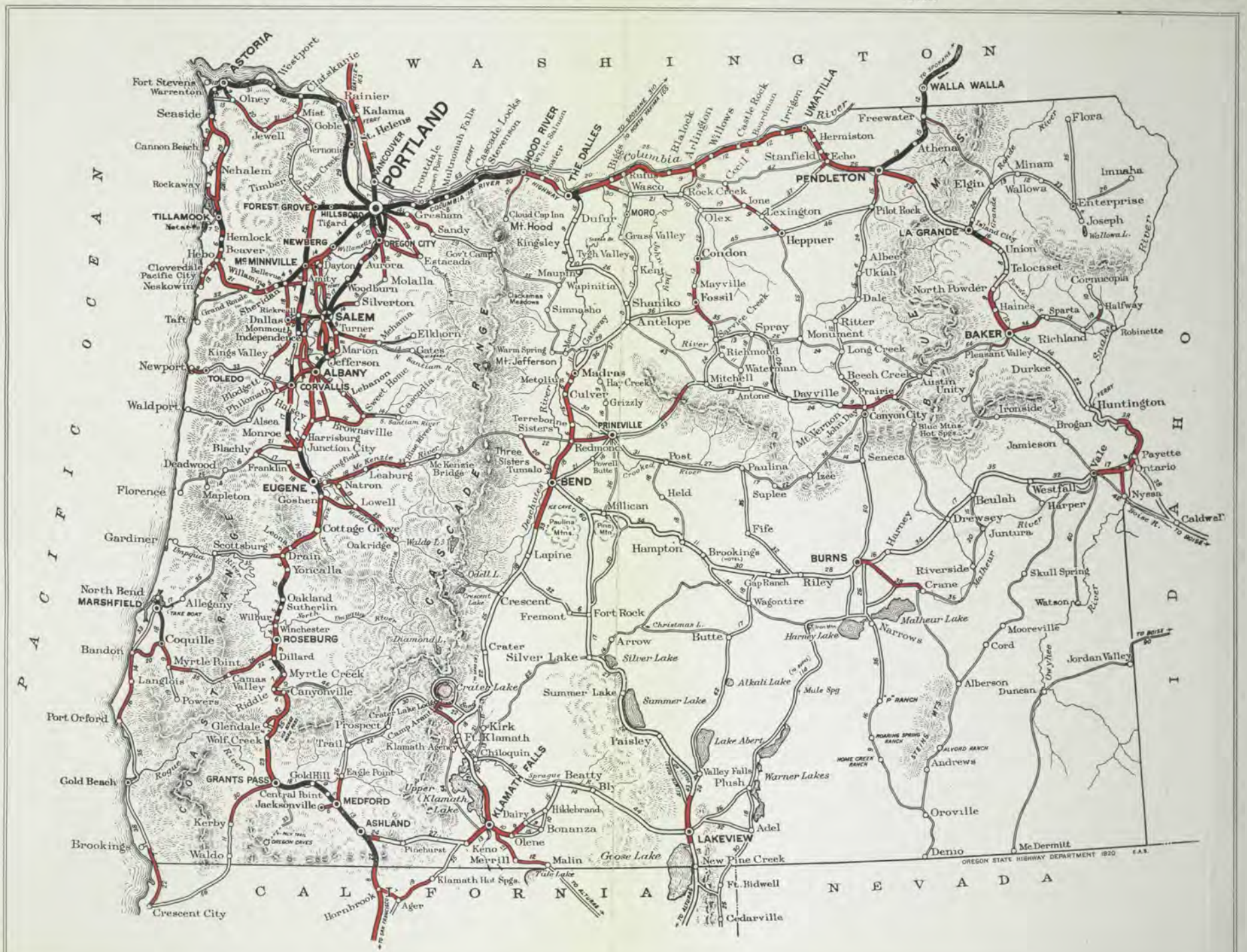


TABLE N

MILEAGES OF NEW CONSTRUCTION IN EACH COUNTY—PERIOD DECEMBER 1, 1918 TO NOVEMBER 30, 1920

This table shows the mileages of different classes of road improvement constructed by the State of Oregon and by the State of Oregon co-operating with Counties and with the Federal Government during the two year period from December 1, 1918, to November 30, 1920. These mileages include construction work under all State, Post Road and Forest Road Projects and under such County Projects as were handled under the direct supervision of the State Highway Department.

COUNTY	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel and Broken Stone Surfacing	Grading
Baker	.....	.....	28.4	38.3
Benton	16.6	.....	3.2	9.6
Clackamas	0.1	.....	2.4	7.3
Clatsop	24.6	0.6	.....	0.6
Columbia	54.0	.....	.....	11.8
Coos	.....	13.4	.....	17.1
Crook	.....	.....	9.7	45.1
Curry	.....	.....	.....	20.8
Deschutes	.....	.....	12.2	25.6
Douglas	23.9	.....	42.4	54.5
Gilliam	.....	.....	21.4	40.4
Grant	.....	.....	12.4	18.8
Harney	.....	.....	16.7	16.7
Hood River	22.1	.....	4.1	5.8
Jackson	34.6	.....	2.2	58.4
Jefferson	.....	.....	6.0	6.0
Josephine	11.0	.....	6.5	14.3
Klamath	.....	.....	21.4	34.4
Lake	.....	.....	10.5	11.4
Lane	17.3	.....	10.0	10.2
Lincoln	.....	.....	.....	3.5
Linn	6.7	.....	7.0	6.7
Malheur	.....	0.9	9.0	10.5
Marion	28.2	.....	7.9	.....
Morrow	.....	.....	30.2	50.2
Multnomah	2.8	.....	.....	.....
Polk	18.6	.....	0.5	20.2
Sherman	.....	.....	.....	14.8
Tillamook	3.7	.....	12.2	10.3
Umatilla	21.1	.....	45.9	54.2
Union	3.6	.....	3.6	22.9
Wallowa	.....	.....	.....	17.0
Wasco	4.4	.....	14.6	30.3
Washington	8.2	11.2	6.7	3.9
Wheeler	.....	.....	4.6	33.4
Yamhill	10.8	8.8	17.7	36.9
Totals	312.3	34.9	369.4	761.4

TABLE O

MILEAGE OF NEW CONSTRUCTION DETAILED BY JOBS DECEMBER 1, 1918, TO NOVEMBER 30, 1920

This table shows in detail the mileages of different classes of road improvement constructed by the State of Oregon, and, by the State of Oregon co-operating with Counties and with the Federal Government, during the two-year period from December 1, 1918, to November 30, 1920. It includes construction under all State Projects, Post Road Projects and Forest Road Projects, and under such County Projects as were handled under the direct supervision of the State Highway Department.

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Baker County:				
North Powder to Haines				1.0
Haines to Baker			9.4	9.4
Baker to Middle Bridge			9.9	18.8
Canyon Section Baker-Cornucopia Highway			4.4	4.4
Sag Section of Baker-Cornucopia Highway			4.7	4.7
Totals for Baker County			28.4	38.3
Benton County:				
Polk County Line to Corvallis	10.2			
Monroe North Nine Miles	6.4			6.4
Monroe to Lane County Line			3.2	3.2
Totals for Benton County	16.6		3.2	9.6
Clackamas County:				
Multnomah County Line to Oregon City			0.4	4.7
Canemah Hill Fill	0.1			
Canby to Aurora			2.0	2.6
Totals for Clackamas County	0.1		2.4	7.3
Clatsop County:				
Columbia County Line to Svenson	19.1			
Svenson to Astoria	5.5			
Youngs Bay to Miles Crossing		0.6		0.6
Totals for Clatsop County	24.6	0.6		0.6
Columbia County:				
Scappoose to Deer Island	10.9			10.9
Deer Island to Rainier	22.2			
Rainier City Section				0.9
Rainier to Clatskanie	12.3			
Clatskanie to Clatsop County Line	8.6			
Totals for Columbia County	54.0			11.8
Coos County:				
Marshfield to Cedar Point		11.8		11.8
Cedar Point to Coquille		1.6		2.0
Camas Valley to Remote, Unit No. 1				3.3
Totals for Coos County		13.4		17.1
Crook County:				
Redmond to Prineville				6.5
Prineville to Davis Ranch				28.9
Ochoco Canyon Forest Road			9.7	9.7
Totals for Crook County			9.7	45.1

TABLE O—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Curry County:				
Hubbard Creek to Brush Creek	.....	.....	.....	6.0
McKenzie Pass Forest Road	.....	.....	.....	14.8
Totals for Curry County	.....	.....	.....	20.3
Deschutes County:				
Jefferson County Line to Bend	.....	.....	7.1	24.1
Bend to Allen Ranch	.....	.....	5.1	1.5
Totals for Deschutes County	.....	.....	12.2	25.6
Douglas County:				
Lane County Line to Comstock	.....	.....	0.6	0.6
Comstock Section, Pacific Highway	.....	.....	0.1	.....
Comstock to Pass Creek	.....	.....	1.0	1.0
Leona to Drain	.....	.....	3.6	3.6
Drain to Yoncalla	.....	.....	6.9	8.1
Yoncalla to Oakland	9.7	.....	.....	.....
Oakland South	.....	.....	1.1	1.1
Oakland to Wilbur	1.3	.....	.....	6.9
Wilbur to Roseburg	.....	.....	1.8	4.1
Roseburg to Dillard	.....	.....	6.6	6.6
Dillard to Myrtle Creek	12.9	.....	.....	.....
Canyonville to Galesville	.....	.....	11.0	11.0
Galesville to Jacques Place	.....	.....	7.2	7.2
Jacques Place to Stage Road Pass	.....	.....	2.5	2.5
Camas Valley to Remote, Unit No. 2	.....	.....	.....	1.8
Totals for Douglas County	23.9	.....	42.4	54.5
Gilliam County:				
John Day River to Blalock	.....	.....	.....	14.9
Blalock to Arlington	.....	.....	9.2	8.8
Arlington to Morrow County Line	.....	.....	12.2	12.2
Thirtymile Creek to Mayville	.....	.....	.....	4.5
Totals for Gilliam County	.....	.....	21.4	40.4
Grant County:				
Sarvice Creek to Valades Ranch, Unit No. 3	.....	.....	.....	3.0
Sarvice Creek to Valades Ranch, Unit No. 4	.....	.....	.....	6.5
Cole Bridge to Danby Ranch	.....	.....	3.1	.....
John Day to Fisk Creek	.....	.....	7.2	7.2
Hall Hill to Prairie City	.....	.....	2.1	2.1
Totals for Grant County	.....	.....	12.4	18.8
Harney County:				
Burns to Lawen	.....	.....	16.7	16.7
Totals for Harney County	.....	.....	16.7	16.7
Hood River County:				
Ruthton Hill to Hood River	.....	.....	.....	1.7
Cascade Locks to Hood River	22.1	.....	.....	.....
Hood River to Wasco County Line	.....	.....	4.1	4.1
Totals for Hood River County	22.1	.....	4.1	5.8

TABLE O—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Jackson County:				
Josephine County Line to Gold Hill	6.8			6.8
Gold Hill to Central Point	8.9			8.9
Ashland Hill Section, Pacific Highway	0.8			
Ashland to Green Springs Junction	5.3			5.3
Ashland Overcrossing Approaches				0.2
Talent Reservoir Section, Pacific Highway				0.6
Green Springs Junction to California State Line	12.8			
Pacific Highway to Green Springs Mountain Summit			2.2	8.6
Green Springs Mountain Summit to Jenny Creek				5.8
Prospect to Crater Lake, Forest Road				22.2
Totals for Jackson County	34.6		2.2	58.4
Jefferson County:				
Madras to Deschutes County Line			6.0	6.0
Totals for Jefferson County			6.0	6.0
Josephine County:				
Stage Road Pass to Wolf Creek			4.5	4.5
Wolf Creek to Grave Creek	4.9			
Grave Creek to Pleasant Valley			2.0	7.4
Grants Pass to Jackson County Line	6.1			
Hayes Hill Section, Forest Road				2.4
Totals for Josephine County	11.0		6.5	14.3
Klamath County:				
Algoma Section of The Dalles-California Highway			2.8	8.9
Klamath Falls North Three Miles			3.4	3.4
Klamath Falls to Merrill			13.0	7.4
Merrill to California State Line				8.5
Klamath Falls to Dairy			2.2	6.2
Totals for Klamath County			21.4	34.4
Lake County:				
Crooked Creek to Lakeview			9.6	9.6
Lakeview to New Pine Creek			0.9	1.8
Totals for Lake County			10.5	11.4
Lane County:				
Benton County Line to Junction City			5.5	5.5
Junction City to Eugene	12.4			
Eugene to Goshen	4.9			
Walker to Cottage Grove			3.1	3.1
Divide Overcrossing Approaches				0.2
Divide to Douglas County Line			1.4	1.4
Totals for Lane County	17.3		10.0	10.2
Lincoln County:				
Toledo to Newport				3.5
Totals for Lincoln County				3.5

TABLE O—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Linn County:				
Jefferson to Albany	6.7	.....	.....	6.7
Albany to Tangent	.....	.....	7.0	.....
Totals for Linn County	6.7	.....	7.0	6.7
Malheur County:				
Cow Valley to Brogan	.....	.....	.....	9.6
Cairo to Nyssa	.....	.....	9.0	.....
Ontario to Snake River	.....	0.9	.....	0.9
Totals for Malheur County	.....	0.9	9.0	10.5
Marion County:				
Aurora to Brooks, Unit No. 2	10.7	.....	.....	.....
Aurora to Brooks, Unit No. 1	7.2	.....	.....	.....
Brooks to Salem	4.2	.....	.....	.....
Salem South	.....	.....	7.2	.....
Jefferson North	6.1	.....	0.7	.....
Totals for Marion County	28.2	.....	7.9	.....
Morrow County:				
Columbia River Highway across Morrow County, Unit No. 2	.....	.....	9.4	9.4
Columbia River Highway across Morrow County, Unit No. 1	.....	.....	20.8	20.8
Gilliam County Line to Heppner	.....	.....	.....	20.0
Totals for Morrow County	.....	.....	30.2	50.2
Multnomah County:				
Bertha to Washington County Line	2.8	.....	.....	.....
Totals for Multnomah County	2.8	.....	.....	.....
Polk County:				
Yamhill County Line to Holmes Gap	5.2	.....	.....	5.2
Rickreall to Monmouth to Independence	7.8	.....	.....	7.8
Benton County Line North	.....	.....	.....	1.6
Salem to Dallas	5.6	.....	.....	5.6
Yamhill County Line to Butlers Store	.....	.....	0.5	.....
Totals for Polk County	18.6	.....	0.5	20.2
Sherman County:				
Columbia River Highway across County	.....	.....	.....	14.8
Totals for Sherman County	.....	.....	.....	14.8
Tillamook County:				
Hobsonville to Riverdale	.....	.....	1.2	.....
Moore Cutoff Section of Coast Highway	.....	.....	0.5	.....
Hemlock to Beaver	3.7	.....	.....	.....
Beaver to Hebo	.....	.....	0.2	.....
Three Rivers Forest Road	.....	.....	10.3	10.3
Totals for Tillamook County	3.7	.....	12.2	10.3
Umatilla County:				
Morrow County Line to Echo	.....	.....	20.8	20.8
Echo to Pendleton	.....	.....	17.7	21.9
Pendleton to Cabbage Hill	.....	.....	5.1	7.5
Cabbage Hill to Deadmau's Pass	.....	.....	0.1	.....
Adams to Athena	9.0	.....	.....	4.0
Athena to Milton	5.9	.....	2.2	.....
Milton to Washington State Line	6.2	.....	.....	.....
Totals for Umatilla County	21.1	.....	45.9	54.2

TABLE O—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Union County:				
Island City to La Grande to Lone Pine	3.6			
Lone Pine to Hot Lake			3.6	
Union to Telocaset				6.0
Telocaset to North Powder				7.5
Elgin to Minam				9.4
Totals for Union County	3.6		3.6	22.9
Wallowa County:				
Wallowa Canyon Section of La Grande-Joseph Highway				4.0
Enterprise to Flora Forest Road				13.0
Totals for Wallowa County				17.0
Wasco County:				
Wasco County Line to Mosier, Unit No. 3			2.3	2.3
Mosier to Rowena			9.0	9.0
Rowena to The Dalles			2.8	7.8
Chenowith to The Dalles	0.5			
The Dalles to Seufert	1.9			
Seufert to Deschutes River				8.7
Toll Bridge Cutoff			0.5	0.5
The Dalles to Threemile Creek	2.0			2.0
Totals for Wasco County	4.4		14.6	30.3
Washington County:				
Multnomah County Line to Hillsboro		11.2		
Hillsboro to Forest Grove	4.3			
Forest Grove to Gaston			6.7	
Multnomah County Line to Beaverton	3.9			3.9
Totals for Washington County	8.2	11.2	6.7	3.9
Wheeler County:				
Fossil to Summit (Butte Creek Section)			2.9	9.4
Summit to Service Creek			1.7	
Service Creek to Valades Ranch, Unit No. 1				13.0
Service Creek to Valades Ranch, Unit No. 2				11.0
Totals for Wheeler County			4.6	33.4
Yamhill County:				
Newberg to West Dayton			3.6	5.9
West Dayton to McMinnville			4.9	4.9
Amity to Polk County Line	2.3			2.3
Gaston to Yamhill				5.6
Yamhill to McMinnville		8.8		8.8
McMinnville to Sheridan	8.5			
Sheridan to Polk County Line			1.7	
Butlers Store to Grand Ronde				1.9
Grand Ronde Section, Post Road			3.5	3.5
Bee Ranch Section			4.0	4.0
Totals for Yamhill County	10.8	8.8	17.7	36.9
Grand Totals for All Counties	312.3	34.9	369.4	761.4

TABLE P

SCHEDULE OF BRIDGES CONSTRUCTED, UNDER CONSTRUCTION OR DESIGNED—SPANS 18-FEET AND ABOVE

This table is a complete list of all bridge structures having spans of eighteen feet and over, designed for locations on State highways. It includes 107 structures constructed and 55 structures under contract. The status of each structure is indicated by the symbols in the third column, the key to these symbols being given at the bottom of each page. For structures designed for counties, see Table Q.

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
	Benton County—		
394	2-20′ Reinforced Concrete Spans over Lake Slough three miles south of Monroe	a	$ 3,585.00
395	557′ Trestle Approach to Long Tom Bridge at Monroe	a	14,000.00
419	30′ Reinforced Concrete Span at Lewisburg	a	3,800.00
420	2-15′ Reinforced Concrete Spans on West Side Highway South of Lewisburg	a	3,600.00
	Clackamas County—		
357	350′Steel Arch encased in Concrete and 500′ Reinforced Concrete Viaduct Approach, over Willamette River at Oregon City	d	
409	128′ Reinforced Concrete Arch and 204′ Reinforced Concrete Viaduct over Sucker Creek on Pacific Highway near Oswego	a	69,589.21
411	3-80′ Steel Deck Truss Spans and 2-30′ Reinforced Concrete Spans over Molalla River near Canby	b	61,200.00
414	228′ Frame Trestle over Tryon Creek near Oswego	a	9,349.45
	Clatsop County—		
330	150′ Clear Span, Double Leaf Trunnion Bascule Bridge and Pile Trestle Approach over Youngs Bay at Astoria	b	365,000.00
	Columbia County—		
301	18′ Reinforced Concrete Span over Honeyman Creek on Scappoose-Deer Island Section, Columbia River Highway, near Honeyman Station	a	4,896.87
302	30′ Reinforced Concrete Span over McNulty Creek on Scappoose-Deer Island Section, Columbia River Highway, near Houlton	a	3,081.83
303	3-30′ Reinforced Concrete Spans over Milton Creek on Scappoose-Deer Island Section, Columbia River Highway, near Houlton	a	6,592.70
304	3-30′ Reinforced Concrete Spans over North Fork Scappoose Creek on Scappoose-Deer Island Section Columbia River Highway ,near Scappoose	a	8,761.39
306	3-85′ Reinforced Concrete Spans over South Fork Scappoose Creek on Scappoose-Deer Island Section Columbia River Highway near Scappoose	a	18,136.63
335	30′ Reinforced Concrete Span over Beaver Creek on Columbia River Highway near Rainier	a	5,561.00
338	3-30′ Reinforced Concrete Spans over Tide Creek on Columbia River Highway near Goble	a	14,454.98
	Coos County—		
468	60′ Covered Wood Span and 35′ Trestle Approach over Rock Creek on Coos Bay-Roseburg Highway	a	6,590.34
482	60′ Covered Wood Span on Concrete and 38′ Trestle Approach over Sandy Creek on Coos Bay-Roseburg Highway	d	

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
	Crook County—		
527	24′ Reinforced Concrete Span on the McKenzie River Highway at Prineville	a	4,589.94
528	56′ Wood Deck Truss Span and 38 lin. ft. Trestle over Old Bed of Crooked River on McKenzie River Highway near Prineville	b	3,000.00
536	2-105′ Wood Spans and 57′ Frame Trestle on Concrete	f	
537	40′ Wood Span and 40′ Frame Trestle on Concrete	d	
538	120′ Wood Span and 76′ Frame Trestle on Concrete	f	
539	40′ Wood Span and 76′ Frame Trestle on Concrete	d	
540	120′ Wood Span and 114′ Frame Trestle on Concrete	b	18,210.19
541	120′ Wood Span and 150′ Frame Trestle on Concrete	d	
	Curry County—		
452	95 lin. ft. Frame Trestle on Hubbard Creek-Brush Creek Section, Coast Highway	a	1,928.37
453	110 lin. ft. Frame Trestle over North Rocky Point Creek on Hubbard Creek-Brush Creek Section, Coast Highway	a	2,634.98
454	34 lin. ft. Frame Trestle over Retz Creek on Hubbard Creek-Brush Creek Section, Coast Highway	a	564.49
	Deschutes County—		
497	28′ Reinforced Concrete Span on Redmond Creek-County Line Section, McKenzie River Highway	d	
518	18′ Reinforced Concrete Span over Lateral "B" Canal on Bend-Jefferson County Line Section, The Dalles-California Highway	h	
519	35′ Reinforced Concrete Span over North Canal on The Dalles-California Highway at Bend	d	
521	20′ Reinforced Concrete Span over Swally Canal on Bend-Jefferson County Line Section, The Dalles-California Highway	h	
522	21′ Reinforced Concrete Span over Swalley Canal on Bend-Jefferson County Line Section, The Dalles-California Highway	b	3,000.00
542	19′ Frame Trestle over Irrigation Canal on Bend-Horse Ridge Section, Central Oregon Highway	d	
543	57′ Frame Trestle over Irrigation Canal on Bend-Horse Ridge Section, Central Oregon Highway	d	
544	19′ Frame Trestle over Irrigation Canal on Bend-Horse Ridge Section, Central Oregon Highway	d	
	Douglas County—		
317	57′ Pile Trestle on Pacific Highway near Glendale	h	
318	57′ Frame Trestle on Pacific Highway near Glendale	a	868.67
319	57′ Frame Trestle on Pacific Highway near Glendale	a	853.84
321	76′ Frame Trestle on Pacific Highway near Glendale	a	1,157.69
323A	42′ Reinforced Concrete Span and 512 lin. ft. Trestle Overcrossing one mile south of Comstock on Pacific Highway	a	19,913.61
368	2-30′ Reinforced Concrete Spans over Pass Creek on the Pacific Highway near Comstock	a	8,382.26
407	6-70′ Wood Spans over Cow Creek on Stage Road-Pass Section, Pacific Highway near Glendale	a	21,265.19
427	25′ Reinforced Concrete Span on Oakland-Wilbur Section, Pacific Highway	a	4,248.67
428	20′ Reinforced Concrete Span on Oakland-Wilbur Section, Pacific Highway	a	3,903.19
429	2-20′ Reinforced Concrete Spans on Oakland-Wilbur Section, Pacific Highway	a	6,015.51

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
430	2-30′ Reinforced Concrete Spans on Oakland-Wilbur Section, Pacific Highway	a	8,172.04
431	2-20′ Reinforced Concrete Spans on Oakland-Wilbur Section, Pacific Highway	a	4,497.86
433	25′ Reinforced Concrete Span on Roseburg-Dillard Section, Pacific Highway	a	2,831.60
437	18′ Reinforced Concrete Span on Roseburg-Wilbur Section, Pacific Highway	a	2,814.84
438	27′ Reinforced Concrete Span on Roseburg-Wilbur Section, Pacific Highway	a	6,778.52
444	108′ Reinforced Concrete Viaduct over Sand Creek on Leona-Drain Section, Pacific Highway near Leona	b	13,500.00
490	2-150′ and 1-60′ Wood Spans and 78′ Frame Trestle Bridge and Overcrossing at Myrtle Creek	f	.....
490A	2-125′ and 1-130′ Reinforced Concrete Arch Spans and 130′ Reinforced Concrete Viaduct Overcrossing and Bridge at Myrtle Creek	d	.....
490B	3-120′ Steel Deck Spans and 117′ Reinforced Concrete Viaduct Bridge and Overcrossing at Myrtle Creek. Alternate for Bridge 490A	d	.....
500	Reconstruction of Trestle Approach to Bridge on Pacific Highway at Winston	a	2,624.00
509	2-135′ Wood Spans over Umpqua River near Myrtle Creek	d	.....
509A	180′ Steel Span with Trestle Approaches over Umpqua River near Myrtle Creek, Alternate for Bridge No. 509	d	.....
545	118′ Reinforced Concrete Arch Span on Canyonville Galesville Section, Pacific Highway. Designed and being constructed by United States Office of Public Roads	b	40,000.00
548	90′ Covered Howe Truss on Pacific Highway near Canyonville	d	.....
548A	2-45′ Reinforced Concrete Spans on Pacific Highway near Canyonville. Alternate Design for No. 548	d	.....
559	60′ Howe Truss on Concrete and 38′ Trestle Approach over Coquille River on Coos Bay-Roseburg Highway	d	.....
579	2-20′ Reinforced Concrete Spans over Yoncalla Creek on Pacific Highway	b	5,761.95
581	57′ Frame Trestle on Mud Sills over Bear Creek on Remote-Camas Valley Section, Coos Bay-Roseburg Highway	b	1,230.00
587	2-60′ Wood Spans on Concrete over Looking-Glass Creek on Coos Bay-Roseburg Highway. Devil's Garden Bridge	d	.....
588	60′ Covered Wood Span and 57 lin. ft. Trestle over Looking-Glass Creek on Coos Bay-Roseburg Highway	d	.....
	Gilliam County—		
322	80′ Steel Deck Girder and 66′ Reinforced Concrete Viaduct over Willow Creek near Heppner Junction	a	24,555.30
323	144′ Reinforced Concrete Viaduct Overcrossing at Heppner Junction	b	18,500.00
503	22′ Reinforced Concrete Span over Quinton Creek on John Day River-Blalock Section, Columbia River Highway	a	5,251.20
299	88′ Reinforced Concrete Viaduct over Lang Canyon on Columbia River Highway near Arlington	a	9,727.78

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
	Grant County—		
239	40' "A" Frame Span over Waterspout Gulch on Unit No. 3 Service Creek-Valades Ranch Section, John Day River Highway	b	6,100.00
240	40' "A" Frame Span and 12' Trestle over Waterspout Gulch on Unit No. 3, Service Creek-Valades Ranch Section, John Day Highway	b	4,900.00
241	40' "A" Frame Span and 12' Trestle over Waterspout Gulch on Unit No. 3 Service Creek-Valades Ranch Section, John Day Highway	b	7,350.00
242	40' "A" Frame Span and 57' Trestle over Holmes Creek on Unit No. 3 Service Creek-Valades Ranch Section, John Day Highway	b	8,200.00
244	2-105' Wood Spans and 133' Trestle over John Day River on Unit No. 3 Service Creek-Valades Ranch Section, John Day Highway	b	41,300.00
240A	57' Trestle across Overflow Channel on Unit No. 3 Service Creek-Valades Ranch Section, John Day Highway	b	2,280.00
240B	19' Trestle over Waterspout Gulch on Unit No. 3 Service Creek-Valades Ranch Section, John Day Highway	b	780.00
256A	51' Trestle over Waterspout Creek on Unit No. 4 Service Creek-Valades Ranch Section, John Day Highway	b	2,040.00
256B	19 lin. ft. Trestle Cattle Pass on Unit No. 4 Service Creek-Valades Ranch Section, John Day Highway	b	780.00
256C	19 lin. ft. Trestle Cattle Pass on Unit No. 4 Service Creek-Valades Ranch Section, John Day Highway	b	780.00
256D	47 lin. ft. Trestle over Dry Gulch on Unit No. 4 Service Creek-Valades Ranch Section, John Day Highway	b	1,880.00
256F	19 lin. ft. Trestle over Cottonwood Creek on Unit No. 4 Service Creek-Valades Ranch Section John Day Highway	b	780.00
484	2-23' Timber Spans on Concrete piers over Canyon Creek on John Day Highway at edge of city of John Day	d	.....
	Harney County—		
349	19 lin. ft. Trestle on Burns-Lawen Section Central Oregon Highway	a	705.00
	Hood River County—		
504	34' Half Viaduct on Hood River-Mosier Section Columbia River Highway	a	1,517.93
	Jackson County—		
332A	115' Reinforced Concrete Arch and 325' Reinforced Concrete Viaduct over Rogue River at Rock Point on the Pacific Highway	a	48,393.91
374	26' "I" Beam Span, 3-20' Reinforced Concrete Spans and 171 lin ft. of Trestle, Overcrossing at Tolo....	a	18,973.33
380	21' Reinforced Concrete Span over Neil Creek on the Ashland-Green Springs Mountain Section, Pacific Highway	a	3,203.06
381	20' Reinforced Concrete Span over Neil Creek on the Ashland-Green Springs Mountain Section, Pacific Highway	a	3,023.50
382	28' Reinforced Concrete Span over Neil Creek on the Ashland-Green Springs Mountain Section, Pacific Highway	a	5,882.43

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
391	83 lin. ft. Pile Trestle over Griffon Creek on Pacific Highway near Central Point	a	1,667.82
392	103 lin. ft. Pile Trestle over Jackson Creek on Pacific Highway near Central Point	a	2,012.88
406	105′ Reinforced Concrete Viaduct and 342 lin. ft. Frame Trestle Overcrossing at Ashland	b	36,000.00
412	2-30′ Reinforced Concrete Spans over Birdseye Creek on Gold Hill-Josephine County Line Section, Pacific Highway	b	6,380.00
413	2-27′ Reinforced Concrete Spans over Millers Gulch on Gold Hill-Josephine County Line Section, Pacific Highway	b	5,830.00
466	38 lin. ft. Frame Trestle over Cattle Gulch on Gold Hill-Josephine County Line Section, Pacific Highway	a	586.89
467	28 lin. ft. Frame Trestle over Hill Creek on Green Springs Mountain-Pacific Highway Section, Ashland-Klamath Falls Highway	a	551.36
597	39 lin. ft. Frame Trestle over Soda Gulch on Green Springs Mountain-Pacific Highway Section, Ashland-Klamath Falls Highway	a	1,016.50
596	57 lin. ft. Frame Trestle over Keene Creek on Green Springs Mountain-Jenny Creek Section, Ashland-Klamath Falls Highway	b	1,388.00
660	68 lin. ft. Frame Trestle on the Green Springs Mountain-Jenny Creek Section, Ashland-Klamath Falls Highway	b	1,657.00
677	2-80′ Reinforced Concrete Arches and 140′ Reinforced Concrete Viaduct over Rogue River at Trail on Medford-Crater Lake Highway (Alternate for Bridge No. 684)	f	.....
678	40′ Reinforced Concrete Span over Indian Creek on Agate-Trail Section, Medford-Crater Lake Highway	b	7,900.00
679	2-40′ Reinforced Concrete Spans over Antelope Creek on Agate Trail Section, Medford-Crater Lake Highway	b	14,500.00
681	88 lin. ft. Reinforced Concrete Viaduct and 1-60′ Steel Deck Truss over Little Butte Creek on Agate-Trail Section, Medford-Crater Lake Highway	b	19,400.00
682	2-30′ Reinforced Concrete Spans over Reese Creek on Agate-Trail Section, Medford-Crater Lake Highway	b	9,700.00
684	Reinforced Concrete Spans over Rogue River at Trail on Medford-Crater Lake Highway (Alternate for Bridge 677)	b	52,320.00
	Josephine County—		
575	105′ Wood Span and 152′ Frame Trestle over Grave Creek on Grave Creek-Wolf Creek Section, Pacific Highway	b	21,334.28
652	19′ Timber Span on Concrete Abutments over Harris Creek on Grants Pass-Pleasant Valley Section, Pacific Highway	b	2,300.00
	Klamath County—		
410	57 lin. ft. Frame Trestle Overcrossing at Terminal City	a	1,420.00
550	91 lin. ft. Frame Trestle on Klamath Falls-Merril Section, The Dalles-California Highway, Altamont Bridge	d	.....
551	57 lin. ft. Frame Trestle Overcrossing at Dairy	d	.....

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
	Lake County—		
571	95 lin. ft. Frame Trestle over Chewaucan River on Paisley-Lakeview Section, Lapine-Lakeview Highway about twenty miles south of Paisley	d	.....
572	100′ Reinforced Concrete Viaduct over Chewaucan River near Paisley (Alternate for Bridge 685)	d	.....
573	114 lin. ft. Frame Trestle over Chewaucan Narrows on Paisley-Lakeview Section, Lapine-Lakeview Highway about eleven miles south of Paisley	d	.....
685	2-48′ Wood Spans on Concrete over Chewaucan River near Paisley (Alternate for Bridge 572)	d	.....
	Lane County—		
432	2-20′ Reinforced Concrete Spans over Crow Creek on the Pacific Highway near Junction City	d	.....
590	150′ Covered Wood Span and 171 lin. ft. Trestle over Coast Fork of Willamette River at Walker	d	.....
602	57 lin. ft. Frame Trestle on Cresswell-Walker Section Pacific Highway near Cresswell	a	1,464.65
	Lincoln County—		
439	152 lin. ft. Pile Trestle over Depot Slough near Toledo	a	4,242.63
	Linn County—		
359	231 lin. ft. of Trestle on the Albany-Jefferson Section, Pacific Highway near Jefferson	a	6,004.69
360	273 lin. ft. of Trestle on Albany-Jefferson Section Pacific Highway near Jefferson	a	7,096.27
361	294 lin. ft. Trestle on Albany-Jefferson Section Pacific Highway near Jefferson	a	7,635.74
397	19′ Timber Span on Concrete Substructure on Albany-Tangent Section, Pacific Highway near Tangent	b	1,505.00
398	2-19′ Timber Spans on Concrete Substructure on Albany-Tangent Section, Pacific Highway at Tangent	b	2,370.00
399	19′ Timber Span on Concrete Substructure on Tangent-Albany Section, Pacific Highway near Tangent	b	1,425.00
415	2-19′ Timber Spans on Concrete over Small Creek on Pacific Highway near Albany	a	2,750.00
510	105′ Covered Wood Span and 190′ Trestle on Tangent-Shedd Section, Pacific Highway over Callapooia River	d	.....
552	2-19′ Timber Spans on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
553	2-19′ Timber Spans on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
560	19′ Timber Span on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
561	4-19′ Timber Spans on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
562	5-19′ Timber Spans on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
564	3-19′ Timber Spans on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
565	2-19′ Timber Spans on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
566	13-19′ Timber Spans on Concrete Piers on Albany-Shedd Section, Pacific Highway	d	.....
567	2-19′ Timber Spans on Concrete Piers on Harrisburg-Shedd Section, Pacific Highway	d	.....
568	3-19′ Timber Spans on Concrete Piers on Shedd-Harrisburg Section, Pacific Highway	d	.....

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
569	12-19′ Timber Spans on Concrete Piers on Shedd-Harrisburg Section, Pacific Highway	d	
570	3-19′ Timber Spans on Concrete Piers on Shedd Section, Pacific Highway	d	
578	40′ Reinforced Concrete Span over Mill Race in City of Lebanon on Albany-Sisters Highway, being constructed by the city	b	12,000.00
	Malheur County—		
507	20 lin. ft. Trestle over Owyhee Wasteway on the Cairo Nyssa Highway	a	484.00
546	75′ Wood Span and 38 lin. ft. Frame Trestle over Pole Creek on Cow Valley-Brogan Section, John Day Highway	a	12,928.67
589	89 lin. ft. Frame Trestle over Canyon Creek on Cow Valley-Brogan Section, John Day Highway	a	4,085.76
599	3-64′ Wood Spans and 186 lin. ft. of Trestle over Malheur River at Vale (Alternate for Bridge 599A)		44,300.00
599A	180′ Steel Span on Concrete Piers and 152 lin. ft. Pile Trestle over Malheur River at Vale	b	45,000.00
599B	2-105′ Wood Spans and 105′ Trestle over Malheur River at Vale (Alternate for Bridge 599A)		47,000.00
630	56′ Wood Span and 51 lin. ft. Trestle over Bully Creek on Burrell Ranch-Vale Section Central Oregon Highway	d	
	Marion County—		
365	20′ Reinforced Concrete Span, North Crossing with Neil Creek on Salem-Jefferson Section, Pacific Highway	a	2,755.46
366	20′ Reinforced Concrete Span over Sidney Power Canal on Salem-Jefferson Section, Pacific Highway	a	2,614.67
367	20′ Reinforced Concrete Span, South Crossing with Neil Creek on Salem-Jefferson Section, Pacific Highway	a	3,223.19
440	20′ Reinforced Concrete Span over Taylor Creek on Salem-Jefferson Section, Pacific Highway	a	5,893.84
	Morrow County—		
356	104′ Reinforced Concrete Viaduct and 209 lin. ft. Pile Trestle Overcrossing at Messner	b	17,500.00
594	19′ Timber Span on Masonry over School House Creek on Heppner-Gilliam County Line Section, Oregon-Washington Highway	b	3,466.10
611	23′ Timber Span on Masonry Abutments over Black Horso Creek on Heppner-Gilliam County Line Section, Oregon-Washington Highway	b	2,447.27
651	40′ "A" Frame Span on Masonry Abutments over Morgan Creek on Heppner-Gilliam County Line Section, Oregon-Washington Highway	b	1,800.00
670	19′ Timber Span on Masonry over Brady Creek on Heppner-Gilliam County Line Section, Oregon-Washington Highway	b	1,000.00
672	3-19′ Timber Spans on Masonry over Reitman Creek on Heppner-Gilliam County Line Section, Oregon Washington Highway	b	2,500.00

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
	Polk County—		
403	18′ Reinforced Concrete Span on Amity-Holmes Gap Section, West Side Highway near McCoy	a	2,342.55
417	18′ Reinforced Concrete Span over Ash Swale on Amity-Holmes Gap Section, West Side Highway near McCoy	a	2,692.04
	Sherman County—		
339	80′ "I" Beam Span over Fulton Canyon on Columbia River Highway	a	6,258.02
340	2-10′ Reinforced Concrete Spans over Gurkin Canyon on Columbia River Highway	a	2,593.50
341	18′ Reinforced Concrete Span over Scott Canyon on Columbia River Highway	a	3,671.35
345	18′ Reinforced Concrete Span over Hell Roaring Canyon on Columbia River Highway	a	4,907.72
362	20′ Reinforced Concrete Span over Helms Canyon on Columbia River Highway	a	3,784.55
443	56′ Wood Deck Truss Span and 304′ Frame Trestle Spanish Gulch Overcrossing near Biggs	a	22,097.80
	For Deschutes River Bridge see Wasco County.		
	Tillamook County—		
455	90′ Steel Span and 60′ Reinforced Concrete Viaduct over Kilches River on Coast Highway near Juno	b	28,500.00
505	117 lin. ft. Reinforced Concrete Viaduct, Juno Overcrossing on Coast Highway	d	.....
554	100 lin. ft. Reinforced Concrete Viaduct over Wilson River on Coast Highway	a	11,739.93
555	140′ Steel Span and 176 lin. ft. Reinforced Concrete Viaduct over Nestucca River, Condor Bridge	b	46,500.00
556	30′ Reinforced Concrete Span on Beaver-Hebo Section Coast Highway	f	.....
633	105′ Wood Span and 76 lin. ft. Trestle over North Fork Nehalem River on Coast Highway, Scovil Bridge	d	.....
574	Nehalem Draw Bridge, 234′ Swing Span with 460 feet of Pile Trestle	d	.....
	Umatilla County—		
348	32′ Reinforced Concrete Span over Drainage Canal on Echo-Pendleton Section, Columbia River Highway	a	4,427.81
383	2-20′ Reinforced Concrete Spans over Furnish Canal on Echo-Pendleton Section, Columbia River Highway	a	3,213.00
384	20′ Reinforced Concrete Span over Furnish Canal on Echo-Pendleton Section, Columbia River Highway	a	2,134.43
385	20′ Reinforced Concrete Span over Furnish Canal on Echo-Pendleton Section, Columbia River Highway	a	2,171.33
386	20′Reinforced Concrete Span over Furnish Canal on Echo-Pendleton Section, Columbia River Highway	a	2,154.30
387	20′ Reinforced Concrete Span over Furnish Canal on Echo-Pendleton Section, Columbia River Highway	a	3,874.33
388	20′ Reinforced Concrete Span over Furnish Canal on Echo-Pendleton Section, Columbia River Highway	a	2,580.05
470	20′ Reinforced Concrete Span over Furnish Canal on Echo-Pendleton Section Columbia River Highway	a	3,572.53
471	22′ Reinforced Concrete Span over Furnish Canal on Echo-Pendleton Section, Columbia River Highway	a	4,004.90
472	20′ Reinforced Concrete Span over Brownell Ditch on Echo-Pendleton Section, Columbia River Highway	a	2,717.23

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
473	3-16′ Reinforced Concrete Spans over U. S. Feed Canal on Echo-Pendleton Section, Columbia River Highway	a	5,583.96
474	26′ Reinforced Concrete Span over Maxwell Canal on Echo-Pendleton Section, Columbia River Highway	a	3,845.95
475	24′ Reinforced Concrete Span over "A" Line Canal on Echo-Pendleton Section, Columbia River Highway	a	2,715.35
476	3-16′ Reinforced Concrete Spans over Storage Feed Canal on Echo-Pendleton Section, Columbia River Highway	a	5,214.08
478	2-22′ Reinforced Concrete Spans over U. S. Feed Canal on Echo-Pendleton Section, Columbia River Highway	a	4,563.11
479	2-24′ Reinforced Concrete Spans over Storage Feed Canal on Echo-Pendleton Section, Columbia River Highway	a	5,009.67
530	3-18′ Reinforced Concrete Spans over Wild Horse Creek on Adams-Athena Section, Oregon-Washington Highway	a	7,163.78
495	60′ Steel Span over Dry Creek on Athena-Milton Section, Old Oregon Trail	b	11,600.00
557	20′ Reinforced Concrete Span in City of Weston on Athena-Milton Section, Oregon-Washington Highway (60′ Roadway)	f	.....
	Union County—		
558	60′ Steel Span Concrete Substructure over Catherine Creek on Old Oregon Trail	d	.....
	Wasco County—		
307	113′ Reinforced Viaduct and 96′ Frame Trestle Overcrossing at Big Eddy on Columbia River Highway	b	19,436.01
308	200′ Reinforced Concrete Viaduct at Seufert on Columbia River Highway	b	43,573.61
331	136′ Reinforced Concrete Viaduct Overcrossing at Dillon, on Columbia River Highway	b	22,459.30
332	2-95′ and 3-78′ Plate Girder Spans and 85 lin. ft. Reinforced Concrete Approach over Deschutes River on Columbia River Highway between Sherman and Wasco Counties	a	81,191.26
464	124′ Reinforced Concrete Viaduct over Mill Race on Columbia River Highway at The Dalles, built by the city	a	20,932.57
498	110′ Reinforced Concrete Arch over Mosier Creek on Columbia River Highway	b	28,521.82
506	60′ Reinforced Concrete Viaduct over Chenowith Creek on the Columbia River Highway	a	5,466.42
523	20′ Reinforced Concrete Span over Rowena Dell on the Columbia River Highway	b	10,011.60
524	75′ Reinforced Concrete Arch over Dry Canyon on Columbia River Highway	b	20,759.00
653	Completion of Tunnel on Hood River-Mosier Section Columbia River Highway	b	30,000.00
	Washington County—		
459	123′ Pile Trestle over Naylor Creek on Forest Grove-Gaston Section, Tualatin Valley Highway	a	4,339.06
461	30′ Reinforced Concrete Span over Slough near Patton on Forest Grove-Gaston Section, Tualatin Valley Highway	a	3,030.35

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE P—Continued

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920	Estimated Cost
462	57′ Frame Trestle near Gaston on Forest Grove-Gaston Section, Tualatin Valley Highway	a	1,281.45
628	57′ Frame Trestle on Forest Grove-Gaston Section, Tualatin Valley Highway, Hughes Bridge near Forest Grove	a	1,281.45
	Wheeler County—		
286	1-70′ Wood Span and 38 lin. ft. Trestle over Alder Creek on Unit No. 1 Sarvice Creek-Valades Ranch Section, John Day River Highway	b	5,274.34
287	108′ Wood Span and 17 lin. ft. Trestle over Kahler Creek on Unit No. 1 Sarvice Creek-Valades Ranch Section, John Day River Highway	a	7,623.22
288	98′ Wood Span and 38 lin. ft. Trestle over Muleshoe Creek on Unit No. 1 Sarvice Creek-Valades Ranch Section, John Day River Highway	a	6,133.47
290	40′ "A" Frame Span and 38 lin. ft. of Trestle over Haystack Creek on Unit No. 2 Sarvice Creek-Valades Ranch Section, John Day Highway	b	6,100.00
	Yamhill County—		
309	24′ Reinforced Concrete Span on McMinnville-Sheridan Section, McMinnville-Tillamook Highway	a	2,934.00
311	18′ Reinforced Concrete Span on McMinnville-Sheridan Section, McMinnville-Tillamook Highway	a	1,382.80
312	20′ Reinforced Concrete Span on McMinnville-Sheridan Section, McMinnville-Tillamook Highway	a	2,144.80
315	36′ Reinforced Concrete Span on McMinnville-Sheridan Section, McMinnville-Tillamook Highway	a	3,351.00
372	92′ Reinforced Concrete Viaduct over Ash Swail Amity-Holmes Gap Section, West Side Highway	a	14,120.08
390	50′ Wood Span on Concrete and 38 lin. ft. Trestle over Agency Creek on McMinnville-Tillamook Highway near Grande Ronde	a	2,241.93
441	360′ Reinforced Concrete Viaduct over North Yamhill River on West Side Highway near McMinnville	d	.....
442	60′ Reinforced Concrete Viaduct over Deer Creek on McMinnville-Tillamook Highway near Bellevue	d	.....
442A	94 lin. ft. Pile Trestle over Deer Creek on McMinnville-Tillamook Highway near Bellevue	d	.....
458	576 lin. ft. Reinforced Concrete Viaduct on West Side Highway at Newberg	a	66,670.69
494	323 lin. ft. Pile Trestle over Chehalem Creek on West Side Highway near Newberg	a	10,902.60
526	51 lin. ft. Pile Trestle on McMinnville-Yamhill Section, Tualatin Valley Highway at Yamhill	a	1,799.00
612	2-50′ Wood Spans on Concrete and 19′ Pile Trestle over Yamhill River on Bee Ranch Section, Tualatin Valley Highway	d	.....
633	57′ Frame Trestle over Rock Creek on Sheridan-Willamina Section, McMinnville-Tillamook Highway	d	.....

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation. h—Multiple pipe culvert substituted.

TABLE Q

BRIDGE DESIGNS PREPARED FOR COUNTIES

Designs for the following structures were prepared at the request of County officials for use on County roads. For the status of each structure refer to the third column and to the key to symbols given at the bottom of the page.

Bridge No.	Location and Type of Structure	Status on Nov. 30, 1920
	Clackamas County—	
605	150′ Medium Traffic Wood Span and 50 lin. ft. Frame Trestle over Mollala River near Mollala (Dickey Bridge)	b
655	4-19′ Spans Timber Trestle over Union Mill Tail Race on Swede Stump-Meadow Brook Section Market Road No. 1	d
656	2-19′ Spans Timber Trestle over Union Mill Intake on Swede Stump-Meadow Brook Section Market Road No. 1	d
	Clatsop County—	
623	Superstructure for 130′ Deck Plate Girder Draw Span over Walluski River near Olney	b
	Coos County—	
598	235′ Swing Span and 171 lin. ft. Trestle over Coquille River at Coquille	d
	Douglas County—	
657	2-120′ Wood Spans and 287′ Frame Trestle, Alexander Bridge in Roseburg, superseded by Bridge No. 686	f
686	4-105′ Wood Spans and 253′ Frame Trestle, Evans Park Bridge in Roseburg	d
	Lane County—	
451	16′ Reinforced Concrete Span over Bushnell Slough on Eugene-Coburg Road near Eugene	d
	Marion and Linn Counties—	
533	240′ Steel Span on Concrete Piers over Santiam River between Mehama and Lyons, Intercounty Bridge	b
	Polk County—	
350	114′ Wood Span Wallace Bridge over Yamhill River near Willamina	a
426	72′ Steel Span John Smith Bridge near Luckiamute Station	a

Key to Symbols in third column: a—Structure completed. b—Structure under construction. d—Plans completed. f—Eliminated by relocation.

TABLE R

MILES OF STATE HIGHWAYS SURVEYED DURING PERIOD DECEMBER 1, 1918, TO NOVEMBER 30, 1920.

This table includes only surveys made under the direct supervision of the State Highway Department. It does not include surveys by Counties or by the U. S. Bureau of Public Roads. It does not include surveys of market roads.

COUNTY AND SECTION	Miles of Completed Location
Baker County:	
Middle Bridge to Emigrant Creek	27.4
Canyon Section	4.6
Sag Section	4.7
Baker to Haines	9.4
Baker City to Malheur County Line	51.3
Union County Line to Haines	7.9
Total for Baker County	105.3
Benton County:	
Monroe to Corvallis	17.0
Corvallis to Lincoln County Line	6.9
Monroe to Lane County Line	3.2
Total for Benton County	27.1
Clackamas County:	
Oregon City to Oswego	6.3
Canby to Aurora	4.1
Sandy to Forest Reserve Boundary	17.5
Sandy to Gresham	12.0
Total for Clackamas County	39.9
Clatsop County:	
Astoria to Seaside	14.8
Total for Clatsop County	14.8
Columbia County:	
Columbia City to Scappoose	10.8
Total for Columbia County	10.8
Coos County:	
Myrtle Point to Douglas County Line	24.3
Total for Coos County	24.3
Crook County:	
Crooked River Section	32.0
Prineville to Redmond	14.5
Prineville to Wheeler County Line	16.0
Total for Crook County	62.5
Curry County:	
Hubbard Creek to Mussel Creek	14.0
Port Orford to Hubbard Creek	1.3
Port Orford North to Coos County Line	13.0
Total for Curry County	28.3
Deschutes County:	
Bend to Horse Ridge	24.6
Bend to Jefferson County Line	24.2
Bend to Sisters	20.0
Redmond to Sisters	20.1
Allen Ranch to Klamath County Line	17.3
Total for Deschutes County	106.2

TABLE R—Continued

COUNTY AND SECTION	Miles of Completed Location
Douglas County:	
Roseburg to Dillard	6.7
Roseburg to Sutherlin	13.2
Roseburg to Coos County Line	28.4
Total for Douglas County	48.3
Gilliam County:	
Mayville to Thirtymile Creek	6.9
Arlington to Morrow County Line	12.2
John Day River to Blalock	14.9
Heppner Junction to Morrow County Line	1.0
Total for Gilliam County	35.0
Grant County:	
Danby Ranch to Cole Bridge	4.6
Dayville to Iron Bridge	7.5
Total for Grant County	12.1
Harney County:	
Burns to Lawen	16.7
Burns to Suntex	35.7
Lawen to Crane	10.5
Total for Harney County	62.9
Hood River County:	
Ruthton Hill to Hood River	1.7
Mount Hood Loop	21.8
Total for Hood River County	23.5
Jackson County:	
Centrol Point to Josephine County Line	21.0
Ashland South	20.9
Medford to Prospect	46.0
Ashland to Klamath County Line	26.0
Total for Jackson County	113.9
Jefferson County:	
Deschutes County Line to Madras	17.4
Madras to Wasco County Line	3.0
Total for Jefferson County	20.4
Josephine County:	
Sexton Mountain Section	7.4
Grants Pass to Crescent City	14.3
Total for Josephine County	21.7
Klamath County:	
Klamath Falls to Sand Creek	46.5
Klamath Falls to Lake County Line	60.0
Klamath Falls to Merrill to California State Line	27.5
Deschutes County Line to Sand Creek	37.6
Total for Klamath County	171.6
Lake County:	
Lakeview to Lapine	109.0
Lakeview to Pine Creek	13.0
Klamath County Line to Lakeview	41.0
Total for Lake County	163.0

TABLE R—Continued

COUNTY AND SECTION	Miles of Completed Location
Lane County:	
Cottage Grove to Walker	4.3
Goshen to Walker	10.3
Eugene to Goshen	4.9
Junction City to Lane County Line	5.8
Junction City to Eugene	12.4
Pacific Highway to Blachley	24.3
Harrisburg to Junction City	4.2
Total for Lane County	66.2
Lincoln County:	
Toledo to Newport	7.3
Benton County Line to Toledo	21.5
Total for Lincoln County	28.8
Linn County:	
Albany to Harrisburg	26.6
Lebanon to Cascadia	20.0
Tangent to Lebanon	10.0
Total for Linn County	56.6
Malheur County:	
Cow Valley to Brogan	9.3
Burrell Ranch to Vale	5.9
Vale to Brogan	24.3
Baker County Line to Ontario	29.6
Ontario to Vale	12.0
Ontario East to Snake River	0.9
Ironside to Cow Valley	15.2
Total for Malheur County	97.2
Morrow County:	
Oregon-Washington Highway across Morrow County	66.1
Columbia River Highway across Morrow County	30.2
Total for Morrow County	96.3
Polk County:	
Salem to Dallas	13.0
Yamhill County Line to Rickreall	11.5
Rickreall to Monmouth to Independence	8.3
Monmouth South	7.6
Willamina to Butlers Store	7.6
Total for Polk County	48.0
Sherman County:	
Columbia River Highway across Sherman County	14.8
Total for Sherman County	14.8
Tillamook County:	
Tillamook to Hebo	8.0
Neskowin to Hebo	16.0
Neskowin to Salmon River	10.0
Tillamook to Nehalem	28.0
Total for Tillamook County	62.0

TABLE R—Continued

COUNTY AND SECTION	Miles of Completed Location
Umatilla County:	
Pendleton to Kamela	27.1
Echo to Reith	21.9
Pendleton to Umatilla	20.8
Athena to Milton	11.6
Pendleton to Cabbage Hill	7.5
Pendleton to Pilot Rock to Morrow County Line	32.2
Pendleton to Cold Springs	27.6
Ukiah to Grant County Line	12.0
Total for Umatilla County	160.7
Union County:	
Wallowa Hill Section	5.2
La Grande to Kamela	19.6
Hot Lake to Union	6.3
Telocaset to North Powder	9.1
La Grande to Elgin	23.7
Total for Union County	63.9
Wallowa County:	
Union County Line to Joseph	39.8
Total for Wallowa County	39.8
Wasco County:	
The Dalles to Threemile Creek	2.0
Toll Bridge Cutoff	0.5
Mosier to The Dalles	16.7
Chenowith to The Dalles to Seufert	3.0
Threemile Creek to Dufur	13.3
Seufert to Deschutes River	12.5
Total for Wasco County	48.0
Washington County:	
Forest Grove to Gaston	6.5
Forest Grove to Hillsboro	5.0
Canyon Road Section	3.8
Total for Washington County	15.3
Wheeler County:	
Units No. 1 and No. 2, Sarvice Creek to Valades Ranch	25.5
Sarvice Creek Section	10.0
Fossil to Sarvice Creek to Summit	9.8
Cummins Hill to Fossil	0.7
Total for Wheeler County	46.0
Yamhill County:	
Newberg to West Dayton	5.9
McMinnville to Sheridan	8.5
McMinnville to Gaston	17.7
Grand Ronde to Butlers Store	2.0
West Dayton to McMinnville	5.1
McMinnville to Amity	8.0
Sheridan to Willamina	4.5
Amity to Polk County Line	2.3
Total for Yamhill County	54.0
Grand Total for All Counties	1,989.2

TABLE S

STATEMENT OF STATE HIGHWAY WORK UNDER CONSTRUCTION DURING THE 1919-1920 SEASON

COUNTY	Section	Length	Kind of Work	Contractor	Estimated Cost
			PACIFIC HIGHWAY		
Clackamas	Multnomah County Line—Oregon City	6.3	Grading	Palmer & Young	$ 60,300.00
"	Multnomah County Line—Oregon City	.3	Surfacing	State	2,482.34
"	Multnomah County Line—Oregon City	5.7	Concrete Pavement 18'	Scandia Shipbuilding Co.	242,800.00
"	Tryon Creek Bridge	.....	Bridge	E. D. Olds	9,349.45
"	Sucker Creek Arch	.....	Bridge	Pacific Bridge Co.	69,589.21
"	Canby-Aurora	3.77	Grading	W. B. Tull	35,318.37
"	Barlow-Aurora	1.97	Macadam	Washburn & Hall	11,450.98
"	Molalla River	.....	Bridge	Portland Bridge Co.	61,200.00
"	Canemah Hill	0.1	Paving	Clackamas County	2,004.48
Marion	Aurora-Salem, Unit No. 2	10.65	Paving, Type "D"	Oskar Huber	241,217.48
"	Aurora-Salem, Unit No. 1	7.35	Paving, Type "D"	Blake-Compton Co.	177,475.73
"	Brooks-Salem	4.16	Paving, Stand. Bit.	Blake-Compton Co.	115,702.76
"	Jefferson-North Six Miles	6.05	Paving and 0.71 Macadam	A. D. Kern	237,000.00
"	Salem-South	7.2	Macadam	A. D. Kern	48,000.00
"	Bordner Hill and Wain Hill	1.2	Macadam	Marion County Court	1,802.82
Linn	Jefferson-Albany	6.77	Paving, Type "D" & Grdg.	A. D. Kern	210,000.00
"	Albany-Tangent	7.41	Macadam	A. D. Kern	46,000.00
"	Santiam Approaches near Jefferson	.....	Timber Trestle on Concrete Foundation	Linn County Court	19,000.00
Lane	Junction City-Eugene	12.4	Paving, Stand. Bit.	Clark Henery Const. Co.	272,264.81
"	Eugene-Goshen	4.9	Paving, Stand. Bit.	Guy F. Pyle	101,325.02
"	Walker-Cottage Grove	3.07	Grading	Joplin & Eldon	49,602.38
"	Walker-Cottage Grove	3.07	Macadam	Hakanson & Corson	38,059.85
"	Divide Crossing and Approaches	0.19	Grading and Structure	Albert Anderson	27,500.00
"	Divide-Douglas County Line	1.38	Macadam	State Forces	26,771.03
"	Divide-Douglas County Line	1.2	Grading	J. H. Hawley	14,607.97
Douglas	Lane County Line-Comstock	0.76	Macadam and Grading	State Forces	17,200.00
"	Lane County Line-Comstock	.....	Culverts	S. L. Godard	7,000.00
"	Pass Creek	.....	Reinforced Concrete Bridge	Albert Anderson	8,382.86
"	Comstock-Pass Creek	1.0	Grading and Macadam	Albert Anderson	15,170.80
"	Comstock Overcrossing	0.2	Viaduct and Grading	Curtis Gardner	22,547.96
"	Comstock Overcrossing Section	0.2	Macadam	State Forces	1,650.00
"	Sand Creek Bridge	.....	Bridge	Curtis Gardner	13,500.00

"	Leona-Drain	4.0	Grading and Macadam	Albert Anderson	95,000.00
"	Drain-Yoncalla	5.89	Grading	H. J. Hildeburn	75,500.00
"	Drain-Yoncalla	2.78	Grading)		
"	Yoncalla Section	8.67	Macadam)	Albert Anderson	120,000.00
"	Yoncalla-Oakland	10.12	Paving, Stand. Bit.	Clark & Henery Const. Co.	338,000.00
"	Oakland-South	1.13	Grading and Macadam	John Hakanson	26,397.34
"	Oakland-Wilbur	7.0	Grading and Paving, Stand. Bit.	Clark & Henery Const. Co.	361,000.00
"	Wilbur-Roseburg	4.10	Grading	H. J. Hildeburn	37,000.00
"	Wilbur-Roseburg	4.10	Macadam	John Hakanson	42,000.00
"	Roseburg-Dillard	6.64	Grading)		
		3.6	Macadam)	J. W. Colby	132,000.00
"	Dillard-Myrtle Creek	12.94	Removal of Slides	H. J. Hildeburn	37,172.02
"	Dillard-Myrtle Creek	12.94	Pav., Stand. Bit. Type "D"	Oregon Hassam Paving Co.	470,000.00
"	Myrtle Creek-Canyonville	9.18	Grading	H. J. Hildeburn	87,000.00
"	Canyonville-Galesville, Unit No. 1	10.0	Grading	Forest Road Project	211,000.00
"	Canyonville-Galesville, Unit No. 2	1.0	Grading	Forest Road Project	96,900.00
"	Canyonville-Galesville	11.04	Macadam	Warren Const. Co.	117,993.14
"	Johns Place-Jacques Place	7.15	Grading and Macadam	Joplin & Eldon	111,600.00
"	Cow Creek Bridge	.....	Bridge	Union Bridge Co.	21,265.19
"	Stage Road Pass	2.48	Grading	John Hampshire & Co.	46,424.60
"	Stage Road Pass	2.48	Macadam	Joplin & Eldon	19,628.82
"	Stage Road Pass	.....	Bridges	Union Bridge Co.	3,803.80
Josephine	Stage Road Pass-Wolf Creek	4.47	Grading	Joplin & Eldon	51,072.15
"	Stage Road Pass-Wolf Creek	4.48	Macadam	Warren Const. Co.	69,315.49
"	Wolf Creek-Grave Creek	4.92	Paving, Stand. Bit.	Warren Const Co.	141,978.49
"	Wolf Creek-Grave Creek	.....	Grave Creek Bridge	J. Elmer Nelson	21,500.00
"	Sexton Mountain Section	7.43	Grading	H. J. Hildeburn	153,000.00
"	Sexton Mountain Section	7.48	Macadam	D. M. Stevenson	96,000.00
"	Pleasant Valley-Grants Pass	9.84	Grading and Macadam	Joplin & Eldon	125,000.00
"	Grants Pass-Jackson County Line	6.09	Paving, Type "D"	S. S. Schell	128,685.50
Jackson	Josephine County Line-Gold Hill	11.95	Paving and Grading	Schell & Calver	410,000.00
"	Josephine County Line-Gold Hill	.....	2 Concrete Bridges	F. S. Carter	12,250.00
"	Rock Point Bridge over Rogue River	.....	Bridges	Parker & Banfield	48,393.91
"	Gold Hill-Central Point	8.9	Paving, Type "D" & Grdg	Clark & Henery Const. Co.	223,062.72
"	Tolo Overcrossing	.....	Bridge and Approaches	Albert Anderson and Clark Henery Const Co.	32,431.87
"	Near Central Point	.....	2 Timber Bridges	J. Hartman	3,680.70
"	Talent-Reservoir	0.64	Grading	C. H. Natwick	9,600.00
"	Near Ashland	.....	3 Bridges	Frank Jordan	12,108.99
"	Ashland-Green Springs Mountain Road	5.85	Paving & Grdg., Stand. Bit.	Oskar Huber	230,000.00
"	Ashland-Green Springs Mountain Road	.....	Ashland Overhead	D. M. Stevenson	36,000.00
"	Ashland Overcrossing Approaches	0.2	Grading	C. H. Natwick	12,000.00
"	Green Springs Mountain-California Line	14.6	Paving, Stand. Bit.	Oskar Huber	550,000.00
	Total for Pacific Highway				$7,022,041.03

TABLE S—Continued

COUNTY	Section	Length	Kind of Work	Contractor	Estimated Cost
			COLUMBIA RIVER HIGHWAY		
Clatsop	Astoria-Svenson	9.0	Paving, Stand. Bit.	Warren Const. Co.	$ 265,206.72
"	Astoria-Svenson	0.49	Guard Fence	R. A. McClanathan	3,334.24
"	Svenson-Rock Creek	8.0	Paving, Stand. Bit.	Warren Const. Co.	235,000.00
"	Rock Creek-Westport	9.5	Paving, Stand. Bit.	Warren Const. Co.	215,000.00
"	Westport-Clatskanie	10.5	Paving, Stand. Bit.	Warren Const. Co.	265,000.00
Columbia	Clatskanie-Rainier	12.3	Paving, Stand. Bit.	Warren Const. Co.	242,841.19
"	Beaver Creek No. 11	.....	Bridge	Warren Const. Co.	6,957.00
"	Delena-Deer Island	0.83	Guard Fence	A. J. McGarry	5,833.91
"	Rainier City	0.9	Grading	Pacific Bridge Co.	48,659.99
"	Rainier-Deer Island	22.16	Paving, Stand. Bit.	Warren Const Co.	465,500.00
"	Tide Creek Bridge	.....	Bridge	Union Bridge Co.	14,454.98
"	Deer Island-Scappoose	10.85	Grading	L. O. Herrold	62,468.41
"	Deer Island-Scappoose	10.85	Paving	Warren Const Co.	313,000.00
"	Deer Island-Scappoose	.....	5 Bridges	Union Bridge Co.	41,469.42
Hood River	Cascade Locks-Hood River	22.11	Paving, Stand. Bit.	G. E. Kibbe	662,000.00
"	Ruthton Hill-Hood River	1.7	Grading	G. E. Kibbe	37,137.89
"	Hood River-Mosier, Unit No. 1	1.37	Grading	A. D. Kern	38,997.52
"	Hood River-Mosier, Unit No. 2	2.7	Grading	A. D. Kern	118,500.00
Hood River and Wasco	Hood River-Mosier	6.4	Macadam	A. D. Kern	32,588.07
Wasco	Hood River-Mosier, Unit No. 3	2.3	Grading	A. D. Kern	197,599.14
"	Hood River-Mosier, Unit No. 3	.....	Lining Tunnel No. 1	State Forces	12,000.00
"	Mosier-Rowena	8.96	Grading	Johnson Contract Co.	280,000.00
"	Mosier-Rowena	8.96	Macadam	A. D. Kern	37,500.00
"	Mosier-Rowena	.....	Mosier Creek Arch	Lindstrom & Fiegenson	47,400.00
"	Mosier-Rowena	.....	Dry Canyon Bridge	State Forces	22,300.00
"	Rowena-The Dalles	7.76	Grading, 7.76 Talus Surfcg.	A. D. Kern	150,000.00
"	Chenowith-The Dalles	0.5	Paving, Stand. Bit.	United Contracting Co.	12,900.93
"	The Dalles-Seufert	1.86	Paving, Stand. Bit.	United Contracting Co.	44,670.10
"	Seufert-Deschutes River	12.5	Grading	Jas. F. Clarkson & Co.	241,000.00
"	Seufert-Deschutes River	.....	Oiling Sand Fills	State Forces	3,000.00
"	Seufert-Deschutes River	.....	Seufert Viaduct	Colonial Building Co.	42,200.00
"	Seufert-Deschutes River	.....	Big Eddy Overcrossing	Lindstrom & Fiegenson	19,500.00
"	Seufert-Deschutes River	.....	Dillon Overcrossing	Colonial Building Co.	33,000.00
"	Toll Bridge Cutoff	0.54	Grading and Macadam	State Forces & R.N.Niemeyer	2,226.55

Wasco and Sherman	Deschutes River Bridge	.....	Bridge	Lindstrom & Fiegenson	81,191.26
Sherman	Sherman County	14.78	Grading	Porter & Conley	239,000.00
"	Sherman County	14.78	Macadam	Porter & Conley	118,800.00
"	Spanish Gulch	.....	Bridge	Hord-Brooks Co.	22,500.00
Sherman and Gilliam	John Day River Bridge	.....	Bridge	Portland Bridge Co.	30,646.77
Gilliam	John Day River-Blalock	14.94	Grading	Oskar Huber	236,500.00
"	John Day River-Blalock	14.94	Macadam	A. D. Kern	151,150.00
"	Oiling Columbia River Highway	.....	Oiling	State Forces	20,000.00
"	Blalock-Arlington	8.84	Grading	Johnson Contract Co.	244,546.18
"	Blalock-Arlington	9.21	Macadam	Porter & Conley	60,500.00
"	Arlington-Morrow County Line	12.23	Grading and Macadam	M. J. Conley	243,500.00
"	Heppner-Overcrossing	.....	Bridge	Reese & Davis	18,500.00
"	Willow Creek Overcrossing	.....	Bridge	Reese & Davis	20,450.45
Morrow	Morrow County, Unit No. 2	9.4	Grading and Macadam	Porter & Conley	106,376.83
"	Morrow County, Unit No. 1	20.8	Grading and Macadam	Porter & Conley	154,201.54
"	Messner Overcrossing	.....	Bridge	Reese & Davis	17,500.00
Umatilla	Morrow County Line-Echo	20.8	Grading and Macadam	Porter & Conley	193,578.14
"	Echo-Pendleton	21.88	Grading	Clifton, Applegate & Toole	277,500.00
"	Echo-Pendleton	22.0	Macadam	Porter & Conley	139,200.00
"	Echo-Pendleton	.....	Reinforced Concrete Bridges	Umatilla County	19,415.00
	Total for Columbia River Highway				$6,614,311.23

WEST SIDE HIGHWAY

Yamhill	Newberg	.....	Bridge	J. W. Sadler	$ 65,660.00
"	Chehalem Creek	.....	Bridge	E. D. Olds	10,902.60
"	Newberg-West Dayton	5.9	Grading, 3.58 Macadam	E. E. Cummins	38,148.45
"	Newberg-West Dayton	5.9	Concrete Paving	Oregon Contract Co.	185,000.00
"	Newberg-Dundee	1.58	Macadam	E. A. Palmer	9,500.00
"	West Dayton-McMinnville	5.0	Grading	Palmer & Young	91,500.00
"	West Dayton-McMinnville	4.94	Macadam	E. A. Palmer	26,000.00
Yamhill and Polk	Amity-Holmes Gap	8.3	Paving & Grdg., Stand. Bit.	Independent Paving Co.	289,000.00
"	Amity-Holmes Gap	.....	Bridges	State Forces	21,132.73
Polk	Rickreal-Monmouth-Independence	7.8	Paving & Grdg., Stand. Bit.	Warren Const. Co.	267,000.00
"	Benton-Polk County Line-North	1.64	Paving & Grdg., Stand. Bit.	Oskar Huber	53,500.00
Benton	Polk County Line-Corvallis	10.51	Pav., Type "D" Stand. Bit.	Oskar Huber	308,500.00
"	Corvallis-South	7.96	Concrete Pavement	Kibler & Bartlett	268,000.00
"	Monroe-North	9.15	Grdg. & Paving, Stand. Bit.	Pacific Bridge Co.	264,000.00
"	Monroe to Lane County Line	3.24	Grading and Macadam	Benton County	18,942.37
Lane	Benton County Line-Junction City	5.5	Grading and Macadam	Washburn & Hall	53,056.27
	Total for West Side Highway				$1,969,842.42

TABLE S—Continued

COUNTY	Section	Length	Kind of Work	Contractor	Estimated Cost
	McMINNVILLE-TILLAMOOK HIGHWAY				
Yamhill	Eight (8) Reinforced Concrete Bridges	.....	Bridges	Yamhill County	$ 16,000.00
"	McMinnville-Sheridan	8.0	Paving, Stand. Bit.	V. R. Dennis Const. Co.	240,000.00
"	Sheridan-Polk County Line	4.5	Macadam	W. N. Trent	35,500.00
Polk	Yamhill County Line-Butler's Store	7.6	Grading and Macadam	Elliott & Scoggin	108,000.00
Yambill	Butler's Store-Grand Ronde	1.85	Macadam	W. N. Trent	16,000.00
"	Grand Ronde	3.47	Grading and Macadam	W. N. Trent	57,250.00
"	Bee Ranch	3.97	Grading and Macadam	Elliott & Scoggin	81,000.00
Tillamook	Three Rivers-Forest Road Project	10.3	Grdg. & Macadam & Bridges	State Forces	211,457.00
	Total for McMinnville-Tillamook Highway				$ 765,207.00
	SALEM-DALLAS HIGHWAY				
Polk	Salem-Dallas	13.07	Grading & Paving, Type 'D'	Oskar Huber	355,000.00
	Total for Salem-Dallas Highway				$ 355,000.00
	JOHN DAY RIVER HIGHWAY				
Gilliam	Thirtymile Creek-Mayville	6.9	Grading	Copenhagen Brothers Co.	$ 180,790.00
Wheeler	Sarvice Creek Summit	1.7	Macadam	Copenhagen Brothers Co.	12,302.28
"	Butte Creek Section	9.35	Grading	J. F. Clarkson	73,300.00
"	Butte Creek Section	9.35	Macadam	Blake-Compton Co.	81,600.00
"	Sarvice Creek-Valades Ranch, No. 1	13.0	Grading	Copenhagen Brothers Co.	218,500.00
"	Sarvice Creek-Valades Ranch, No. 1	.....	Bridges	J. F. Clarkson & Co.	21,700.00
"	Sarvice Creek-Valades Ranch, No. 2	12.1	Grading	J. F. Clarkson & Co.	162,000.00
"	Sarvice Creek-Valades Ranch, No. 2	.....	Bridges	Curtis Gardner	6,000.00
Grant	Sarvice Creek-Valades Ranch, No. 3	12.0	Grading	J. F. Clarkson & Co.	131,000.00
"	Sarvice Creek-Valades Ranch, No. 3	.....	Bridges	Curtis Gardner	67,600.00
"	Sarvice Creek-Valades Ranch, No. 4	10.92	Grading	A. D. Kern	175,750.00
"	Cole Bridge-Danby Ranch	4.55	Macadam	Jim Ross	30,000.00
"	John Day-Fiske Creek	7.2	Grading and Macadamizing	A. D. Kern	107,313.43
"	Hall Hill-Prairie City	2.14	Grading and Macadamizing	A. D. Kern	41,169.03
Malheur	Cow Valley-Brogan	9.57	Grading	Curtis Gardner	20,250.00
"	Cow Valley-Brogan	.....	Pole & Canyon Crk. Bridges	Morris & Knudsen Co.	95,644.80
"	Jamieson-Vale	17.8	Macadam	Oxman & Harrington	68,200.00
"	Malheur River Bridge	.....	Bridge	Illinois Steel Bridge Co.	45,000.00
"	Cairo-Nyssa	8.98	Macadam	Porter & Conley	68,777.43
	Total for John Day River Highway				$1,606,896.97

LA GRANDE-ENTERPRISE HIGHWAY

Union	Elgin-Minam	9.37	Grading	State Forces	$ 66,607.35
"	Elgin-Minam	.....	Bridges	Rhyner-Dicke	16,003.91
Wallowa	Wallowa Canyon	8.38	Grading	A. D. Kern	140,000.00
	Total for La Grande-Enterprise Highway				$ 222,611.26

TUALATIN HIGHWAY

Multnomah	Bertha-Multnomah-Washington Co. Line	2.76	Paving, Stand. Bit.	Warren Const. Co.	$ 61,261.47
Washington	Canyon Road-County Line-Beaverton	3.89	Grdg. & Paving, Stand. Bit.	Warren Const. Co.	126,000.00
"	Multnomah-Washington Co. Line-Hillsboro	11.2	Paving, Concrete	A. Guthrie & Co.	234,969.98
"	Hillsboro-Forest Grove	4.3	Paving, Stand. Bit.	Warren Const. Co.	83,690.01
"	Forest Grove-Gaston	6.7	Macadam	Washington County Court	47,500.00
Yamhill	Gaston-Yamhill	7.9	Grading	Yamhill County Court	40,000.00
"	Yamhill-North	0.5	Macadam	Yamhill County Court	3,500.00
"	Yamhill-McMinnville	9.8	Grading & Concrete Paving	Northwest Const. Co.	245,000.00
	Total for Tualatin Highway				$ 841,921.46

ASHLAND-KLAMATH FALLS HIGHWAY

Jackson	Pacific Hwy.-Green Springs Mtn. Summit	10.09	Grading	A. Giebisch	$ 182,000.00
"	Pacific Hwy.-Green Springs Mtn. Summit	5.91	Macadam	A. Giebisch	26,000.00
"	Green Springs Mtn. Summit-Jenny-Creek	8.71	Grading	Jackson County Court	110,000.00
	Total for Ashland-Klamath Falls Highway				$ 318,000.00

COOS BAY-ROSEBURG HIGHWAY

Coos	Remote-Camas Valley, Unit No. 1	6.07	Grading	John Hampshire & Co.	$ 167,700.00
Douglas	Remote-Camas Valley, Unit No. 2	8.10	Grading	John Hampshire & Co.	222,800.00
	Total for Coos Bay-Roseburg Highway				$ 390,500.00

LAPINE-LAKEVIEW HIGHWAY

Lake	Crooked Creek-Lakeview	11.09	Grading and Graveling	Lake County Court	$ 134,000.00
"	Lakeview-New Pine Creek, No. 1	1.78	Grading and Macadam	Lake County Court	20,000.00
	Total for Lapine-Lakeview Highway				$ 154,000.00

TABLE S—Continued

COUNTY	Section	Length	Kind of Work	Contractor	Estimated Cost
			OREGON-WASHINGTON HIGHWAY		
Morrow	Heppner-Gilliam County Line	25.0	Grading	Oskar Huber	$ 172,000.00
Umatilla	Pilot Rock-Pendleton	10.48	Grading and Macadam	Umatilla County Court	123,446.40
"	Adams-Athena	9.0	Paving, Stand. Bit. 4.0 Grdg.	Warren Const. Co.	230,000.00
"	Adams-Athena	.....	Bridges	Rhyner-Dicke Co.	15,250.00
"	Athena-Milton Section	11.54	Paving, Stand. Bit.	Warren Const. Co.	379,000.00
"	Athena-Milton Section	.....	Bridges	Pacific Foundation Co.	11,600.00
"	Milton-Washington State Line	6.2	Paving, Stand. Bit.	Warren Const. Co.	139,329.59
	Total for Oregon-Washington Highway				$1,070,625.99
			OLD OREGON TRAIL		
Umatilla	Pendleton-Cabbage Hill	7.54	Grading and Macadam	Clifton, Applegate & Toole	116,000.00
"	Cabbage Hill-Deadmans Pass	12.82	Macadam	Security Const. Co.	106,000.00
Union	Island City-La Grande-Hot Lake	6.0	Paving, 1.99 Grading	Warren Const. Co.	226,000.00
"	Lone Pine-Hot Lake	3.91	Macadam	Warren Const. Co.	69,000.00
"	Union-Telocaset	6.02	Grading	State Forces	76,690.77
"	Telocaset-North Powder	9.06	Grading	Oxman & Harrington	46,000.00
Baker	North Powder-Haines	8.06	Grading and Macadam	Oxman & Harrington	116,500.00
"	Haines-Baker	9.38	Grading and Macadam	F. C. Oxman	103,151.71
Malheur	Ontario-Snake River	0.89	Paving, Concrete	Gilmore & Richie	32,000.00
	Total for Old Oregon Trail				$ 891,342.48
			BAKER-CORNUCOPIA HIGHWAY		
Baker	Baker-Middle Bridge	18.75	Grading, 2.04 Macadam	J. A. Hoskins	$ 103,513.36
"	Baker-Middle Bridge	7.9	Macadam	F. C. Oxman	41,550.96
"	Sag Section	4.69	Grading and Macadam	Morrison-Knudsen Co.	79,840.14
"	Canyon Section	4.42	Grading	Morrison-Knudsen Co.	77,014.20
"	Canyon Section	4.42	Macadam	F. C. Oxman	34,713.11
	Total for Baker-Cornucopia Highway				$ 336,631.77

CROOKED RIVER HIGHWAY

Crook	Prineville-Davis Ranch	31.99	Grading	A. Guthrie	$ 307,000.00
"	Prineville-Davis Ranch	.....	Bridge	State Forces	24,500.00
	Total for Crooked River Highway				$ 331,500.00

McKENZIE RIV ER HIGHWAY

Lane	Albany-Blue River	.....	Widening Roadbed	Lane County	$ 25,000.00
Lane and Deschutes	Blue River East	30.9	Grading, 14.2 Macadam	Forest Road Project	408,000.00
Crook	Redmond-Prineville	15.2	Grading)		
		7.2	Graveling)	Oskar Huber	105,200.00
"	Deschutes County Line-Prineville	.....	Prineville City Bridge	Oskar Huber	5,100.00
"	Ochoco Canyon	9.7	Grading and Macadam	Forest Road Project	111,145.00
Wheeler	Ochoco Canyon	10.13	Grading, 4.0 Macadam	Elliott & Scoggin	233,600.00
	Total for McKenzie River Highway				$ 888,045.00

CRATER LAKE HIGHWAY

Jackson	Agate-Trail, Unit No. 1	2.44	Grading	Wm. von der Hellen	$ 48,650.00
"	Agate-Trail, Unit No. 2	7.22	Grading	Rhodes & Price	121,100.00
"	Agate-Trail, Unit No. 3	4.69	Grading	W. B. Tull	62,850.00
"	Agate-Trail Bridges	.....	Rogue River Bridge	Portland Bridge Co.	52,300.00
"	Agate-Trail Bridges	.....	4 Concrete Structures	Albert Anderson	51,300.00
"	Prospect-Forest Boundary	22.2	Grading, 7.0 Macadam	Forest Road Project	246,000.00
Klamath	Anna Creek Section	3.0	Grading	Forest Road Project	15,000.00
	Total for Crater Lake Highway				$ 597,200.00

FLORA-ENTERPRISE HIGHWAY

Wallowa	Flora-Enterprise	13.0	Grading, 6.05 Macadam	Forest Road Project	$ 123,000.00
	Total for Flora-Enterprise Highway				$ 123,000.00

MOUNT HOOD LOOP HIGHWAY

Clackamas	Mt. Hood Loop	14.4	Grading	Forest Road Project	$ 260,000.00
	Total for Mount Hood Loop Highway				$ 260,000.00

TABLE S—Continued

COUNTY	Section	Length	Kind of Work	Contractor	Estimated Cost
	COAST HIGHWAY				
Clatsop	Youngs Bay Bridge	.....	Bridge	Gilpin Const. Co.	$ 348,500.00
"	Youngs Bay-Miles Crossing	0.62	Paving, Concrete	Northwestern Const. Co.	23,263.72
"	Youngs Bay-Miles Crossing	0.62	Hydraulic Fill	Port of Astoria	23,430.49
"	Necanicum-Tillamook County Line	7.0	Macadam	Clatsop County	20,000.00
"	Miles Crossing-Warrenton	2.9	Sand Embankment	McLean & Williams	20,600.00
"	Skipanon-Seaside	9.94	Concrete Pavement	J. H. Tillman Co.	271,000.00
Tillamook	Hobsonville-Riverdale	4.69	Macadam	Tillamook County Court	33,000.00
"	Moore Cutoff	3.0	Macadam	Tillamook County Court	31,000.00
"	Nestucca River Bridge	.....	Bridge	Pacific Foundation Co.	46,500.00
"	Hemlock-Beaver	5.0	Paving, Stand. Bit.	Warren Const. Co.	166,000.00
"	Beaver-Hebo	4.72	Macadam	Tillamook County Court	34,000.00
"	Kilchis River	.....	Bridge	Pacific Foundation Co.	28,500.00
Coos	Marshfield-Coquille	14.49	Grdg. & Concrete Pavement	Perham, Brown, Doan & Hague	388,000.00
"	Cedar Point-Coquille	1.96	Grading	Moon & Co.	9,591.40
"	Cedar Point-Coquille	1.96	Paving	Scandia Shipbuilding Co.	70,000.00
Curry	Hubbard Creek-Brush Creek	6.82	Grading	Moon & Co.	171,500.00
"	Hubbard Creek-Brush Creek	4.2	Macadam	J. W. Hillstrom	28,500.00
	Total for Coast Highway				$1,713,385.61
	CORVALLIS-NEWPORT HIGHWAY				
Benton	Wren-Blodgett	4.86	Macadam	Washburn & Hall	$ 29,200.00
Lincoln	Toledo-Newport	5.3	Grading	Thomas E. Young	64,000.00
"	Depot Slough	.....	Bridge	R. W. Pepin	4,242.63
"	Alsea River	4.0	Grading and Macadam	Forest Road Project	67,600.00
	Total for Corvallis-Newport Highway				$ 165,042.63
	GRANTS PASS-CRESCENT CITY HIGHWAY				
Josephine	Hayes Hill	2.4	Grading and Macadam	Forest Road Project	$ 75,300.00
	Total for Grants Pass-Crescent City Highway				$ 75,300.00

KLAMATH FALLS-LAKEVIEW HIGHWAY

Klamath	Klamath Falls-Dairy	13.91	Grading and Macadam	Oskar Huber	$ 166,000.00
	Total for Klamath Falls-Lakeview Highway				$ 166,000.00

CENTRAL OREGON HIGHWAY

Harney	Burns-Lawen	16.72	Grading and Macadam	Pacific Bridge Co	$ 241,000.00
"	Lawen-Crane	10.46	Grading and Macadam	Porter & Conley	170,000.00
	Total for Central Oregon Highway				$ 411,000.00

THE DALLES-CALIFORNIA HIGHWAY

Wasco	The Dalles-Threemile Creek	2.0	Grading and Paving	United Contracting Co	$ 47,229.78
Jefferson	Madras-Deschutes County Line	16.3	Grading and Macadam	Oskar Huber	174,000.00
Deschutes	Jefferson County Line-Bend	24.2	Grading	Oskar Huber	108,000.00
"	Jefferson County Line-Bend	24.2	Macadam	Wickner, Sharpe & Chindahl	147,000.00
"	Bend-Allen Ranch	5.1	Macadam, 1.5 Grading	Oskar Huber	31,346.31
Klamath	Algoma Section	8.92	Grading and Macadam	Oskar Huber	145,000.00
"	Klamath Falls-North (State Share)	3.42	Macadam	Klamath County Court	39,000.00
"	Klamath Falls-Merrill	14.68	Grading, 7.6 Macadam	Oskar Huber	180,000.00
"	Merrill-California Line	12.8	Macadam, 9.35 Grading	Oskar Huber	137,000.00
	Total for The Dalles-California Higbway				$1,008,576.09

WILLAMETTE VALLEY-FLORENCE HIGHWAY

Lane	Goldson Section	11.29	Grading	Washburn & Hall	$ 134,000.00
	Total for Willamette Valley-Florence Highway				$ 134,000.00

COUNTY ROAD

Marion and Linn	Mehama Bridge	.....	Bridge over Santiam River	Parker & Banfield	$ 48,000.00
	Total for County Road				$ 48,000.00

Description of Work

of the

State Highway Department

In the

Counties of the State

1919-1920

BAKER COUNTY

Baker County includes within its boundaries the most productive mining district in Oregon, in addition there are extensive lumbering operations and stock ranches, as well as numerous prosperous hay and fruit farms. While fairly well supplied with railroads, there are many communities practically isolated in the winter season, due to the poor condition of the present roads. Proper locations, avoiding the high passes, will afford all year roads, and be of incalculable value in the development of this county. Furthermore, those sections now supplied with railroads are developed to the extent that highways are an economic necessity in hauling produce to shipping points.

The Old Oregon Trail, the main trunk highway, traverses this county for about 70 miles from northwest to southeast corners. Connecting with this highway at Baker is the Baker-Cornucopia Highway, extending northeast to Cornucopia, a distance of 75 miles. The State has cooperated with the County in improving the Old Oregon Trail, nine miles of which is graded and macadamized, ten miles under contract and the balance surveyed. About 28 miles of the Baker-Cornucopia Highway has been graded and surfaced with aid from State and Federal Government as a post road project, and 28 additonal miles surveyed. A number of market roads tributary to these highways have been located by the County, about ten miles of which are now under contract for completion in 1920.

The work in this County was handled under the direction of M. O. Bennett, Division Engineer, resigned, until September 15, 1920, at which time the work in the county was taken over by R. H. Baldock, Division Engineer.

[BAKER]

Baker-Haines Grading and Macadam

This section, 9.38 miles in length, extends from First Street in Haines to the north city limits of Baker. The route selected is very direct, paralleling, for the major portion, the O. W. R. & N. Company right-of-way through irrigated farms in the wide fertile valley of the Powder River. The location was chosen on account of being shorter than the old road, and because it eliminated two grade crossings of the O. W. R. & N. Railway. The roadbed was graded to a width of 24 feet, and surfaced with crushed gravel macadam, 1½ inches maximum size, to a width of 16 feet, 8 inches loose thickness.

Contract No. 177, for grading and macadamizing this section, was awarded F. C. Oxman of Baker, Oregon, on August 5, 1919. Work was started August 30, 1919 and completed August 10, 1920, under the supervision of H. G. Smith, Resident Engineer.

The estimated total cost of this project is $103,151.71. Baker County agreed to pay for the grading and the county share amounts to approximately $34,756.62, the balance being paid from State funds. Total expenditures to date amount to $101,556.21.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 8,600.50
Rental of Tractor (to be deducted from amounts due contractor)		75.00
Contract Items as follows:		
Clearing and Grubbing, all	$ 250.00	
Excavation, no classification, 32,895.2 cu. yds. at 50c	16,447.60	
Grader Work, 4.488 miles at $1000.00	4,488.00	
Overhaul, 37,125 sta. yds. at 5c	1,856.25	
Class "A" Concrete, 233.86 cu. yds. at $30.00	7,015.80	
Class "C" Concrete, 26.92 cu. yds. at $25.00	673.00	
Metal Reinforcement, 15,882 lbs. at 10c	1,588.20	
12 in. Corrugated Galvanized Iron Pipe, 442 lin. ft. at $1.95	861.90	
18 in. Corrugated Galvanized Iron Pipe, 304 lin. ft. at $2.60	790.40	
24 in. Corrugated Galvanized Iron Pipe, 86 lin. ft. at $3.50	301.00	
Crushed Gravel, 20,047.6 cu. yds. at $2.70	54,128.52	
Pay Haul per mile, 17,379.65 cu. yds. at 33 1-3c	5,793.22	
Force Account Items:		
Replacing Right-of-Way Fence	21.24	
Changing head-gates and digging irrigation ditch	61.09	
Wet Excavation for footings of Menke Creek Culvert	402.14	
Total amount earned by Contractor to Nov. 30, 1920	$94,678.36	
Percentage retained until completion of contract	1,797.65	
Total amount paid Contractor		$ 92,880.71
Grand total amount expended to November 30, 1920		$101,556.21
Paid by State	$ 66,799.59	
Paid by County	34,756.62	
Total paid to Nov. 30, 1920	$101,556.21	

Haines-North Powder Grading and Macadam

Contract No. 293, for grading and graveling the Haines-North Powder section of the Old Oregon Trail, was awarded to Oxman & Harrington of Baker, Ore., on August 24, 1920. The section is 8.06 miles in length and will be graded to a standard width of 24 feet, with a macadam surface 16 feet in width. This section traverses the wide, fertile valley

of the Powder River and will accommodate a very heavy local traffic, in addition to being a portion of the main traffic highway in eastern Oregon.

Construction is being done under the supervision of J. N. Bishop, Resident Engineer, and is estimated to cost a total of $116,500.00. Baker County co-operates to the extent of paying for the grading, which is estimated at $53,500.00, the balance of $63,000.00 being paid by the State. Expenditures to date amount to $8,934.90.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,373.54
Contract Items as follows:		
Clearing and Grubbing, 25 per cent at $300.00	$ 75.00	
Common Excavation, 10,808 cu. yds. at 50c	5,404.00	
Overhaul, 3,500 sta. yds. at 5c	175.00	
12 in. Plain Concrete Pipe, 112 lin. ft. at $2.00	224.00	
18 in. Reinforced Concrete Pipe, 116 lin. ft. at $3.00	348.00	
24 in. Reinforced Concrete Pipe, 92 lin. ft. at $4.00	368.00	
36 in. Reinforced Concrete Pipe, 32 lin. ft. at $7.00	224.00	
Materials on hand	2,057.72	
Total amount earned by contractor	$ 8,895.72	
Percentage retained until completion of contract	1,334.36	
Total amount paid contractor		7,561.36
Grand total expended to November 30, 1920		$ 8,934.90
Paid by State	$ 1,373.54	
Paid by County	7,561.36	
Total	$ 8,934.90	

Baker-Middle Bridge Post Road Project.

The Baker-Middle Bridge Section of the Baker-Cornucopia Highway, Oregon Federal Aid Project No. 10, extends from Baker to a point near Middle Bridge on the lower Powder River. From Baker the line follows the old road to the head of Ruckles Creek Canyon, thence down Ruckles Creek to a point about two miles south of Keating. Turning east at this point the highway leaves Ruckles Creek and enters the Powder River Valley near Middle Bridge, the total distance being 18.75 miles. This section forms a connecting link between Baker City and the rich, irrigated lands in Eagle Valley and carries a very heavy local traffic.

The section was constructed as a Post Road Project, co-operation being received from both the County and the Federal Government. The work has been handled under two separate contracts, the first being No. 109, awarded to J. A. Hoskins on April 15, 1919, and consisting of 18.75 miles of grading including 2.3 miles of macadam. Work was started May 5, 1919 and completed September 30, 1919, being finished under the direction of H. G. Smith, Resident Engineer. The total expenditures under this contract amount to $103,513.36, of which the county co-operation amounts to $15,000.00 and the Federal Government co-operation to $40,345.60, the balance of $48,167.76 being paid from state funds.

Contract No. 224 was awarded to F. C. Oxman on October 7, 1919, covering the surfacing of 8.7 miles to a width of twelve feet and eight inches loose thickness. Approximately 1 mile was surfaced below the bridge crossing in Ruckles Canyon, 12 miles north of Baker, the balance of 7.7 miles being just north of Baker. The gravel, for the most part, consisted of crushed mine dump material and formed an excellent surface.

[BAKER]

The completed surfacing represents a total expenditure of $41,550.96. Baker County co-operates to the extent of 50 per cent of the cost of the portion between Station 200 and Station 240, and 25 per cent of the cost of the balance, making a total co-operation under this contract of $11,222.97. The Federal Government share of the cost amounts to $16,923.58, the balance of $13,404.41 being paid by the state.

Work was started on November 18, 1919 and completed June 10, 1920, H. G. Smith, Resident Engineer, having charge of the work.

The total cost for both contracts on the project amounts to $145,064.32 of which the County share is $26,222.97, the Federal Government share $57,269.18 and the State share $61,572.17.

DETAILED STATEMENT OF EXPENDITURES

Grading

Engineering		$ 7,804.74
Contract Items as follows:		
Clearing and Grubbing, all at $250.00	$ 250.00	
Common Excavation, 76,927.6 cu. yds. at 50c	38,463.80	
Solid Rock Excavation, 16,267.1 cu. yds. at $1.50	24,400.65	
Overhaul, 15,870 sta. yds. at 3c	476.10	
Class "A" Concrete 34.57 cu. yds. at $35.00	1,209.95	
Class "C" Concrete 188.99 cu. yds. at $27.50	5,197.23	
Reinforcing Steel, 1,668 lbs. at 16c	266.88	
18 in. Corrugated Galvanized Iron Pipe, 2,138 lin. ft. at $2.60	5,558.80	
24 in. Corrugated Galvanized Iron Pipe, 794 lin. ft. at $3.50	2,779.00	
30 in. Corrugated Galvanized Iron Pipe, 128 lin. ft. at $5.00	640.00	
36 in. Corrugated Galvanized Iron Pipe, 148 lin. ft. at $5.90	873.20	
48 in. Corrugated Galvanized Iron Pipe, 12 lin. ft. at $6.90	82.80	
Guard Rail, 944 lin. ft. at $1.00	944.00	
Snow Fence, 3,712 lin. ft. at $1.00	3,712.00	
Lumber and Timber, 29.775 M-FBM at $62.50	1,860.94	
Gravel Surfacing, 2,908 cu. yds. at $2.85	8,287.80	
Force Account:		
Replacing Floor and Guard Rail on Bridge	73.43	
Scarifying 2.3 miles of existing macadam	632.04	
Total paid to contractor		$ 95,708.62
Grand total cost of project		$103,513.36
Paid by State	$ 54,346.60	
Paid by County	15,000.00	
Paid by Government	34,166.76	
Total	$103,513.36	

DETAILED STATEMENT OF EXPENDITURES

Surfacing

Engineering		$ 2,236.76
Contract Items as follows:		
Crushed Gravel, 11,858.5 cu. yd. at $2.80	$33,203.80	
Pay haul per mile, 13,283.5 cu. yd. at 43c	5,711.91	
Force Account Items:		
Scarifying subgrade Station 180+00—203+00	50.00	
Grading private road approach	60.29	
Building up shoulders with Fresnoes	244.97	
Building concrete apron for culvert	43.23	
Total amount paid contractor		39,314.20
Grand Total cost of project		$ 41,550.96
Paid by State	$ 37,484.59	
Paid by Government	4,066.37	
Total	$ 41,550.96	

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Sag Section Post Road Project

This section is located on the Baker-Cornucopia Highway and extends north from the divide between Powder River Gorge and Pine Valley to about 2 miles south of the town of Halfway. For years the Sag, a wide flat, adobe bed, was a menace to highway transportation between the rich, irrigated fields of Pine Valley and the outside world. Pine Valley is isolated from the railroad and a highway passable at all seasons of the year is an absolute necessity.

The section is 4.69 miles in length and has been constructed in co-operation with the Federal Government, being designated as Project No. 9.

Contract No. 144 was awarded to the Morrison-Knudsen Company of Boise, Idaho, on June 10, 1919. Construction was started July 10, 1919 and completed November 17, 1919 under A. C. Forrester, Resident Engineer.

The total expenditures for the project amount to $79,840.14, of which $6,000.00 was paid by Baker County, $22,528.41 by the Federal Government and the balance of $51,311.73 by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,852.82
Culvert Pipe bought from Baker Company		298.40
Contract Items as follows:		
Clearing and Grubbing, all	$ 10.00	
Common Excavation, 23,068.94 cu. yd. at 60c	13,841.36	
Solid Rock Excavation, 2,025.2 cu. yd. at $3.00	6,075.60	
Overhaul, 1,921.2 sta. yd. at 4c	76.85	
12 in. Corrugated Galvanized Iron Pipe, 952 lin. ft. at $2.50	2,380.00	
18 in. Corrugated Galvanized Iron Pipe, 244 l n. ft. at $3.20	780.00	
24 in. Corrugated Galvanized Iron Pipe, 92 lin. ft. at $5.00	460.00	
Class "A" Concrete, 101.42 cu. yd. at $20.00	2,028.40	
Metal Reinforcement, 9,591 lbs. at 10c	959.10	
Rubble Masonry, 66 cu. yd. at $20.00	1,320.00	
Rip Rap, 77.6 cu. yd. at $2.00	155.20	
Run of Bank Gravel, 9,701.15 cu. yd. at $1.40	13,581.61	
Payhaul (per mile) 39,606.76 cu. yd. at 80c	31,685.41	
Force Account Items:		
Digging test pits for gravel	70.34	
Removing culverts from old county road and replacing in new grade	179.03	
Raking oversize out of run of bank gravel in top layer of gravel surfacing	1,360.98	
Building Blind Stone drain for Springs	701.71	
Loan of services of one man to assist Engineers	22.53	
Total amount paid contractor		$ 75,688.92
Grand total cost of project		$ 79,840.14
Paid by State	$ 51,311.73	
Paid by County	6,000.00	
Paid by Government	22,528.41	
Total	$ 79,840.14	

Canyon Section Post Road Project

This section of the Baker-Cornucopia Highway is located about midway between Baker and Cornucopia. The project begins 1.5 miles east of the town of Richland and runs in an easterly direction 4.42 miles, closely following the former traveled road along the side of the steep

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banks and rock cliffs of the Powder River. The old road was very narrow and crooked with a number of steep grades and the new construction is a decided improvement. In addition to being a part of the main highway between Baker and Cornucopia, this portion serves as an outlet from the fertile Eagle Valley towards the railroad at Robinette.

The work was done in co-operation with the County and Federal Government, being designated as Post Road Project No. 11. Two contracts were awarded on the section, the first for the grading and the second for the surfacing.

Contract No. 161 covering the grading was awarded to Morrison-Knudsen Co., on July 8, 1919. Work was started on July 20, 1919 and completed February 9, 1920. Total expenditures under this contract amount to $77,014.20. Baker County co-operates to the amount of $6,000.00 and the Federal Government approximately $31,584.91, the balance of $39,429.29 being paid by the State.

Contract No. 243 was awarded February 5, 1920 to F. C. Oxman, Baker, Oregon, for surfacing the entire distance. Work was started July 1, 1920, and is completed at the present time. This work was under the direction of B. H. McNamee, Resident Engineer, and the total cost is $34,713.11. Baker County co-operates to the extent of 50 per cent of the cost, or an amount of $17,356.55, and the Federal Government to the amount of $17,356.56.

The total cost of the grading and surfacing is $111,727.31 which is to be paid, $23,356.55 from County funds, $48,941.47 from Government funds and $39,429.29 from State funds.

DETAILED STATEMENT OF EXPENDITURES
Grading

Engineering		$ 6,771.89
Contract Items as follows:		
Clearing and Grubbing, all	$ 100.00	
Common Excavation, 28,431.5 cu. yd. at 72c	20,470.68	
Solid Rock Excavation, 24,286.1 cu. yd. at $1.40	34,000.54	
Overhaul, 20,245 sta. yd. at 4c	809.80	
12 in. Corrugated Galvanized Iron Pipe, 1,220 lin. ft. at $2.25	2,745.00	
18 in. Corrugated Galvanized Iron Pipe, 534 lin. ft. at $3.75	2,002.50	
24 in. Corrugated Galvanized Iron Pipe, 138 lin. ft. at $5.00	690.00	
36 in. Corrugated Galvanized Iron Pipe, 80 lin. ft. at $7.50	600.00	
Class "A" Concrete, 108.85 cu. yd. at $30.00	3,265.50	
Metal Reinforcement, 13,145 lbs. at 10c	1,314.50	
Rock Slope (hand placed), 425 sq. yd. at $1.50	637.50	
Rubble Masonry, 93 cu. yd. at $20.00	1,860.00	
Force Account:		
Salvaging old culvert pipe	124.74	
Hauling lumber, building floors for Engineer's Camp	19.33	
Moving Telephone line	60.83	
Erecting irrigation flume in new location	571.75	
Changing Bridge over Emigrant Creek	508.66	
Changing Bridge at Station 151+00	61.24	
Building Rock Toe Wall	399.74	
Total amount paid contractor		$ 70,242.31
Grand total cost of project		$ 77,014.20
Paid by State	$ 53,839.56	
Paid by County	6,000.00	
Paid by Government	17,174.64	
Total	$ 77,014.20	

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DETAILED STATEMENT OF EXPENDITURES
Surfacing

Engineering		$ 2,224.36
Contract Items as follows:		
Crushed Gravel, 9,282.5 cu. yds. at $3.50	$32,488.75	
Total amount paid contractor		$ 32,488.75
Grand total cost of project		$ 34,713.11
Paid by State	$ 31,403.05	
Paid by County	3,310.06	
Total	$ 34,713.11	

Middle Bridge-Emigrant Creek Survey

About six thousand people, one third of the population of Baker County, live in the prosperous Eagle and Pine Valleys in the northeast portion of the county. The present road connecting them with Baker, the metropolis of this section, passes over the high Sparta summit and is impassable for at least two months in the year. In order to overcome this condition, a survey was ordered from Middle Bridge, on the lower Powder River at the termination of the present constructed Baker-Middle Bridge section, to a point about two miles east of Richland, connecting with the graded and macadamized Canyon section of this Highway. The survey is located in the Powder River Canyon throughout, the construction of which will afford an all year road with very easy grades. For the most part the construction will be very heavy, through the rim rock in the Box Canyon of the Powder River. The location of this line, 28 miles in length, which was both difficult and expensive, was made in the winter of 1919-1920 by J. M. Clark, Locating Engineer. The plans of this section are about 80 per cent complete at the present time.

Canyon and Sag Section Surveys

Surveys of the Canyon and Sag sections of the Baker-Cornucopia Highway were made in 1917, and included in the 1917-1918 Biennial Report. However, the plans for these projects were not entirely completed, and an amount of $445.07 was expended on the Canyon section and $288.35 on the Sag section during 1919. Both of these projects have since been graded and macadamized.

Haines-Baker Section Survey

The main traveled road between Haines and Baker crossed the O. W. R. & N. Railroad main line track twice between the above towns, and followed the jogs in the section lines. In the summer of 1919 a survey was made by H. G. Smith, Locating Engineer, from Haines, through the irrigated fields along the south side of the railroad, to Baker, avoiding the grade crossings and saving approximately 3.5 miles between the common points. This section has since been graded, macadamized and opened to traffic.

Baker-Malheur County Line Survey

From Baker to the north line of Malheur County, along the designated Old Oregon Trail, the present road follows closely the O. W. R. & N. railroad through Pleasant Valley, Unity, Durkee, Weatherby and Huntington, over a distance of approximately 52 miles. This road crosses the railway 17 times at grade. A number of the grade crossings are

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especially hazardous, and in addition the road has many sharp curves, steep grades and narrow places.

The survey of this section was begun on April 1, 1920, for the purpose of obtaining a route which would reduce the curvature and grades and eliminate the railroad crossings at grade. The location extends from the south city limits of Baker, along the north side of the railroad, to Engina, where an overhead crossing is proposed. A second grade separation crossing is planned, one-half mile east of Durkee, where the Highway location passes under the railroad fill. Just east of the proposed subway the survey enters the canyon of the Burnt River, which is very narrow and walled by precipitous rock slopes. The location problems are further increased by proximity of the railroad which crosses and recrosses the canyon a number of times, forcing very heavy work at certain points in order to avoid crossing the railroad at grade. A combined river and overhead crossing is proposed about three miles west of Huntington. At Huntington the location leaves the Burnt River Canyon and crosses over a low summit to the Snake River, terminating at Baker-Malheur County line about four miles east of Huntington.

Eleven miles on the east end of this project was surveyed in the summer of 1920 by J. N. Bishop, Locating Engineer, and the remainder by J. M. Clark. The location, including plans and estimate, is about 90 per cent complete, and it is expected to advertise this section on or near the first of the year.

The improvement of this road as contemplated will be highly appreciated by the farmers along the route and afford tourist traffic, which comes from the east and south, a road free from all railroad crossings at grade and passable at all times of the year.

North Powder-Haines Survey

The survey of the Old Oregon Trail from Haines to North Powder was made by G. V. Robinson, Locating Engineer, during the months of April and May, 1920. The route chosen was very direct, over a total distance of 7.9 miles, and forms a connecting link on the Old Oregon Trail Highway. The construction of this section is now under way and when completed will accommodate a heavy local traffic.

Market Roads

The State Highway Commission has on file "Market Road Resolutions" signed by William Duby, County Judge, J. L. Dodson and E. E. Marker, County Commissioners, under date of March 17, stating that a levy of one mill on all the taxable property of the County was made for market road construction and designating four roads to be improved as market road projects.

A levy of one mill on a valuation of $26,760,378.51 produced a County market road fund of $26,760.38.

Included in the state levy of taxes was a levy of one mill on a valuation of $23,470,210.70, which produced $23,470.21, and which became a part of the "State Market Road Appropriation."

Fund apportioned by the State Highway Commission March 2	$ 23,470.21
Fund apportioned by the State Highway Commission April 3	9,572.45
Fund produced by County levy of one mill	26,760.38
Total available for 1920	$ 59,803.04

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The surveys and estimates of cost were made by T. L. Borman, County Engineer.

Project No. 1.—"Beginning at the Muddy Creek schoolhouse, thence east about 2 miles, then south 1 mile, thence east about 1 mile." Project is 4.8 miles in length. 4.35 miles were improved in 1920. The road is through foothill country, regular slope with fall of about 100 feet per mile.

A contract was awarded by the County Court August 7, 1920 for grading roadbed 18 and 20 feet in width and surfacing with gravel 12 feet in width. The maximum grade on the project is 5 per cent. The contract includes placing of drainage culverts, drain tile, siphons, and small bridges.

The estimated cost of the project is as follows:

Grading	$ 3,644.50
Culverts, bridges, siphons	3,007.54
Gravel Surface	9,926.00
Miscellaneous, moving fences, etc.	200.00
	$ 16,778.04
Engineering and contingencies, 10 per cent	1,677.80
Total	$ 18,455.84

Project No. 2.—"Beginning a t a point about 1 mile west of Hutchinson spur, thence East and south-easterly to intersect the Old Oregon Trail, a distance of about four and a half miles."

A report from County Judge Duby, dated October 12, 1920, enclosing data prepared by T. L. Borman showing status of market road work in the county, gives no information concerning Project No. 2. It is therefore assumed that no work is contemplated in 1920.

Project No. 3.—"Beginning at a point near Lockhart, thence up Powder River approximately five miles." A report received October 12, 1920, contains the following information:

A survey of 11.8 miles of line has been made, but the number of miles to be graded in 1920 has not been determined. It is proposed to grade the roadbed fourteen feet wide, with a maximum grade of 5 per cent. The proposed road is through the Upper Powder River Canyon, mountainous country. It is the intention of the County Court to award a contract for this work. The estimate of cost is not completed.

Project No. 4.—"Beginning at Robinette and following the present road to Timber Canyon a distance of approximately three miles."

The line as located shows a length of 3.42 miles. It passes through Powder River and Snake River Canyons, very steep hills and numerous rock cliffs. The maximum grade is 7 per cent. A contract was awarded to J. R. Hoskins for grading approximately 1½ miles, width of roadbed to be 14 feet, time limit of contract March 1, 1921. The contract includes the placing of culvert pipes and concrete culverts.

The estimated cost of project as follows.

Clearing	$ 25.00
Grading	23,651.78
Culverts	2,078.88
	$ 25,755.66
Engineering and Contingencies	2,575.57
Total	$ 28,331.23

BENTON COUNTY

Up to the beginning of the two year period covered by this report, no State funds had been expended on highway work in Benton County aside from a comparatively small amount for designing and field engineering for work done by the County. In 1919, however, contracts were let covering the entire West Side Highway in the County, except 8 miles immediately south of Corvallis, and contract for that section was let in November, 1920. Upon completion of the work now under contract, the highway will be paved from the north line of the county to Monroe. There will remain unpaved only 3.2 miles, from Monroe south to the County line.

On the Corvallis-Newport Highway the State has spent no funds for construction but has made a complete preliminary survey and has located and done construction engineering work on such portions as the County desired to grade. Contract for about five miles of macadam has been let for 1921 construction and it is expected that three miles or more, in addition, will be ready for surfacing during the 1921 season.

Work in Benton County, with the exception of the section from Monroe to the Lane County Line, has been under the supervision of Division Engineer, W. D. Clarke. This one job has been under the supervision of Division Engineer J. C. McLeod.

Corvallis-Polk County Line Paving

This project comprises 10.51 miles of paving on the West Side Highway, extending from the northerly city limits of Corvallis to the Polk County line.

Contract No. 83, awarded February 4, 1919, to Oskar Huber of Portland, Oregon, provided for 2 inches of standard bitulithic on a broken stone base, 16 feet wide and with 2-foot broken stone or gravel shoulders.

Work began on the contract May 13, 1919 and 3.23 miles of pavement were laid during the 1919 season. During this work the type of base was changed from open broken stone to a bound macadam and the depth increased to 6 inches, the contractor being paid for screenings used for binder at his price for broken stone, with no charge being made for placing. Shortly after beginning work in 1920 the type of construction was changed, in line with similar changes made on numerous other contracts in the State, and a mixed bituminous base was included. Where no macadam had yet been laid, three inches of bituminous base was substituted for an equal thickness of macadam. Where 4 inches or more of the broken stone was already in place, two inches of the bituminous base was added, thus making a finished pavement of 4 inches of asphaltic mixed pavement on not less than 4 inches of bound macadam, or 5 inches of the asphaltic pavement on 3 inches of macadam.

Broken stone for the macadam sub-base, and for plant material, was obtained from a quarry about a mile west of Lewisburg, at which point the paving plant was located.

Due to the additional work necessitated by the change in type of construction, and, to the large loss of time on account of rain in September

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and October, this contract will not be completed in the 1920 season. A total of 10.2 miles of pavement has been finished to November 30.

The estimated cost to the State for this section, when completed, is $308,500.00. This does not include the grading and drainage which was done by Benton County with its own force and equipment.

Engineering work on this section was in charge of M. E. DeWitt during the 1919 season and J. G. Garrow, Resident Engineer in 1920. Total State expenditures to date amount to $223,400.04.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 13,345.31
Lumber for headers furnished by State		1,649.38
T N T furnished by State		549.14
Asphalt furnished by State (to be deducted from amounts due contractor)		5,177.91
Advertisements for Bids		8.03
Contract Items as follows:		
Common Excavation, 371 cu. yds. at $1.00	$ 371.00	
Standard Bit. Pavement, 85,726 sq. yds. at $1.43	122,588.18	
3 inch Bituminous Base, 31,749 sq. yds. at $1.15	36,511.35	
2 inch Bituminous Base, 7,609 sq. yds. at 90c	6,848.10	
Broken Stone, Loose Measure, 28,016 cu. yds. at $2.40	67,238.40	
Screened Gravel, 356 cu. yds. at $2.40	854.40	
Shoulders, 33,500 lin. ft. at 6c	2,010.00	
Run of Bank Gravel, 1,619 cu. yds. at $2.40	3,885.60	
Materials on hand	750.00	
Force Account Items:		
Installing Bleeders and digging ditch at Station 270+00	321.55	
Total amount earned by Contractor	$241,378.58	
Deductions for War Tax on Freight	204.82	
Deductions for Asphalt furnished by State	2,738.15	
Percentage retained until completion of contract	35,765.34	
Amount paid contractor		$202,670.27
Grand total expended to November 30, 1920 (All State Funds)		$223,400.04

Corvallis-South Post Road Project

On November 6, 1920, Contract No. 311 was awarded to Kibler & Bartlett, of Tacoma, Washington, for paving 7.96 miles of the West Side Highway, extending from the south city limits of Corvallis to the north end of the Monroe-North pavement. The contract calls for a 16-foot concrete pavement of an average thickness of six inches, with two foot gravel shoulders on each side, and when completed, will finish the paving of the West Side Highway through Benton County.

The work is being undertaken, under post road project agreement No. 50, on the basis of equal co-operation by the State and Federal Government, and is estimated to cost a total of $268,000. No expenditures have been made to date of this report.

Monroe North Paving

On June 10, 1919, contract No. 145 for the grading and paving of 9.15 miles north from the north end of the Long Tom River Bridge at Monroe was awarded to the Pacific Bridge Company of Portland. This contract was later extended to cover paving of the Long Tom River bridge. A short stretch of pavement was laid at the south end of the

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project in 1919. Grading and rocking was continued until November 15, 1919.

Paving was resumed June 1, 1920 and approximately 7 miles will be completed this year. The pavement laid was a 5 inch bituminous concrete on a 4 inch gravel macadam base.

All grading during 1920 was performed by Benton County forces under a sub-contract from the Pacific Bridge Co. All grading charges were paid for by County vouchers, the State paying for paving items.

Engineering supervision was under C. J. Dillinger, Resident Engineer, during the 1919 work and under H. O. Ragan, Resident Engineer, during the 1920 season.

The total estimated cost is $264,000.00, of which $21,500.00 is to be paid by Benton County and $242,500.00 from State funds. The sum of $124,616.07 has been expended to date.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 8,347.33
Contract Items as follows:		
Clearing and Grubbing, 10 per cent at $200.00	$ 20.00	
Excavation, no classification, 10,366 cu. yds. at 55c	5,701.30	
12 in. Plain Concrete Pipe, 154 lin. ft. at $1.30	200.20	
18 in. Reinforced Concrete Pipe, 96 lin. ft. at $2.95	283.20	
24 in. Reinforced Concrete Pipe, 252 lin. ft. at $4.00	1,008.00	
36 in. Reinforced Concrete Pipe, 128 lin. ft. at $6.55	838.40	
Class "C" Concrete, 27.4 cu. yds. at $20.00	548.00	
Class "A" Concrete, 24.5 cu. yds. at $25.00	612.50	
Steel Reinforcement, 800 lbs. at 10c	80.00	
Type "D" Pavement, 47,303 sq. yds. at $2.10	99,336.30	
Gravel Shoulders, 39,882 lin. ft. at 6c	2,392.92	
R-O-B Gravel Shoulders & Base, 9,908 cu. yds. at $2.25	22,293.00	
Paving Monroe Bridge, 524 batches at $6.30	3,301.20	
Force Account Items:		
Redistributing culvert pipe account change in plans	171.73	
Total amount earned by contractor	$136,786.75	
Percentage retained until completion of contract	20,518.01	
Total amount paid to contractor		116,268.74
Grand total expended to November 30, 1920		$124,616.07
Paid by State	$118,650.28	
Paid by County	5,965.79	
Total Expenditures	$124,616.07	

Monroe-Lane County Line Macadam

This section of 3.2 miles was advertised for grading and screened gravel waterbound macadam surfacing on May 16, 1919. Contract No. 113 was awarded to Benton County for this work. Grading was started immediately after contract award and the job was completed in 1919. Grading charges were paid for by Benton County and macadam by the State. Engineering supervision was under H. B. Glaisyer, Resident Engineer.

Total expenditures for the surfacing amount to $18,942.37, which has been paid from state funds. No records are available of the grading expenditures made by the county.



NORTH OF MONROE ON THE WEST SIDE HIGHWAY IN BENTON COUNTY. PAVED IN 1920.



OLD BRIDGE OVER THE LONG TOM RIVER SOUTH OF MONROE. ON THE PACIFIC HIGHWAY IN BENTON COUNTY. MAIN SPAN REINFORCED AND APPROACHES REBUILT IN 1919.

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DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,196.04
Contract Items as follows:		
Screened Gravel, Waterbound, 6,129.25 cu. yds. at $2.50	$ 15,323.13	
Clay or Other Earth Filler, 1,186 cu. yds. at $1.20	1,423.20	
Total amount paid contractor		16,746.33
Grand Total Cost of Project (All State Funds)		$ 18,942.37

Monroe-Corvallis Survey

During May and June, 1919, a location survey was made between the north end of the Long Tom River Bridge at Monroe and the south city limits of Corvallis, under the supervision of M. E. DeWitt, Locating Engineer.

The location for the entire distance was within the right of way of the existing road. All necessary field data was taken and estimates compiled for construction work between these points.

Corvallis-Toledo Survey

A preliminary survey for the Corvallis-Newport Highway from Corvallis as far as Toledo was made in the summer of 1919. The survey follows along the north side of the Yaquina branch of the Southern Pacific Railroad for about five miles west from Corvallis and then bears off to the northwest, leaving Philomath to the south. The line crosses the present Corvallis-Toledo road at its crossing of Gellatley Creek near Wren, thence follows up Gellatley Creek to a junction with the present road near the summit, about 3 miles east of Blodgett. From that point to Toledo the survey follows very closely the route of the present road via Blodgett, Burnt Woods Post Office, Eddyville, Chitwood and Simpson Creek.

In connection with the selection of this route a reconnaissance was made and consideration given to several other locations, viz: from the summit east of Blodgett, via Summit and Nashville, along the Yaquina River to Eddyville; from Chitwood, via Elk City, along the Yaquina River to Toledo; and from Corvallis via Philomath, Big Elk Creek to Elk City and along the Yaquina River to Toledo.

All of these, however, were eliminated after careful consideration by reason of numerous unavoidable railroad grade crossings, greater distance and cost of construction, greater elevation, snow condition, etc. Especial effort was made by business interest of Toledo and Elk City in favor of the location from Chitwood to Toledo, via Elk City, and in this case, a preliminary survey was made to determine the merit of that location, as compared with the Simpson Creek location.

In addition to the preliminary survey for the entire distance of 55 0 miles, from Corvallis to Toledo, location surveys have been completed on about 25.0 miles. The preliminary survey in 1919 was made by Sam Dolan, Locating Engineer, and location surveys by the resident engineers in charge of various sections of the line.

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Wren-Blodgett Grading

During the season of 1919 Benton County undertook the grading of a 2.5 mile section from a point near Wren, through the canyon of Gellatley Creek, to a point on the present road about 3 miles from Blodgett. This section when completed will eliminate from the Corvallis-Newport road the grade known as Gellatley Hill, which, because of its extremely steep grades and red clay roadbed, has been one of the worst stretches of that road and a terror to autoists for years. About one mile of the cut-off was graded in 1919 and work has been continued in 1920 on the remaining 1.5 miles, which comprises some heavy side hill work.

A 2.25 mile extension of the project toward Blodgett has also been undertaken and approximately 4 miles in all have been graded. This grading will be completed in 1921.

Over this same section the State has let a contract for rocking, which will be done in the 1921 season, at an estimated cost of $29,200.00.

In 1919 the engineering work in connection with this section was done by W. C. Galloway and during 1920 by H. O. Ragan.

In addition to the completion of the Wren-Blodgett section in 1921, it is expected that Benton County will grade a section of about 3 miles from the Lincoln County line east, so that it may be rocked in connection with 5 miles in Lincoln County, west from the County line, which has been graded.

Engineering on County Bridges

Two small concrete bridges and a number of culverts on the Corvallis-Polk County Line Section were built by Benton County forces, the State providing the necessary engineering. The County kept a small crew busy throughout the season of 1919 and were able to finish everything except the handrail on one bridge. This was done during 1920, completing the bridge work on this section in a satisfactory manner.

A number of culverts and small bridges were built on the Monroe-Lane County Line Section by County forces, the State furnishing engineering only. The principal one of these jobs was the construction of the trestle approaches to the existing steel bridge over the Long Tom River. The usual standard construction was used and an excellent piece of workmanship obtained.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by W. H. Malone, County Judge, H. C. Herron and R. C. von Lehe, County Commissioners, under date of May 6, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for market road construction and designating four roads to be improved as market road projects. A levy of 1 mill on a valuation of $11,054,016.20 produced a County Market road fund of $11,054.02. Included in the State levy of taxes was a levy of 1 mill on a valuation of $12,118,666.87, which produced $12,118.67, which became a part of the "state market road appropriation."

[BENTON]

Funds apportioned by the State Highway Commission March 2	$ 12,118.67
Funds apportioned by the State Highway Commission April 3	4,942.66
Funds produced by County levy of 1 mill	11,054.02
Total available for 1920	$ 28,115.35

W. C. Galloway, County Engineer, made the surveys, prepared maps and estimates of cost and did the necessary construction engineering. The construction work was done by County forces under the direction of C. G. McKy, Roadmaster.

Project No. 1.—"Blodgett to Devitt." No work was done on this project in 1920.

Project No. 2.—"Granger to Albany." This is a section of the main traveled road between Albany and Corvallis. A new location was made 1.87 miles in length, paralleling the C. & E. Ry., eliminating the necessity of through traffic making two crossings of the railroad, both of which are very dangerous. This section was graded to 24 feet width of roadbed and surfaced 16 feet wide with gravel. Approximately $16,000.00 was spent on this project.

Project No. 3.—"Wren to Alder." No work was done on this project in 1920.

Project No. 4.—"Alsea to Lincoln County Line." A preliminary survey of part of a road from about 7 miles west of Alsea to the Lincoln County line was made.

No construction work was done in 1920.

CLACKAMAS COUNTY

In Clackamas County during the two year period ending November 30, 1920, the pavement of the Pacific Highway has been completed from Canemah to Canby and a contract awarded, upon which work is now under way, for the paving of the section from the Multnomah County line to within three-quarters of a mile of Oregon City. This gap, with the one of 3.75 miles from Canby to the Marion County line, will comprise the only unpaved parts of the Pacific Highway in this county after completion of other existing contracts. Of the Canby-Aurora Section, two-thirds has been graded and the other third, from Canby to the Molalla River, is ungraded only because of delays on the part of Clackamas County in obtaining necessary rights-of-way, so long continued that the contract for that part was cancelled in justice to the contractor who had completed the remainder of his contract months before. The opening of the Canby-Aurora Section to traffic which, it is expected, will be accomplished early next summer, will eliminate from the Pacific Highway the only two grade crossings between Canemah and Salem.

The Oregon City-Multnomah County Line Section is of interest in two particulars, first, because the paving contract provides for the first section of reinforced concrete pavement to be laid on a state highway in Oregon, and second, because it includes one of the handsomest concrete arch bridges on the State Highway system—the Sucker Creek arch at Oswego.

All work on the Pacific Highway in this County is under the supervision of Division Engineer W. D. Clarke. The Mt. Hood Loop Highway was under the direction of C. C. Kelley, Division Engineer, until September 15, 1920, being transferred to Division Engineer C. W. Wanzer, at that time.

Oregon City-Multnomah County Line Paving

Pursuant to the decision of the Highway Commission at the time of opening and rejection of bids for graveling of this section, bids were received September 28, 1920, for paving the Oregon City-Multnomah County Line Section of the Pacific Highway from a point one-half mile north of the Oregon City bridge to the Multnomah County line, 5.7 miles.

Bids were invited on three alternate types of construction, (1) Type "A", 7 inch reinforced concrete for the entire distance; (2) Type "A" pavement from the Multnomah County line to Tryon Creek and Type "C", 6 inch concrete base and 2 inch bitulithic top, from Tryon Creek to Oregon City; and (3) Type "A" pavement from the Multnomah County line to Tryon Creek and Type "D", 2 inch bitulithic top on 3 inch bituminous base over 4 inches of waterbound macadam on the balance.

The bid of the Scandia Shipbuilding Company of Marshfield, Oregon, for the first alternate was the low bid and contract No. 299 was awarded to them. Work was commenced about the middle of October, 1920, but on account of the continued rainy weather, completion of the paving from the Multnomah County line to Oswego, which it was expected to accomplish this fall, has not been realized.

The reinforcing specified for the Type "A" pavement consists of one-fourth inch bars, transverse bars to be spaced 5 ft. center to center

[CLACKAMAS]

and one longitudinal bar along each edge of the pavement. Provision is also made for laying the pavement in two strips where necessary to maintain traffic on the road during construction.

This section was submitted to the Bureau of Public Roads and approved as Federal Aid Post Road Project No. 49. The estimated cost when complete is $242,800.00, of which the Federal Government will pay $114,000.00 and the State $128,800.00. Expenditures to date amount to $513.52. F. T. Young is the Resident Engineer in charge of this section.

Oregon City-Canby Paving

On September 4, 1917, contract for the construction of 7.5 miles of paving between Oregon City and Canby on the Pacific Highway was awarded to the Oregon Hassam Paving Co., of Portland, Oregon.

The paving of this section was uncompleted at the time of the last biennial report, expenditures of $102,114.85 having been made at that date. During the present biennium the work has been carried to completion with additional expenditures of $29,739.37. This brings the total cost of the project to $131,854.22. This total cost has been borne by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,830.40
Contract Items as follows:		
Standard Bitulithic Pavement, 70,436 sq. yds. at $1.26	$ 88,749.36	
Broken Stone Shoulders, 78,208 lin. ft. at 5½c	4,301.44	
Hauling and Placing Broken Stone furnished by the State, 6,168.25 cu. yds. at $1.18	7,278.54	
Broken Stone, Loose Measure, 13,487.75 cu. yds. at $2.37	31,965.97	
Extra Cost on base rock not supplied by State, as per resolution, 13,487.75 cu. yds. at 51c	6,878.75	
Force Account:		
Grading 800 feet north from New Era and dismanteling and loading crusher on cars	2,642.49	
Loading and hauling material to bring roadbed to grade, no material nearby	154.14	
Excavating and refilling spongy place in subgrade	67.10	
Filling low places after rolling and cleaning up debris after forest fire	59.53	
Installing wooden headers at railroad crossings	24.06	
Total	$142,121.38	
Deductions:		
Plant rock screenings and miscellaneous items furnished by State	13,097.56	
Total amount paid Contractor		$129,023.82
Grand Total Cost of Project (All State Funds)		$131,854.22

Canemah Paving

During the 1920 season Clackamas County, at its own expense and with its own paving force and equipment, paved the section of the Pacific Highway through Canemah at a cost of $5,177.21.

This section is approximately 1800 feet in length, extending from the Southern Pacific railroad crossing to the north end of the Oregon City-Canby paving section.

The pavement is a 16-foot surface of 3 inches of asphaltic concrete laid as a redress job on the old macadam as a sub-base.

No State expenditures have been involved in this work.

[CLACKAMAS]

Canemah Hill Fill Paving

Upon completion of the grading, that section of the Pacific Highway just south of Canemah, which is known as the Canemah Hill section, has been paved during the present biennium by Clackamas County forces. The State co-operated on the cost of this paving to the extent of $2,004.48 for the 0.1 mile involved.

Oregon City-Oswego Macadam

In certain places the revised location of the Oregon City-Oswego section coincided with the existing old road. During the course of grading construction the macadam surface on this old road was destroyed and in order that the section might be kept open to winter traffic, these portions were furnished with a gravel surface. The total expenditures for this surfacing amount to $2,482.34, which has been paid from State funds.

Further improvement of the section, beyond the grading being done, was for a time considered inexpedient by the Commission on account of the increased traffic over the Oregon City Bridge which would naturally ensue. However, the imperative need of the road for local traffic caused the Commission to advertise the section for a macadam surface. Bids were opened on August 24, 1920, but were all rejected, the Commission deciding to request Federal aid on the project and place it under a paving contract.

Barlow-Aurora Graveling

Contract No. 264 for graveling of the Pacific Highway from Barlow to the Pudding River bridge at Aurora was awarded to Washburn & Hall of Lebanon, Oregon, April 27, 1920. This section, 1.82 miles in length as originally let, was extended to 1.97 miles, and was surfaced with run-of-bank gravel 20 feet in width and 8 inches thick. Gravel was obtained from the Pudding River at the south end of the job. A very small amount of sandy loam was used for binder on parts of the section where the gravel was coarse and loose enough to not bind readily without the use of a filler.

Work was begun on this contract May 28, 1920, and completed August 19, 1920. The gravel was laid in two layers of 4 inches each, hauling being done over each course as laid so far as possible. No rolling was attempted but the surface was dragged at frequent intervals during construction. Resident Engineer, F. T. Young was in charge of the work, which represents a total expenditure of $11,450.98 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 680.73
Contract Items as follows:		
Run-of-bank Gravel Surface, 4,736.5 cu. yds. at $2.00	$ 9,473.00	
Run-of-bank Gravel Surface beyond limits of original contract, 402.5 cu. yds. at $2.50	1,006.25	
Gravel left in bunkers (loose measure) 24 cu. yds. at $1.00	24.00	
Earth filler, 356 cu. yds. at 75c	267.00	
Total amount paid Contractor		$ 10,770.25
Grand total cost of project (All State Funds)		$ 11,450.98

[CLACKAMAS]

Canemah Hill Grading

On December 10, 1917, the State Highway Commission awarded Clackamas County a contract for the grading of 1.5 miles between Flag Creek and Oregon City, known as the Canemah Hill section. At the date of the last report the grading was uncompleted, with total expenditures of $24,037.20 having been made. During the present biennium the work has been completed with an additional expenditure of $8,935.79. This brings the total cost of the section to $32,972.99, which has been borne $5,098.90 by the State and $27,874.09 by Clackamas County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,082.86
Hauling crushed rock for drain tile		46.20
18 in. Concrete pipe at Station 156+00		87.15
Wood Guard Fence, ditches, tile drains, etc.		2,882.69
Contract Items as follows:		
Clearing and Grubbing, all	$ 500.00	
Common Excavation, 5,104 cu. yds. at 60c	3,062.40	
Intermediate Excavation, 12,289 cu. yds. at 80c	9,831.20	
Solid Rock Excavation, 9,250 cu. yds. at $1.25	11,562.50	
12 in. Reinforced Concrete Pipe, 391 lin. ft. at $1.25	488.75	
36 in. Reinforced Concrete Pipe, 56 lin. ft. at $4.00	224.00	
6 in. Porous Drain Tile, 585 lin. ft. at 10c	58.50	
Class "A" Concrete, 53 cu. yds. at $15.00	795.00	
Class "C" Concrete, 21 cu. yds. at $12.00	252.00	
Rubble Masonry, 2 cu. yds. at $1.25	2.50	
Overhaul, 54,862 sta. yds. at 2c	1,097.24	
Total Contruction Cost paid direct by County		$ 27,874.09
Grand Total Cost of Project		$ 32,972.99
Paid by State	$ 5,098.90	
Paid by County	27,874.09	
Total	$ 32,972.99	

Grading and Rock Crushing at New Era

During 1917 and 1918 the State Highway Department entered into an agreement with the Warren Construction Company for the crushing of rock from the quarry in New Era to be used in the Oregon City-Canby paving. This work was taken over by the state with their own forces on March 1, 1918. The total cost of the work to the date of the last report amounted to $63,047.79. During the present biennium delayed charges of $3,546.39 have been paid. This brings the total cost of the work to $66,594.18. Of this amount, Clackamas County co-operated to the extent of $15,836.01, the balance of $50,758.17 being paid by the state.

Canby-Aurora Grading

Contract No. 146 as let to W. B. Tull of Portland, for the grading of the Canby-Aurora Section of the Pacific Highway covered the 3.77 miles from the south end of the Oregon City-Canby paving section, near the north city limits of Canby, to the north end of Unit No. 2 of the Salem-Aurora paving section at Pudding River. Practically the entire distance was new construction, eliminating the grade crossings at Canby and Barlow and making a short cut along the railroad from Barlow to Aurora.

This contract was let June 10, 1919, and the section from Aurora to the Molalla River was completed in April, 1920. Failure of Clackamas

[CLACKAMAS]

County to obtain necessary rights-of-way through property of the Southern Pacific between Canby and Molalla River has prevented completion of the grading and resulted in cancellation of the Tull contract for that part of the work.

Condemnation suit for the needed rights-of-way has recently been filed and it is expected the grading can be completed early next spring.

Resident Engineer, F. T. Young, has had charge on this section with total expenditures of $35,318.37 from State funds. Of this amount, Clackamas County is to make reimbursement to the amount of $32,678.58, the balance of $2,639.79 being borne by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,639.79
Rent of Truck		82.00
576 lin. ft. of Piling at 15c		86.40
Construction of pile foundation for culvert		201.37
Dragging and keeping highway passable at Clackamas County end of Pudding River Bridge		10.00
Contract Items as follows:		
Clearing and Grubbing, all	$ 2,500.00	
Common Excavation, 28,652 cu. yds. at 52c	14,899.04	
Intermediate Excavation, 6,195 cu. yds. at 70c	4,336.50	
Overhaul, 90,606 sta. yds. at 4c	3,624.24	
12 in. Corrugated Iron Pipe, 318 lin. ft. at $1.60	508.80	
18 in. Corrugated Iron Pipe, 58 lin. ft. at $2.50	145.00	
24 in. Corrugated Iron Pipe, 230 lin. ft. at $3.20	736.00	
Class "A" Concrete, 49.73 cu. yds. at $25.00	1,243.25	
Class "C" Concrete, 14.54 cu. yds at $25.00	363.50	
Metal Reinforcement, 4,628 lbs. at 10c	462.80	
Clearing and grubbing extra right-of-way, 0.2571 acre, at $455.00	116.98	
Force Account:		
Temporary Bridge over Molalla River to haul road material	2,105.84	
Graveling 350 lin. ft.	375.90	
Building flume to care for drainage	9.01	
Clean and deepen drainage ditch	66.27	
Wet Excavation for Concrete Box Culvert	501.88	
Cross Ditching to prevent fills washing	18.12	
Redistribution of culvert pipe	13.46	
Digging out Southern Pacific Culvert and replacing with new 30 in. Concrete Culvert furnished by S. P. Co.	235.98	
Graveling 500 ft. of Pacific Highway and private road crossing	266.62	
Lowering culvert pipe and constructing catch basin	33.50	
Building 900 ft. of drainage flume	118.12	
Total	$ 32,680.81	
Deductions:		
Rent of State Truck	82.00	
Total amount paid Contractor		$ 32,598.81
Total		$ 35,618.37
Credit by lumber salvaged from temporary bridge and sold to the Portland Bridge Company, contractors on the Molalla River Bridge		300.00
Net total cost of Project (All State Funds)		$ 35,318.37
State to be reimbursed by County to extent of	$ 32,678.58	

[CLACKAMAS]

Oregon City-Oswego Grading

Contract No. 167 for grading of the Pacific Highway from the west end of the Oregon City bridge to the Multnomah County line, 6.3 miles, was awarded July 8, 1919, to Palmer & Young of Portland. Work was begun July 18, 1919 and after completing the grading from a point about 2 miles north of Oregon City to Oswego, and partially completing the section from Oswego to the Multnomah County line, by mutual agreement, the contract was cancelled, the contractor was given a final estimate upon the completed portion and it, together with portions where no work had been begun, was eliminated and a supplemental contract covering the partly completed portions was entered into. This arrangement was of advantage to the Commission in that it released from the contract that part of the road near Oregon City where a question of relocation and possible crossing elimination was involved, and was also advantageous to the contractor in facilitating his settlement with sub-contractors and was made primarily at his request.

Work under the supplemental agreement has recently been completed. F. T. Young was Resident Engineer on this work. The total cost of the work is estimated at $60,300.00, being borne $54,300.00 by Clackamas County and $6,000.00 by the State. Total expenditures to date amount to $57,461.82 which have all been made from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 5,274.70
Materials furnished by State for special culvert and flume		187.58
Contract Items as follows:		
Extra Clearing and Grubbing, 6 acres at $416.515	$ 2,499.09	
Clearing and Grubbing, 98 per cent at $600.00	588.00	
Common Excavation, 22,395 cu. yds. at 59c	13,213.05	
Intermediate Excavation, 4,336 cu. yds at 84c	3,642.24	
Solid Rock Excavation, 11,630 cu. yds. at $1.69	19,654.70	
Overhaul, 10,565 sta. yds. at 10c	1,056.50	
12 in. Plain Concrete Pipe, 390 lin. ft. at $1.49	581.10	
18 in. Reinforced Concrete Pipe, 144 lin. ft. at $2.69	387.36	
24 in. Reinforced Concrete Pipe, 244 lin. ft. at $3.69	900.36	
36 in. Reinforced Concrete Pipe, 188 lin ft. at $7.59	1,426.92	
Class "A" Concrete, 105.01 cu. yds. at $34.00	3,570.34	
Class "B" Concrete, 26.33 cu. yds. at $34.00	895.22	
Class "C" Concrete, 5.45 cu. yds. at $34.00	185.30	
Metal Reinforcement, 11,854 lbs. at 10c	1,185.40	
Force Account:		
Rocking detour and maintenance work	187.86	
Gravel backfill under box culvert	53.50	
Building temporary guard fence on detour road	107.18	
Rehauling culvert pipe account change in size	30.84	
Graveling to keep road passable	909.75	
Lowering culvert and water pipe	41.71	
Installing 9 in. Culvert Pipe	36.12	
Adjustment account of line change	108.77	
Special rock excavation for county road approach to Sucker Creek Bridge	1,017.74	
Constructing flume to protect fill	52.18	
Total amount earned by Contractor	$ 52,331.23	
Percentage retained until completion of contract	331.69	
Total amount paid Contractor		$51,999.54
Grand total expended to November 30, 1920 (All State Funds)		$57,461.82

[CLACKAMAS]

Mount Hood Loop Forest Road Project

The Mt. Hood Loop section is the largest forest road project that has been put under way in this State, having a total agreement estimate cost of $910,000. The total length of the project is 37.2 miles, extending around the south and east sides of Mt. Hood. When completed, this will be a very important recreational road, possessing scenic beauties probably unsurpassed by any road in the state except the Columbia River Highway.

The construction of the Zig Zag section, extending from Zig Zag to the Government camp at the foot of Mount Hood, 14.4 miles, was begun in September, 1920, and is expected to be completed during December of the present year. The work consists of grading with all necessary concrete structures.

Total expenditures to date on the entire project amount to $172,602.52. Of this amount the Government has expended $85,504.87 and the state $87,079.65, including $427.30 spent during 1918.

Maintenance

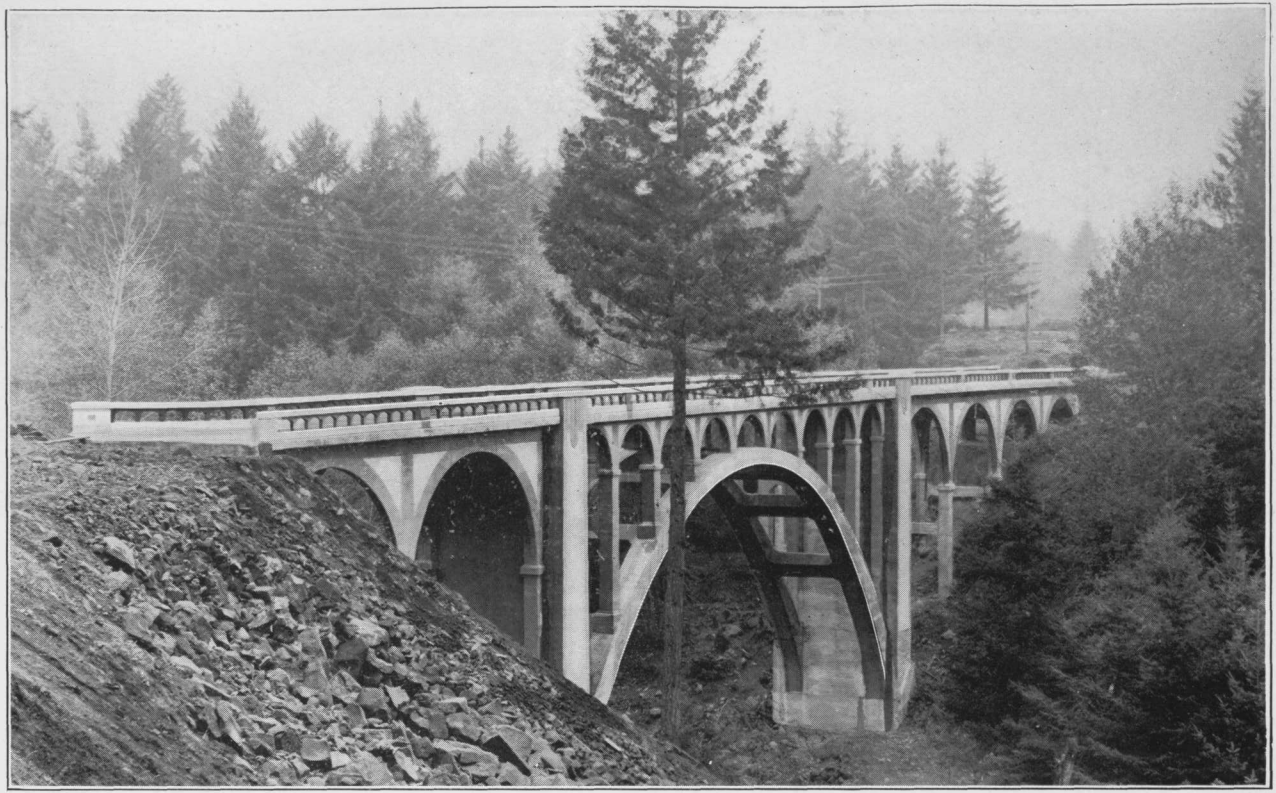
During the 1919-20 period, the State has expended from State Funds a total amount of $11,661.17 for maintenance work in Clackamas County. These expenditures have covered the placing of gravel on certain sections of the road between Oregon City and Oswego, the construction of fencing, removal of slides, etc., between Canemah and New Era, repairs to the pavement between Canemah and Canby, placing of gravel at the Pudding River Bridge and gravel surfacing between Barlow and Aurora. One stretch of about 300 yards near the middle of the last named section, where the grade was made from side borrow of black beaver dam soil, has given considerable trouble and required a large amount of maintenance work in order to keep it in a passable condition. Considerable area where the subgrade became boggy after a heavy rain has been dug out and replaced with gravel. Blind drains have been constructed to drain the subgrade and in all about 1,200 cubic yards of gravel, in addition to the quantities placed under the graveling contract, have been put on this section. Dragging and general maintenance work has also been carried on throughout the balance of the unit. The work on this unit has been done by State forces under the supervision of F. T. Young, Resident Engineer.

Tryon Creek Bridge

On October 7, 1919, Mr. E. D. Olds of Oak Grove, Oregon, was awarded Contract No. 217 for the construction of twelve spans of 19 foot framed trestle designed to carry the Pacific Highway over Tryon Creek at approximately the same location as the old bridge.

Work was started early in November and was completed by April 1, 1920. Mr. L. P. Campbell was Resident Engineer until January 1, 1920, being succeeded on that date by Mr. Stewart Mitchell.

The construction cost, $8,497.98, will be borne by the County and the engineering, amounting to $851.47, by the State. Total expenditures amounting to $6,377.83 have been paid by the State.



CONCRETE ARCH AND VIADUCT OVER SUCKER CREEK NEAR OSWEGO. IN CLACKAMAS COUNTY ON THE PACIFIC HIGHWAY. BUILT IN 1920. TOTAL LENGTH OF STRUCTURE THREE HUNDRED AND THIRTY-TWO FEET.

[CLACKAMAS]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 851.47
Contract Items as follows:		
Frame Trestle, 90 per cent at $7,224.00	$ 6,501.60	
Earned by Contractor	$ 6,501.60	
Percentage retained until completion of contract	975.24	
Total paid to Contractor		$ 5,526.36
Total expended to November 30, 1920 (All State Funds)		$ 6,377.83

Sucker Creek Arch

One of the most important bridge projects undertaken by the Commission was the construction of a concrete arch on the Pacific Highway over Sucker Creek, just below the point where it leaves Oswego Lake, near the town of Oswego.

The bridge consists of a main arch span of 128 feet with two spans of 36 feet each at one end and two 36 and two 32 foot spans at the other. It is designed for a load of two 20-ton trucks side by side and has a roadway width of 20 feet. In view of the prominence of the structure on the State Highway system it was thought appropriate that some effort be made toward pleasing appearance. Accordingly the design was made rather pretentious and a striking contrast was obtained by the use of two brands of cement of widely differing color. The result is a very pleasing effect which has already been the subject of much favorable comment.

The total cost of the structure was $69,589.21 which has all been paid from State funds. Clackamas County is to make reimbursement of $65,851.14, the balance of $3,738.07 being borne by the State. Construction was supervised by Stewart Mitchell, Resident Bridge Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,738.07
Bronze Name Plate (to be deducted from amounts due contractor)		16.00
Contract Items as follows:		
Class "A" Concrete, 1,121.5 cu. yds. at $32.50	$ 36,442.25	
Class "B" Concrete, 281.2 cu. yds. at $21.50	6,045.80	
Reinforcing Steel, 173,961.3 lbs. at 8c	13,916.90	
Handrail, 657 lin. ft. at $3.25	2,135.25	
Force Account:		
Excavating for Piers 1 to 8 inclusive	4,572.48	
Excavating for Abutment for Pier No. 3 and placing 4 extra anchor bolts	613.76	
Connecting reinforcing bars with 2 Crosby Clips each	239.73	
Additional cost of precasting Handrail member, Brass pipe dowels, for use at expansion joints and excess cost of White "Atlas" cement	1,607.39	
Excavating for turnout, putting in curved handrail, additional concrete reinforcing	281.58	
Total amount earned by Contractor	$ 65,855.14	
Deduction for Name Plate furnished by State	20.00	
Total paid to Contractor		$ 65,835.14
Grand Total cost of structure (All State Funds)		$ 69,589.21

[CLACKAMAS]

Molalla River Bridge

Owing to the relocation of the Pacific Highway between Canby and Aurora, it was necessary to provide a new crossing of the Molalla River at a point about a quarter of a mile upstream from the old wooden bridge now in use. The new bridge consists of three 80 foot deck steel trusses, two 33 foot concrete spans and 266 lineal feet of wood trestle approach.

Contract Number 192 for the construction was awarded to the Portland Bridge Company on August 5, 1919. Work was started on September 3 and fair progress was made until November 2, when a sudden rise of the river took out the contractors' falsework and filled up the partially finished pier excavations. From that time until about the first of May, 1920, progress was greatly hindered by rapid and frequent fluctuation of the stage of water in the river and by the severe winter weather. However, from that date conditions were better and the contractor was able to make somewhat more satisfactory progress with the result that at the time of writing this report the structure is practically finished.

L. P. Campbell was Resident Engineer until January 1, 1920, when the work was turned over to Stewart Mitchell who is in charge at the present time.

The total cost of this work will be approximately $61,200.00 which will be paid $57,000.00 by the County and the engineering charges, of about $4,700.00, by the State. Total expenditures to date amount to $46,015.14, having all been made from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 3,586.29
Lumber transferred from Canby-Aurora Grading		300.00
Contract Items as follows:		
Class "A" Concrete, 232 cu. yds. at $25.00	$ 5,800.00	
Class "B" Concrete, 439.19 cu. yds. at $25.00	10,979.75	
Reinforcing Steel, 51,200 lbs. at 6c	3,072.00	
Structural Steel, 167,000 lbs. at $0.108	18,036.00	
Approach Piling, 1,049 lin. ft. at 50c	524.50	
Timber Approach, 267 lin. ft. at $15.60	4,165.20	
Materials on hand	1,794.60	
Force Account Items:		
Excavating for Pier No. 3	4,188.95	
Excavating for Pier No. 4 and Pedestal B	984.68	
Changing the shoes for the trusses	317.67	
Total	$ 49,863.35	
Deduction for lumber transferred from Canby-Aurora Grading	300.00	
Total earned by Contractor	$ 49,563.35	
Percentage retained until completion of contract	7,434.50	
Total paid to Contractor		$42,128.85
Grand Total Expended to Nov. 30, 1920 (All State Funds)		$ 46,015.14

Oregon City-Oswego Survey

Survey for permanent location of the Pacific Highway from the Multnomah County line, through Oswego, to the west end of the Oregon City bridge, a total of 6.3 miles, was begun during March, 1919, and completed in July of the same year. This survey was made under the direction of H. C. Compton, Locating Engineer.



BRIDGE OVER THE MOLALLA RIVER NEAR CANBY. ON THE PACIFIC HIGHWAY IN CLACKAMAS COUNTY. COMPLETE EXCEPT HAND-RAIL.

[CLACKAMAS]

Oregon City Bridge Design

Since the date of the last report complete plans have been prepared for a new bridge across the Willamette River at Oregon City on the route of the Pacific Highway. These plans contemplate a 350 foot steel arch span encased in concrete, with 500 feet of concrete viaduct approach, crossing the river on the location now occupied by the old bridge.

This will probably be put under contract in the spring of 1921 and will greatly relieve the undesirable traffic conditions now existing on the present suspension bridge.

Canby-Aurora Survey

Location survey of 4.1 miles of the Pacific Highway between Canby and Aurora was begun during May, 1919, and completed in August of the same year, under the direction of W. P. Smith, Locating Engineer. Some additional detailed surveys at various bridge sites were made during March and April of 1920.

Canemah-Oregon City Survey

The question of the route to be selected for the entrance of the Pacific Highway into Oregon City from the south, involving the elimination of the present dangerous grade crossing at Canemah, has been given considerable study and has been the subject of considerable discussion between the County Court, the interested people of Oregon City and the Commission. Some preliminary surveys have been made but as yet the matter has not been determined.

Three different projects have been discussed: (a) Through Canemah and along the hill on the east side of the Southern Pacific track to an undergrade crossing at the site of the present undergrade crossing at Third Street in Oregon City; (b) An overhead crossing a short distance north of the present grade crossing at Canemah, thence following the present road along the river to Main Street in Oregon City; and (c) Along the hill east of the track to a point south of the paper mill building, thence by an overhead crossing and viaduct around the mill building into Main Street and down to the grade of that street at about Third Street. Final decision in this matter, and in the construction of the section, is being complicated and delayed by the lack of funds on the part of Clackamas County and Oregon City and by the fact that the Highway Commission is not authorized to expend its funds on streets within the limits of incorporated cities.

Mount Hood Loop Survey

A party was assigned to this survey in March, 1919, with instructions to first make surveys for the Sandy-Firwood Market Road, and, while this was in progress, to conduct necessary investigation for selection of the Mount Hood Loop Road route, after which permanent surveys were to be made.

There were a number of possible lines developed but these were finally brought down to two general routes, one on the North side of the Sandy River through Bull Run and the other on the South side through the town of Sandy. Both routes had considerable support from

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both local and other interested people and offers of right-of-way, and various funds were offered to get each route adopted. Complete investigation proved the route through Sandy to be cheaper as well as shorter, and having advantage of both grade and alignment as well as greater service to the public. This route was adopted August 24, 1920 by the Highway Commission.

The standards used are very high as the road must carry a great volume of traffic as rapidly as safety will permit, as this, in addition to being a producing center, is a summer home district and speed is essential. The surveys were made in two sections, one from Gresham to Sandy and the other from Sandy to the Forest Reserve boundary. Work was handled under the supervision of J. H. Scott, Locating Engineer.

The Sandy-Forest Boundary Section is a continuation of the Sandy-Firwood Market Road and is 15.4 miles in length, or a total of 17.4 miles from Sandy, including the Market Road. The route is very scenic but has little agricultural value. While in apparently a very rough section, the construction will present no particular difficulties. Surveys were completed July 1, 1920.

The Gresham-Sandy Section extends 12.0 miles in length from the center of Gresham, but approximately one mile of this is in the city limits. The alignment and grades are particularly good. The country is entirely agricultural and the road is very essential to development at this time. Five miles of this section is in Multnomah County and it is expected that this will be constructed by the County. Field work on the surveys was completed July 12, 1920 and data completed August 5.

Construction Engineering County Bridges

At the request of the Clackamas County Court considerable investigation and design has been carried on for County bridges not on the State Highway system.

The principal ones of these are over the Clackamas River at Park Place and the Dickey bridge over the Molalla River near Molalla. A design has been prepared for the latter place calling for a 105-foot wood truss on concrete piers and is under contract to E. D. Olds of Oak Grove at the present time.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by H. S. Anderson, County Judge, W. A. Proctor and W. F. Harris, County Commissioners, under date of March 6, 1920, stating that a levy of 1¼ mills on the total value of all the taxable property of the County was made for Market Road construction and designating four roads to be improved as Market Road Projects. A levy of 1¼ mills on a valuation of $29,299,088.68 produced a County Market Road Fund of $36,623.86. Included in the State levy of taxes was a levy of 1 mill on a valuation of $33,811,563.70 which produced $33,811.56, which became a part of the "State Market Road Appropriation."

Funds apportioned by the State Highway Commission March 2	$ 33,811.56
Funds apportioned by the State Highway Commission April 3	13,790.23
Funds produced by County levy of 1¼ mills	36,623.86
Total available for 1920	$ 84,225.65

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Project No. 1.—"Colton to connection with Road A—District 9."

This road connects with the Oregon City-Molalla Road and extends to Colton, a distance of approximately 7 miles, serving a thickly settled, fertile valley. A location survey 4 miles in length was made by F. T. Young, Resident Engineer in the employ of the State Highway Commission. Plans and estimates of cost to grade a roadbed 24 feet wide, surfaced 18 feet wide with gravel, were prepared. Culverts and wooden trestle 200 feet in length are included in the estimated cost of $28,300.00.

Approximately 1 mile of grading and surfacing was done by County forces under the supervision of H. C. Compton, Roadmaster, at a cost of approximately $10,000.00.

Project No. 2.—"Sandy-Estacada Road, Firwood, Dover."

A section of this road approximately 2.3 miles in length will be used as a part of the Mt. Hood Loop Road. This section was surveyed by J. H. Scott, Locating Engineer in the employ of the State Highway Commission. Plans and estimates of cost to grade a 24 foot roadbed were prepared, the estimated cost being approximately $14,500.00. This road was graded by County forces and some of the road planked to care for the traffic through the winter. Approximately $15,000.00 was expended on this project.

Project No. 3.—"Douglas Ridge Road connecting permanent Road A District 3 with Market Road 2."

A survey approximately 10 miles in length was made by F. T. Young. Most of the country served by this road is bench land. The old road used to reach the bench land from the valley has grades which are 15 and 20 per cent, is narrow and crooked. The new survey eliminates these excessive grades and makes the bench accessable by use of a 7½ per cent grade. No construction work was done in 1920. The right-of-way is being acquired and the clearing and grubbing on a section of the road will be done during the winter.

Project No. 4.—"Borland Road from Washnigton County line to Road A District 2."

A survey of this road was made by H. H. Johnson, County Surveyor. A section about 2 miles in length was graded 24 feet wide and surfaced with gravel. Construction work was done by County forces. Approximately $6,000.00 was spent on this project.

CLATSOP COUNTY

During the past two years, the entire 27.7 miles of the Columbia River Highway between the Columbia County line and the city limits of Astoria have been paved with a 16-foot bituminous wearing surface, having 2-foot shoulders on each side. Guard fences have been constructed at various places and all necessary drainage has been adequately taken care of.

On the Coast Highway, the Youngs Bay Bridge has been placed under contract and construction is progressing very rapidly at the present time. The section from the end of the Youngs Bay bridge to Miles Crossing has been paved with an 18-foot concrete pavement. From Miles Crossing south to the beginning of the Warrenton Cutoff, the embankment is being widened in order to accommodate a standard 16-foot width of pavement. From the south end of the Warrenton Cutoff to Seaside, the section is under contract for pavement at the present time. The section between Seaside and the Tillamook County line is macadamized with the exception of approximately 1.5 miles south of Necanicum. This macadamizing from Necanicum south is being done by the County Court and it is expected that the 1.5 mile gap will be carried to completion as soon as the spring weather will permit resumption of surfacing operations. This means that, by the use of the detour through the city of Warrenton, the Coast Highway is now open to all winter traffic through Clatsop County.

General supervision of all State work in the County has been handled by C. W. Wanzer, Division Engineer.

Astoria-Svenson Paving

On July 20, 1917, contract No. 5 was awarded to the Warren Construction Company of Portland, Oregon, for the paving of 9 miles of the Columbia River Highway between Astoria and Svenson, and the grading of a section known as the John Day Cutoff, located about midway of the project. The paving under the terms of the contract consisted of a 2-inch bituminous wearing surface, 16 feet wide, with 2-foot macadam shoulders on each side.

Grading of the cutoff was started on August 6, 1917 and paving began at the Svenson end on September 20. This section experienced an unusually early rainy season and the work had to be discontinued when it had just got well under way. At this time the grading of the cutoff had been carried to approximately fifty per cent completion, and one mile of paving had been laid.

Work was started the following season on July 23, 1918. Due to the late winter and the acute shortage of labor and materials occasioned by the participation of the United States in the war, it was impracticable to get construction under way before this time. This shortage continued during the season and very little construction was accomplished, although a creditable showing was made in view of the adverse conditions existing. Paving operations were closed on October 2, 1918. At this time the cutoff had been graded and it was decided to continue the placing of rock base during the winter months in order to provide a



ONE OF THE MANY STRETCHES OF OUR STATE HIGHWAYS MADE DESOLATE BY LOGGING OPERATIONS. ON HUNT CREEK ABOUT TWENTY MILES EAST OF ASTORIA. PAVED IN 1920.

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passable roadbed for traffic. This work was done by State forces and every effort made to reduce inconvenience to the traveling public to a minimum.

Paving work was resumed in the spring of 1919 and completed during the month of October. The total cost of the project amounts to $265,206.72 from State funds, $96,955.97 having been expended during 1917-18 and $168,250.75 during the present biennium.

J. E. Nelson, Resident Engineer, was in charge of the work during 1917, H. N. Hackett, Resident Engineer, during 1918, and R. A. Furrow, Resident Engineer during 1919.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,645.44
Rocking by State forces		38,307.46
Widening, Ditching, Draining and Maintenance by State forces		4,978.79
Contract Items as follows:		
Clearing and Grubbing, all	$ 5,610.00	
Common Excavation, 12,346 cu. yds. at 49c	6,049.54	
Intermediate Excavation, 13,912 cu. yds. at 75c	10,434.00	
Solid Rock Excavation, 3,093 cu. yds. at $1.20	3,711.60	
Overhaul, 15,355 sta. yds. at 1c	153.55	
12 in. Concrete Pipe, 24 lin. ft. at $1.40	33.60	
18 in. Concrete Pipe, 120 lin. ft. at $2.00	240.00	
24 in. Concrete Pipe, 92 lin. ft. at $2.75	253.00	
36 in. Concrete Pipe, 176 lin. ft. at $4.60	809.60	
Broken Stone, 23,009.7 cu. yds. at $2.30	52,922.31	
Standard Bitulithic Pavement, 82,385 sq. yds. at $1.24	102,157.40	
Crushed Stone Shoulders, 30,636 lin. ft. at 5c	1,531.80	
Force Account:		
Extra Clearing and Grubbing	468.18	
Placing Culverts	635.51	
Removing Slides	11,513.17	
Widening and Reshaping grade	6,360.39	
Placing Drain Tile	4,843.21	
Camp buildings for Force Account work	548.17	
Total amount earned by Contractor		$208,275.03
Grand Total completed cost of project (All State Funds)		$265,206.72

Svenson-Clatskanie Paving

On July 8, 1919, contracts for paving the Columbia River Highway between Clatskanie and Svenson, a distance of 27.54 miles, were awarded to the Warren Construction Company of Portland. The section was divided into three contracts as follows: Svenson to Rock Creek, Contract No. 162, length 7.54 miles; Rock Creek to Westport, Contract No. 163, length 9.5 miles; Westport to Clatskanie, Contract No. 164, length 10.5 miles.

The work consisted of grading, scarifying, constructing guard fences, laying drains and paving, the wearing surface consisting of a 2-inch bituminous concrete paving on a new macadam base. During construction it was found necessary to reinforce the pavement through various low and wet sections by using a bituminous mixed base from 1 to 3 inches in thickness. This mixture was purchased by the batch of 1,000 pounds and spread as required. The contractor located camps, quarries and paving plants at Clatskanie, Westport, Hunt Creek and Knappa.

The Svenson-Rock Creek section was completed October 25, 1920, with a total cost of approximately $225,000.

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The pavement on the Rock Creek-Westport section was completed in November of the present year, there remaining at this time only a small amount of necessary shoulder work to finish the entire contract. It is expected that this will be cleaned up in the very near future. This section, which takes in one of the most beautiful drives in the northwest, winds up to the summit of Clatsop Crest on the Bugby Loops. Authority has been given for a tourist parking strip on the top of the crest and this, with a drinking fountain at Dorothy Creek, will bring the total cost of the section to approximately $240,000.00.

The Westport-Clatskanie section was completed during October of the present year at a total cost of approximately $250,000.

The construction of the entire distance from Svenson to Clatskanie has been under the direction of A. J. Olsen, Resident Engineer for the Department. The total estimated cost is $715,000.00, which is all to be borne from State funds. Expenditures to date amount to $461,026.06.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering, all units		$ 18,390.62
Express on materials, paid by State		6.46
Contract Items as follows:		
UNIT NO. 1 SVENSON-ROCK CREEK—		
Excavation, no classification, 5,596 cu. yds. at 75c	4,197.00	
6 in. Porous Drain Tile, 4,278 lin. ft. at 30c	1,283.40	
Guard Fence, 1,272 lin. ft. at 85c	1,081.20	
Broken Stone for Base, 5,280 cu. yds. at $3.925	20,724.00	
Clay or earth filler, 205.5 cu. yds. at $1.00	205.50	
Bitulithic pavement, Type "E", 63,804 sq. yd. at $1.54	98,258.16	
Broken Stone Shoulders, 26,500 lin. ft. at 6c	1,590.00	
Broken Stone for Shoulders, 1,316 cu. yds. at $4.23	5,566.68	
Bituminous Base, 42,070 sq. yds. at 98c	41,228.60	
Batch haul, first mile, 3,480 batches at 20c	696.00	
Batch haul, second mile, 2,102 batches at 40c	840.80	
Batch haul, third mile, 4,502 batches at 60c	2,701.20	
Batch haul, fourth mile, 3,063 batches at 80c	2,450.40	
Materials on hand	3,094.06	
Force Account Items:		
Constructing dry wall at Station 1423+00	47.03	
Rip Rapping approach to Big Creek Bridge	183.04	
Removing overhanging snags	389.18	
Constructing guard rail and repairing bridges at Sta. 1411 and 1413	143.99	
Total amount earned by Contractor on Unit No. 1	$184,680.24	
Percentage retained until completion of contract	27,702.04	
Total paid Contractor on Unit No. 1 to November 30, 1920		$156,978.20
UNIT NO. 2 ROCK CREEK-WESTPORT—		
Excavation, no classification, 6,154 cu. yds. at 75c	4,615.50	
12 in. Plain Concrete Pipe, 116 lin. ft. at $1.25	145.00	
6 in. Porous Drain Tile, 2,470 lin. ft. at 30c	741.00	
Class "C" Concrete, 20 cu. yds. at $22.00	440.00	
Guard Fence, 3,052 lin. ft. at 85c	2,594.20	
Broken Stone for Base, 5,211 cu. yds. at $3.24	16,883.64	
Clay or earth filler, 93 cu. yds. at $1.00	93.00	
Bitulithic Pavement, Type "E", 64,516 sq. yds. at $1.46	94,193.36	
Broken stone for Shoulders, 393.5 cu. yds. at $3.50	1,377.25	
Broken Stone Shoulders, 4,380 lin. ft. at 6c	262.80	
Bituminous Base, 9,994 sq. yds. at 98c	9,794.12	
Batch Haul, first mile, 1,269 batches at 20c	253.80	
Batch Haul, second mile, 1,215 batches at 40c	486.00	
Batch Haul, fourth mile, 558 batches at 80c	446.40	
Batch Haul, fifth mile, 81 batches at $1.00	81.00	

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Force Account Items:		
Redecking Hunt Creek, Gnat Creek and Rock Creek Bridges	1,171.01	
Removing overhanging snags	320.69	
Constructing dry wall and rip rap	423.78	
Constructing spillway for culvert at Station 1050	11.30	
Constructing 34 feet of masonry wall at Station 764	1,041.33	
Materials on hand	2,528.60	
Total amount earned by Contractor on Unit No. 2	$137,903.78	
Percentage retained until completion of contract	20,685.57	
Total paid contractor on Unit No. 2 to November 30, 1920		$117,218.21

UNIT NO. 3 WESTPORT-CLATSKANIE--

Excavation, no classification, 7,154 cu. yds. at 75c	5,365.50	
12 in. Plain Concrete Pipe, 138 lin. ft. at $1.25	172.50	
6 in. Porous Drain Tile, 3,797 lin. ft. at 30c	1,139.10	
Class "C" Concrete, 25 cu. yds. at $22.00	550.00	
Guard Fence, 6,185 lin. ft. at 85c	5,257.25	
Broken Stone for Base, 5,695 cu. yds. at $3.72	21,185.40	
Clay or earth filler, 408.5 cu. yds. at $1.00	408.50	
Bitulithic Pavement, Type "E", 88,115 sq. yds. at $1.51	133,053.65	
Broken Stone for Shoulders, 472.5 cu. yds. at $4.00	1,890.00	
Broken Stone Shoulders, 15,850 lin. ft. at 6c	951.00	
Bituminous Base, 16,360 sq. yds. at 98c	16,032.80	
Batch Haul, first mile, 729 batches at 20c	145.80	
Batch Haul, second mile, 549 batches at 40c	219.60	
Batch Haul, third mile, 360 batches at 60c	216.00	
Batch Haul, fourth mile, 2,088 batches at 80c	1,670.40	
Batch Haul, fifth mile, 1,386 batches at $1.00	1,386.00	
Materials on hand	7,162.50	
Force Account Items:		
Constructing dry wall at Station 82	957.46	
Removing overhanging snags	159.75	
Rip rap	102.48	
Constructing guard rail and repairing bridges at Station 17+00 and 17+99	130.27	
Total amount earned by Contractor on Unit No. 3	$198,155.96	
Percentage retained until completion of contract	29,723.39	
Total paid Contractor on Unit No. 3		$168,432.57
Grand total amount expended on project to Nov. 30, 1920 (All State Funds)		$461,026.06

Skipanon-Seaside Section Paving

On November 6, 1920, the State Highway Commission awarded Contract No. 310 to J. H. Tillman Company, of Seaside, for the paving of 9.94 miles of the Coast Highway, from the south end of the Warrenton Cut-off, near Skipanon, to Seaside. The contract calls for bituminous concrete pavement, and is estimated to cost a total amount of $271,000, which will be paid $206,000 by the State, and $65,000 by Clatsop County. No expenditures have been made on the project at the date of this report.

Young's Bay-Miles Crossing Paving

After construction of the fill between Miles Crossing and the Young's Bay Bridge, contract No. 269 was awarded June 1, 1920 to the Northwestern Construction Company of Portland, Ore., for approximately 3,600 lineal feet of Type "A" Portland Cement Concrete Pavement. This

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pavement was constructed 18 feet wide with an average thickness of 7 inches. Work was started June 20, 1920 and completed on September 25, 1920. The entire cost of the paving and necessary grading amounts to approximately $23,263.72. The sum of $19,428.13 has been paid to date from State funds. Construction was accomplished under the direction of R. A. Furrow, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,024.40
Contract Items as follows:		
Common Excavation, 1,565 cu. yds. at $1.00	$ 1,565.00	
Concrete Pavement, 7,239 sq. yds. at $2.75	19,907.25	
Expansion Joints, 2,190 lin. ft. at 18c	394.20	
Force Account Items:		
Removing pipe line bents and old crossings	30.88	
Furnishing and laying 2x8 in. headers	341.99	
Total amount earned by Contractor		$ 22,239.32
Grand total cost of project (All State Funds)		$ 23,263.72
Final payment to Contractor, in transit		3,835.59
Total amount expended to November 30, 1920		$ 19,428.13

Svenson-Columbia County Line Macadam

During 1918, the State Highway Department took over with their own forces the placing of waterbound macadam between Svenson and the Columbia County line. A more complete description of the work will be found on page 77 of the 1917-18 department report.

During the present biennium delayed charges of $4,660.14 have been made from State funds. This, in addition to the amount of $210,079.16 expended over the entire distance from Svenson to Westport during 1918, brings the total cost to $214,739.30.

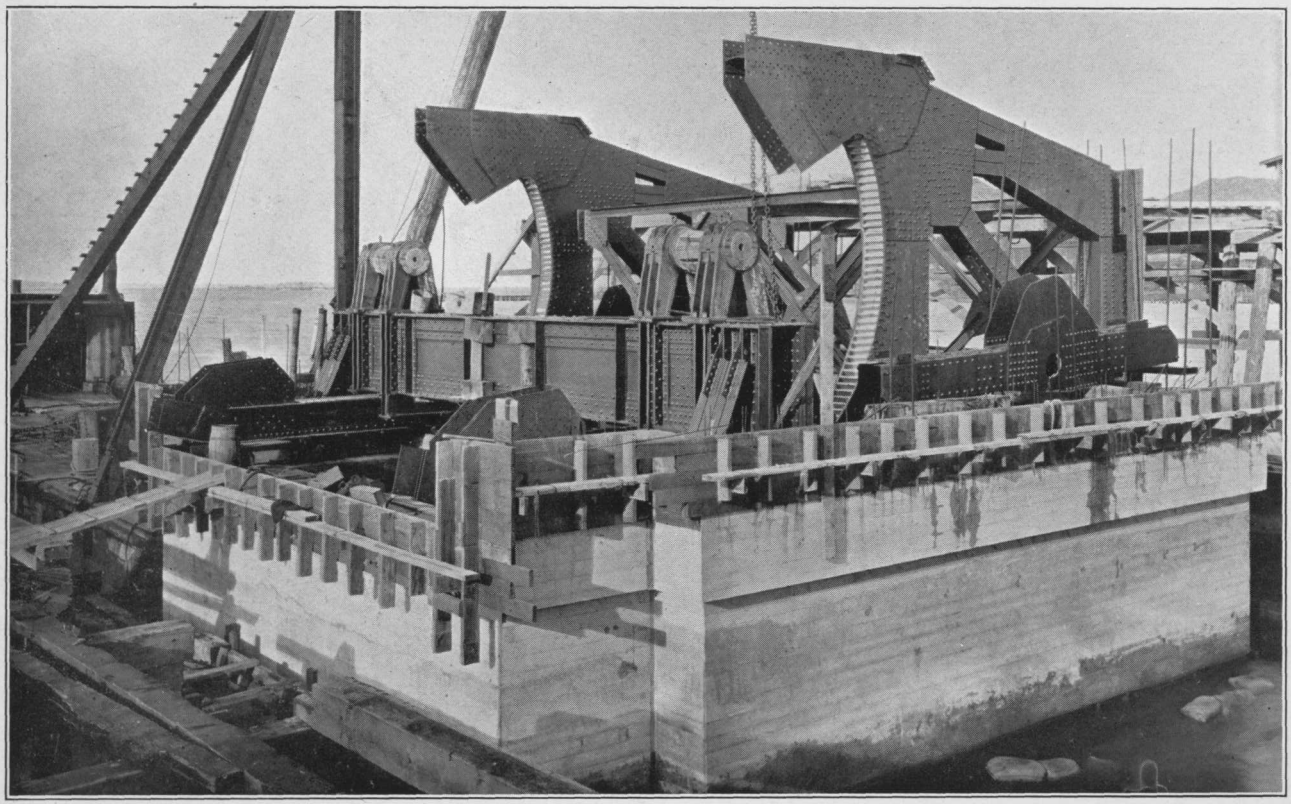
Necanicum-Tillamook County Line Macadam

In connection with the macadamizing by county forces of 7 miles of the Coast Highway between Necanicum and the Tillamook County line, the State Highway Commission has agreed to co-operate to the extent of $20,000.00. The County has rushed this work in order to have all possible completed before the setting in of the winter rains and all but 1.5 miles were completed. It is expected that work will be resumed early in the spring and this gap closed up.

To the date of this report, the State Highway Commission has furnished the County with State equipment to the value of $1,711.70. In the final adjustment with the county court, this amount will be deducted from the state co-operation of $20,000.00.

Young's Bay-Miles Crossing Fill

On September 24, 1919, the State Highway Commission entered into an agreement with the port of Astoria for the construction of a bulkhead and hydraulic fill from Miles Crossing to the Young's Bay Bridge. This work was done by the port of Astoria, the State bearing the expense of the Bulkhead only. This work was completed early in the spring of 1920 at a cost to the State of $23,430.49.



BASCULE BRIDGE OVER YOUNGS BAY NEAR ASTORIA ON THE COAST HIGHWAY IN CLATSOP COUNTY. VIEW TAKEN ABOUT NOVEMBER 10, 1920, SHOWING MOVING LEAF IN PROCESS OF CONSTRUCTION. DOUBLE LEAF SIMPLE TRUNNION TYPE.

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Miles Crossing-Warrenton Embankment

Contract No. 309, for the widening of the fill between Miles Crossing and Warrenton, was awarded to McClean & Williams of Astoria, Oregon, on November 6, 1920. This section begins at what is known as Miles Crossing, and extends south to the Warrenton Cut-off.

The work involved is 2.9 miles in length, and the contract calls for the use of sand, obtained from the sand dunes at the southern outskirts of Warrenton, in constructing the extra width of embankment.

The total estimated cost of the work is $20,600, which is to be paid entirely from State funds. No expenditures have been made to the date of this report.

Astoria-Svensen Wood Guard Fence

After the completion of the paving work on the Astoria-Svensen section, contract No. 239 was awarded December 20, 1919 to R. A. McClanathan of Astoria for the construction of 3,072 lineal feet of wood guard fence on this section. Work was started January 1, 1920 and completed February 10. The total cost of this fence was $3,334.24, which has all been paid from state funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering (Carried against paving job)		$ 0.00
Contract Items as follows:		
Wood Guard Fence, 3,072 lin. ft. at $1.05	$ 3,225.60	
Shoulder Boards, 1,552 F.B.M. at $70.00-M	108.64	
Total amount paid to Contractor		$ 3,334.24
Total cost of job (All State Funds)		$ 3,334.24

Young's Bay Bridge Post Road Project

Immediately south of Astoria the Coast Highway crosses Young's Bay on a steel draw bridge with pile trestle approaches. On account of the large amount of water traffic now using Young's Bay and the dilapidated condition of the existing structure, it was felt advisable to construct a new bridge having a larger waterway opening and being considerably faster in operation than the old one. Accordingly the bascule type was adopted and for the sake of appearance the channel span was made a deck structure of two leaves with curved bottom chords meeting at the center to form an arch when closed.

In architectural treatment the bridge is very simple and at the same time has a very dignified appearance. Much thought was put on the lines of the piers and the trusses and the final plans give a pleasing suggestion of strength and beauty. Especial care was given to the handrail of the approaches and it is felt that the finished bridge will present a harmonious combination of wood approach, concrete piers and steel center span.

Plans were started in April of 1919 and were completed late in the summer so that the Commission was able to receive bids on December 20. These bids were considered to be too high and were rejected. The work was readvertised for February 5, 1920 and, on that day, contract No. 244

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was awarded to the Gilpin Construction Company of Astoria at a price considerably lower than the low bid of December 20.

The total length of this structure is 1765 feet. The center portion is 227 feet long, and consists of the two moving leaves and their supporting piers. The remainder of the structure consists of a heavy type of pile trestle approach, the north approach being 873 feet long and the south approach 665 feet long. The roadway is 20 feet wide throughout and a 3-foot sidewalk is placed on the approaches.

Each pier is approximately 40 feet square and resembles a large box, the inside being water tight, which provides a pocket into which the counterweight of the moving leaf descends when the bridge is opened. Each pier has a concrete operating house on each side of the roadway, making four houses in all. Of these, one will contain the operating controls and the switchboard, one will be fitted up for living quarters for the operator and the other two will be used for the storage of supplies, parts, tools and miscellaneous equipment.

The foundation for each pier consists of 223 piles driven inside of a timber crib which had previously been sunk to a depth of about fifty feet below high tide by the open dredging process. Many of the piles are as long as 115 feet. These were driven until their tops were 25 feet below low water, which brings their tips 150 feet below high tide. In the bottom of the crib and surrounding the tops of the piles just described, a slab of concrete 19 feet thick was poured in order to exclude the water from the inside of the crib. This concrete was poured under the water and allowed to set, after which the water inside the crib and above the concrete was pumped out, allowing the rest of the work to be done in the dry.

The moving leaves each consist of two steel trusses revolving in a vertical plane about a trunnion which is supported near the front of each pier. In the normal, or closed position, these leaves are locked at the center in order to maintain them at an even level. Each leaf is counter-balanced by a block of concrete placed back of the trunnion so that the only work required of the machinery is to overcome friction and the force of the wind blowing on the upraised leaf.

The power for operation is furnished by two 37-horsepower motors for each leaf. Of this available power only about ten horsepower is required for ordinary operation, the remainder being held in reserve for operation of the bridge during high winds. It is possible with this amount of power to open the bridge in a 60-mile gale. These motors, together with the necessary operating machinery, are located inside the pier under the roadway floor and can be gotten at only through the operating house. Both leaves are controlled from the Astoria side of the channel and are provided with automatic electric brakes to hold the bridge in any desired position.

All operations attendant to the opening of the bridge are so interlocked that it is impossible for the operator to cause an accident. The machinery just described is so proportioned that it will be possible to pass a boat through the bridge with a delay to traffic of only three minutes, which compares very favorably with the fastest bridges in any of the large cities.

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At the time of this report the contractors are placing the steel work for the trusses. The completion date named in the contract is June 1, 1921, and indications are that the bridge will be finished on time. Great credit should be given to the contractors for the efficient and speedy manner in which they have successfully put in the main piers for the bridge. These piers represent by far the most difficult example of foundation work which has come under the supervision of the Department.

Mr. R. A. Furrow is the Resident Engineer in charge of the construction and is assisted by Mr. C. P. Richards.

The total estimated cost of the structure, which is being built as a Post Road Project under agreement No. 22, is $348,500.00, of which $164,131.41 have been spent at this time. Clatsop County will pay one-third of the final cost, or $116,116.67, the Federal Government $169,741.33, and the State the balance of $62,592.00.

John Day River Bridge

During 1918 a bridge was constructed over the John Day River about four miles east of Astoria. A complete description of this structure will be found on page 79 of the 1917-18 Department report.

During the present biennium final charges of $4,425.61 have been paid. This, in addition to the sum of $21,051.52 expended during the previous biennium, brings the total cost of the structure to $25,447.13, the total amount having been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 882.65
Cement and miscellaneous material furnished by State		21.32
Contract Items as follows:		
Foundation Piles driven, 2,403 lin. ft. at 70c	$ 1,682.10	
Concrete in place, 377.77 cu. yds. at $30.00	11,333.10	
Reinforcing steel in place, 3,229 lbs. at 8c	258.32	
Force Account Items:		
Placing guides for counterweights	97.23	
Repairing counterweight	83.08	
Extra painting window frames, rafters, etc.	131.10	
Changing windows account change in design	81.61	
Making change in handrail	15.06	
Raising falsework account raising height of piers	73.10	
Building extra approaches and ladder	239.46	
Total amount paid to contractor		$ 24,573.16
Grand total cost of structure (All State Funds)		$ 25,477.13

Maintenance

The State Highway Department, in conjunction with the County Court of Clatsop County, has accomplished considerable maintenance work on the Astoria-Svenson section of the Columbia River Highway. This work has consisted chiefly of removing slides, cleaning out ditches, and increasing the sight distances on curves by removing the underbrush, which grows very rapidly in this section of the State. All work has been done on a fifty-fifty co-operation basis by the State and County under maintenance agreements which have been executed.

Some difficulty was experienced in operating the lift span across the John Day River about eight miles east of Astoria, which had been built

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by the Department in 1918. In order to remedy this, it was advisable to remodel the machinery to some extent, and it has been found that the new installation operates much more easily and safely than did the old. This work was accomplished by State forces under the superintendence of H. H. Flanagan at a total cost of $6,082.96, which has all been paid from State funds.

Youngs Bay Railway Bridge Design

In connection with the design for the bascule bridge over Youngs Bay, plans were prepared contemplating the additional widening of the structure in order to provide trackage for the Port Railway. The additional cost of this extra design was paid by the railway company with the exception of $86.87, delayed charges which were received after payment of the railroad share had been made to the State.

Construction Engineering County Bridges

At the request of the Clatsop County Court, a design has been prepared for a plate girder draw span over the Walluski River about six miles southeast of Astoria. The County Court has awarded a contract for the steel work to the Colby Star Manufacturing Co., Tacoma, Washington, and will erect the structure with their own forces. It is expected that the work will be complete by the spring of 1921.

Astoria-Seaside Survey

Preliminary survey and the taking of all necessary topography was accomplished during February and March, 1919, on six miles of the Coast Highway between Astoria and Seaside. This work was handled under the direction of H. N. Hackett, Locating Engineer, although no final location was staked in the field.

Lewis and Clark River Bridge Survey

Survey for the preparation of a vicinity map on the site of the proposed Lewis and Clark River Bridge was made by R. A. Furrow, Resident Engineer, during September and October of 1920. One-half mile of preliminary line was run and all necessary topography taken. Complete soundings of the river were made at this time.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by T. S. Cornelius, County Judge; John Waterhouse and K. F. Johnson, County Commissioners, under date of March 3. 1920, stating that a levy of 1.3635 mills on all the taxable property of the County was made for market road construction, and designating one road to be improved as a Market Road Project.

A levy of 1.3635 mills on a valuation of $30,347,595.40 produced a County market road fund of $41,381.11. Included in the State levy of taxes was a 1 mill levy on a valuation of $28,517,522.20, which produced $28,517.52, which became a part of the "State Market Road Appropriation."

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Funds apportioned by the State Highway Commission March 2	$ 28,517.52
Funds apportioned by the State Highway Commission April 3	11,631.04
Funds produced by County levy of 1.3635 mills	41,381.11
Total available for 1920	$ 81,529.67

H. N. Hackett, Roadmaster, made the surveys, prepared plans and estimates and did the necessary construction engineering.

Project No. 1, "Miles Crossing-Youngs River Falls-Olney Road."

The section improved in 1920 was an old macadam road across the tide flats. The grade was approximately fifteen feet wide, the macadam surface ten to fourteen feet wide. Starting at Miles Crossing approximately two and three-fourths miles were widened to a roadbed width of approximately sixteen feet and paved with concrete pavement fifteen feet wide, six inches thick at the sides, and seven and one-half inches thick at the center, mixed 1 to 1½ to 3. On curves the pavement was widened to eighteen feet with a maximum super-elevation of one and eight-tenths feet. After the pavement was laid, earth shoulder material was hauled in and the roadbed widened to eighteen feet.

The cost of grading and paving two and three-fourths miles was approximately $80,000.00. The construction work was done by County forces under the superintendence of H. N. Hackett.

COLUMBIA COUNTY

During the biennium covered by this report the entire 55.6 miles of the Columbia River Highway through Columbia County have been paved, with the exception of nine-tenths of a mile through the city of Rainier. This portion has been graded to the State Highway Department standard. With the completion of the paving in Columbia County, the Columbia River Highway has a paved surface from the city limits of Astoria, through Portland, to the city of Hood River, and the trip down the Lower Columbia River Highway, which in the winter was formerly a matter of uncertainty, may now be made in a very few hours.

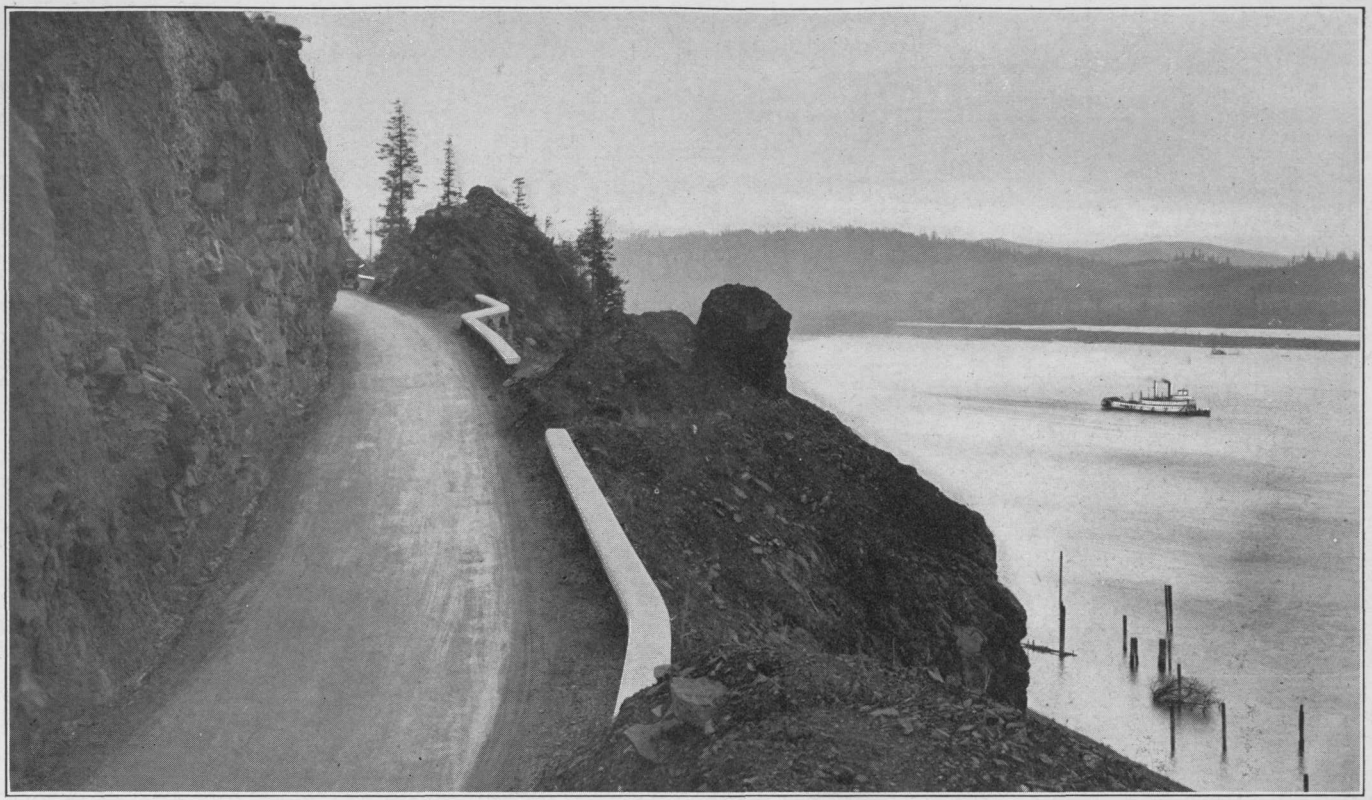
The grading of the Columbia River Highway in the County was started during 1915-16 by the proceeds from County bond issues. During 1917 and 1918 the grading and macadamizing of the highway was done principally by State forces at the expense of the State. The work during the present year has been paid for entirely from State funds with the exception of City and County co-operation received on the grading in Rainier, the County co-operation for cattle-passes on the Scappoose-Deer Island section, and Federal Government co-operation on the paving of the Scappoose-Deer Island section, which is being handled as a Post Road Project.

The supervision of all State construction work in Columbia County has been handled by C. W. Wanzer, Division Engineer.

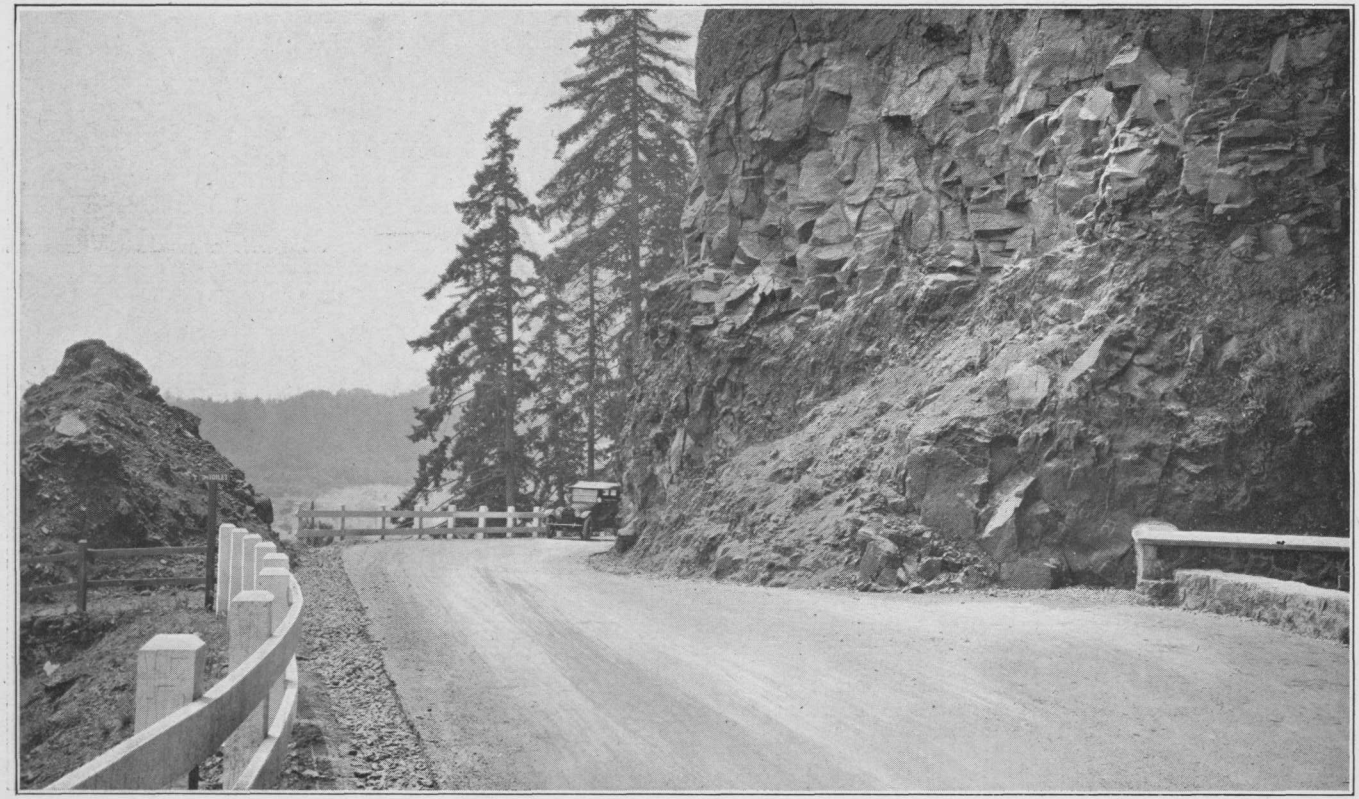
Deer Island-Scappoose Post Road Project

Contract No. 201, for paving 10.85 miles of the Columbia River Highway between Deer Island and Scappoose, was awarded to the Warren Construction Company of Portland, Ore., on September 9, 1919. Work was carried to completion in November of the present year. The clearing and grading of the section was accomplished during 1919 and all fills of any depth allowed to settle during the winter months. At the time of grading of the section, five reinforced concrete bridges of standard design were also built. The revised alignment, being practically all new location, eliminates six dangerous railroad crossings and several short and steep grades, in addition to shortening the total distance approximately 1.5 miles.

The pavement as constructed consists of two inches of bituminous surface on a three-inch bituminous base with an average depth of three inches of new macadam sub-base. Ideal conditions existed for the construction of this project as one detour allowed the traveling public a means of communication without the use of the new alignment. Practically no trucking was allowed on the new pavement as it was laid, and the contractor was able to secure a very smooth and high type of finishing throughout. Work was completed during November of the present year, the approximate total cost being $313,000.00. Of this amount, the Federal Government co-operates to the extent of $156,500.00, the State paying the balance of $156,500.00. Total expenditures made to date under the supervision of E. A. Collier, Resident Engineer in charge, amount to $252,267.90, the State having paid $146,213.97 and the Federal Government $106,053.93.



NEAR LITTLE JACK FALLS ON THE COLUMBIA RIVER HIGHWAY IN COLUMBIA COUNTY. SURFACED WITH BITUMINOUS PAVEMENT IN 1920.



PRESCOTT POINT ON THE DEER ISLAND-RAINIER SECTION. THREE MILES WEST OF GOBLE. PAVED IN 1920.

[COLUMBIA]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 10,240.77
Moving telephone pole from privately owned right of way		21.63
Rental of Asphalt Plant (to be deducted from amount due contractor)		483.87
Contract Items as follows:		
Common Excavation, 4,102.8 cu. yds. at $1.00	$ 4,102.80	
6-inch Porous Drain Tile, 531 lin. ft. at 40c	212.40	
Broken Stone (loose measure), 12,412.5 cu. yds. at $3.21	39,844.13	
Crushed Gravel, 7,707.5 cu. yds. at $2.74	21,118.55	
3-inch Asphalt Concrete Base, 93,737 sq. yds. at 79c	74,052.23	
3-inch Asphalt Concrete Top, 93,895 sq. yds. at $1.41	132,391.95	
Crushed Gravel Shoulders, 93,000 lin. ft. at 6c	5,580.00	
Materials on hand	6,364.00	
Force Account:		
Planking Honeyman Hill Grade to carry winter traffic	898.72	
Laying 30 feet 12-inch Concrete Pipe	32.25	
Removing planking Honeyman Hill Grade	29.94	
Total	$284,626.97	
Deductions for rental on State equipment	483.87	
Total amount earned by contractor	$284,143.10	
Percentage retained until completion of contract	42,621.47	
Total paid to contractor		$241,521.63
Grand total expended to November 30, 1920		$252,267.90
Paid by State	$146,213.97	
Paid by Government	106,053.93	
Total	$252,267.90	

Deer Island-Rainier Paving

Contract No. 104 for the paving of this 21-mile section of the Columbia River Highway was awarded to the Warren Construction Company of Portland, Ore., on April 15, 1919. While the entire length was awarded under one contract, the actual work was handled in two separate units, Unit No. 1 extending from Rainier to a point near Prescott and Unit No. 2 extending from Prescott to McBride's Fill.

This contract called for a two-inch Bitulithic wearing surface on a new macadam base. The pavement was constructed 16 feet wide with two-foot macadam shoulders on each side. Sufficient crushed rock and gravel was placed upon the old macadam to secure a good bottom and give sufficient stability to the base.

Work was started on Unit No. 1 on May 10, 1919, and on October 24 the pavement on this section was completed with the exception of 200 square yards, which could not be laid owing to the incompletion of a small concrete slab bridge and culvert. This work was afterwards done with hot stuff from the plant erected at Beaver Creek for the paving of the Rainier-Clatskanie section.

Work was started on Unit No. 2 on May 22, 1919 and the pavement was completed late in the fall of the same year, except for a stretch of approximately 1,500 feet, which could not be paved owing to the incompletion of the Tide Creek Bridge and the approaches to this bridge, which had to be allowed to settle before the placing of the final wearing surface.

On account of the fact that the portions left uncompleted were occasioned by no fault of the contractor, the final payment was made for all the work done outside of these two uncompleted stretches. A supplementary agreement was entered into for the completion of these por-

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tions at the same unit prices prevailing in the original contract. This work was completed in November of the present year.

Three paving plants, one at Rainier City, one at Goble and one at Deer Island, as well as five rock crushing plants, were operated on this work. The sand and finer aggregate for the bituminous mixture was shipped from Portland.

Work on Unit No. 1 was handled under the direction of A. J. Olsen, Resident Engineer, and on Unit No. 2 by J. C. Russell, Resident Engineer.

The total estimated cost of the completed project is $465,500.00, of which amount $458,620.13 has been expended to date. The entire project is being paid for from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 12,855.60
Work by State Forces removing slides, cleaning ditches, etc.		3,744.86
Maintenance work to maintain travel		517.72
Contract Items as follows:		
Common Excavation, 31,846.8 cu. yds. at 75c	$ 23,885.10	
Solid Rock Excavation, 3,458 cu. yds. at $1.60	5,532.80	
Overhaul, 4,329 sta. yds. at 4c	173.16	
6-inch Porous Drain Tile, 17,886 lin. ft. at 29c	5,186.94	
12-inch Porous Drain Tile, 285.5 lin. ft. at $1.25	356.88	
24-inch Concrete Pipe, 8 lin. ft. at $3.32	26.56	
Bituminous Pavement, Type "E," 188,818.5 sq. yds. at $1.44	271,898.64	
Gravel, 1,805.5 cu. yds. at $3.07	5,542.89	
Broken Stone for Base, 32,053 cu. yds. at $3.55	113,788.16	
Broken Stone Shoulders, 191,630 lin. ft. at 6c	11,497.80	
Clay or Earth Filler, 481 cu. yds. at $1.00	481.00	
Force Account:		
Clearing borrow for Tide Creek Fill	25.77	
Constructing catch basins and culverts	679.76	
Constructing dry rock walls	1,001.35	
Cutting dangerous trees along highway	41.52	
Work on Deer Island Bridge	170.34	
Hauling lumber from Prescott, Ore.	45.74	
Building driveway at Sta. 139+75	34.29	
Building railroad crossing	39.06	
Building apron and boxing to protect shoulders	252.15	
Removing overhanging rocks and slides	940.15	
Rocking approaches to bridge	246.31	
Maintenance work	174.41	
Bulkhead and rip-rap at Merrill Creek	173.80	
Rip-rap at Sta. 38+12	27.84	
Total	$442,222.42	
Deductions, war tax and freight reduction on sand	269.04	
Total amount earned by contractor	$441,953.38	
Percentage retained until completion of contract	451.43	
Total amount paid to Contractor		$441,501.95
Grand Total Expenditures to Nov. 30, 1920 (all State funds)		$458,620.13

Rainier-Clatskanie Paving

On May 27, 1919, Contract No. 128 was awarded to the Warren Construction Company of Portland, Ore., for the paving of 12.3 miles between Rainier and Clatskanie on the Columbia River Highway. This contract was awarded for a type of pavement similar to that on the adjoining Deer Island-Rainier section. The preparation of the sub-grade was started June 12, and paving operations began as soon as a plant could be erected at Beaver Creek. When the plant at Rainier completed

its work on that section, it was installed at Clatskanie and was put into operation at this point late in the fall of 1919. The paving of the entire section was completed July 31, 1920, and represents a total cost of $242,-841.19, which has all been paid from State funds. Construction was carried on under the supervision of A. J. Olsen, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,609.05
Maintenance work by State Forces		312.00
Contract Items as follows:		
Common Excavation, 12,894.01 cu. yds. at 75c	$ 9,670.58	
Intermediate Excavation, 639.6 cu. yds. at $1.75	1,119.30	
Solid Rock Excavation, 712.3 cu. yds. at $2.75	1,958.83	
Overhaul, 2,100 sta. yds. at 4c	84.00	
6-inch Porous Drain Tile, 1,136 lin. ft. at 30c	340.80	
Bitulithic Pavement, Type "E," 115,981 sq. yds. at $1.44	167,012.64	
Broken Stone Base and Shoulders, 11,913 cu. yds. at $3.48	41,457.24	
Broken Stone Shoulders, 127,441 lin. ft. at 6c	7,646.46	
Clay or other earth filler, 379 cu. yds. at $1.00	379.00	
Guard Fence, 2,834 lin. ft. at 75c	2,125.50	
12-inch Plain Concrete Pipe, 309 lin. ft. at $1.20	370.80	
Class "C" Concrete, 3 cu. yds. at $25.00	75.00	
Force Account:		
Rip-rap Station 315-00 and 370 to 374	460.27	
Rock retaining walls	168.52	
Cutting dangerous trees along highway	71.04	
Removing slides	671.71	
Raising bridge to conform to new grade	135.15	
Ditching, removing tile and placing culvert	92.13	
Hauling lumber and redecking bridges	165.77	
Removing flume, sidewalk, fences and other structures	90.03	
Total	$234,094.77	
Deduction for war tax on freight	174.63	
Total amount paid Contractor		$233,920.14
Grand Total cost of Project (all State funds)		$242,841.19

Clatsop County Line-Clatskanie Macadam

During 1917-18 the State Highway Department with their own forces macadamized the Columbia River Highway between Westport and Clatskanie with total expenditures of $118,922.90. During the present biennium delayed charges of $1,979.24 have been made, bringing the total cost of the work to $120,902.14.

Clatskanie-Delena Macadam

During 1917-18, 12.1 miles of macadam were constructed, extending from a point three miles east of Clatskanie to a point 2.5 miles east of Delena on the Columbia River Highway. Total expenditures for the previous biennium amounted to $136,560.40. During the period covered by this report $5,100.66 have been expended in payment of delayed charges, making the total cost of the work $141,661.06. This total amount has been paid entirely from State funds.

[COLUMBIA]

Scappoose-Deer Island Grading

L. O. Herrold of Salem, Ore., was awarded Contract No. 110 on April 15, 1919, for the grading of 10.85 miles of the Columbia River Highway from the end of the pavement at Scappoose to McBride's Fill. This grading was practically finished in the fall of 1919, but owing to the non-completion of five reinforced concrete slab bridges on the section, the filling of the approaches was not finished until February 29, 1920. One of the notable features of this section was that the highway as constructed eliminated all remaining main line railroad crossings between Portland and Astoria.

An exceptionally high standard of finished roadbed was secured on this section, and even after the settlement occasioned by the winter rains, very little refinishing was required when it was placed under contract for a pavement wearing surface.

Engineering supervision was handled by E. A. Collier, Resident Engineer. The completed cost of the work represents a total expenditure of $62,468.41. The entire cost of the project is to be borne by the State with the exception of $2,296.81. This amount is to be repaid from County funds for the construction of what is known as the Honeyman and Hegele cattle passes.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,272.43
Royalty on 3,148 cu. yds. of Borrow Material at 8c per yd		251.84
Guarding Railway and Telephone Line		1,366.94
Contract Items as follows:		
Clearing and grubbing, all	$ 3,400.00	
Common Excavation, 42,920.6 cu. yds. at 57c	24,464.74	
Intermediate Excavation, 5,238.7 cu. yds. at 83c	4,348.12	
Solid Rock Excavation, 5,685.5 cu. yds. at $2.30	13,076.65	
Overhaul, 60,756 sta. yds. at 4½c	2,734.02	
12-inch Plain Concrete Pipe, 1,324 lin. ft. at $1.20	1,588.80	
18-inch Reinforced Concrete Pipe, 208 lin. ft. at $2.45	509.60	
24-inch Reinforced Concrete Pipe, 156 lin. ft. at $3.20	499.20	
36-inch Reinforced Concrete Pipe, 28 lin. ft. at $5.10	142.80	
Class "A" Concrete, 110.2 cu. yds. at $30.00	3,306.00	
6-inch Drain Tile, 469 lin. ft. at 30c	140.70	
Rubble Masonry, 125.7 cu. yds. at $10.00	1,257.00	
Guard Fence, 336 lin. ft. at 70c	235.20	
Rip-rap, 32.5 cu. yds. at $7.50	243.75	
Metal Reinforcement, 5,739 lbs. at 7c	401.73	
Force Account:		
Clearing and grubbing for channel change at North Scappoose Creek and piling logs across present channel	192.50	
Clearing for Hegele Borrow Pit and removing drift from South Scappoose Creek	76.13	
Extending Corrugated Galvanized Iron pipe now in place	20.16	
Total	$ 56,637.10	
Deductions:		
Freight reductions	55.36	
War tax on freight	4.54	
Total deductions	59.90	
Total amount paid contractor		$ 56,577.20
Grand total expenditures on project (all State funds)		$ 62,468.41

County is to reimburse the State to the amount of $2,296.81.

[COLUMBIA]

Rainier City Grading

This section consists of approximately nine-tenths of a mile between paved sections ending at either side of Rainier. Contract No. 184 for the grading of this gap was awarded to the Pacific Bridge Company of Portland on August 5, 1919. The work extends across the tide flats and overflow land between two high points. Two very steep hills and right angle turns through the town are eliminated by the use of maximum gradients of five per cent. Material was secured for the fills from the bottom land by dredging from the Columbia River.

Construction was carried on under the supervision of A. J. Olsen, Resident Engineer, and represents a total expenditure of $48,659.99. Of this amount Columbia County co-operates to the extent of $5,000.00, and the city of Rainier to the extent of $7,000.00. At the present time the State Highway Commission has on hand city of Rainier bonds to the amount of $6,697.37, in addition to payments of $1702.63 already made. Owing to the high rate of discount prevailing at the present time, the State Highway Commission has not attempted to negotiate these bonds and is holding them for a more favorable market. When these bonds are disposed of, the city of Rainier will be given credit in the Department records for the actual amount received by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,489.32
Fertilizer and seed for Embankment Protection		48.00
Erecting barricade and auto hire		7.75
Contract Items as follows:		
Clearing and Grubbing, all	$ 1,000.00	
Common Excavation, 5,026.4 cu. yds. at $1.00	5,026.40	
Solid Rock Excavation, 3,217.7 cu. yds. at $2.25	7,239.83	
Overhaul, 17,500 sta. yds. at 5c	875.00	
12-inch Plain Concrete Pipe, 198 lin. ft. at $1.50	297.00	
6-inch Porous Drain Tile, 2,165 lin. ft. at 31c	671.15	
Class "A" Concrete, 83.92 cu. yds. at $30.00	2,517.60	
Class "C" Concrete, 5.85 cu. yds. at $25.00	146.25	
Fir piling, 769 lin. ft. at 83c	638.27	
Embankment in place, 32,589.8 cu. yds. at 75c	24,442.35	
Metal Reinforcement, 7,069 lbs. at 8c	565.52	
Force Account:		
Reconstructing sewer in several streets in Rainier City	2,688.27	
Constructing catch basins and rock walls	720.94	
Constructing temporary 20-foot span Station 691+70	123.25	
Planking Blanchard Street crossing	134.60	
Constructing sidewalk and handrail at Station 695-00 to 696-00	28.49	
Total amount paid contractor		$ 47,114.92
Grand total cost of project		$ 48,659.99
Paid by State	$ 46,957.36	
Paid by County	1,702.63	
Total	$ 48,659.99	

State to be reimbursed to the extent of $5,297.37 by the County and $5,000.00 by the City of Rainier.

[COLUMBIA]

Deer Island-Delena Wood Guard Fence

On November 4, 1919, Contract No. 226 was awarded to A. J. McGarry of Seattle, Wash., for the construction of 5,845 lineal feet of guard fence on the Columbia River Highway between Deer Island and Delena. Work was started November 10, 1919, and completed February 16, 1920, at a total cost to the State of $5,833.91.

A. J. Olsen and J. C. Russell, Resident Engineers, superintended the construction of this guard fence on their respective paving residencies.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 96.36
Contract Items as follows:		
Wood Guard Fence, Unit No. 1, 4,035 lin. ft at 95c	$ 3,833.25	
Wood Guard Fence, Unit No. 2, 1,810 lin. ft. at 95c	1,719.50	
Shoulder Boards, 2.64M, FBM. at $70.00	184.80	
Total amount paid contractor		$ 5,737.55
Grand total cost of project (all State funds)		$ 5,833.91

Beaver Valley Bridges.

During 1917-18 concrete structures for nine crossings of Beaver Creek between Rainier and Clatskanie were constructed under contract let to L. O. Herrold of Salem, Ore. A description of these structures will be found on page 87 of the last biennial report. Total expenditures to the date of this report amounted to $29,808.58. During the present biennium payment has been made for $4,722.30 of delayed charges, bringing the total cost of the nine structures to $34,530.88. This amount has been paid entirely from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 922.54
Contract Items as Follows:		
Class "A" concrete, foundation, 493.4 cu. yds. at $19.50	$ 9,621.30	
Class "A" concrete, superstructure, 553.2 cu. yds. at $20.56	11,373.79	
Reinforcing steel in place, 108,749 lbs. at .065	7,068.69	
Handrailing, 1,046.05 lin. ft. at $1.68	1,757.36	
30′ concrete span, built on cost plus basis, including some extra work on other bridges	3,787.20	
Total amount paid contractor		$ 33,608.34
Grand total cost of project (all State funds)		$ 34,530.88

Deer Island-Scappoose Bridges

Included in the Scappoose-Deer Island section of the Columbia River Highway are five concrete bridges ranging in length from one 18-foot span to three 35-foot spans, the combined length of the five structures being 327 feet. Contract No. 140, covering the construction of these bridges, was awarded to the Union Bridge Company of Portland, Ore., on May 27, 1919. The work was completed in the early spring of 1920 at a total cost of $41,469.42, which has all been paid from State funds.

Supervision of the construction was handled by N. W. Reese, Resident Bridge Engineer, until September 1, 1919, at which time the work was turned over to E. A. Collier, Resident Engineer, for completion.



NINETY FOOT CONCRETE VIADUCT OVER MILTON CREEK ON THE COLUMBIA RIVER HIGHWAY NEAR ST. HELENS IN COLUMBIA COUNTY. BUILT IN 1919 AND 1920.

[COLUMBIA]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,128.23
Drain pipes for bridges		4.40
Contract Items as Follows:		
Class "A" concrete, 1,019.7 cu. yds. at $29.50	$ 30,081.15	
Metal reinforcement, 92,939 lbs. at 6c	5,576.34	
Piling, 2,989 lin. ft. at 60c	1,793.40	
Concrete handrail, 673 lin. ft. at $3.50	2,355.50	
Force Account Items:		
Installing expansion plates on South Scappoose Bridge	74.11	
Installing weep hole drain pipes on North Scappoose Bridge	23.33	
Total	$ 39,903.83	
Deductions, war tax and freight reduction on sand	567.04	
Total amount paid to contractor		$ 39,336.79
Grand total cost of structures (all state funds)		$ 41,469.42

Tide Creek Bridge

On May 27, 1919, Contract No. 139 for the construction of a bridge over Tide Creek on the Deer Island-Goble section was awarded to the Union Bridge Company of Portland, Ore. This work was handled by the contractor in conjunction with the bridges on the Scappoose-Deer Island section and was completed at the same time. The structure consists of three 30-foot concrete spans and was built at a total cost of $14,454.98, being paid for entirely from State funds.

N. W. Reese was Resident Bridge Engineer until September 1, 1919, at which time the work was turned over to E. A. Collier, Resident Engineer, for completion.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,255.24
Contract Items as Follows:		
Class "A" concrete, 269.2 cu. yds. at $33.50	$ 9,018.20	
Metal reinforcement, 26,740 lbs., at 6¼c	1,671.25	
Piling, 1,518 lin. ft. at 60c	910.80	
Concrete handrail, 189 lin. ft. at $3.50	661.50	
Force Account Items:		
Labor and material used to build and maintain detours at Tide Creek Bridge	1,030.03	
Total	$ 13,291.78	
Deductions, war tax and freight reduction on sand	92.04	
Total amount paid contractor		$ 13,199.74
Grand total cost of structure (all state funds)		$ 14,454.98

Beaver Creek Bridge

About three miles west of the town of Rainier, the Columbia River Highway makes the first of ten crossings of Beaver Creek. Nine of the structures were built during 1917 and 1918, leaving only this one, a 35-foot concrete span, to be built during 1919 and 1920.

Bids were received for the construction of this structure on March 23, 1918, but were rejected as being too high. The work was readvertised and on July 8, 1919, bids received were again rejected. An agreement to build the bridge was then made with the Warren Construction Company, who held the paving contract on this section. This agreement was designated as Contract No. 237 and dated September 2, 1919, it covering not only the Beaver Creek bridge, but also a small culvert nearby.

[COLUMBIA]

Final payment was made to the contractor in September, 1920, the total expenditures for both structures amounting to $6,957.00, which has all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 158.81
Piling, spindles and reinforcing steel furnished by state		85.20
Contract Items as Follows:		
Class "A" concrete in bridge, 94.68 cu. yds. at $35.00	$ 3,313.80	
Piling, 560 lin. ft. at $1.75	980.00	
Concrete handrail, 75 lin. ft. at $3.00	225.00	
Reinforcing steel, 11,709 lbs. at 8c	936.72	
Class "A" concrete in culvert, 34.84 cu. yds. $30.00	1,045.20	
Force Account Items:		
Backfilling at end of Beaver Creek Bridge	302.45	
Total	$ 6,803.17	
Deductions for materials furnished by State	85.20	
Total amount paid to contractor		$ 6,717.99
Grand total cost of structure (all State funds)		$ 6,957.00

Maintenance

The State Highway Department has maintained a crew of from three to five men engaged in cleaning ditches, removing slides, cutting brush, etc., between Deer Island and Clatskanie on the Columbia River Highway in Columbia County. The total distance is thirty-two miles and it has been found that the cost averages about $15.00 per mile per month for this class of work and size of crew.

Columbia City-Scappoose Survey

During January and February, 1919, 10.8 miles of the Columbia River Highway between Scappoose and Deer Island were surveyed under the direction of H. C. Compton, Locating Engineer. This work consisted of the retracement of the center line, the running of levels and the taking of complete cross-sections throughout.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by Martin White, County Judge, A. E. Harvey and Judson Weed, County Commissioners, under date of March 3, 1920, stating that a levy of two mills on all the taxable property of the County was made for market road construction, and designating one road to be improved as a market road project.

A levy of 2 mills on a valuation of $13,459,668.17 produced a County market road fund of $26,919.34. Included in the State levy of taxes was a levy of 1 mill on a valuation of $14,513,113.60 which produced $14,514.11 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 14,514.11
Funds apportioned by the State Highway Commission April 3	5,919.66
Funds produced by County levy of two mills	26,919.34
Total available for 1920	$ 47,353.11

[COLUMBIA]

Project No. 1.—"Beginning at the southeast corner of the southeast quarter of the southwest quarter of section 20 T-5N, R-2W, W. M. in Columbia County, Oregon, and at or near the Post Office of Trenholm, and running thence in a westerly direction through sections 19, 20, and 30 in said T-5N, R-2W, sections 25, 24, 23, 22, 27, 28, 21, 20, 19 and 30 in T-5N, R-3W, and sections 24 and 23 in T-5N, R-4W, W. M. and ending at a point on the Nehalem Highway near the center of section 23 in T-5N, R-4W, W. M., at or near a place commonly known as Pittsburg; which said proposed road is a part of what is known as the St. Helens-Pittsburg Road and as surveyed, located and established by the State Highway Commission of the State of Oregon in the year 1914, and as per field notes, map and profile thereof on file and of record in the office of said State Highway Commission."

The location survey of the line above described was made by C. C. Kelley, Locating Engineer, in 1914. The section chosen for improvement in 1920 consisted of miles 3, 4, 5 and 6, east of Pittsburg, as shown on location map. A contract was awarded to J. Kilby of Rainier to grade four miles of roadbed 20 feet in width, for a lump sum bid of $56,000.00. It is expected that mile 3 will be completed in 1920 at a cost of approximately $20,000.00. Unexpended funds will be carried over to complete this section in 1921.

T. S. Wilkes, County Roadmaster, has handled all engineering work on this project.

COOS COUNTY

State work in this County has been confined to the Coast Highway between Marshfield and Coquille and the Coos Bay-Roseburg Highway between Coquille and Douglas County line. Contracts are under way for paving the entire distance between Marshfield and Coquille and the section adjacent to the Douglas County line has been placed under contract for grading.

All work is being handled under the supervision of W. E. Chandler, Division Engineer.

Marshfield-Coquille Paving

Contract No. 99 was awarded to Perham, Brown, Dean & Hague, Marshfield, Ore., on April 15, 1919, for constructing a 16-foot concrete pavement between Marshfield and Cedar Point, a distance of 14.49 miles. Through many delays, including selection of material, the actual laying of pavement did not begin until June 18, 1919. Delays in receiving the material continued throughout the summer and on September 23, 1919, the contractors, with the consent of their bonding company, petitioned the State Highway Commission to take over the work as they were unable to finance operations any longer. The work was taken over by the Commission without cessation of activities and continued with the contractors' organization practically intact until October 21, when the winter rains began and the work was closed for the winter. At this time 5 miles had been completed.

The principal reason for poor progress by the contractor was a shortage of crushed rock. Solution of this problem was therefore the first thing that was undertaken by the State and an agreement was entered into with the Mathews Gravel Company of Eugene with the idea of stock piling gravel on the work during the winter. Through a shortage of cars, this did not prove entirely successful, although approximately two thousand yards were received and stored at Marshfield. It then became apparent that a new source of material must be found which would adequately supply the needs of a job of this size, and the gravel beds of the Umpqua and south fork of the Coquille Rivers were investigated and tested. It was found that both would be acceptable, but the Coquille River gravel was considered preferable on account of containing a certain percentage of large boulders which would require crushing. Bids were asked for on material from both of the above sources and but two bids were received, both being for Umpqua River gravel. The low bid was received from the Umpqua Sand & Gravel Company and a contract entered into with them for delivery on May 1, 1920. During the winter sidings and derricks had been built for receiving material in almost any quantity as two unloading places were available.

Paving was started April 29, 1920, at Millington and progressed towards Marshfield, as this was a macadamized road and could be paved earlier than any of the other sections on which wet subgrade conditions prevailed. An average of 400 feet per day was maintained until May 21, when the material which had been previously stored was entirely used. Failure of the Umpqua Gravel Company to deliver materials practically held up the work until July 10, after which time construction

proceeded in a more satisfactory manner. By September 8 sufficient material was on hand to keep two mixers going, but the unusually early rains required the indefinite closing of the paving work on September 14. Part of the organization was retained for placing shoulders on the completed pavement and the remainder laid off until weather conditions permit a resumption of paving construction. At the present time there only remains 3.3 miles to be completed. The total estimated cost of the work to the State is $388,000.00, of which amount $375,604.34 has been expended to date. The construction work was carried on under the supervision of A. B. Gidley, Resident Engineer, during 1919 and A. D. Griffin, Resident Engineer, during 1920.

Cedar Point-Coquille Paving

Contract No. 280 was awarded on July 6, 1920 to the Scandia Shipbuilding Company of Marshfield, Ore., for the construction of a 16-foot concrete pavement from Cedar Point to the city limits of Coquille, a distance of approximately 2.3 miles. On account of shortage of cement, no pavement was laid until October 24 and from that date work progressed very satisfactorily until early rains forced the closing down of the work. The total estimated cost for this section is $70,000.00 from State funds. Of this amount $25,251.91 have been expended to date under the supervision of F. C. Tews, Resident Engineer.

Cedar Point-Coquille Grading

The Coos County survey for this work, which had been made for the purpose of flattening curves and reducing steep grades, was taken over by the State. At the request of Coos County, this work was advertised and financed by the State, with the understanding that the County would reimburse the State during 1920 for all expenditures except engineering.

Moon & Company of Marshfield, Ore., were awarded contract No. 149, covering grading of the 1.96 miles involved, on June 10, 1919. Work was started on June 25, and completed on August 25, 1919. This project completed the grading of the Coast Highway between Marshfield and Coquille. A. B. Gidley, Resident Engineer, handled the construction of the project which represents a total cost of $9,591.40. Expenditures for engineering amounted to $652.96, which has been paid from State funds. The grading amounted to $8,938.44 and the State has been reimbursed by Coos County for this amount.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 652.96
Contract Items as Follows:		
Clearing and grubbing, all at $100.00	$ 100.00	
Common excavation, 14,167.2 cu. yds. at 48c	6,800.26	
Overhaul, 26,320 cu. yds. at 3c	789.60	
Lumber in place, 31.522M FBM at $35.00	1,103.27	
Force Account Items:		
Cleaning channel and other special work in connection with bridges at Stations 21 and 30	43.05	
Extending existing culverts	27.76	
Moving buildings	46.59	
Painting guard rails on new bridges	27.91	
Total paid to contractor		$ 8,938.44
Grand total cost of project		$ 9,591.40
Paid by State	$ 652.96	
Paid by County	8,938.44	
Total	$ 9,591.40	

[COOS]

Remote-Camas Valley Post Road Project

This work consists of 14.2 miles between Remote and Camas Valley on the Coos Bay-Roseburg Highway in Coos and Douglas Counties. The project was financed by the State and Federal Government under Project Agreement No. 29. Construction was contracted under two separate units, these units being divided at the Coos-Douglas County line. Contract Nos. 207 and 208, for the grading of both units to a standard 20-foot roadbed, were awarded to John Hampshire & Co., of Grants Pass on October 7, 1919. Work was started immediately after the awards were made and pushed during the winter of 1919-1920. Clearing was done and some heavy rock work completed during the rainy season. The hauling in of supplies and equipment during this part of the year proved very expensive to the contractor. One steam shovel was hauled over 19 miles from Myrtle Point during the winter and a second shovel was brought in and started early in the spring of 1920. The contractors carried on operations to the summer of the present year, but in July found themselves unable to finance the work any further. They requested that the State Highway Commission take over the work and finish it by State forces, with the understanding that they would liquidate any expense on the part of the State in excess of the amounts due them, based on the quantities involved and the unit price items of the contract. Work was taken over by the Department on August 1, 1920 and Superintendent J. D. MacVicar placed in charge. At this date all work not complete has been sublet to station-men, with the exception of approximately two miles. This two miles was held to be done by steam shovel, but the early rains have made this impossible and it is expected that the work will be either held over until spring or let out to station gangs. All station work which is under way at the present time will be completed by December 1, if reasonably good working weather prevails.

Work has been carried on unit No. 1 in Douglas County under the supervision of Clement F. Waite, Resident Engineer, and on Unit No. 2 in Coos County under W. M. Strohmeyer, Resident Engineer.

The total estimated cost of this work is $390,500.00, the Federal Government co-operating to the extent of $193,650.99, with the State paying the balance of $196,849.01. At the date of this report, total expenditures of $237,711.69 have been made, $168,019.00 by the State and $69,692.69 by the Federal Government.

Maintenance

Maintenance work in Coos County has been confined to the removing of small slides between Marshfield and Coquille, and placing gravel on the first 4 miles of the highway from Coquille towards Myrtle Point in order to keep the road open to winter traffic. This work will be paid for under existing maintenance agreements, fifty per cent by the County and fifty per cent by the State.

Pacific Highway-Myrtle Point Survey

The original intention of the Commission on the Roseburg-Coos Bay Highway was to advertise an 8 mile portion west of Camas Valley early in 1919; but as this was made a Federal Aid Project, and, as the Gov-



SIXTY FOOT HOUSED TIMBER TRUSS SPAN AND APPROACHES. BUILT IN 1920 OVER ROCK CREEK ON REMOTE-CAMAS VALLEY SECTION OF THE COOS BAY-ROSEBURG HIGHWAY.

[COOS]

ernment objects to constructing one portion of a project until the whole has been surveyed and the original estimate made, it was decided to hurry the location through in order to get actual construction started as soon as possible.

Three location parties were therefore organized and the work rushed. F. H. Drinkhall was started at Myrtle Point May 1, 1919, working toward Roseburg. C. F. Waite was started May 16, 1919, near the County line between Douglas and Coos, working toward Myrtle Point to meet Drinkhall and toward Roseburg to meet H. O. Ragan, who started on June 5 at Camas Valley and worked toward Roseburg.

Mr. Drinkhall completed 19.5 miles on August 15; C. F. Waite completed his 12.7 miles on August 15; H. O. Ragan 20.5 miles on August 20.

Office work was completed and contract let on October 7, 1919, for the heaviest 14.17 miles between Camas Valley and Remote.

Construction Engineering County Bridges

At the request of the County Court of Coos County, the Highway Department has prepared a design for a steel draw span over the Coquille River at Coquille, which will probably be constructed during the season of 1921.

The design as prepared calls for 170 feet of pile trestle approach and a main span of 235 feet in length, providing two 100-foot navigation openings. This structure will replace the present ferry which is incapable of handling the traffic now existing.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by C. R. Wade, County Judge, John Yoakam and H. G. Kern, County Commissioners, under date of March 9, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for market road construction, and designating three roads to be improved as market road projects.

A levy of 1 mill on a valuation of $23,545,544.30 produced a County market road fund of $23,545.54.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $22,125,683.40, which produced $22,125.68, which became a part of the "State market road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 22,125.68
Funds apportioned by the State Highway Commission April 3	9,024.08
Funds produced by County 1-mill levy	23,545.54
Total available for 1920	$ 54,795.30

C. S. McCulloch, Roadmaster, made the surveys, prepared plans and estimates and did the necessary construction engineering.

Project No. 1.—"City of Myrtle Point via Gravel Ford and North and East Forks to Sitkum."

A section of this road .65 mile in length was graded 16 feet wide and graveled 9 feet wide. The work was done by County forces at a cost of approximately $4600.00.

[COOS]

Project No. 2.—"Begin at the Norway School House, on the Coquille-Myrtle Point Section of the State Highway, thence via Lee up Middle Creek to junction with the Coos Bay wagon road at the Snow place."

A location survey 3.7 miles in length was made. The road is through rough, hilly country.

A section 2.3 miles in length is being graded 16 feet wide by County forces and will be surfaced 9 feet wide with gravel, in 1920, if the weather permits. The estimated cost of grading, drainage, rocking and engineering is $22,485.46.

Project No. 3—"Glasgo north to Hauser."

A survey 2 miles in length was made along steep side hills, through rough, timbered country, using a maximum grade of 5 per cent.

A contract was awarded for clearing and grading 1.3 miles, the roadbed to be 24 feet in width, culverts and drainage to be done by County forces.

The work was completed at a cost of approximately $30,700.00.

CROOK COUNTY

Prineville, in Crook County, is very near the geographical center of the State of Oregon, and is one of the chief points along the McKenzie Highway which traverses the northern section of the County. This highway will prove a favorite route for summer tourists from the Willamette Valley to the John Day River Country, via the McKenzie Pass.

Eastward from Prineville this highway will connect at the Ochoco National Forest boundary with the government road recently completed through this forest to the Wheeler County line. The survey for the McKenzie Highway to connect at this point is about complete, and it is expected construction will be under way early in 1921.

Terminating at Prineville is the Crooked River Highway which will open up the rich agricultural and stock country about Paulina and the head of Bear Creek and Crooked River.

The people of Crook County, through the untiring efforts of Judge N. G. Wallace, have initiated a program of active highway construction entirely in keeping with the progressiveness of its citizens. Handicapped by lack of any great appraised wealth, the people have put forward two bond issues to the legal limit.

In May, 1918, bonds in the sum of $95,000.00 were voted, $85,000.00 to apply on the Crooked River Highway and $10,000.00 to apply on the McKenzie Highway between Crook-Deschutes County line and the Ochoco Forest boundary. Later this $85,000.00 has been increased to $108,000.00. In November, 1919, $220,000.00 additional bonds were voted by a big majority. This last issue, however, was made on the new 6 per cent bond limitation, and, pending action of the next legislature, is not yet available.

All State work in Crook County was handled by C. C. Kelley, Division Engineer, until September, 1920, being under the supervision of J. H. Scott, Division Engineer, since that time.

Redmond-Prineville Post Road Project

Contract No. 233 for the grading of 15.2 miles and the surfacing of 7.2 miles of the McKenzie Highway between Prineville and the Deschutes County line, was awarded to Oskar Huber of Portland, Ore., on November 4, 1919. While this section possesses no especial scenic attractions or construction problems of interest, it is a much needed and valuable improvement, and connects Prineville with the Oregon Trunk Railway at Redmond.

Contract No. 258 for the construction of a 24-foot concrete span in Prineville was awarded to Oskar Huber on March 23, 1920. Work was not started until August but it is practically complete at the present time, with a total estimated cost of $5100.00, of which amount $3833.68 has been expended to date.

This improvement is being carried on as post road project No. 43, in co-operation with the County and Federal Government. The total estimated cost, including 8 miles of surfacing which was not covered by the awarded contract and the Prineville bridge, is $166,400.00. Of this amount the State share is $41,112.27, the County share $42,087.73 and

[CROOK]

the Federal Government share $83,200.00. Progress on the construction of this project has been greatly retarded on account of the lack of organization and working forces on the part of the contractor. It is expected that more favorable progress will be made during the coming winter when the working conditions are better in eastern Oregon. Expenditures to the amount of $22,893.77 on the grading and surfacing have been made during the present biennium under the direction of C. W. Woodruff, Resident Engineer. This makes the total expenditures on the project, $26,727.45, which have been paid $21,727.45 from State funds and $5,000.00 from County funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Grading and Macadam

Engineering		$ 2,013.99
Equipment rental charges (to be deducted from amounts due contractor)		373.85
Contract Items as Follows:		
Clearing and grubbing, 60 per cent at $2,500	$ 1,500.00	
Common excavation, 15,670.7 cu. yds. at 54c	8,462.18	
Solid rock excavation, 7,691.8 cu. yds. at $1.80	13,845.24	
Overhaul, 250 sta. yds. at 5c	12.50	
12" plain concrete pipe, 72 lin. ft. at $1.35	97.20	
18" reinf. concrete pipe, 104 lin. ft. at $3.00	312.00	
Total	$ 24,229.12	
Deduction for State equipment furnished	104.50	
Total amount earned by contractor	$ 24,124.62	
Percentage retained until completion of contract	3,618.69	
Total amount paid contractor		$ 20,505.93
Grand total expended to November 30, 1920		$ 22,893.77
Paid by State	$ 17,893.77	
Paid by County	5,000.00	
Total	$ 22,893.77	

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Prineville Bridge

Engineering		$ 562.44
Contract Items as Follows:		
Class "A" concrete, 80.48 cu. yds. at $35.00	$ 2,816.80	
Reinforcing steel, 7,818 lbs. at 11c	859.98	
Excavation, 85 cu. yds. at $1.00	85.00	
Materials on hand	87.27	
Total amount earned by contractor	$ 3,848.52	
Percentage retained until completion of contract	577.28	
Total amount paid contractor		$ 3.271.24
Grand total expended to Nov. 30, 1920 (all State funds)		$ 3,833.68

Ochoco Canyon Forest Road Project

The Crook County section of the Ochoco Canyon Forest Road Project begins at a point on the McKenzie River Highway approximately twenty miles northeast of Prineville and extends 9.7 miles to the Wheeler County line. At this point it connects with the Wheeler County section of the project.

Grading of this section was handled by the Bureau of Public Roads using day labor forces. Upon completion of the grading in October, 1919,

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the entire length was gravel surfaced by the use of a steam shovel and trucks, the surfacing being completed in July, 1920.

Total expenditures for the entire work have amounted to $111,123.03, the Federal Government paying $44,613.86, Crook County $21,875.00 and the State $44,634.17. State expenditures include $3,295.88 during 1918 and the sum of $5,000.00 which has been advanced for the County. This amount is to be repaid as soon as the condition of the County's finances will permit.

Crooked River Project—Grading

This section follows up the gorge of the Crooked River from Prineville to the Shorty Davis ranch. The first 7 miles out of Prineville constitute work of comparatively light nature, but further up the steep side slopes footing the high rim rock have made much of the work very inaccessable. Much of the material handled has consisted of large boulder formation which has been taken out by steam shovel in small cuts, and this class of work has been very expensive. Private irrigation ditches have caused no small amount of inconvenience and delay.

It was originally contemplated that Federal Aid would be enlisted for co-operation in financing this project, but Government aid was refused on account of the fact that the southeastern terminus of the highway was not fully established and the Government would not consider the project as a portion of a through State highway. This made a situation which was very critical for the County. However, they have pledged themselves to the amount of $102,912.27 on this work, the balance to be paid by the State.

Owing to the heavy character of construction and limitation of funds available, the standard roadbed width for this highway has been fixed at 18 feet. Since construction started line revision has been made which eliminated two bridge crossings of the Crooked River, the cost on the revised line being estimated at about the same amount as the cost of the original line. This change was considered advisable on account of the apparent impossibility of securing a reasonable bid for bridges in this district. Bids were received on March 23, 1919 for the construction of six bridges and only one bid was received, which was considered too high to be acceptable. All bids were rejected and four of the structures readvertised, two having been eliminated by the above re-location. On June 1, six bids were received which were again too high and it was decided to build the most important one with State forces. Work was started early in September and is well along at the time of this report. It is expected that construction will be complete by January 15, 1921, and that the cost will not exceed $24,500.00. H. H. Flanagan is in charge of the construction of this bridge for the State Department.

On November 4, 1919 contract No. 234 was awarded to A. Guthrie & Company of Portland, Oregon, for grading the 31.99 miles involved. Construction work is under way at the present time at a total estimated cost of $307,000.00. This makes the total estimated cost of the project, including the bridge being built by State forces, $331,500.00. Of this amount, Crook County co-operates to the extent of $102,912.27, the State paying the balance of $228,587.73. Construction has been carried on under the direction of C. W. Woodruff, Resident Engineer, with total

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expenditures of $222,622.10 to date, $162,622.10 from State funds and $60,000.00 from County funds. These amounts include an expenditure of $8,738.83 from State funds for construction of the bridge.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 17,536.59
Contract Items as Follows:		
Clearing, 96 per cent, at $8,500.00	$ 8,160.00	
Common excavation, 116,934.7 cu. yds. at 68c	79,515.60	
Solid rock excavation, 55,635.4 cu. yds. at $1.75	97,361.95	
Overhaul, 41,873 sta. yds. at 5c	2,093.65	
12" corrugated iron pipe, 3,684 lin. ft. at $3.50	12,894.00	
18" corrugated iron pipe, 1,440 lin. ft. at $4.50	6,480.00	
24" corrugated iron pipe, 840 lin. ft. at $5.50	4,620.00	
36" corrugated iron pipe, 114 lin. ft. at $9.00	1,026.00	
Rip-rap, 240.8 cu. yds. at $15.00	3,612.00	
Lumber and timber, 94.186M FBM at $75.00	7,063.95	
Dry rock wall, 294.4 cu. yds. at $14.00	4,121.60	
Force Account:		
Temporary installation and operation of pumping plant to deliver irrigation water over highway	1,247.49	
Labor and material constructing metal irrigation flume	1,792.14	
Building hand placed slopes to protect fills from irrigating ditch	1,007.72	
Total amount earned by contractor	$230,996.10	
Percentage retained until completion of contract	34,649.42	
Total amount paid contractor		$196,346.68
Grand total expended to November 30, 1920		$213,883.27
Paid by State	$153,883.27	
Paid by County	60,000.00	
Total	$213,883.27	

Redmond-Prineville Survey

A survey of the McKenzie Highway between Prineville and Redmond was made during 1919 by C. W. Woodruff, Resident Engineer. With the exception of about two miles of developed grade up the side hill slopes of Rim Rock Cove just west of Prineville, the location traverses flat table land with soil of light volcanic ash.

Crooked River Highway Survey

A survey of the Crooked River Highway from Prineville southeasterly to the Shorty Davis ranch was made during the winter of 1918-19 by R. H. Baldock, Locating Engineer. The adopted route is 32 miles in length and was designated by the State Highway Commission as a State highway during 1919. The section connects with the present road to Paulina and provides the citizens of Crook County with an outlet by water grade from the upper Crooked River and Bear Creek district to Prineville. This location obviates the need for traveling over the high summit through the heavy adobe soil that is found on the present County road.

Prineville-Wheeler County Line Survey

In the fall of 1919 the Commission authorized a survey up the canyon of the Ochoco River from Prineville to connect with the Ochoco Canyon Forest Road Project in Wheeler County.

[CROOK]

The route passes over the north end of the new earth dam of the Ochoco Irrigation District 5 miles east of Prineville, and is carried thence eastward following the north side of the Ochoco Canyon above the high water line, and past the upper end of the reservoir, and then along the bottom of the Ochoco Valley.

The survey has been carried on intermittently with other work in the County under the direction of C. W. Woodruff, Locating Engineer, and is now about ninety per cent complete. If funds of the last County bond issues are made available by legislative act, it is expected to prepare this work for immediate construction and surfacing.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by N. G. Wallace, County Judge, E. T. Luthy and Hugh Lister, County Commissioners, under date of March 5, 1920, stating that a levy of 1.98 mills on all the taxable property of the County was made for market road construction, and designating two roads to be improved as market road projects.

A levy of 1.98 mills on a valuation of $5,034,641.45 produced a County market road fund of $9,968.59. Included in the State levy of taxes was a levy of 1 mill on a valuation of $6,021,322.10, which produced $6,021.32, and which became a part of the "State market road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 6,021.32
Funds apportioned by the State Highway Commission April 3	2,455.83
Funds produced by County levy of 1.98 mills	9,968.59
Total available for 1920	$ 18,445.74

C. W. Woodruff, Resident Engineer for the State Highway Commission, made the surveys and prepared the estimates of cost Construction work is being done by County forces.

Project No. 1.—"Beginning at a point on the Crooked River Highway near the center of Section 22, T-17S, R-22E. of W.M., running thence in a southerly direction up the south fork of Crooked River, by the most practicable route to a point on the Prineville-to-Burns road at or near the southeast corner of Section 36, T-21S, R-22E of W.M."

No work was done on this project in 1920.

Project No. 2.—"Beginning at a point on the McKenzie River Highway at the west end of the approach to the bridge across Crooked River in the N.E. quarter of the N.W. quarter of Section 6, T-14S, R-16E, W.M., running thence in a westerly direction to a point 73 feet south from the S.W. corner of Section 23, T-4S, R-14E, W.M., thence northerly to the N.W. corner of said Section 23 of the same Township and Range."

The road which is along the foot of the hills, in the river bottom, is being graded to eighteen and twenty feet roadbed and surfaced fourteen feet wide with gravel, approximately ten miles to be graded and five miles to be surfaced in 1920. Eighteen thousand dollars will be spent on this project.

CURRY COUNTY

With the exception of market roads, State construction work in this County has been confined to the Coast Highway in the vicinity of Port Orford. The most necessary section, covering the elimination of the long climb between Hubbard Creek and Brush Creek, has been taken up first and put under contract for grading, with a portion of the distance under additional contract for surfacing.

Location surveys of the entire Coast Highway have been made or are under way from the Coos County line south to Mussel Creek, and a very thorough reconnaissance has been made from that point south to the California line.

On June 3, 1919, the County voted bonds to the extent of $98,000.00, of which $49,000.00 is to be applied between Port Orford and Mussel Creek and $49,000.00 between Gold Beach and Brookings. The sum of $30,000.00 has already been definitely obligated to the State as co-operation on the grading between Hubbard Creek and Brush Creek.

All State activities in this County have been carried on under the direction of W. E. Chandler, Division Engineer for the State Highway Department.

Hubbard Creek-Brush Creek Macadam

On September 28, 1920, the State Highway Commission awarded Contract No. 302, covering the surfacing of 4.2 miles of the Hubbard Creek-Brush Creek section of the Coast Highway to J. W. Hillstrom of Marshfield, Oregon. The total estimated cost of this work is $28,500.00. No expenditures have been made to the date of this report.

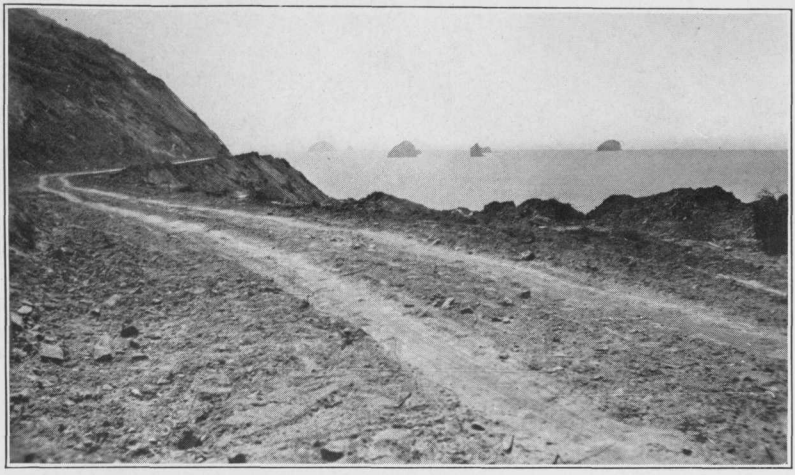
Hubbard Creek-Brush Creek—Grading

Contract No. 148 for the grading of 6.82 miles between Hubbard Creek and Brush Creek on the Coast Highway was awarded to Moon & Company of Marshfield, Oregon, on June 10, 1919. The remoteness of this work has made it very difficult for the contractor to obtain labor and material and it is not expected that the improvement will be completed before January 31, 1921.

The total estimated cost is $171,500.00, toward which amount the County co-operates to the extent of $30,000.000. At the date of this report expenditures of $111,753.25 from State funds have been made under the engineering supervision of B. O. Johnson, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 8,193.25
Contract Items as Follows:		
Clearing and grubbing, 97 per cent, at $7,000.00	$ 6,790.00	
Common excavation, 104,689 cu. yds. at 50c	52,344.50	
Solid Rock excavation, 49,956 cu. yds. at 99c	49,456.44	
Overhaul, 3,500 sta. yds. at 3c	105.00	
Rip-rap, 65 cu. yds. at $4.00	260.00	
Lumber and timber, 133.400M FBM at $40.00	5,336.00	
Cedar for culverts, 188.584M FBM at $40.00	7,543.36	
Total amount earned by contractor	$121,835.30	
Percentage retained until completion of contract	18,275.30	
Total amount paid contractor to Nov. 30, 1920		$103,560.00
Grand total expenditure to Nov. 20, 1920 (all State funds)		$111,753.25



A NEWLY GRADED SECTION ON THE COAST HIGHWAY IN CURRY COUNTY.



NEW CONSTRUCTION ON THE COAST HIGHWAY SOUTH OF PORT ORFORD.

Port Orford-Coos County Line Survey

At the present time, location survey of the Coast Highway is being made between Port Orford and the Coos County line under the direction of B. O. Johnson, Resident Engineer. At the time of making this report the survey is approximately 95 per cent complete. This survey was requested by the County, as they have $49,000.00 available from their bond issue to devote to this section and it is their desire that any moneys which may be expended will be on work fully meeting State Highway Department standard requirements.

Port Orford-Hubbard Creek Survey

Location survey of this 1.3 miles of the Coast Highway has recently been completed under the direction of B. O. Johnson, Resident Engineer. The final adopted location follows what is known as the Hill Route with a maximum gradient of 6 per cent. This line was chosen in preference to a somewhat shorter beach route, which would always be in grave danger of being eaten away by constant wave action.

Hubbard Creek-Mussel Creek Survey

During the early spring of 1919 final location between Hubbard Creek and Brush Creek was made by W. E. Chandler, Locating Engineer. At the present time final location between Brush Creek and Mussel Creek is in progress and will be completed in the very near future. This survy is under the direction of B. O. Johnson, Resident Engineer.

The district traversed by this line has required a very careful study as there are many active slides on the slopes toward the ocean. Some of these slides must be taken care of during construction while many others will be avoided.

Mussel Creek-California Line Reconnaissance

A very thorough reconnaissance was made of this section of the Coast Highway in order to determine as closely as possible the best location without, at this time, going to the expense of a final detailed survey. Reconnaissance was started on August 7, 1920, and completed on September 25, 1920, by J. H. Scott, Locating Engineer, with a total length of 47.6 miles investigated and reported upon.

Market Roads

The State Highway Commission has on file "Market Road Resolutions" signed by W. A. Wood, County Judge, under date of March 8, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for market road construction, and designating two roads to be improved as market road projects.

A levy of 1 mill on a valuation of $4,868,680.65 produced a County market road fund of $4,868.68. Included in the State levy of taxes was a levy of 1 mill on a valuation of $3,767,717.80, which produced $3,767.72, which became a part of the "State Market Road Appropriation."

[CURRY]

Funds apportioned by the State Highway Commission March 2	$ 3,767.72
Funds apportioned by the State Highway Commission April 3	1,536.68
Funds produced by County 1-mill levy	4,868.68
Total available for 1920	$ 10,173.08

B. O. Johnson, Resident Engineer in the employ of the State Highway Commission, made the location survey, prepared plans and estimates and did the necessary engineering work during construction.

Project No. 1.—"Commencing at a point about three and one-half miles north of Port Orford, thence east and south along the most practicable route to the center of Section 35, T-32S, R-15W, W.M., a distance of about three and one-half miles."

A location survey 3.37 miles in length was made. The road is through a narrow river valley, about one-half the length along the side hill and one-half on flat or rolling ground. The maximum grade is 8 per cent.

The work planned for 1920, consisted of grading 2.75 miles, width of roadbed ten feet, with passing places provided. A contract was awarded for this work and the work was completed. The estimated cost of the project is $15,042.50.

Project No. 2.—"Commencing at a point in front of the Court House in Section 36, T-36S, R-15W, thence southerly by the most practicable route to the Pistol River bridge, Section 20, T-38S, R-14W, W.M., a distance of about sixteen miles."

No work was done on this project in 1920.

DESCHUTES COUNTY

The McKenzie River Highway, The Dalles-California Highway, the Bend-Sisters Highway and the Central Oregon Highway form a network of four State highways having junction points in Deschutes County. Construction of these highways will not only give tourists from all points access to this refreshing bit of mountain country, but will serve the local interests very completely for all traffic, and give them one of the best systems of State highways within the borders of any County.

From Bend north to the Jefferson County line, on The Dalles-California Highway, 22.5 miles of grading is now complete, and gravel surfacing is in progress.

South from Bend 17.1 miles to the Allen Ranch, on The Dalles-California Highway, one mile of gravel surfacing and 4.1 miles of cinder surfacing, together with reshaping part of the remaining twelve miles of cinder curfacing were completed in the winter of 1919-1920.

From Bend southeast to Millican, via Horse Ridge, twenty-six miles of Central Oregon Highway were located in the summer of 1919.

Location survey from Bend to Sisters, twenty-two miles in length, was run during the present year. From Redmond west to Sisters, a location survey of twenty miles on the MeKenzie Highway was run in the summer of this year.

A County bond issue of $125,000 was voted June 3, 1919, $60,000.00 being applied on the Bend-Jefferson County Line Section, $20,000.00 on the Redmond-Sisters Section, $15,000.00 on the Bend-Horse Ridge Section and $25,000.00 on the Tumalo-Sisters Section.

Work in Deschutes County was handled by C. C. Kelley, Division Engineer, until September, 1920, being taken over at that time by J. H. Scott, Division Engineer.

Bend-Jefferson County Line Macadam

On July 6, 1920, Contract No. 272, for graveling the section between Bend and a point one mile south of the Jefferson County line, was awarded to Wickner, Sharpe & Chindahl of Portland. This surfacing is now complete for a distance of approximately five miles. The total estimated cost of the work is $147,000.00, which is all being paid from State funds. To date the sum of $19,234.70 has been expended under the engineering supervision of R. P. Newland, Resident Engineer.

Bend-Allen Ranch Macadam

This section of The Dalles-California Highway extends south from Bend a distance of 17.1 miles to Allen's Ranch. During 1918 County forces placed a cinder surfacing on portions totaling 12.5 miles. On November 4 the State Highway Commission awarded Contract No. 231 to Oskar Huber of Portland, Ore., for 1.1 miles of grading, one mile of gravel surfacing, 4.1 miles of new cinder surfacing and reshaping 7.19 miles of the old cinder surfacing placed by the County. Cinders were secured from Lava Butte eleven miles south of Bend, and in order to show comparative results with this cinder surfacing, the gravel was hauled from a pit at Bend and one mile of this gravel surfacing was

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laid. Work was completed on May 10, 1920, under the engineering supervision of G. I. Stebbins, Resident Engineer. The work represents a total cost of $31,346.31, which has all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,535.11
Truck rental and repairs		208.82
Contract Items as Follows:		
Clearing and grubbing, all, lump sum	$ 200.00	
Common excavation, 3,960 cu. yds. at 90c	3,564.00	
Solid rock excavation, 21 cu. yds. at $3.00	63.00	
Gravel surfacing, 1,504 cu. yds. at $3.70	5,564.80	
Cinder surfacing, 7,471 cu. yds. at $2.40	17,930.40	
Reshaping old cinder surfacing, 7.19 miles at $100.00	719.00	
Grader work, 1.1 miles at $700.00	770.00	
Total	$ 28,811.20	
Deductions:		
Tractor rental and repairs	208.82	
Total amount paid contractor		$ 28,602.38
Grand total cost of project (all State funds)		$ 31,346.31

Bend-Jefferson County Line Grading

Contract No. 232 for grading the 23.9 miles between Bend and the Jefferson County line was awarded to Oskar Huber of Portland on November 4, 1919. The last mile of this section, at the north end, was cancelled in view of a possible revision of location contemplating the construction of a high bridge over the Crooked River instead of the present trail crossing. The line as a whole traverses flat, open country with light surface soil. Good alignment was secured, although some objection was made by property owners on account of the land being cut diagonally. The many scab rocks encountered were covered by earth fills to avoid expensive rock excavation. The construction of eleven concrete slab structures for irrigation canal crossings were included in the grading contract. Changes of design from concrete structures to multiple pipe culverts have been made for these canal crossings, at an estimated saving of approximately $15,000.00.

Owing to the difficulty in securing sufficient working forces, progress has been slow, but at the present time is complete with the exception of concrete bridges over the Swalley Ditch and Pilot Butte Canal.

Work was handled under the direction of G. I. Stebbins, Resident Engineer, until July 1, 1920, when he was succeeded by R. P. Newland, Resident Engineer. The estimated cost of the work is $108,000.00, of which amount $79,267.15 have been expended to date. Deschutes County co-operates on this grading to the extent of $60,000.00, having paid $45,000.00.

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DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 8,961.98
Filling old reservoir		22.50
Repairing weir and constructing ditch		95.65
Charges for State owned equipment (to be deducted from amounts due contractor)		1,507.31
Contract Items as Follows:		
Clearing, 95 per cent, at $6.000.00	$ 5,700.00	
Common excavation, 54,898 cu. yds. at 54c	29,644.92	
Intermediate excavation, 5,079 cu. yds. at 78c	3,961.62	
Solid rock excavation. 9,049 cu. yds. at $2.75	24,884.75	
Overhaul, 4,867 sta. yds. at 5c	243.35	
Grader work, 11.14 miles at $700.00	7,798.00	
8" plain concrete pipe, 120 lin. ft. at $1.25	150.00	
12" plain concrete pipe, 1,135 lin. ft. at $1.50	1,702.50	
18" reinforced concrete pipe, 520 lin. ft. at $3.00	1,560.00	
24" reinforced concrete pipe, 216 lin. ft. at $3.75	810.00	
30" reinforced concrete pipe, 340 lin. ft. at $5.00	1,700.00	
36" reinforced concrete pipe, 96 lin. ft. at $6.00	576.00	
Rubble masonry. 13.61 cu. yds. at $15.00	204.15	
Class "C" concrete, 118.16 cu. yds. at $25.00	2,954.00	
Metal reinforcement, 282 lbs. at 10c	28.20	
Total	$ 81,917.49	
Deduction for equipment furnished by State	1,117.83	
Total amount earned by contractor	$ 80,799.66	
Percentage retained until completion of contract	12,119.95	
Total amount paid contractor		$ 68,679.71
Grand total expended to November 30, 1920		$ 79,267.15
Paid by State	$ 34,267.15	
Paid by County	45,000.00	
Total	$ 79,267.15	

Maintenance

During the summer of 1920, maintenance work was done on the Bend-Allen Ranch section in order to preserve the cinder surfacing which was being badly cut up by heavy travel. The total expenditures for this maintenance amount to $1,314.92 which is to be shared equally by Deschutes County and the State Highway Department.

Redmond-Sisters Construction Engineering

During the spring of 1920, location was accomplished on 20.1 miles of the McKenzie River Highway between Redmond and Sisters. The route in general is westerly from Redmond through Cline Falls to Sisters, and traverses an open country with some sections of rolling ridges. Light soil conditions prevail and the gravel supply for surfacing will be available near Cline Falls. Crossing Deschutes River was made on the present County bridge at Cline Falls and Broad Canyon was crossed on the present 300-foot steel County bridge. This location was made by G. I. Stebbins and R. P. Newland, Locating Engineers.

A fairly good cindered road now extends from Redmond to Cline Falls and grading work is being carried on by County forces from Cline Falls west to Sisters. It is estimated that expenditures of $20,000.00 will be made on this grading, which is to be paid for from the Deschutes County bond issue. Most of the grading will be very light and can be done by the use of graders and caterpillar tractors. One mile of the

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grading has been completed at an expenditure of $300. So far the costs have been very gratifying and the results highly satisfactory. This work is being done under the general supervision of R. P. Newland, Resident Engineer for the State Highway Department.

Bend-Horse Ridge Construction Engineering

In the summer of 1919, 26.2 miles of location on the Bend-Horse Ridge section of the Central Oregon Highway to a point near Millican was made by R. B. Gould, Locating Engineer. The line traverses flat country up to Horse Ridge, where it climbs over the easterly end of that ridge.

As sufficient funds were not available for application on complete construction, the County Court agreed to expend their quota of $15,000.00, bond money, on the first 17 miles from Bend to the foot of Horse Ridge.

Work was largely in the nature of grader work, a Holt 120-H.P. Caterpillar tractor being furnished by the State.

Great success was achieved in the prosecution of this County work, and the greater portion of the work undertaken is now complete, except for the small bridges. The construction costs to date amount to about $10,000.00.

R. B. Gould is in charge of County grading operations and R. P. Newland is in charge of construction engineering for the State.

It is expected that the State will gravel the completed grade some time during 1921.

Construction Engineering County Bridges

At the request of the County Court of Deschutes County, designs have been prepared for three small wooden bridges on the Bend-Horse Ridge section of the Central Oregon Highway. The County is working on this section and desire to have their construction in conformance with the usual State standards and these designs have been prepared for a type of structure which will fully meet all requirements.

Bend-Jefferson County Line Survey

In the summer of 1919, survey of The Dalles-California Highway from Bend north to the Jefferson County line was made by R. B. Gould and G. I. Stebbins, Locating Engineers. Preliminary investigations indicated the most economical and desirable line was one which circled around the west end of Long Butte, near Tumalo. Residents of the town of Deschutes asked that a trial line be run paralleling closely the west side of the Oregon Trunk Railway. Results showed this latter line to be objectionable because of poor alignment and broken grades, and at a greater cost of $40,00.00, due to masses of lava rock; with the advantage of saving only one-half mile in length over the adopted line.

Beginning at Bend, this section runs north through Redmond and Terrebonne to the Jefferson County line near Trail Crossing of the Crooked River, a distance of 24.2 miles.

[DESCHUTES]

Bend-Sisters Survey

Location of this highway was carried on during 1919 and 1920 and completed in the spring of 1920 by G. I. Stebbins, Locating Engineer. The Bend-Sisters Highway begins at a point opposite Tumalo on The Dalles-California Highway, approximately 5.5 miles north of Bend, and extends 15.5 miles to the town of Sisters where a connection is made with the McKenzie River Highway. The location as made crosses the Deschutes River at Tumalo and effects a saving of approximately 3.5 miles over the present traveled road between Bend and Sisters.

It is expected that grading by County forces will be started in the very near future. The County will expend their bond quota of $25,000.00 upon this work with the understanding that the State Highway Department will give credit for this expenditure as a County co-operation on future State work within the County. R. P. Newland is Resident Engineer for the State on this construction being done by County forces.

Allen Ranch-Klamath County Line Survey

About August 1, 1920, F. N. Drinkhall began a location of The Dalles-California Highway from Allen's Ranch, 17.1 miles south of Bend, to the Klamath County line, a distance of 17.3 miles. The location was completed August 30, 1920, and follows the easterly side of a survey for the proposed Oregon Trunk Railway southerly from Bend. The grade is comparativly flat, and the alignment good, being only 0.3 of a mile longer than a straight line for the entire distance. The survey passes through the town of Lapine, and connects with a survey now being made of The Dalles-California Highway through Klamath County to Klamath Falls. Construction work is expected to be undertaken in 1921.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by W. D. Barnes, County Judge, Seth Stackey and C. H. Miller, County Commissioners, under date of March 4, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for market road construction, and designating two roads to be improved as market road projects.

A levy of 1 mill on a valuation of $8,887,266.62 produced a County market road fund of $8,887.27. Included in the State levy of taxes was a levy of 1 mill on a valuation of $10,079,203.60 which produced $10,079.20, and which became a part of the "State market road appropriation."

Funds apportioned by State Highway Commission March 2	$ 10,079.20
Funds apportioned by State Highway Commission April 3	4,110.86
Funds produced by County levy of 1 mill	8,887.27
Total available for 1920	$ 23,077.33

Project No. 1.—"The Shevlin Park road." Beginning at the S. E. corner of the N.E. ¼ of the N.W. ¼ of Sec. 31, T-17 S., R-12 E., W.M., same being at the intersection of Newport Avenue in the City of Bend, with the western boundary of said corporate City of Bend thence running

[DESCHUTES]

in a general northwesterly direction through Sec. 31, T-17 S., R-12 E., W.M., and Sections 36, 25, 26 and 23 of T-17 S., R-11 E., W.M., to a point on the west side of Tumalo Creek near the State Fish Hatchery.

The survey and estimate of cost was made by G. I. Stebbins, Resident Engineer, in the employ of the State Highway Commission. The project is 2.92 miles in length, and was improved the entire length in 1920. The road before the 1920 improvement was a narrow road through rolling country sparsely timbered with juniper and pine; the soil being a light volcanic ash over a deposit of lava, the latter showing many outcroppings.

The improvement was made on good alignment with a maximum grade of 8 per cent from the flat into the Tumalo bottoms near the hatchery. The road was graded 20 feet in width and surfaced with crushed gravel 14 feet in width approximately seven inches in depth.

A rustic log bridge was built over Tumalo Creek. Rock crushing was done by contract, the contractor furnishing gravel in the bunkers. The hauling of the gravel and all other work was done by County forces. The construction engineering was done by Robert B. Gould, County Surveyor.

The estimated cost of project was as follows:

Clearing and grubbing	$ 300.00
Grading	2,156.45
Culverts	84.00
Bridges	450.00
Gravel surfacing	11,922.48
	$ 14,912.93
Engineering and contingencies, 10 per cent	1,491.29
Total	$ 16,404.22

Project No. 2.—"The North West Redmond Road." "From Redmond northwest to an intersection with the Terrebonne-lower bridge road at Williams Corner."

The survey and estimate of quantities was made by R. P. Newland, Resident Engineer in the employ of the State Highway Commission. The survey shows the line to be 9 miles in length. 5.93 miles were improved in 1920. The survey of the road follows the old road over considerable portion of the line with new location in some places. The road runs through land under irrigation, most of which is in alfalfa.

The improvement was made on good alignment with a maximum grade of 7 per cent. The road was graded to 20 feet width of roadbed and surfaced with gravel twelve feet wide and approximately seven inches in depth. The construction work was done by the County.

Estimated cost of project No. 2 (6 miles):

Clearing and grubbing	$ 1,000.00
Grading	9,280.00
Culverts and bridges	3,228.00
Right-of-way and fence	276.00
Gravel surfacing	17,285.00
	$ 31,069.00
Engineering and contingencies, 10 per cent	3,106.90
	$ 34,155.90

DOUGLAS COUNTY

Douglas County offers more barriers to road construction than any County in the state, except possibly the Counties bordering on the Columbia River. Soil conditions varying from adobe to solid rock, with accompanying drainage problems, render road work both difficult and expensive.

The biennium covered by this report marks the completion of a passable winter road throughout the entire length of the Pacific Highway in the County. The last grading through Pass Creek Canyon has been completed and the section macadamized. The well, but unfavorably, known Rice Hill grade is eliminated and traffic now goes over ten miles of finished pavement surface from Rice Hill to Oakland.

Roberts Mountain, and with it seven grade crossings of the Southern Pacific are now no more, and a paved water grade highway replaces the old road. The heretofore impassable old road south of Canyonville and across Cow Creek to the south line of the County is now graded and macadamized. In all, fifty-four miles of standard graded roadbed have been completed, 51.5 miles have been macadamized and 24.3 miles paved during the past two years on the Pacific Highway alone.

In addition to the work on the Pacific Highway, a 14.17 mile section of the Roseburg-Coos Bay Highway between Camas Valley and Remote, of which 8 miles lies in Douglas County, is now almost completely graded. This work is being done as a post road project with State and Government funds. A complete description will be found in the portion of this report devoted to Coos County.

The sum of $100,000.00 has been set aside for work on the Tiller Trail Forest Road Project, apportioned equally between the State, the County and the Federal Government. Work on this project is being handled under the supervision of the Bureau of Public Roads.

The grading of 11 miles from Canyonville to Galesville has been accomplished by the Bureau of Public Roads as a Forest Road Project. This work has been financed by the State, the County and the Federal Government.

Aside from forest road projects, the construction of the Comstock Overhead Crossing and approaches, which has been accomplished in cooperation with the County and the Southern Pacific Railroad, and the sum of $10,000.00 County co-operation for grading between Leona and Myrtle Creek, all construction on the Pacific Highway during the past biennium has been supervised and paid for by the State.

Surveys and construction on the Roseburg-Coos Bay Highway are under the supervision of W. E. Chandler, Division Engineer. The Pacific Highway, from Galesville, 11 miles south of Canyonville, to the Douglas County line is under the supervision of K. E. Hodgman, Division Engineer, the work in the balance of the County being under the supervision of J. C. McLeod, Division Engineer.

[DOUGLAS]

Advances for Rights-of-Way

During the past two years, the State Highway Commission has advanced payments to Douglas County for the purchase of rights-of-way on the Pacific Highway as follows:

Comstock-Pass Creek	$ 530.00
Leona-Drain	50.54
Drain-Yoncalla	5,964.76
Oakland-Wilbur	400.00
Wilburg-Roseburg	3,053.00
Roseburg-Dillard	10,857.38
Myrtle Creek-Canyonville	1,919.00
Canyonville-Johns Place	1,440.50
Stage Road Pass Section	2,706.24
Total	$ 26,921.42

These advances are to be repaid to the State by Douglas County.

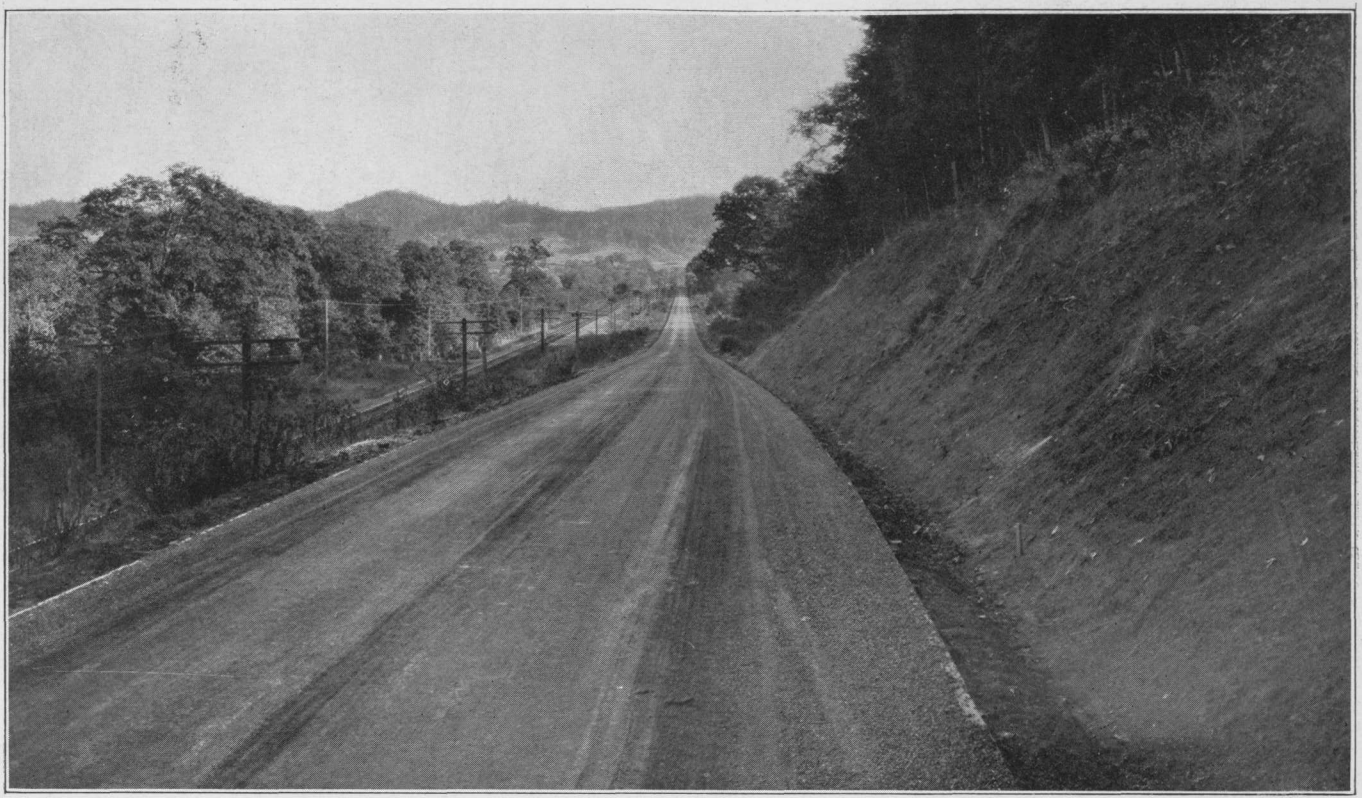
Oakland-Yoncalla Paving

The State Highway Commission awarded the Clark & Henery Construction Company of Stockton, Cal., contract No. 96, for the paving of the newly graded 10.12 miles of the Pacific Highway between Oakland to a point 3.7 miles south of Yoncalla. The original contract called for a 2-inch bitulithic wearing suface on an 8-inch macadam base. However, great difficulty was experienced in securing suitable rock in sufficient quantities for the construction of the macadam base from the quarry at Isadore and this shortage of material, in connection with the better results which are obtained by the use of bituminous base, rendered it advisable to change the type of pavement to a 5-inch bituminous mix on a 4-inch macadam base. This change was effected on the south 7 miles of the work. All crushed gravel aggregate used in the bituminous pavement was shipped in by railroad to the paving plant, which was set up at Isadore.

Paving was completed from the north end of the section to Isadore during 1919 and the road rocked south of this point to Chenowith Park, which is the junction with the old County road through Oakland. Winter traffic was routed via this detour to Oakland and southern points.

Paving operations were resumed in June, 1920, as soon as the road was sufficiently dry. As this report goes to press, the work is practically completed and traffic has been routed over the new pavement since October 1. The opening of this section to travel eliminates a long construction detour of 11 miles. At the Oakland end of the project, a temporary macadam connection has been made with the old steel bridge over the Calapooya River. Plans have been made for a future structure spanning the river and the Southern Pacific tracks and connecting with the main street in Oakland.

The total estimated cost of the paving amounts to $338,000.00, which is all to be paid from State funds. Total expenditures have been made to date amounting to $249,800.53. This work is being handled under the supervision of G. E. Farnsworth, Resident Engineer.



ON THE OAKLAND-YONCALLA SECTION OF THE PACIFIC HIGHWAY, TWO MILES NORTH OF OAKLAND. PAVED IN 1920.



BITUMINÓUS PAVEMENT SOUTH OF DILLARD ON THE MYRTLE CREEK-DILLARD SECTION OF THE PACIFIC HIGHWAY IN DOUGLAS COUNTY. LAID IN 1919.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 10,138.57
Grass seeds furnished by State to be used for slope protection		3.10
Hauling logs for footbridge over borrow pit near schoolhouse		9.00
Lumber for header boards, furnished by State		4,918.90
Contract Items as Follows:		
Excavation, no classificaitou, 11,050.6 cu. yds. at 75c	$ 8,287.95	
6" porous drain tile, 5,089 liu. ft. at 30c	1,526.70	
Broken stone shoulders, 29,758 lin. ft. at 6c	1,785.48	
Broken stone for base, 7,838 cu. yds. at $3.97	31,116.86	
Run of quarry crushed rock, 15,813.5 cu. yds. at $3.65	57,719.27	
Bituminous pavement, Type "E," 26,452.3 sq. yds. at $1.47	38,884.88	
Bituminous pavement, Type "D," 54,051 sq. yds. at $2.24	121,074.24	
Materials on hand	20,280.01	
Total	$280,675.39	
Deduction for freight reduction and war tax	4,521.32	
Total amount earned by contractor	$276,154.07	
Percentage retained until completion of contract	41,423.11	
Total amount paid contractor		$234,730.96
Grand total expended to Nov. 30, 1920 (all State funds)		$249,800.53

Oakland-Wilbur Grading and Paving

Contract No. 130, for grading and paving 7 miles from the undercrossing of the Southern Pacific south of Oakland to the grade crossing of the Southern Pacific Railway one mile south of Wilbur, was awarded to the Clark & Henery Construction Co., of Stockton, Cal., on May 27, 1919. The grading was for the most part quite light, following an existing gravelled road for all but 1.5 miles. This section of new grading follows the west side of the Southern Pacific Railway just north of Wilbur and required heavy filling across black adobe land to place it above flood waters. This change eliminated two dangerous railroad grade crossings. A half mile gap remains not under contract in the center of the project. A future grade separation is contemplated to eliminate the existing dangerous grade crossing of the Southern Pacific Railway at this point.

The Clark & Henery Company's contract specified that all fills of over one foot in depth should be graded and rocked and allowed to settle over one winter prior to paving. Accordingly, the entire section was graded during the 1919 season and covered with macadam 8 inches in depth and 20 feet wide. Crushed cemented gavel from natural deposits just east of Wilbur was used in the macadam base. Five concrete bridges were also built, replacing timber structures that had outlived their usefulness.

Paving operations were much delayed on this section due to inability of the contractor to get crushed gravel and sand for pavement aggregate. This had to be shipped in and delays were due both to car shortage and unusual demand elsewhere for this class of material. One and three-tenths miles of pavement north of Sutherlin were completed October 1, 1920, when paving was shut down on account of bad weather. This job will be completed in 1921. The road is in excellent condition for all winter travel. The Resident Engineer in charge of this work is G. E. Farnsworth.

[DOUGLAS]

The total cost of the work is estimated at $361,000.00, of which $190,875.66 has been expended to date. Douglas County co-operates to the extent of $10,000.00, the balance of the cost being paid from State funds.

Myrtle Creek-Dillard Paving

The Oregon Hassam Company of Portland was the successful bidder on the paving of the 12.94-mile newly graded section between Myrtle Creek and Dillard. Contract No. 97 awarded April 15, 1919, covered the laying of a macadam base 8 inches deep with a 2-inch bitulithic wearing surface. Paving operations began June 7, 1919. Base was laid on the north half of the project and wearing surface placed on 3.6 miles before the paving plant was shut down for the winter on November 21, 1919. Paving was resumed March 22, 1920 and completed September 21, 1920. On the south 6.7 miles of this project a heavier pavement was laid, a 5-inch bituminous pavement being placed on a 4-inch macadam base. The heavier pavement was necessary because of the adobe soils crossed. In addition particular care was taken with the drainage to insure a dry base under pavement, drain tile being used through adobe cuts and where open ditches were not practicable.

The pavement was thrown open to travel on its completion, thereby eliminating the Roberts Mountain grade and the dangerous grade crossings of the Southern Pacific Railway previously traversed on the old Pacific Highway.

Work is now progressing rapidly on macadam shoulders to pavement and construction of guard fence along the outside of curves and where the road skirts the river. The road should be ready for acceptance in the very near future. Supervision of this project has been under A. S. Kennedy, Resident Engineer.

This piece of road is one of the most scenic sections between Portland and the California line. Beautiful fields and orchards and wonderful scenery are viewed from the road, and with the easy riding pavement more opportunity is given to admire them.

At the southern terminus of this section a temporary routing will be maintained over the old timber bridge across the Umpqua River, thence crossing the Southern Pacific at grade and entering Myrtle Creek. Plans are now prepared for a new permanent structure to cross the Umpqua below the site of the present bridge and cross the railroad with an overgrade structure. Bids will be requested on this structure in the spring of 1921.

The total cost of the completed work is estimated at $470,000.00 of which amount $386,642.26 has been expended to date. Payment for the entire work is to be made by the State.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 15,797.27
T N T furnished by State (to be deducted from amounts due contractor)		59.95
Grass seed furnished by State, to be used for slope protection		3.00
Contract Items as follows:		
Excavation, no classification, 4,763.5 cu. yds. at 70c	$ 3,334.45	
Common excavation (widening roadbed), 8,832 cu. yds. at 90c	7,948.80	
Intermediate excavation (widening roadbed), 1,956 cu. yds. at 90c	1,760.40	
Solid rock excavation (widening roadbed), 7,069 cu. yds. at $1.40	9,896.60	
Overhaul, 200 sta. yds. at 3c	6.00	
6" porous drain tile, 4,338 lin. ft. at 40c	1,735.20	
Class "A" concrete, 5.44 cu. yds. at $32.00	174.08	
Broken stone for base, loose measure, 48,404.5 cu. yds. at $2.93	141,825.19	
Standard Bitulithic pavement, Type "E," 121,720 sq. yds. at $1.49	181,362.80	
Bituminous base, 63,005.1 sq. yds. at $1.15	72,455.87	
Broken stone shoulders, 27,990 lin. ft. at 6c	1,679.40	
Wood headers, 68,003 lin. ft. at 7½c	5,100.23	
Broken stone for shoulders, 2,829.25 cu. yds. at $2.93	8,289.70	
Force Account Items:		
Laying concrete pipe culverts	106.49	
Furnishing and delivering 6" drain tile tees	20.95	
Excavating shoulder drains	362.08	
Rock backfill for tile drains	62.31	
Excavating 650 ft. of side ditches	55.52	
Removing temporary deck of Umpqua River Bridge	95.42	
Salvaging macadam base for shoulders	138.93	
Total	$436,410.42	
Deductions:		
T N T furnished by State	59.95	
Tile purchased by State	9.66	
War tax on freight	126.65	
Total deductions	$ 196.26	
Total amount earned by contractor	$436,214.16	
Percentage retained until completion of contract	65,432.12	
Total amount paid to contractor		$370,782.04
Grand total expended to Nov. 30, 1920 (all State funds)		$386,642.26

Lane County Line-Comstock Grading and Macadam

On July 26, 1920 certain short sections totaling 0.76 miles between the Lane-Douglas County Line and Comstock were ordered graded to Pacific Highway standards and covered with a 16-foot macadam, by the Highway Commission. This work has been done by State forces in conjunction with other work of similar character between Divide and Leona. Construction forces were in charge of Superintendent J. L. Shaska. Resident Engineer W. S. Hodge was in charge of the engineering on this work.

Work was completed in November, 1920.

The quantities involved amount to:

Common excavation	3,028 cu. yds.
Solid rock excavation	598 cu. yds.
Broken stone macadam, waterbound	1,400 cu. yds.

The total estimate of cost amounts to $17,200.00 of which $11,540.11 has been expended to date.

[DOUGLAS]

Comstock Macadam

On completion of the Comstock overgrade crossing on November 30, 1919, macadamizing of the approach fills was undertaken by State forces. Because of the lateness of the season only an 8-foot strip of rock was placed to take care of the winter traffic. A 16-foot macadam was completed during the 1920 season.

W. S. Hodge was Resident Engineer and Superintendent J. L. Shaska was in charge of construction forces.

Three hundred and thirty cubic yards of waterbound macadam were laid at a total estimated cost of $1,650.00. Expenditures of $621.68 have been made to date.

Comstock-Pass Creek Grading and Macadam

This section, 1 mile in length, extends from a point opposite the S. P. R. R. station at Comstock to the north end of the Comstock-Leona section, which was graded and macadamized during 1918 by Hall & Soleim, excepting only the section covered by the Comstock overhead. Albert Anderson of Grants Pass was awarded contract No. 114 for grading and macadamizing this project on May 6, 1919. A 16-foot waterbound macadam, 8 inches deep, was laid using crushed stone from a quarry site 1 mile south of the Lane-Douglas County line. Macadamizing began June 17, 1919 and was completed August 8, 1919, under the supervision of W. S. Hodge, Resident Engineer, at a total expense of $15,170.80 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 694.46
Ditching, drainage and maintenance work by State forces		159.64
Contract Items as Follows:		
Clearing and grubbing, all	$ 175.00	
Common excavation, 4,481 cu. yds. at 80c	3,584.80	
Intermediate excavation, 19 cu. yds. at 90c	17.10	
Overhaul, 1,980 sta. yds. at 5c	99.00	
12" plain concrete pipe, 228 lin. ft. at $2.50	570.00	
6" porous drain tile, 260 lin. ft. at 40c	104.00	
Class "C" concrete, 6.7 cu. yds. at $30.00	201.00	
Broken stone macadam, waterbound, 2,209 cu. yds. at $4.20	9,277.80	
Broken stone, delivered, loose measure, 96 cu. yds. at $3.00	288.00	
Total amount paid contractor		$ 14,316.70
Grand total cost of project (all State funds)		$ 15,170.80

Comstock-Leona Grading and Macadam

A description of this 4.6 miles, between a point approximately one and one-half miles south of Comstock and extending to a point one-half mile north of Leona, will be found on pages 94 and 95 of the previous biennial report. Prior to the beginning of the present biennium, expenditures of $79,082.39, of which $4,773.90 was paid by the State and $74,348.49 by the County, had been made. During the present biennium delayed charges of $4,327.13 have been paid, $2,817.85 by the State and $1,509.28 by the County. This brings the total expenditures for the work to $83,409.52, the sum of $7,551.75 having been paid by the State and $75,857.77 by Douglas County.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,208.57
Construction Items as Follows:		
Clearing and grubbing, all	$ 2,247.00	
Common excavation, 21,394 cu. yds. at 37½c	8,022.75	
Intermediate excavation, 5,446 cu. yds. at 61c	3,322.06	
Solid rock excavation, 5,509 cu. yds. at $1.12	6,170.08	
Overhaul, 5,483 sta. yds. at 2½c	137.08	
12" plain concrete pipe, 664 lin. ft. at 67c	444.88	
18" plain concrete pipe, 168 lin. ft. at $1.55	260.40	
36" reinforced concrete pipe, 97 lin. ft. at $5.50	533.50	
Class "A" concrete, 141.4 cu. yds. at $18.00	2,545.20	
Class "B" concrete, 27.89 cu. yds. at $16.05	447.63	
Metal reinforcement, 11,122 lbs. at 12c	1,334.64	
Waterbound macadam, 1,770 cu. yds. at $4.59	8,124.30	
Waterbound macadam, 8,107 cu. yds. at $4.89	39,643.23	
Earth filler, 500 cu. yds. at 62c	310.00	
Force Account:		
Placing Telford macadam, account of subdrainage	665.75	
Redrilling rock point	74.78	
Excavating ditch, lay tile drain, backfill with gravel	265.11	
Maintenance work	101.97	
Hauling rock for embankment protection	133.98	
Extra clearing account of line revision	155.63	
Moving and repairing fences	300.16	
Raise logging railroad track to highway grade	351.03	
Rock stored at Anlauf, 98.18 cu. yd. at $2.75	270.01	
Reimburse contractor for increase in freight rates	2,339.78	
Total construction cost		$ 78,200.95
Grand total cost of project		$ 83,409.52
Paid by State	$ 7,551.75	
Paid by County	75,857.77	
Total	$ 83,409.52	

Leona-Drain Grading and Macadam

This section, 4 miles in length, begins at Rock Creek, approximately a half mile north of Leona, and extends to the Southern Pacific spur track south of Drain. While following the alignment of the old road for the greater part of the way, the grading in places was quite heavy. When grading was completed scarcely a trace of old gravel or rock remained. Contract No. 150 for grading and macadamizing of this section was awarded to Albert Anderson of Grants Pass on June 10, 1919. Grading was started at once and a quarry opened up 1 mile south of Drain to supply rock for macadam. Rough grading was completed from Drain to Sand Creek during the 1919 season. Grading has been held up between Sand Creek and Rock Creek by the Sand Creek bridge construction, as excavation north of the bridge must be hauled over the finished structure to make the fill on the south side of the bridge.

Macadamizing operations began October 15, 1919 and on January 5, 1920 a passable rocked road was put through the entire section. Construction operations were shut down during the winter and resumed May 17, 1920.

Grading and a 16-foot macadam, 8 inches deep, is now complete on all the job except that portion from Sand Creek to Rock Creek. This work will be handled this fall and winter and can be completed without interference to traffic, as the present road will serve for the winter travel. The Sand Creek bridge is covered by a separate report.

[DOUGLAS]

This section was under the supervision of R. W. Oakley, Resident Engineer, until September 1, 1919 and since that date under supervision of J. S. Sawyer, Resident Engineer, and represents a total estimated cost to the State of $95,000.00. The sum of $74,442.12 has been expended to date.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 4,680.68
Rental of gas roller		246.77
Contract Items as Follows:		
Clearing and grubbing, 95 per cent, at $1,200	$ 1,140.00	
Common excavation, 10,770.7 cu. yds. at 70c	7,539.49	
Intermediate excavation, 5,906.4 cu. yds. at 80c	4,725.12	
Solid rock excavation, 5,102.2 cu. yds. at $2.35	11,990.17	
Overhaul, 8,150 sta. yds. at 7c	570.50	
12" plain concrete pipe, 585 lin. ft. at $1.75	1,023.75	
18" reinforced concrete pipe, 32 lin. ft. at $2.75	88.00	
24" reinforced concrete pipe, 84 lin. ft. at $3.25	273.00	
12" corrugated galvanized iron pipe, 72 lin. ft. at $1.75	126.00	
36" corrugated galvanized iron pipe, 39 lin. ft. at $6.75	263.25	
Class "A" concrete, 128.57 cu. yds. at $28.00	3,599.96	
Class "C" concrete, 21.69 cu. yds. at $25.00	542.25	
Steel reinforcement, 8,401.1 lbs. at 10c	840.11	
Broken stone macadam, waterbound, 10,595 cu. yds. at $4.50	47,677.50	
Clay filler, 657 cu. yds. at $1.75	1,149.75	
6" porous drain tile, 848 lin. ft. at 40c	339.20	
Total	$ 81,888.05	
Deductions:		
Reduction of freight and war tax	106.09	
Total amount earned by contractor	$ 81,781.96	
Percentage retained until completion of contract	12,267.29	
Total amount paid to contractor		$ 69,514.67
Grand total expenditures to Nov. 30, 1920 (all State funds)		$ 74,442.12

Yoncalla Grading and Macadam

As the grading on the Drain-Yoncalla section approached completion, plans were made for macadamizing of this section. It was decided by the Highway Commission to include in this contract the grading and macadamizing of 2.7 miles from a point 1 mile south of Yoncalla south to the beginning of the Yoncalla-Oakland paving contract. This project was called the Yoncalla section and was awarded as contract No. 178 to Albert Anderson of Grants Pass on August 5, 1919. Macadamizing operations began September 29, 1919 and the section from Drain south to the point where the new grade diverged from the old road was covered with macadam before winter. No attempt was made to open up the grading south of Yoncalla until the spring of 1920.

With considerable maintenance the old County road was kept passable as a detour through the winter, although at times the going was rather difficult.

On resuming work on this section in 1920, a second quarry was opened up 2½ miles south of Yoncalla, and as the grading progressed rock was supplied from this quarry.

Because of the extremely short construction season of 1920, this section was finished after the fall rains had set in. The project is not ready for acceptance as this report goes to press.

Supervision of this section was in charge of J. S. Sawyer, Resident Engineer.

[DOUGLAS]

The total cost of the project is estimated at $120,000.00, the sum of $75,829.42 having been expended to date.

Oakland-South Grading and Macadam

This section of 1.13 miles is entirely new construction. Beginning at the south city limits of Oakland, just east of the Southern Pacific tracks, it follows closely the alignment of the Southern Pacific Railway to a connection with the highway just east of the old undercrossing of the Southern Pacific. Contract No. 115, for grading and macadamizing of this section was awarded to John Hakanson of Oakland on May 6, 1919. Grading and a portion of the macadam was completed in 1919. The entire job was completed and accepted August 7, 1920. The macadam was 16 feet wide and 8 inches in depth, being screened Calapooya River gravel, waterbound. By the construction of this unit a grade crossing and an undercrossing of the Southern Pacific Railway were eliminated. G. E. Farnswoth was Resident Engineer in charge of this work.

Total expenditures to date amount to $26,021.64 in a total estimated cost of $26,397.34.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,643.69
Extra gravel hauled by Clark & Henery Construction Company		27.00
Truck rental and repairs (to be deducted from amounts due contractor)		1,069.40
Contract Items as Follows:		
Clearing and grubbing, 100 per cent	$ 800.00	
Common excavation, 5,238.4 cu. yds. at 50c	2,619.20	
Intermediate excavation, 6,216.3 cu. yds. at 75c	4,662.23	
Solid rock excavation, 1,954.3 cu. yds. at $1.85	3,615.46	
Overhaul, 942 sta. yds. at 5c	47.10	
Screened gravel, waterbound, 2,597 cu. yds. at $4.20	10,907.40	
Class "C" concrete, 10.9 cu. yds. at $25.00	272.50	
Rubble masonry, 33.63 cu. yds. at $10.00	336.30	
12" plain concrete pipe, 317 lin. ft. at $1.50	475.50	
18" reinforced concrete pipe, 32 lin. ft. at $3.00	96.00	
36" reinforced concrete pipe, 84 lin. ft. at $6.50	546.00	
6" porous drain tile, 688 lin. ft. at 25c	172.00	
Force Account Items:		
Cutting back slopes after slide removals	147.29	
Spreading gravel hauled by Clark & Henery Construction Company	29.67	
Total	$ 24,726.65	
Deductions for rental of equipment owned by State	1,069.40	
Total amount earned by contractor		$ 23,657.25
Grand total cost of project (all State funds)		$ 26,397.34
Final payment to contractor in transit		375.70
Grand total expended to November 30, 1920		$ 26,021.64

Roseburg-Wilbur Macadam

John Hakanson of Oakland was awarded Contract No. 273 for 4.1 miles of graveling on the Roseburg-Wilbur Section on July 6, 1920. The material specified was run of crusher material having a maximum size of 2 inches.

Due to some delay in acquiring a material site for gravel, and non-arrival of contractor's crusher, this job was over a month late in starting after the awarding of the contract. This, together with an early and prolonged rainy season, made progress slow. On November 10 all disturbed sections of the old road that must be traveled during the winter

[DOUGLAS]

had been rocked and made passable and a favorable winter should see the entire job rocked. Supervision of this work is under W. K. Wright, Resident Engineer. The total estimated cost is $42,000.00, with total expenditures to date amounting to $7,625.20.

Roseburg-Dillard Grading and Macadam

While the road between Roseburg and Dillard has always been a passable winter road it was far from standard as to width, grade, alignment, drainage, or surface. It had adverse grades, three railroad grade crossings, right angle turns and extremely rough surface in many places.

J. E. Colby of Roseburg was awarded contract No. 129 for grading and macadamizing the revised location on this section on July 10, 1919. Grading was started August 27 and carried on through the winter. The old road surface was not disturbed where it would interfere with traffic. On July 20, 1920 macadamizing was started, laying a crushed gravel waterbound macadam 16 feet wide and 8 inches deep. At the date of this report the section is approximately completed and ready for acceptance. The city of Roseburg proposes to grade and gravel a connection from the north end of the section, which is the south city limit, north to the end of the city pavement on Stephens Street. When this is completed a good macadam road will connect with the north end of the Myrtle Creek-Dillard pavement. A further grade separation of the Southern Pacific just south of Shady is proposed as a future project. Resident Engineer W. K. Wright is in charge of this section.

Expenditures of $98,073.28 have been made. The total estimated cost is $132,000.00.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 7,407.82
Contract Items as Follows:		
Clearing and grubbing, all, $1,000.00	$ 1,000.00	
Common excavation, 22,232 cu. yds. at 60c	13,339.20	
Intermediate excavation, 10,494 cu. yds. at 80c	8,395.20	
Solid rock excavation, 17,508 cu. yds. at $1.20	21,009.60	
Overhaul, 69,002 sta. yds. at 10c	6,900.20	
12" plain concrete pipe, 450 lin. ft. at $1.50	675.00	
18" reinforced concrete pipe, 408 lin. ft. at $2.70	1,101.60	
24" reinforced concrete pipe, 344 lin. ft. at $4.51	1,551.44	
36" reinforced concrete pipe, 68 lin. ft. at $7.34	499.12	
6" porous drain tile, 5,167 lin. ft. at 45c	2,325.15	
Class "A" concrete, 292 cu. yds. at $22.00	6,424.00	
Class "C" concrete, 24.1 cu. yds. at 20.00	482.00	
Metal reinforcement, 24,762 lbs. at 8c	1,980.96	
Lumber and timber, 40.5M FBM at 40.00	1,620.00	
Broken stone macadam, 10,465 cu. yds. at $3.45	36,104.25	
Clay or earth filler, 1,039 cu. yds. at $1.80	1,870.20	
Concrete handrail, 50 lin. ft. at $4.00	200.00	
Force Account Items:		
Backfilling tile drain ditches with gravel	1,187.33	
Total amount earned by contractor	$106,665.25	
Percentage retained until completion of contract	15,999.79	
Total amount paid to contractor		$ 90,665.46
Grand total expended to Nov. 30, 1920 (all State funds)		$ 98,073.28

Canyonville-Galesville Macadam

Just prior to completion of the grading from Canyonville to Galesville, bids were received by the State Highway Commission for the

[DOUGLAS]

macadamizing of the 11 miles comprising Forest Road project Units No. 1 and No. 2.

Contract No. 194 for crushed rock and crushed gravel macadam waterbound, 16 feet wide and 8 inches deep was awarded to the Warren Construction Co. of Portland on August 5, 1919. A late start was made due to delays in delivery of crushing equipment on the ground. Delivery of rock on the road began October 17, from the crusher on the north end, and the delivery of crushed gravel from the crusher on Cow Creek began October 5. Rocking from the Canyon Creek crusher continued until December 19 when the crusher was shut down for the winter, reopening again May 1, 1920, and finishing the section north of the Canyon Creek arch June 22, 1920.

The Cow Creek crusher was operated until December 9 and again from May 14 to the completion of the graveling August 7, 1920.

By the placing of some short stretches of corduroy on the south side of the Canyon Creek summit and maintenance of a mile of detour aound the Canyon Creek arch construction, the canyon was kept open for traffic.

On the throwing open for travel of the Canyon Creek arch now under construction by the government, on or about December 5, 1920, there will remain no obstructions to all year travel. Macadamizing on this section was under the supervision of E. R. Green. Resident Engineer.

The completed work represents a total expenditure of $117,993.14.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,667.31
Contract Items as Follows:		
6" porous drain tile, 11,848 lin. ft. at 45c	$ 5,331.60	
Conglomerate, 1,902 cu. yds. at $3.25	6,181.50	
Broken stone macadam, 21,980.5 cu. yds. at $4.15	91,219.08	
Broken stone back fill for drain tile. 1,568 cu. yds. at $3.75	5,880.00	
Excavation, no classification, 1,416.7 cu. yds. at $1.00	1,416.70	
Earth filler, 518 cu. yds. at $1.00	518.00	
Payhaul, 2,417 yd. mi. at 30c	725.10	
Force Account:		
Excavating mudholes and backfilling with decomposed granite	159.93	
Repairing old road, making suitable for traffic	44.66	
Corduroy over mudholes	834.16	
Grader work for drainage	15.10	
Total amount paid contractor		$112,325.83
Grand total cost of project (all State funds)		$117,993.14

Jacques Place to Johns Place Grading and Macadam

This section is 7.15 miles in length, joining the Stage Road Pass section on the south, and the Canyonville-Galesville Forest Road project on the north. The new alignment follows the old road closely, reducing the excessive grades and eliminating unnecessary curvature. As the grading was light, the grading and macadamizing were advertised together, and, on May 27, 1919, contract No. 131 was awarded to Joplin & Eldon of Portland for the work to be done. All of the traffic through this section had to make use of the road during construction, and, as the roadbed was composed of clay that would not sustain traffic, the macadamizing was carried forward as fast as the grading was completed. Waterbound macadam, composed of run-of-bank gravel from Cow Creek, was placed to a width of 16 feet and a depth of 8 inches.

[DOUGLAS]

Work was started July 28, 1919 and completed August 26, 1920 under the supervision of Paul Van Scoy, Resident Engineer.

The final construction quantities are being checked at the present time and final payment to the contractor has not yet been made. It is estimated that the total cost will be approximately $111,600.00 of which $104,917.92 has been expended to date. This work is being paid for entirely from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 7,780.33
Royalty on gravel		381.75
Raking oversize out of surfacing (State forces)		183.45
Contract Items as Follows:		
Clearing and grubbing, 98 per cent, at $3,000.00	$ 2,940.00	
Common excavation, 24,994 cu. yds. at 90c	22,494.60	
Intermediate excavation, 14,950 cu. yds. at $1.00	14,950.00	
Solid rock excavation, 3,635 cu. yds. at $1.50	5,452.50	
Overhaul, 17,475 sta. yds. at 5c	873.75	
12" corrugated galvanized iron pipe, 1,290 lin. ft at $1.90	2,451.00	
18" corrugated galvanized iron pipe, 464 lin. ft. at $3.10	1,438.40	
24" corrugated galvanized iron pipe, 276 lin. ft. at $4.50	1,242.00	
36" corrugated galvanized iron pipe, 40 lin. ft. at $8.35	334.00	
Class "A" concrete, 164.1 cu. yds. at $25.00	4,102.50	
Class "C" concrete, 34.45 cu. yds. at $22.00	757.90	
Metal reinforcement, 11,780 lbs. at 10c	1,178.00	
Lumber and timber, 4.92M FBM at $50.00	246.00	
Run of bank gravel, waterbound, 16,433.5 cu. yds. at $2.60	42,727.10	
Force Account Items:		
Extending old culverts	223.71	
Lowering private water pipe across highway	7.65	
Maintenance work	37.53	
Raking oversize gravel from top course	203.43	
Total	$101,660.07	
Deduction for war tax on freight	4.92	
Total amount earned by contractor	$101,655.15	
Percentage retained until completion of contract	5,082.76	
Total amount paid to contractor		$ 96,572.39
Grand total expended to Nov. 30, 1920 (all State funds)		$104,917.92

Stage Road Pass Macadam

On July 8, 1919 contract No. 165 for macadamizing the 2.5 mile section north of Stage Road Pass, previously placed under contract for grading, was awarded to Joplin & Eldon of Portland, Oregon. After completion of the grading. the fills were allowed to settle during the winter, placing of the macadam being started April 6, 1920, and completed June 29, 1920. Owing to the height of the fills considerable settlement took place and any delay in placing the surfacing appears to have been fully justified by the results obtained. The detour road through Glendale was used to good advantage while the construction work was in progress.

The surfacing consisted of placing and waterbinding run-of-bank gravel from Cow Creek to a width of 16 feet and a depth of 8 inches, loose measure, being done under the supervision of Paul Van Scoy, Resident Engineer.

Total expenditures for the work amount to $19,628.82 from State funds.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,404.51
Materials and labor furnished direct by State connection extra work		71.21
Contract Items as Follows:		
Run of bank gravel, 5,286 cu. yds. at $3.10	$ 16,386.60	
Clay filler, 270 cu. yds. at $1.25	337.50	
Force Account Items:		
Removing slides, building up fills, light grading and ditching as required	1,387.36	
Raising logging railway tracks to grade of highway	41.64	
Total amount paid contractor		$ 18,153.10
Grand total cost of project (all State funds)		$ 19,628.82

Drain-Yoncalla Grading

With the awarding of contract No. 80 on February 4, 1919 for the grading of the section from the Southern Pacific spur track south of Drain to a point 1 mile south of Yoncalla, a move for the elimination of one of the worst spots on the Pacific Highway was made. The old road was very narrow and rough, skirting the hill above Elk Creek for a mile south of Drain, then dropping on excessive grades to the low lands north of Yoncalla, which became absolutely impassable under winter traffic.

Grading on this section of 5.89 miles was started by the contractor, H. J. Hildeburn of Roseburg, on March 1, 1919, and completed September 15, 1920. G. E. Farnsworth, Resident Engineer, was in charge of this section until June 5, 1919 when he was transferred to Oakland to supervise the Oakland-Yoncalla paving section, and relieved by R. W. Oakley, Resident Engineer. Mr. Oakley was relieved by J. S. Sawyer as Resident Engineer on September 1, 1919, who supervised the work until completion.

The total estimated cost of the work is $75,500.00, of which $73,182.93 has been expended to date.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 7,562.87
Grass seed furnished by State to be used for slope protection		3.10
Advertisements for bids		9.78
Contract Items as Follows:		
Clearing and grubbing, 100 per cent	$ 1,400.00	
Common excavation, 42,832.5 cu. yds. at 75c	32,124.38	
Intermediate excavation, 10,781.5 cu. yds. at 75c	8,086.13	
Solid rock excavation, 8,518.9 cu. yds. at $1.00	8,518.90	
Overhaul, 35,286 sta. yds. at 5c	1,764.30	
12" plain concrete pipe, 1,105 lin. ft. at $1.50	1,657.50	
18" reinforced concrete pipe, 440 lin. ft. at $3.00	1,320.00	
24" reinforced concrete pipe, 120 lin. ft. at $3.50	420.00	
6" porous drain tile, 972 lin. ft. at 50c	486.00	
Class "A" concrete, 197.88 cu. yds. at $26.00	5,144.88	
Class "C" concrete, 50.01 cu. yds. at $24.00	1,200.24	
Metal reinforcement, 14,729 lbs. at 12c	1,767.48	
Rubble masonry, 174.2 cu. yds. at $2.00	348.40	
Force Account Items:		
Planking soft places	307.34	
Lowering culverts to fit new grade	85.05	
Ditching outside of right-of-way for drainage	40.55	
Resloping deep cuts to eliminate slides	585.73	
Removing slides	2,327.83	
Rebuilding right-of-way fence	51.56	
Total amount earned by contractor	$ 67,636.27	
Percentage retained until completion of contract	2,029.09	
Total amount paid contractor		$ 65,607.18
Grand total expended to Nov. 30, 1920 (all State funds)		$ 73,182.93

[DOUGLAS]

Oakland-Yoncalla Grading

On September 5, 1917, the State Highway Commission awarded a contract to the Warren Construction Company for grading the section from the Calapooya River bridge at Oakland to a point 2 miles south of Yoncalla, and a complete description of the work will be found on page 95 of the last biennial report.

At the time this report was written, final payment to the contractor in the amount of $13,131.92 was in transit and had been entered in the Department accounts. Payment of this final voucher was not accepted by the contractors and the accounts for the present biennium show a credit of this amount. Since the closing of the books for this year, acceptance of this final payment has been made by the contractor and settlement will be made. The total final cost of the work will be $101,096.12.

Roseburg-Wilbur Grading

At the meeting of the Highway Commission on May 27, 1919, contract No. 151 for grading from a point near the north city limits of Roseburg to the Southern Pacific Railway crossing 1 mile south of Wilbur was awarded to H. J. Hildeburn of Roseburg. Excepted from this was a section from Winchester to a point approximately one thousand feet north of the Umpqua bridge near Winchester. Before this section can be improved to a 5 per cent grade a new bridge must be constructed over the Umpqua. The length of the section under contract is 4.1 miles.

Subsequent to the awarding of a grading contract on this section the macadamizing of the same was twice advertised but no bids were received. The contractor, after placing all culverts and building two concrete bridges on this section, agreed to grade only on portions where the alignment did not coincide with the existing graveled road. This method was followed and, a macadamizing contract having been awarded on this section on July 6, 1920, the old road was graded and prepared for macadam. A final estimate and acceptance of this work has been delayed until the completion of minor details on the work.

W. K. Wright was the Resident Engineer in charge of this section.

The total estimated cost is $37,000.00 of which $28,893.58 has been expended to date.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 3,946.07
Contract Items as Follows:		
Clearing and grubbing, 100 per cent	$ 300.00	
Common excavation, 5,336 cu. yds. at 60c	3,201.60	
Intermediate excavation, 14,322 cu. yds. at 65c	9,309.30	
Solid rock excavation, 1,707 cu. yds. at $1.40	2,389.80	
Overhaul, 8,335 sta. yds. at 5c	416.75	
12" plain concrete pipe, 279 lin. ft. at $1.50	418.50	
18" reinforced concrete pipe, 264 lin. ft. at $3.50	924.00	
24" reinforced concrete pipe, 104 lin. ft. at $4.50	468.00	
36" reinforced concrete pipe, 36 lin. ft. at $6.50	234.00	
6" porous drain tile, 22 lin. ft. at 40c	8.80	
Class "A" concrete, 281 cu. yds. at $26.00	7,306.00	
Class "C" concrete, 11 cu. yds. at $22.00	242.00	
Metal reinforcement, 29,207 lbs. at 11c	3,212.77	
Concrete handrail, 100 lin. ft. at $4.00	400.00	
Force Account Items:		
Rocking detours around new bridges	113.46	
Excavating for bridge foundation at Station 2230	390.39	
Replacing culvert account line change	14.64	
Total amount earned by contractor	$ 29,350.01	
Percentage retained until completion of contract	4,402.50	
Total amount paid contractor		$ 24,947.51
Grand total expended to Nov. 30, 1920 (all State funds)		$ 28,893.58

Myrtle Creek-Dillard Grading

On November 27, 1917 a contract was awarded to Calvert and Wolke of Grants Pass (later known as the Grants Pass Construction Co., J. T. Logan, President), for the clearing, grading, culverts, and concrete bridges on a section of 12.8 miles from Myrtle Creek to the junction of the Pacific Highway with the Roseburg-Coos Bay Highway, 1½ miles north of Dillard. This construction eliminated the well, but unfavorably, known Roberts Mountain grade south of Roseburg, on which several lives have been lost, and also seven grade crossings of the Southern Pacific railway. The finished road is virtually a water grade, following, for about half its length, the beautiful Umpqua River.

This section was not open for traffic during 1918 as two bridges over the Umpqua River were not completed until the spring of 1919. F. N. Drinkhall was Resident Engineer in charge of the grading.

Expenditures during 1917-18 amounted to $88,376.99 and the sum of $16,969.55 has been expended during the present biennium, making a total cost to the State of $105,346.54 for the work.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,514.67
Culvert pipe furnished by State		4.222.56
Contract Items as Follows:		
Clearing and grubbing, all	$ 3,325.00	
Common excavation, 49,813.6 cu. yds. at 35c	17,434.76	
Intermediate excavation, 44,699 cu. yds. at 56c	25,031.44	
Solid rock excavation, 23,917.4 cu. yds. at $1.14	27,265.84	
Overhaul, 23,232 sta. yds. at 2c	464.64	
12" plain concrete pipe, placing only, 1,756 lin. ft. at 35c	614.60	
18" corrugated galvanized iron pipe, placing only, 556 lin ft. at 30c	166.80	
24" corrugated galvanized iron pipe, placing only, 284 lin. ft. at 40c	113.60	
36" corrugated galvanized iron pipe, placing only, 246 lin. ft. at 75c	184.50	
6" porous drain tile, 5,074 lin. ft. at 25c	1,268.50	
Class "A" concrete, 476.92 cu. yds. at $22.00	10,492.24	
Class "C" concrete, 46.85 cu. yds. at $20.50	960.42	
Metal reinforcement, 37,852 lbs. at10c	3,785.20	
Lumber and timber, 17.058M FBM at $45.00	767.61	
Force Account:		
Hauling and placing gravel in tile ditches	413.18	
Rough dry walls	106.41	
Extra clearing	112.96	
Carbolineum, white paint and applying same	101.61	
Total amount paid contractor		$ 92,609.31
Grand total cost of project (all State funds)		$105,346.54

Myrtle Creek-Dillard Slide Removals

Subsequent to the completion of the grading of the Myrtle Creek-Dillard section, and immediately after the early winter rains during the winter of 1918, several large slides occurred along the heavy side hill cuts skirting the Umpqua River between Myrtle Creek and Dillard. Contract No. 107, for the removal of these slides, was awarded to H. J. Hildeburn of Roseburg, Ore., on April 15, 1919. The work was completed in July, 1919 and final payment made to the contractor.

During the winter of 1919, several other slides occurred and it was found that widening of the roadbed was necessary during the course of paving over the section. These slide removals, and the extra widening, were handled by the Oregon Hassam Paving Company in connection with their paving contract.

Work has been handled under the supervision of A. S. Kennedy, Resident Engineer, with total expenditures of $37,172.02, which have all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 280.58
Contract Items as Follows:		
Excavation, no classification, 19,475 cu. yds. at 65c	$ 12,658.75	
Force Account:		
Removing forms and cleaning out culverts	14.27	
Clearing and grubbing	403.94	
Removing slides, widening and ditching, handled by Oregon Hassam Paving Co. on cost plus basis	23,814.48	
Total amount paid to contractor		$ 36,891.44
Grand total expended to Nov. 30, 1920 (all State funds)		$ 37,172.02

Canyonville-Myrtle Creek Grading

This section of 9.18 miles was the last section ungraded in Douglas County. The route as adopted by the State Highway Commission goes

south from Myrtle Creek along the alignment of the present road as far as the point where the road forks to Riddle. From here the Pacific Highway takes the route locally known as the "Cut Off" to Canyonville. At a point 3 miles south of these road forks the location crosses the Umpqua River, connects with what is known as the Orchard Valley Road, and thence in to Canyonville. The survey was made in 1915 by W. M. Peters, Locating Engineer for the State Highway Department.

Contract No. 182 for the grading of this section was awarded to H. J. Hildeburn of Roseburg on August 5, 1919. S. H. Rockhill of Riddle, Oregon, immediately instituted injunction proceedings against the State Highway Commission. The case was heard before Circuit Judge G. F. Skipworth of Eugene, at Roseburg March 29 and 30, 1920 and a decision was handed down by him on May 10, 1920, establishing the Pacific Highway by way of Riddle and restraining the Commission from expending any funds on the Cut Off route. On appeal to the Supreme Court, Judge Skipworth's decision was reversed, and the State Highway Commission given authority to proceed along their adopted location. Right of way clearing was started September 15, 1920. Heavy grading and rock work will be done this winter and light grading completed in the spring in time for macadamizing during the 1921 season. E. R. Green is the Resident Engineer in charge of this section.

The total estimated cost of the work is $87,000.00. The sum of $5,109.51 has been expended to date.

Unit No. 1, Canyonville-Galesville Forest Road Project

Under co-operative agreement between the Bureau of Public Roads, Douglas County and the State, contract for the grading of 9.9 miles between Canyonville and Galesville was awarded to John Hampshire & Co., of Grants Pass, during 1918 by the Bureau of Public Roads. The section contracted extends from the south side of Canyon Creek, just outside of Canyonville, to Johns ranch, and covers the entire distance with the exception of a section 1.1 miles in length at about the center of the project. A description of this section will be found discussed under Unit No. 2 of the project.

The grading was completed on October 30, 1919 and constituted a very difficult piece of construction. It was necessary to close the road during the winter months of 1918-1919 and during the working hours in 1919. The completion of the work marked the elimination of the worst 10 miles of the Pacific Highway in this county. With its narrow and steep road, rough rock surface and sections of yellow clay, which were impassable when wet, this stretch was indeed a terror to tourists.

The total cost of the improvement amounted to $211,000.00, which was apportioned $94,000.00 to the State, $23,000.00 to the County and $94,000.00 to the Federal Government. The State expenditures include $442.99, which was paid during 1918. Construction of this project was carried on under the supervision of the Bureau of Public Roads. Macadamizing of the entire distance has since been accomplished under contract awarded by the State, which, however, was not considered as a forest road project.

[DOUGLAS]

Unit No. 2, Canyonville-Galesville Forest Road Project

A section of extremely heavy grading, 1.1 miles in length, located approximately half way between Canyonville and Galesville, was awarded to J. Elmer Nelson by the Bureau of Public Roads. With the exception of a concrete arch now under construction across Canyon Creek, the grading of the unit is completed. This structure over Canyon Creek is being built as a portion of the forest road project and is also being handled by the Bureau of Public Roads.

The total estimated cost of the grading and concrete structure is $96,900.00, which will be paid $86,900 by the State and $10,000.00 by the Federal Government. Expenditures to date amount to $72,492.33, the State paying $63,000.00, and the Federal Government $9,492.33.

Stage Road Pass Grading

This section of the Pacific Highway extends north from the Josephine County line, a distance of 2.48 miles to Jacques Place in Douglas County. The old road from Stage Road Pass followed down the hillside, reaching the bottom near Glendale. Crossing Cow Creek at this point, it continued back up the creek to Jacques Place. The new grade cuts across from Stage Road Pass to Jacques place, reducing the former distance approximately one-half, and is built on a maximum five per cent grade with a roadbed width of 20 feet.

Contract No. 79 for this work was awarded on February 4, 1919 to John Hampshire & Co., of Grants Pass, Oregon. Construction was started February 20, 1919 and completed September 30, 1919, with the exception of the approaches to the Cow Creek bridge, which at that time had not been built. Upon completion of the bridge, these approaches were built by W. J. Russell of Glendale at a cost of $1,155.80.

No co-operation was received on the work and the completed grading entailed an expenditure of $46,424.60 of state funds. These expenditures were made under the supervision of Paul Van Scoy, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,243.46
Advertisements for bids		18.92
Agreement with W. J. Russell for grading approaches to Cow Creek Crossing:		
South approch, common excavation, 215 cu. yds. at 75c	$ 161.25	
North approach, common excavation, 842 cu. yds. at $1.00	842.00	
Solid rock excavation, 113 cu. yds. at $1.35	152.55	
Total amount paid to W. J. Russell		$ 1,155.80
Contract Items as Follows:		
Clearing and grubbing, all	$ 2,500.00	
Common excavation, 19,354 cu. yds. at 50c	9,677.00	
Intermediate excavation, 10,050 cu. yds. at 50c	5,025.00	
Solid rock excavation, 21,233 cu. yds. at $1.00	21,233.00	
Overhaul, 1,330 sta. yds. at 3c	39.90	
12" plain concrete pipe, 756 lin. ft. at $1.10	831.60	
18" reinforced concrete pipe, 76 lin. ft. at $2.65	201.40	
24" reinforced concrete pipe, 300 lin. ft. at $3.50	1,050.00	
36" reinforced concrete pipe, 136 lin. ft. at $5.80	788.80	
6" porous drain tile, 90 lin. ft. at 20c	18.00	
Class "C" concrete, 12.64 cu. yds. at $20.00	272.80	
Lumber and timber, 1.69M FBM at $40.00	67.60	
Special adjustment account narrowing roadbed	1,140.00	
Force Account:		
Haul and place gravel in drain tile ditch	42.63	
Extra clearing	118.69	
Total amount paid contractor		$ 43,006.42
Grand total cost of project		$ 46,424.60

[DOUGLAS]

Remote-Camas Valley Post Road Project

Full description of this project, which is partly within Douglas County and partly within Coos County, will be found in the section of this report devoted to Coos County.

Comstock Overcrossing

Contract No. 166, for the construction of an overhead crossing of the Southern Pacific Railroad approximately one mile south of Comstock, eliminating an existing dangerous road crossing, was awarded to Curtis Gardner of Portland, Ore., on July 8, 1919. The structure itself is a concrete through girder of 41 feet with 406 feet of wooden approach trestle. In addition to this work, a considerable item of approach grading and macadamizing was included in the contract. This macadam was later canceled, it being considered preferable to do the work by State forces which were working in that section.

Work was started very soon after the award was made and completed by the end of the year at a total cost of $22,547.96, the State paying $16,579.44 and the railroad company $5,968.52. Of the total cost of the project, Douglas County will co-operate to the extent of $4,205.01, the Southern Pacific Company $8,410.02, the balance of $9,932.93 being paid by the State.

Construction of this work was supervised by Walter F. Hodge, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,328.67
Moving Postal Telegraph lines		50.66
Watchmen to guard railway lines		276.23
Repairs to railway fences		113.04
Macadam surfacing placed by State forces		1,522.91
Credit for oil purchased for force account work but transferred		Cr. 87.50
Contract Items as Follows:		
Common excavation, 1,413 cu. yds. at 75c	$ 1,059.75	
Intermediate excavation, 970 cu. yds. at $1.00	970.00	
Solid rock excavation, 649 cu. yds. at $2.00	1,298.00	
Overhaul, 9,875 sta. yds. at 6c	592.50	
Class "A" concrete, 152.3 cu. yds. at $30.00	4,569.00	
Class "C" concrete, 50.3 cu. yds. at $20.00	1,006.00	
Metal reinforcement, 16,234 lbs. at 7c	1,136.38	
Timber trestle, 512 lin. ft. at $15.60	7,987.20	
Force Account Work:		
Pile footings for main span	154.95	
Sand finish on paint	50.00	
2x6" bridging in trestle	50.00	
Cutting holes in forms for better puddling	18.70	
Longitudinal bracing for four extra bents	143.02	
Enlarging concrete haunches	71.97	
Furnishing, painting and piling guard fence material	236.48	
Total amount paid contractor		$ 19,343.95
Grand total cost of project		$ 22,547.96

Participation in Cost

	State	County	S. P. Ry. Co.	Total
Expended to Nov. 30, 1920	$16,579.44		$ 5,968.52	$22,547.96
Balances	6,646.51Cr	$ 4,205.01	2,441.50	
Final participation	$ 9,932.93	$ 4,205.01	$ 8,410.02	$22,547.96

[DOUGLAS]

Comstock-Lane County Line Culverts

On July 20, 1920, contract No. 281 was awarded to S. L. Godard of Cottage Grove for the construction of one 8x8 feet and one 4x4 feet reinforced concrete box and some smaller pipe culverts between the Lane-Douglas County line and Comstock. This work was done in conjunction with State force work between the same points. Excavation for boxes and pipes was handled by State forces as well as back filing. W. S. Hodge was Resident Engineer in charge.

The total estimated cost of the work is $7,000.00, of which $5,073.08 has been expended to date.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 204.04
Excavations for culverts by State forces		1,123.94
Contract Items as Follows:		
12" plain concrete pipe, 76 lin. ft. at $1.80	$ 136.80	
Class "A" concrete, 101.2 cu. yds. at $31.00	3,137.20	
Class "C" concrete, 1.8 cu. yds. at $30.00	54.00	
Metal reinforcement, 9,800 lbs. at 11c	1,078.00	
Total amount earned by contractor	$ 4.406.00	
Percentage retained until completion of contract	660.90	
Total amount paid contractor		$ 3,745.10
Grand total expended to Nov. 30, 1920 (all State funds)		$ 5,073.08

Pass Creek Bridge

The Pacific Highway crosses Pass Creek four times between Divide and Leona, the most southerly crossing being at a point about one mile south of Comstock. This crossing consists of two 30-foot concrete girder spans on concrete abutments, crossing the stream at an angle of 45 degrees.

Contract No. 188 was awarded to Albert Anderson for the construction of this bridge on July 8, 1919. Owing to the peculiar position of the bridge with reference to the railroad bridge nearby, it was found necessary to build a concrete revetment between the two structures. The entire work was completed by the end of the year 1919 and cost $8,382.86 from State funds.

Walter S. Hodge was Resident Engineer in charge for the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 633.30
Contract Items as Follows:		
Class "A" concrete, 170 cu. yds. at $28.00	$ 4,760.00	
Metal reinforcement, 20,912 lbs. at 8c	1,672.96	
Concrete handrail, 155.6 lin. ft. at $3.00	466.80	
Force Account Items:		
Building concrete blanket for bank protection	849.80	
Total amount paid contractor		$ 7,749.56
Grand total cost of structure (all State funds)		$ 8,382.86

Sand Creek Bridge

The Pacific Highway crosses Sand Creek near the town of Leona by means of a concrete structure having two 24-foot and two 30-foot spans. Bids were received for the construction of this bridge on September 9, 1919, but were rejected as too high. The work was readver-

tised and on October 7, 1919 Curtis Gardner was awarded contract No. 219 for its construction.

Work was not started until after the severe weather in December and has progressed rather slowly since. The site is just at the edge of a mill pond and the presence of sunken logs and large quantities of water, together with the semi-liquid condition of the soil has made foundation excavation extremely difficult. During September it was possible for the Mill Company to lower their pond considerably, which made the excavation much easier and a marked increase in speed has been the result. It is expected that the work will be complete by December 15, and that it will cost approximately $13,500.00, all of which is to be paid by the State.

Burt Wilkes is Resident Engineer in charge of the construction, on which expenditures of $9,578.12 have been made.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,881.67
Contract Items as Follows:		
Class "A" concrete, 132 cu. yds. at $39.00	$ 5,148.00	
Metal reinforcement, 18,680 lbs. at 7c	1,307.60	
Concrete handrail, 84 lin. ft. at $3.00	252.00	
Materials on hand	2,347.05	
Total amount earned by contractor	$ 9,054.65	
Percentage retained until completion of contract	1,358.20	
Total amount paid contractor		$ 7,696.45
Grand total expended to Nov. 30, 1920 (all State funds)		$ 9,578.12

Umpqua River Bridges Near Dillard

During 1918, a contract was awarded to the Portland Bridge Company of Portland, Ore., for the construction of a bridge approximately one mile north of Dillard, and a bridge approximately two and one-half miles south of Dillard. A complete description of these structures will be found on page 98 of the last biennial report.

Neither of these structures were completed at the closing of the last biennium and at that time expenditures of $9,925.55 had been made on the structure north of Dillard and $14,877.30 on the structure south of Dillard. During the present biennium, additional expenditures of $16,626.70 have been made on the first mentioned, bringing the total expenditures on this to $26,552.25. Additional expenditures of $6,400.58 have been made on the second mentioned, bringing the total cost of this structure to $21,277.88. This makes the total cost of both jobs $47,830.13, which has all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Bridge North of Dillard

Engineering		$ 286.88
Contract Items as Follows:		
3 144' timber spans, all	$ 18,500.00	
Class "B" concrete, 336.07 cu. yds. at $20.00	6,721.40	
Reinforcing steel, 3,670 lbs. at 6c	220.20	
Force Account Items:		
Additional approach trestle	211.56	
Extra painting	612.21	
Total amount paid to contractor		$ 26,265.37
Grand total cost of structure (all State funds)		$ 26,552.25

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Bridge South of Dillard

Engineering		$ 1,217.23
Contract Items as Follows:		
Lumber in place, 137M FBM at $100.00	$ 13,700.00	
Class "B" concrete, 213.3 cu. yds. at $22.00	4,692.60	
Reinforcing steel, 2,240 lbs. at 8c	179.20	
Force Account Items:		
Additional approach trestle	1,136.69	
Extra painting	352.16	
Total amount paid contractor		$ 20,060.65
Grand total cost of structure (all State funds)		$ 21,277.88

Stage Road Pass Bridges

On July 8, 1919, the Commission awarded two contracts to the Union Bridge Company of Portland, Ore., Contract No. 185 covering three trestles over flood channels of Cow Creek and contract No. 186 covering a small concrete culvert. These structures are all on the Pacific Highway in the vicinity of Glendale and were handled as a unit by the contractor even though the work was made up of two separate contracts.

Two of the three trestles in Contract No. 185 have three spans and the other one has four, all spans being 19 feet in length and making a total of 190 lineal feet of trestle in the three structures. The completed cost of these three trestles was $2,880.20. Contract No. 186, for the single concrete culvert, required an expenditure of $923.60. This makes the total expenditure under both contracts $3,803.80.

Work on these contracts was practically complete at the end of the 1919 season, the small part remaining being finished up by the contractor in the early spring of 1920. Stewart Mitchell was Resident Bridge Engineer on the work.

DETAILED STATEMENT OF EXPENDITURES

Contract No. 185

Engineering		$ 65.89
Contract Items as Follows:		
Fir piles, untreated, 853.9 lin. ft. at 90c	$ 768.51	
Timber trestle, 193 lin. ft. at $10.60	2,045.80	
Total amount paid to contractor		$ 2,814.31
Grand total cost of structure (all State funds)		$ 2,880.20

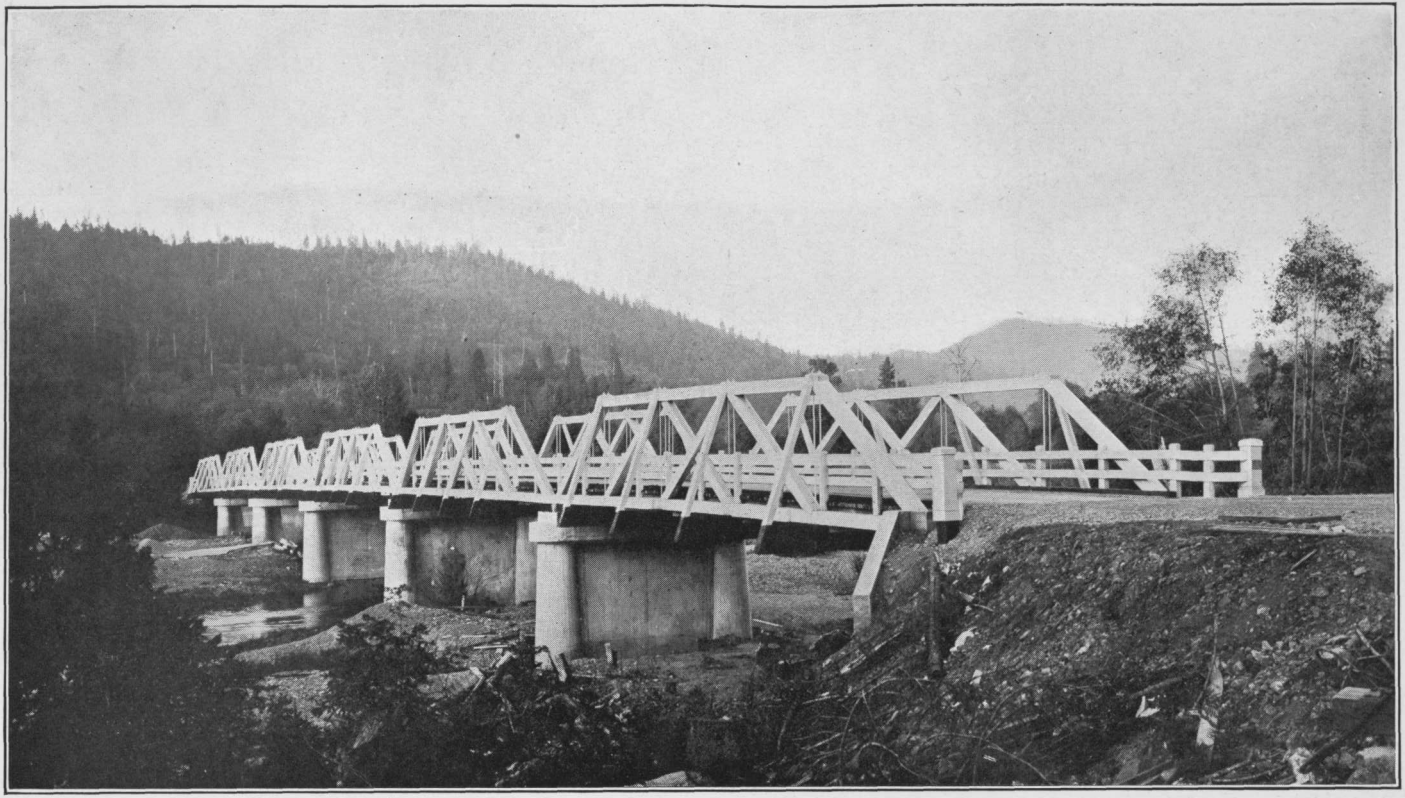
DETAILED STATEMENT OF EXPENDITURES

Contract No. 186

Engineering		$ 19.05
Contract Items as Follows:		
Class "A" concrete, 24.6 cu. yds. at $30.00	$ 738.00	
Steel reinforcement, 2,379.3 lbs. at 7c	166.55	
Total amount paid contractor		$ 904.55
Grand total cost of structure (all State funds)		$ 923.60

Cow Creek Bridge.

The Union Bridge Company of Portland was awarded Contract No. 187 for the construction of a bridge over Cow Creek on July 8, 1919. This structure consists of six wood pony truss spans of 70 feet each on concrete piers. No housing is provided for this type of truss as a liberal use of



SIXTY-SEVEN-FOOT WOODEN TRUSS SPANS OVER COW CREEK ON THE PACIFIC HIGHWAY NEAR GLENDALE IN DOUGLAS COUNTY. BUILT IN 1919.

creosote and paint is depended upon to protect the wood from action of the elements. Structures of this type present a much more attractive appearance than the usual high trusses and are capable of sustaining the heaviest loads that they will probably be required to carry for many years. Upon the completion of the bridge, the approach fills were placed by W. J. Russell of Glendale at a cost of $1,155.80. This expenditure is included in the State Road Pass grading section, being considered as properly constituting a part of the grading expenditures instead of a bridge construction cost.

Work on the structure was completed during the spring of 1920 at a total cost, exclusive of the approaches of $21,265.19. Construction was carried on under the supervision of Stewart Mitchell, Resident Bridge Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,242.39
Setting end posts for guard fence by State forces		35.60
Contract Items as Follows:		
Class "B" concrete, 477.4 cu. yds. at $16.00	$ 7,638.40	
Steel reinforcement, 9,363.6 lbs. at 7c	655.45	
Piling, 198.2 lin. ft. at 90c	178.38	
Wood truss spans, all, at $11,269.00	11,269.00	
Force Account Items:		
Excavation for footings	50.47	
Wood cribbing to protect green concrete	88.81	
Revision of guard rail account change in plans	106.69	
Total amount paid contractor		$ 19,987.20
Grand total cost of structure (all State funds)		$ 21,265.19

Maintenance

On completion of the various grading, macadamizing and paving contracts in Douglas County the maintenance work on these sections has been taken over by the State. The chief items of work which have been necessary consist of the removing of slides, cleaning of ditches and culverts, redressing old macadam with screenings and the dragging of macadamized sections after rains. A partial system of maintenance is being worked out with a local man assigned to approximately a five-mile section and held directly responsible for the upkeep of his particular unit. In some cases, where the first winter's maintenance on the section has been quite heavy, a larger crew has of course been necessary.

All maintenance work in Douglas County has been paid for by the State during the biennium, and has amounted to $29,826.89.

Roseburg-Sutherlin Survey

On March 14, 1919, retracement of an existing location survey from Roseburg to Sutherlin was started under the direction of A. S. Kennedy, Resident Engineer. The original location had been made in 1915 by Location Engineer J. H. Scott.

The line was restaked and additional data taken prior to advertisement of projects for construction.

[DOUGLAS]

Roseburg-Dillard Survey

The 1915 location survey between Roseburg and Dillard was retraced and some revisions made in May, 1919, under the direction of A. S. Kennedy, Resident Engineer. A revision was made from the present grade crossing of the Southern Pacific Railway south of Shady to the Caldera Store corner. The new revision contemplates an overgrade separation of the Southern Pacific Railway near the present grade crossing, whereas the former survey through Green would have required an undergrade crossing of the railroad. The drainage conditions at the old undergrade site were bad and the road would have traversed a long stretch of black adobe land with poor drainage conditions. The new revision, while slightly longer, utilizes practically all of the old road.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by D. J. Stewart, County Judge, W. E. St. John and Edwin Weaver, County Commissioners, stating that a levy of 1 mill on all the taxable property of the County was made for market road construction, and designating twenty roads to be improved as Market Road Projects. Most of the roads designated were being graded with County Bond Issue funds, special tax funds, district funds or general funds, and a definite amount of market road fund was designated for each road to be used for surfacing or other work as the County Court chose.

A levy of 1 mill on a valuation of $28,005,939.00 produced a County Market Road Fund of $28,005.94. Included in the State levy of taxes was a levy of 1 mill on a valuation of $26,317,104.10, which produced $26,317.10, and which became a part of the "State Market Road Appropriation."

Fund apportioned by the State Highway Commission March 2	$ 26,317.11
Fund apportioned by the State Highway Commission April 3	10,733.57
Fund produced by County 1-mill levy	28,005.94
Total available for 1920	$ 65,056.62

F. C. Frear, County Surveyor and Roadmaster, made the necessary surveys, prepared plans and estimates and did the engineering work during construction.

Project No. 1.—"Riddle-Drew-Bland Grade Section." Length 3500 feet. Approximately one-half mile was graded to a roadbed width of 20 feet, along a perpendicular bluff, with a maximum grade of 5 per cent. County bond issue funds were used for grading. Slides were removed and the road surfaced 9 feet wide with gravel conglomerate at a cost of $1000.000 paid from Market Road funds.

Project No. 2.—"Myrtle Creek-Buck Fork-Hans Weaver Section." Length 4486 feet. Approximately 3300 feet was graded to a roadbed width of 20 feet with a maximum grade of 3 per cent. The road is through rolling country. Grading costs were paid from bond issue funds. Approximately 3300 feet of gravel surfacing 9 feet wide was completed. Market Road funds to the amount of $1000.00 were apportioned to this road; $588.25 was spent in 1920 for graveling, $411.75 was carried over to be used in 1921 for grading the remainder of the road.

[DOUGLAS]

Project No. 3.—"Dixonville-Peel-Bob Lane Section." Length 12,391 feet. This road was graded in 1919 with bond issue funds. The roadbed width is 20 feet, maximum grade 4.6 per cent. The road is through rolling open country. Market Road funds are being used for surfacing with gravel, width 9 feet. Market Road funds to the amount of $2000.00 were apportioned to this road; $630.00 was spent in 1920; $1370.00 was carried over to be used for graveling in 1921.

Project No. 4.—"Dixonville-Glide-Bob Blakely Section" (from station 76 plus 00 to 197 plus 00). This section was graded to a 20-foot roadbed, with maximum grade of 4 per cent in 1919. The road runs through fields in rolling country. The road was surfaced 9 feet wide with gravel in 1920, bond issue funds being used. Market Road funds to the amount of $5000.00 were apportioned to this project, but were not expended and will be diverted to another section of this road.

Project No. 5.—"Roseburg-Reston-Taber Section" (Station 0 plus 00 to Station 56 plus 47.5—Station 37 plus 00 to Station 90 plus 50). The line three miles in length has been surveyed and is to be graded to a 20-foot roadbed with maximum grade of 6 per cent and surfaced 9 feet wide with gravel. It was expected that this work would be done in 1920 and Market funds to the amount of $7000.00 were apportioned to this road. No work has been done and the funds will be carried over for use on this project in 1921.

Project No. 6.—"Edenbower-Millwood-Garden Valley Section" (Station 0 plus 00 to 65 plus 00). Length 1¼ miles. Bond issue funds and special tax funds were used to grade a roadbed 20 feet in width with a maximum grade of 4.65 per cent through rolling, orchard country.

Market Road funds to the amount of $1300.00 were apportioned to this project for gravel surfacing 9 feet in width. Nine hundred sixty-one dollars and twenty-five cents had been expended for surfacing when work was stopped by high water over gravel bar. Three hundred thirty-eight dollars and seventy-five cents will be carried over for use on this project in 1921.

Project No. 7.—"Elkton-Reedsport-Dimmick Grade Section" (Station 0 plus 00 to Station 36 plus 04.8). Bond issue funds were used to grade a roadbed 20 feet in width with a maximum grade of 7 per cent, along the Umpqua River Bluffs for a distance of 1 mile. Market Road funds to the amount of $1000.00 were apportioned to this project for gravel surfacing 9 feet in width. Six hundred twenty-eight dollars and fifty cents was expended for surfacing in 1920. Three hundred seventy-one dollars and fifty cents on hand will be used in the removal of slides or for surfacing in 1921.

Project No. 8.—"Elkton-Reedsport-Paradis Creek Section" (Station 0 plus 00 to Station 121 plus 25-8). Length 3 miles. Bond issue funds were to have been used to grade a roadbed 20 feet in width, with a maximum grade of 2.6 per cent through 1½ miles of extremely rough country and 1½ miles of open country through fields. Estimated cost of the grading is $18,028.41.

Market funds to the amount of $5000.00 were apportioned to this project for gravel surfacing 9 feet in width. No work was done on this project in 1920. Funds will be carried over for surfacing in 1921.

[DOUGLAS]

Project No. 9.—"Drain-Elkton-Daisy Creek Section" (Station 36 plus 00 to 89 plus 83-7.) Bond issue money was used to grade a roadbed 20 feet in width, with maximum grade of 5.5 per cent, through rough, broken and rocky country. Approximately one mile was graded in 1920.

Market Road funds to the amount of $4,200.00 were apportioned to this project for gravel surfacing 9 feet in width. Approximately one mile of surface was laid when work was stopped by wet weather. Two thousand five hundred sixty-seven dollars and twenty-seven cents was expended. One thousand six hundred thirty-two dollars and seventy-three cents was carried over to be used on this project in 1921.

Project No. 10.—"Drain-Elkton-Darius Wells Section" (Station 47 plus 00 to 85 plus 00). Length 3800 feet. Special tax money was used to grade a roadbed 20 feet in width with a maximum grade of 6 per cent, through open rolling country except for 1000 feet of rocky hillside. Market Road funds to the amount of $2800.00 were apportioned to this project for gravel surfacing 9 feet in width. The surfacing was completed at a cost of $2655.88, leaving a balance of $144.12, which is to be used on Hancock Mountain in 1921.

Project No. 11.—"Elkton-Plat M-Marion Hill Section" (Station 0 plus 00 to 86 plus 62-2). Length 3 miles. County funds were used in 1919 to grade a roadbed 20 feet in width, with a maximum grade of 5.23 per cent through rough mountainous country. A contract was awarded in 1920 for gravel surfacing 9 feet in width.. Approximately two and one-third miles was completed in 1920. Market Road funds to the amount of $5000.00 were apportioned to this project. Four thousand one hundred forty dollars and sixty-three cents was expended in setting up crusher, constructing a long bridge to the river bar and planking a road from the bar to the main road. Eight hundred fifty-nine dollars and thirty-seven cents remained to be carried over for use in 1921.

Project No. 12—"Yoncalla-Elk Creek Bridge-Jordan Hill & Hayhurst Section" (Station 0 plus 00 to 47 plus 36-5). Bond issue funds and special tax funds were used to grade a roadbed 20 feet wide with a maximum grade of 7.5 per cent through rough, mountainous country, eliminating a steep, dangerous hill. Market Road funds to the amount of $2500.00 were apportioned for gravel surfacing 9 feet in width. No Market Road funds had been expended October 15. The total amount will probably crry over for use in 1921.

Project No. 13.—"Wilbur-Stephens School-Hardin-Davis Hill Section" (Station 0 plus 00 to 41 plus 73-9). This project was graded in 1919 to a 20-foot roadbed, with a maximum grade of 6.16 per cent, through rough mountainous country. Market Road funds to the amount of $1500.00 were apportioned to this project for gravel surfacing 9 feet wide. Report of October 15, 1920, shows that no Market Road funds had been expended; the total amount will probably be carried over for work in 1921.

Project No. 14.—"Drain-Elkton,-Hancock-Mt. Section." Length approximately three miles. It is proposed to grade a roadbed 20 feet wide, with a maximum grade of 5 per cent, through extremely rough and mountainous country. The estimated cost is $40,000.00. Market Road funds to the amount of $10,000.00 were apportioned to this project,

for gravel surfacing 9 feet in width. No funds were expended in 1920 and will be carried over for use in 1921.

Project No. 15.—"Ashland-Marvin Hill-Larkin Section" (Station 0 plus 00 to 36 plus 09-5). Bond issue and special tax funds were used to grade a roadbed 20 feet wide with a maximum grade of 4.2 per cent, through rolling open country. Market Road funds to the amount of $2500.00 were apportioned to this project for gravel surfacing 9 feet wide. No Market Road funds were expended in 1920, and will be carried over for use in 1921.

Project No. 16.—"Edenbower-Millwood-Umpqua Section." Length 10,065 feet. Market Road funds to the amount of $2500.00 were apportioned to this project and were used in making two alignment changes and widening roadbed to 20 feet and placing gravel surfacing 9 feet wide in the worst places. This road is in open country through fields and orchards. Two thousand five hundred dollars was expended in 1920.

Project No. 17.—"Umpqua-Tyee-Loyal Emery Section." Length 1 mile. Market Road funds to the amount of $2000.00 were apportioned to this project and used in grading a roadbed 16 feet wide, with a maximum grade of 6 per cent.

Project No. 18.—"Yoncalla-Elkhead-Section No. 1." (Station 0 plus 00 to 104 plus 42-5). The work proposed on this project consists of grading a 20-foot wide roadbed, with a maximum grade of 5 per cent and gravel surfacing 9 feet wide, at an estimated cost of $10,938.25. Approximately one mile was completed in 1920. Market Road funds to the amount of $1500.00 were apportioned to this project to be used in conjunction with bond issue and special tax funds. One thousand one hundred and thirty four dollars and twenty-seven cents from the Market Road fund was expended in 1920; $365.73 carried over for use in 1921.

Project No. 19.—"Yoncalla-Elkhead-Road over Milltown Hill" (Station 65 plus 85-6 to Station 95 plus 50). Length 1 mile. Approximately three-quarters of a mile was graded to 20-foot roadbed with maximum grade of 5.8 per cent through rough, mountainous country. About one-half mile was surfaced 9 feet wide with gravel. Market Road funds to the amount of $1000.00 were apportioned to this project, to be used in conjunction with special tax fund. Nine hundred ninety-one dollars and seventy-five cents from Market Road fund was expended in 1920. Eight dollars and twenty-five cents carried over for use in 1921.

Project No. 20.—"Roseburg-Reston-Fitzgerald Hill Section" Station 0 plus 00 to Station 118 plus 26-6). Length 4 miles. Special tax funds were used to grade a 20-foot roadbed, with maximum grade of 5.2 per cent, through very rough mountainous country. Two miles of gravel surface 9 feet wide was placed in 1920. Market Road funds to the amount of $1000.00 was apportioned to this project to take care of overdraft on special road tax fund.

SUMMARY

Total available for 1920	$ 65,056.82	
Less 2 per cent for engineering and supervision	1,301.14	
Balance available		$ 63,755.68
Expended		20,800.00
Balance in fund to carry over to 1921		$ 42,955.68

GILLIAM COUNTY

Gilliam County, except for railroad transportation, has always been in an isolated position through lack of suitable roads in adjoining Counties, as well as in the County itself. The main effort of the County was primarily to provide a suitable road from Condon south to the Wheeler County line, both for convenience of the residents of that part of the County and to provide access to the end of the railroad at Condon for a large area to the south, composed principally of Wheeler County. This is the only feasible outlet for this section and received attention first in 1916 by the County. Since that time most of this section has been graded and surfaced except Mayville to Thirtymile Creek, now under construction. At present Gilliam County is very vigorous and insistent in its efforts to have the John Day Highway routed north from Condon to a connection with the Columbia River Highway at Arlington.

As the Columbia River Highway was routed along the Columbia River and construction work began in adjacent Counties, Gilliam County came in for attention in the matter of State and Federal funds on this highway, which was entirely too costly for the County to carry through by itself. This highway was surveyed in 1918, and construction carried on since that time, until now the Columbia River Highway is all graded and either surfaced or under surfacing contract. Great difficulties have presented themselves on this section. High bluffs along the routes, in some places extending out to the O. W. R. & N. Railway tracks, made work very expensive, difficult and slow. Sand blowing along the slopes has been a constant source of trouble and menace, but this is practically overcome now by extensive oiling, both by the railroad company and the Highway Department.

State work in Gilliam County was handled under the supervision of M. O. Bennett, Division Engineer, resigned, until September, 1920, at which time the work was taken over by J. H. Scott, Division Engineer.

John Day River-Blalock Post Road Project

This section of the Columbia River Highway extends from the County line at John Day River to the town of Blalock. Grading and macadamizing of the section has been carried on in co-operation with the Federal Government under Project Agreement No. 24. The work has been put under way under two separate contracts, the first covering the grading and the second covering the surfacing.

On September 9, 1919, Contract No. 238 was awarded to Oskar Huber of Portland, Ore., for the 14.94 miles involved. This contract also covered the construction of three small concrete bridges. With the exception of 5 miles of light grading, the alignment was through heavy rock work and is completed at the present time. The total estimated cost of this grading is $236,500.00, of which amount $206,151.10 has been expended to date.

On August 4, 1920, Contract No. 298 for surfacing the section was awarded to A. D. Kern of Portland, Oregon. It is anticipated that this surfacing will be completed about April 1, 1921, at a total estimated cost of $151,150.00.

The total estimated cost of the Post Road Project as a whole is $387,650.00, of which the state will pay $196,556.85 and the Federal Government $191,093.15. Total expenditures to date amount to $206,-151.10, of which the state has paid $115,943.51 and the Federal Governmemnt $90,207.59. Work on the project was supervised until February, 1920, by E. L. Alspaugh, Resident Engineer, at which time he was succeeded by C. C. Seeley, Resident Engineer.

Blalock-Arlington Post Road Project

On March 23, 1920, Contract No. 251, for surfacing the Columbia River Highway from Blalock through the town of Arlington, was awarded to Porter & Conley of Portland, Oregon. This work, 9.21 miles in length, is being done in co-operation with the Federal Government under the terms of Post Road Project Agreement No. 44. The work is practically complete at the present time and is estimated to cost a total of $60,500.00, toward which the Federal Government will co-operate to the extent of $25,520.00, the State paying the balance of $34,980. Construction has been carried on under the supervision of C. C. Seeley, Resident Engineer, with total expenditures of $39,374.12 to date. These expenditures have all been made from State funds.

Arlington-Morrow County Line Grading and Macadam

Location of this section of the Columbia River Highway from Arlington east to the Morrow County line, a distance of 12.3 miles, was completed in the summer of 1919 by E. L. Vinton, Locating Engineer. The location follows the sidehill slopes above the Columbia River. Good alignment and grades have been obtained.

Grading and Graveling Contract No. 173 was let on July 8, 1919, to M. J. Conley of Portland. Work was completed August 1, 1920.

Grading was of a light character through much sandy material. Blow sand was encountered in the vicinity of Willows and Heppner Junction, which it was necessary to oil by State equipment.

Cement gravel of excellent quality was obtained at two points, one 2 miles east of Arlington and another near Willows Station. All gravel was crushed to a maximum of 1½ inch, and the finished surface gives a remarkably smooth and stable roadway.

The crossing of the Heppner branch of the O. W. R. & N. Company at Heppner Junction is made by a reinforced concrete slab overhead structure. Willow Creek is spanned by an 80-foot steel deck pony truss span. Both these structures are under contract to Rees & Davis of Hermiston.

The total cost of the grading and macadam is borne by the State, and is estimated at $243,500.00. The sum of $193,094.92 has been expended to date under the direction of F. K. Gettins, Resident Engineer.

[GILLIAM]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 14,257.81
Cement furnished by State (to be deducted from amount due contractor)		411.53
Rental on State owned equipment (to be deducted from amount due contractor)		405.35
Contract Items as Follows:		
Clearing, 100 per cent, at $600.00	$ 600.00	
Common excavation, 44,662.5 cu. yds. at 65c	29,030.63	
Solid rock excavation, 21,587.2 cu. yds. at $3.50	75,555.20	
Grader work, 3.3744 miles at $600.00	2,024.64	
Overhaul, 37,016 sta. yds. at 3c	1,110.48	
12" plain concrete pipe, 271 lin. ft. at $2.00	542.00	
Metal reinforcement, 3,265.4 lbs. at 10c	326.54	
Gravel payhaul per mile yard, 18,979.5 cu. yds. at 60c	11,387.70	
Screened gravel surfacing, 25,951 cu. yds. at $3.25	84,340.75	
Class "A" concrete, 49.3 cu. yds. at $30.00	1,479.00	
Class "C" concrete, 5.5 cu. yds. at $25.00	137.50	
Pit run crushed gravel, 1,104 cu. yds. at $3.00	3,312.00	
Payhaul per mile yard, 812 cu. yds. at 50c	406.00	
Total	$210,252.44	
Deductions for truck rental and cement	816.88	
Total amount earned by contractor	$209,435.56	
Percentage retained until completion of contract	31,415.33	
Total amount paid to contractor		$178,020.23
Grand total expended to Nov. 30, 1920 (all State funds)		$193,094.92

Macadam Condon-Thirtymile Creek

In August, 1917, the State Highway Commission awarded a force account contract to the Warren Construction Company for macadamizing 5.7 miles of the John Day River Highway between Condon and Thirtymile Creek on a force account basis. At the time of closing the last report total expenditures of $31,096.05 had been made. During the present biennium delayed charges of $1,530.41 have been paid, bringing the total amount to $32,626.46.

In March, 1919, State forces, under the supervision of C. L. Grutze, started the resurfacing of this section and completed the work in October of the same year with total expenditures of $14,985.75. The total cost of the work handled by the State and by the Warren Construction Company amounted to $47,612.21, which has been paid $44,220.67 by the State and $3,391.54 by the County.

Blalock-Arlington Grading

On January 7, 1919, Contract No. 77 was awarded to the Johnson Contract Company of Portland, Ore., for grading 8.84 miles of the Columbia River Highway, paralleling the O. W. R. & N. Company's tracks and the Columbia River, between Blalock and Arlington. There was also included in this contract the construction of a three-span 60-foot reinforced concrete bridge across Lang Canyon. Owing to stringent requirements of the railroad company, revision of 4500 feet of the alignment at the Arlington end was made and this section was withdrawn from the contract and done on a force account basis, it being impracticable to accomplish the work under the terms of the original contract. On account of right-of-way considerations, the location of approximately 4200 feet on the Blalock end was revised and this portion graded by Oskar Huber under an extension of his contract on the John Day River-Blalock section.

[GILLIAM]

Total expenditures for the work under unit price items amount to $145,236.39, exclusive of the section covered by the force account portion.

Expenditures on this force account work amounted to $98,068.44, covering the handling of 20,360.1 cubic yards of common excavation, 3,707.6 cubic yards of intermediate excavation, 9,392.9 cubic yards of solid rock excavation and 115,400 cubic yards of overhaul; the construction of 3,440.24 cubic yards of rubble masonry, 6.4 cubic yards of Class "C" concrete and the placing of 375 lineal feet of 12-inch plain concrete culvert pipe. This brings the total expenditures for the entire work to $243.304.83, of which the County has expended $45,000.00, and the State $198,304.83. Contrary to the estimates given in the table published in another part of this report, the total estimated cost of the work is $243,920.50, the County's share being $60,000.00 and the State's share $183,920.50. Construction work on the project was supervised by C. C. Seeley, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 11,472.46
Guarding railway from damage		1,295.20
Advertisements for bids		19.79
Grading under agreement with Oskar Huber as follows:		
Common excavation, 6,550.8 cu. yds. at 60c	$ 3,930.48	
18" reinforced concrete pipe, 28 lin. ft. at $2.50	70.00	
24" reinforced concrete pipe, 32 lin. ft. at $3.25	104.00	
Total amount earned by Oskar Huber	$ 4,104.48	
15 per cent retained until completion of agreement	615.67	
Total amount paid to Oskar Huber to Nov. 30, 1920		$ 3,488.81
Contract Items as Follows:		
Clearing and grubbing, all	$ 350.00	
Common excavation, 25,399.9 cu. yds. at 35c	8,889.97	
Intermediate excavation, 29,822.7 cu. yds. at 84c	25,051.07	
Solid rock excavation, 44,825.3 cu. yds. at $1.40	62,755.42	
Overhaul, 69,615 cu. yds. at 5c	3,480.75	
12" plain concrete pipe, 936 lin. ft. at $1.10	1,029.60	
18" reinforced concrete pipe, 168 lin. ft. at $2.30	386.40	
24" reinforced concrete pipe, 284 lin. ft. at $3.10	880.40	
Class "A" concrete, 539.8 cu. yds. at $25.00	13,495.00	
Metal reinforcement, 48,271.6 lbs. at 10c	4,827.16	
Class "C" concrete, 33.85 cu. yds. at $30.00	1,015.50	
Reinforced concrete handrail, 180 lin. ft at $4.00	720.00	
Rip-rap, 128.9 cu. yds. at $3.00	386.70	
Adjustment on concrete structures account change in plans	5,195.23	
Force Account Items:		
Moving O. W. R. & N. right-of-way fences	123.75	
Excavation, embankment and rip-rap at cattle pass	373.18	
Total amount paid contractor		$128,960.13
Total amount expended to Nov .30, 1920		$145,236.39
Paid by State	$100,236.39	
Paid by County	45,000.00	
Total	$145,236.39	

Mayville-Thirtymile Creek Post Road Project

This section of the John Day River Highway extends from Mayville north to Thirtymile Creek, a distance of 6.9 miles. The grading of the unit is being done in co-operation with the Federal Government under Post Road Project Agreement No. 41.

The completion of the section, which is anticipated by March 1, 1921, will eliminate several miles of steep grade running down to Thirtymile

[GILLIAM]

Creek crossing. The section is a very important length as all produce from Wheeler County must be hauled over this road to the O. W. R. & N. Company's branch at Condon. The section under improvement when completed will provide an improved highway from Fossil to Condon.

The total estimated cost of the work is $180,790.00, of which there has been expended to date the sum of $30,368.49. Gilliam County co-operates to the extent of $75,000.00, and the Federal Government to the extent of $90,079.00, the State paying the balance of $15,711.00. Construction is being carried on under the supervision of E. M. Knatvold, Resident Engineer.

Heppner Junction Overcrossing

The Columbia River Highway crosses the Heppner branch of the O. W. R. & N. Company at the station of Heppner Junction, employing for this purpose a concrete structure having one span 43 feet in length and four spans 26 feet each in length. Construction of this bridge is being done by Reese & Davis of Hermiston, under Contract No. 220, which was awarded to them on October 7, 1919. At the time of writing this report, it is expected that the work will be completed during December with a final cost of approximately $18,500.00. County co-operation to the extent of $4,625.00 is to be received, the State paying the balance of $13,875.00. Total expenditures to date amount to $17,016.39, which has all been paid from State funds.

Construction of this bridge was supervised by L. H. Allen, Resident Bridge Engineer, until May 10, 1920, at which time he was transferred to other work and the supervision taken over by Chris Fauerso, Resident Bridge Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,378.43
Name plate furnished by State (to be deducted from amount due contractor)		16.00
Cement furnished by state (to be deducted from amount due contractor)		2,095.20
Contract Items as Follows:		
Concrete, Class "A," 358 cu. yds. at $31.00	$ 11,098.00	
Metal reinforcement, 43,873 lbs. at 7½c	3,290.48	
Concrete handrail, 200 lin. ft. at $3.00	600.00	
Materials on hand	925.35	
Total amount earned by contractor	$ 15,913.83	
Percentage retained until completion of contract	2,387.07	
Total amount paid contractor		$ 13,526.76
Grand total expenditures to Nov. 30, 1920 (all State funds)		$ 17,016.39

Willow Creek Bridge

About 1,000 feet east of the Heppner Junction overcrossing the Columbia River Highway crosses Willow Creek by means of a structure consisting of one 80-foot steel deck span and two 33-foot concrete spans. This work was done by Reese & Davis under Contract No. 221 awarded to them on October 7, 1919. The structure was completed on September 15, 1920, at a total cost of $20,450.45, which has been paid entirely from State funds. The engineering personnel on this work was the same as on the Heppner Junction overcrossing.



EIGHTY FOOT STEEL SPAN WITH TWO THIRTY-THREE FOOT CONCRETE APPROACH SPANS. OVER WILLOW CREEK ON THE COLUMBIA RIVER HIGHWAY NEAR HEPPNER JUNCTION IN GILLIAM COUNTY. COMPLETED IN 1920.



OILING OPERATIONS IN PROGRESS ALONG THE COLUMBIA RIVER HIGHWAY IN GILLIAM COUNTY. TO PREVENT BLOW SAND DRIFTING ONTO HIGHWAY.

[GILLIAM]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,638.30
Bronze name plate (to be deducted from amount due contractor)		16.00
Cement furnished by State (to be deducted from contractor's est.)		2,182.80
Contract Items as Follows:		
Class "A" concrete, 200 cu. yds. at $31.00	$ 6,200.00	
Class "B" concrete, 184 cu. yds. at $25.50	4,692.00	
Metal reinforcement, 34,424 lbs. at 7½c	2,581.80	
Structural steel, 61,626 lbs. at 12c	7,395.12	
Concrete handrail, 100 lin. ft. at $3.00	300.00	
Total	$ 21,168.92	
Deductions for cement furnished by State	1,623.80	
Total amount earned by contractor	$ 19,545.12	
Percentage retained until completion of contract	2,931.77	
Total amount paid contractor		$ 16,613.35
Grand total expended to Nov. 30, 1920 (all State funds)		$ 20,450.45

John Day River Bridge

This bridge is on the Columbia River Highway over the John Day River near its mouth and connects Sherman and Gilliam Counties. It was designed prior to the period covered by this report, but was not put under contract until April 5, 1919. At that time Contract No. 112 was awarded to the Portland Bridge Company, but no material progress was made until after the subsidence of the usual spring freshet in the Columbia River. After this time the construction progressed much more satisfactorily and the structure was completed in January, 1920. The improvement consists of two 126-foot wood deck trusses on concrete piers with 320 lineal feet of wooden approaches and cost a total of $30,-646.77, which has all been paid by the State.

Construction was supervised by Resident Bridge Engineer H. F. Miller.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,214.43
Contract Items as Follows:		
Class "B" concrete, 428.9 cu. yds. at $30.00	$ 12,867.00	
Piling, 1,331 lin. ft. at $1.50	1,996.50	
Wood truss spans, all, at lump sum	10,275.00	
Approach trestle, 320 lin. ft. at $12.50	4,000.00	
Force Account Items:		
Furnishing and placing steel in foundations account change in plans	116.92	
Furnishing carbolineum to paint trusses	251.87	
Furnishing and placing extra bracing in approaches	191.95	
Revising handrail account change in plans	617.16	
Materials for revision of truss details	26.08	
Total	$ 30,342.48	
Deductions:		
Truss housing covered in bid price but not used	821.74	
War tax and freight reduction	88.40	
Total amount paid contractor		$ 29,432.34
Grand total cost of structure (all State funds)		$ 30,646.77

Lang Canyon Slope Protection

During the construction of the Lang Canyon Bridge, it was found that protection of the slopes and paving of the channel were necessary in order to fully protect the structure. This work was done by State forces with a total cost to the State of $1,241.35.

[GILLIAM]

Maintenance

In May, 1920, an oiling outfit was assembled in Arlington for the purpose of spraying the light blow sands adjacent to the Columbia River Highway right-of-way eastward from Arlington. Considerable delay was occasioned by the lack of oil shipments and the outfit was operated by State forces until September 1, 1920, when it was closed down for the season. At that time approximately 75 acres of sand had been oiled.

Oiling outfit No. 1, moving from work in Sherman County, started operations at the John Day River and worked east. Owing to difficulty in transporting oil over the newly constructed sandy grade, it was found advisable to defer the work on this section until 1921, at which time the surfacing from the John Day River to Blalock will be complete. About eight acres of sandy area were oiled on this section and the outfit moved to Blalock where they are operating at the present time. On November 1 considerable area of sand flats, cuts and fills and several large sand dunes had been covered in the vicinity of Blalock, amounting in all to approximately twenty-five acres.

Heppner Junction-Morrow County Line Construction Engineering

It was early seen that there would be considerable delay in completion of the Willow Creek and Heppner overhead bridges and a detour was constructed from the structure at Willow Creek to an intersection with the Oregon-Washington Highway at a point about one mile south. This detour was constructed on the east side of the creek and graded as a part of the permanent Oregon-Washington Highway. Construction was accomplished by the County under the direction of F. K. Gettins, Resident Engineer.

Bridge Design

At the request of the County Court of Gilliam County, bridge designs were prepared for two cattle passes which were built by the County as right-of-way considerations.

John Day River-Blalock Survey

The location of the Columbia River Highway between the John Day River and Blalock was completed during the summer of 1919 by Oscar Cutler, Locating Engineer. The adopted line parallels the Columbia River at a distance of from 1,000 to 1,500 feet and follows very closely the south side of the O. W. R. & N. Company's tracks, being 14.94 miles in length.

After the first location was made, the railroad company objected to the proximity of two contemplated tunnels. On this account ,a revised location was made, eliminating both tunnels, but requiring an adverse 5 per cent grade 1 mile in length through the rim rock to the level bench ground above.

Blalock-Arlington Survey

During 1918, location survey of the Columbia River Highway was made between the John Day River and Arlington. During 1919, revisions of the 14.9 miles between the towns of Blalock and Arlington were made.

[GILLIAM]

Heppner Junction-Morrow County Line Survey

Location survey from a point on the Columbia River Highway and extending 1 mile towards Heppner was made under the direction of F. K. Gettins, Resident Engineer. This survey is on a portion of the Oregon-Washington Highway and was occasioned by the necessity for constructing a detour in order to provide a means of travel made necessary by incompletion of the Heppner Junction and Willow Creek bridges.

Mayville-Thirtymile Creek Survey

During 1919 and 1920, location survey for 6.9 miles of the John Day River Highway between Mayville and Thirtymile Creek was made by Locating Engineer H. Kyle.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by G. W. Parman, County Judge, John W. Maidment and Sherman Wade, County Commissioners, under date of March 3, 1920, stating that a levy of 1.57 mills on all the taxable property of the County was made for Market Road construction, and designating four roads to be improved as Market Road Projects.

A levy of 1.57 mills on a valuation of $14,320,948.02 produced a County Market Road Fund of $22,493.89.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $10,466,832.20, which produced $10,466.83, which became a part of the "State Market Road Appropriation."

Funds apportioned by the State Highway Commission March 2	$ 10,466.83
Funds apportioned by the State Highway Commission April 3	4,268.96
Funds produced by County levy of 1.57 mills	22,493.89
Total available for 1920	$ 37,229.68

Project No. 1.—"Wehrli Canyon Road from head of Wehrli Canyon to John Day Highway, 4 miles."

E. M. Knatvold, Resident Engineer in the employ of the State Highway Commission, made a survey 3.2 miles in length, and prepared an estimate of cost to grade a roadbed 16 feet in width the entire distance. The estimated cost being approximately $27,000.00. Residents to be served by this road requested the County Court to change the location of a part of this road to another canyon, which the Court has agreed to do. No construction work has been done to date (November 5), but the County Court expects to start work about November 10 and expend approximately $10,000.00 on this project during the winter.

Project No. 2.—"Road from Gwendolen down Cayuse Canyon to top of grade across Rock Creek, distance about five miles."

No work has been done on this project.

Project No. 3.—"From Morrow County line down Willow Creek to Columbia River Highway, distance about nine miles."

No work has been done on this project.

Project No. 4.—"Ferry Canyon Road from top of Sniption Hill in Section 12, T-4S, R-20E, W.M., to S.W. corner of Section 7, T-4S, R-19E, W.M."

No work has been done on this project.

GRANT COUNTY

During the past two years great strides in the improvement of State highways in this County have been made. The John Day River Highway from Wheeler County line to Valades Ranch has been placed under contract for grading and is now practically complete. The Cole Bridge-Danby Ranch section is being macadamized and the John Day-Fisk Creek and Hall Hill-Prairie City sections have been graded and macadamized. These various jobs constitute a total of 22.92 miles of grading, 4.55 miles of macadamizing and 9.34 miles of grading and macadamizing, having a combined total length of 36.81 miles.

There now exists a graveled highway between Prairie City and the railroad at John Day which is passable at all times of the year, where there formerly were periods when its was impossible to negotiate the section with an empty wagon. With the completion of the Sarvice Creek-Valades Ranch Post Road Project and the macadam between Cole Bridge and Danby Ranch, the citizens of Grant County will be supplied with a comparatively easy means of traffic communication to the Columbia River Highway.

Work in Grant County was handled under the supervision of M. O. Bennett, Division Engineer, resigned, until September, 1920, at which time the district was taken over by J. H. Scott, Division Engineer.

Hall Hill-Prairie City Post Road Project

Under Project Agreement No. 14, the Bureau of Public Roads approved the grading and surfacing of 2.14 miles of the John Day River Highway between Hall Hill and Prairie City. Contract No. 71 was awarded to A. D. Kern of Portland, Ore., on November 27, 1918. Work was started February 21, 1919, and completed September 10 of the same year. The completed project represents a total cost of $41,169.03 of which $20,036.29 has been paid by the Federal Government and $21,-132.74 by the State.

C. A. Harrington was Resident Engineer the first portion of the work, being succeeded by J. F. Joyce, Resident Engineer, who remained on the project until completion.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,054.90
Lumber and other materials furnished by State to reconstruct irrigation flumes		920.18
Contract Items as Follows:		
Common excavation, 12,609 cu. yds. at 72c	$ 9,078.48	
12" corrugated galvanized pipe, 110 lin. ft. at $1.80	198.00	
18" corrugated galvanized iron pipe, 160 lin. ft. at $2.70	432.00	
Overhaul, 4,130 sta. yds. at 5c	206.50	
Class "A" concrete, 91.66 cu. yds. at $31.00	2,841.46	
Class "B" concrete, 56.02 cu. yds. at $30.00	1,680.60	
Class "C" concrete, 11.48 cu. yds. at $28.00	321.44	
Metal reinforcement, 4,400 lbs. at 10c	440.00	
Crushed gravel, 2,171 cu. yds. at $3.70	8,032.70	
Run of bank gravel, 3,696.5 cu yds. at $3.30	12,198.45	
50' span bridge, lump sum	775.00	
Force Account:		
Reconstructing irrigation flumes	764.32	
Total amount paid contractor		$ 37,193.95
Grand total cost of project		$ 41,169.03
Paid by State	$ 21,132.74	
Paid by Government	20,036.29	
Total	$ 41,169.03	

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John Day-Fisk Creek Post Road Project

The State Highway Department submitted to the Government for co-operation as a post road project, plans for the improvement of the 7.2-mile section between John Day and Fisk Creek. Federal aid was secured on this project under Project Agreement No. 13. This section connects up the town of John Day with the narrow gauge railroad at Prairie City.

Contract No. 88 was awarded to A. D. Kern on March 6, 1919. Work was begun March 25, 1919, and completed December 1 of the same year, under the direction of J. F. Joyce, Resident Engineer.

The Government co-operated to the extent of $53,088.93 in a total cost of $107,313.43, the balance of $54,224.50 being paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,364.55
Advertisements for bids		17.34
Contract Items as Follows:		
Clearing and grubbing, all	$ 100.00	
Common excavation, 42,941.1 cu. yds. at 65c	27,911.72	
Solid rock excavation, 4,316.6 cu. yds. at $1.48	6,388.57	
Overhaul, 52,061 sta. yds. at 4c	2,082.44	
12" corrugated galvanized iron pipe, 1,005 lin. ft. at $2.00	2,010.00	
18" corrugated galvanized iron pipe, 369 lin. ft. at $3.00	1,107.00	
24" corrugated galvanized iron pipe, 218 lin. ft. at $4 00	872.00	
Class "A" concrete, 461.24 cu. yds. at $30.00	13,837.20	
Class "C" concrete, 44.48 cu. yds. at $20.00	889.60	
Metal reinforcement, 17,457 lbs. at 9c	1,571.13	
Run of bank gravel, 16,882.5 cu. yds. at $2.62	44,232.15	
Clay or other earth filler, 1,000 cu. yds. at 75c	750.00	
Force Account:		
Removal of oversize from run of bank gravel	1,179.73	
Total amount paid contractor		$102,931.54
Grand total cost of project		$107,313.43
Paid by State	$ 54,224.50	
Paid by Government	53,088.93	
Total	$107,313.43	

Danby Ranch-Cole Bridge Macadam

This section begins at the Danby Ranch two miles west of the town of John Day and extends westerly a distance of 4.55 miles to Cole Bridge over the John Day River. The grading of this section was accomplished by Grant County at their own expense under the supervision of the State Highway Department.

On August 24, 1920, the Highway Commission awarded Contract No. 292 for graveling of the section to Jim Ross of Prairie City. After considerable difficulty in securing and assembling suitable construction equipment, work was started on September 29 and on October 6 a double shift was put on in order to complete the work by January 1, it not being practicable to carry on construction in this section of the state after that date. The surfacing is being laid to a width of 16 feet in two courses of 4 inches loose measure each. At the date of this report approximately two miles of bottom course and one mile of the top course have been completed.

The construction has been carried on under the supervision of Charles D. Jones, Resident Engineer, and the total cost is estimated at $30,000.00. Of this amount $3,676.21 has been expended to date.

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Sarvice Creek-Valades Ranch Post Road Project

This section constitutes the longest single post road project put under way in this state, having a total length of 48.02 miles. It extends from the mouth of Sarvice Creek in Wheeler County to Valades Ranch, about four miles west of Dayville in Grant County. The location from the mouth of Sarvice Creek is on the north and east sides of John Day River, crossing to the west side about four miles north of Basin. The mileages in the two Counties are very nearly equal, the Wheeler County portion consisting of 25.1 miles and the Grant County portion consisting of 22.92 miles.

Work is being carried on in co-operation with the Counties and the Federal Government under Project Agreement No. 6. Owing to the extreme length of the project, it was considered advisable to award the grading in four units, units No. 1 and 2 being in Wheeler County and units No. 3 and 4 in Grant County. The large bridges on each of the units have also been contracted separately with the exception of the structures on unit No. 4 which have not yet been advertised.

The total estimated cost of the grading and bridges for the entire project is $822,900.00. These funds will be made up as follows: State $372,831.70, Wheeler County $36.000.00, Grant County $50,000.00, Federal Government $364,068.30. Total expenditures to date amount to $447,297.48; Grant County $15,000.00, Wheeler County $36,000.00, Federal Government $139,069.27 and the State $257,228.21.

The construction of the entire project has been under the general supervision of N. W. Bethel, District Engineer.

Unit No. 1 Grading, Wheeler County—

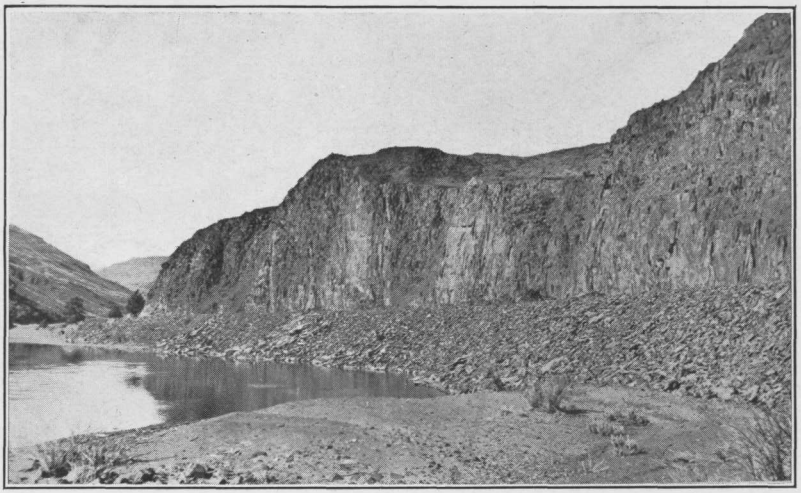
Contract No. 172 for the grading of this 13-mile unit was awarded July 8, 1919, to Copenhagen Brothers Company of Portland, Ore. Owing to the isolation of the work, it has been very difficult for the contractor to secure either supplies or men. However, the work is practically completed at the present time, the only work left being backfilling on the bridges. B. H. McNamee and E. B. Loken, successively, were Resident Engineers during construction.

It is estimated that the grading of this section will represent a total expenditure of $218,500.00. Of this amount $205,277.42 has been expended to the date of this report.

Owing to the rock encountered in several places, this section is not yet open to travel. A maintenance order contemplating the expenditure of about $4,000.00, to be equally divided between the State and County, has been issued for the purpose of placing a temporary surfacing on impassable sections. It is anticipated that this surfacing will be placed and the sections made available for traffic by December 15, 1920.

Unit No. 1 Bridges, Wheeler County—

In addition to the several small bridge structures which were awarded with the grading on this contract, there are three bridges of sufficient size to warrant their advertising under a separate contract. These structures consist of a 70-foot span over Alder Creek, a 90-foot span over Mule Shoe Creek and one 108-foot span over Kahler Creek. These structures are all of a wood design and have timber trestle approaches. Contract No. 191 was awarded August 5, 1919, to James F. Clarkson,



HEAVY ROCK WORK ON THE JOHN DAY RIVER HIGHWAY IN WHEELER COUNTY.

Portland, Ore., for these three structures. All attempts to purchase suitable material in the locality failed and the contractor was forced to install his own mill in the forest reserve nearby. This caused considerable delay, but the bridges are now practically completed and are excellent structures.

The engineering for these bridges was handled in conjunction with the grading operations. The estimated total cost is $21,700.00 of which amount $13,459.48 has been expended to date.

Unit No. 2 Grading, Wheeler County—

Contract No. 210 for grading this 12.1-mile unit was awarded to James F. Clarkson & Co. of Portland, Ore., on October 7, 1919. This section is on the north and east sides of the John Day River throughout its entire distance. Work was carried on with great difficulty as the nearest railroad point is sixty miles away and both men and materials were hard to secure, making construction obstacles much greater than are ordinarily encountered. Owing to a great amount of relocation that was done in order to improve the grade and alignment, the engineering expenditures have been higher than they would otherwise have been. Construction has been carried on under the engineering supervision of C. J. Dillinger, Resident Engineer. This unit is estimated to cost a total of $162,000.00 for the grading and engineering. The sum of $101,099.19 has been expended to date.

Unit No. 2 Bridges, Wheeler County—

Contract No. 295 for the construction of a wood truss span over Haystack Creek was awarded to Curtis Gardner on August 25, 1920. The construction work is under way at the present time and the structure will probably be completed early in the spring of 1921. The estimated cost of this structure is $6,000.00, with expenditures to date of $64.15.

Unit No. 3 Grading, Grant County—

This 12-mile unit is perhaps the most isolated and inaccessible piece of road construction in the state. The "basin" has no roads, the only existing means of communication being more or less of a trail through sage brush with numerous fords across the John Day River which are only passable at favorable periods. Contract No. 210 for the grading of this unit was awarded to James F. Clarkson & Co. of Portland, Ore., on October 7, 1919. Owing to the difficulties inherent in construction work carried on in such an isolated section, progress has been very slow, but is proceeding more rapidly at the present time. The construction work has been handled under the supervision of A. C. L. Jetley, Resident Engineer, and is estimated to cost a total of $131,000.00. To date there has been an expenditure amounting to $40,358.40.

Unit No. 3 Bridges, Grant County—

Contract No. 296 was awarded to Curtis Gardner of Portland, Ore., on August 25, 1920, covering the construction of five bridges on this section. Four of these structures are 40-foot wood truss spans and the other is made up of two 105-foot wood truss spans with 135 lineal feet of approach trestle. This latter structure is over the north fork of the John Day River near its junction with the main stream about twelve miles southeast of Spray. In addition to its necessity as a part of the

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trunk highway, the bridge will provide an outlet for a large volume of local traffic originating in the John Day basin. It is anticipated that the structures on this section will be completed during the 1921 season.

The estimated total cost of the five structures is $67,600.00. No expenditures have been made to date.

Unit No. 4 Grading, Grant County—

This section, 10.92 miles in length, runs through Picture Gorge and follows along the wider valley at the north end. Owing to lack of transportation, this section of the State has never been developed, except for a limited amount for stock raising. The completion of the project under way will open up a means of communication with the interesting fossil beds in the big basin and provide a new and interesting kind of scenery for the tourists of the state.

On October 7, 1919, Contract No. 212 was awarded to A. D. Kern of Portland, Ore. Difficulties have attended construction of this unit, such as hauling coal sixty miles for a steam shovel, and have made the construction progress more slowly and at a greater cost than in more favorable sections. At the present time, seven miles of the total length of this unit have been graded and it is anticipated that the balance will be built during the 1921 working season.

The construction work has been carried on under the engineering supervision of A. A. Kirkwood, Resident Engineer. To date the total expenditures have been $87,038.84 in an estimated total cost of $175,750.00.

Unit No. 4 Bridges, Grant County—

Owing to the various line changes which have been made in this unit in order that a better location might be secured, it has been inadvisable to contract the bridges until the best final location has been thoroughly worked out. It is believed that the bridges on this unit will be advertised early in the 1921 season. From the data available at the present time, it is estimated that they will cost a total of approximately $40,350.00.

Maintenance John Day River Highway

In March, 1919, at the request of the Grant County Court, Maintenance Order No. 1 was issued to provide for taking care of the roadbed between Prairie City and John Day, a distance of 14 miles. The work was handled by Grant County under a general patrolman, and necessary team and labor at times. This order expired October 1, 1920, and a total expenditure of $3,241.18 was required. This was assumed equally by Grant County and the Highway Commission.

On November 1, 1920, Order No. 2, amounting to $3,300.00, taking care of this work until November 1, 1921, was approved. Work is to be handled in the same manner, and paid for 50 per cent by Grant County and 50 per cent by the Highway Commission.

Canyon Creek-Danby Ranch Construction Engineering

The Canyon Creek-Danby Ranch section begins at the west city limits of John Day and extends west 1.97 miles to the Danby Ranch. Location surveys were made in September, 1919, by J. F. Joyce, Resident

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Engineer. Grading work was let by Grant County to A. D. Kern of Portland, Ore., for about $11,000.00. Grading was completed in October, 1919, under the supervision of J. F. Joyce. Upon completion of the grading, graveling with run-of-bank gravel was started by County forces. Charles D. Jones was Resident Engineer in charge. Operations proceeded intermittently through the winter, as weather permitted, until the summer of 1920, when work stopped entirely on account of the difficulty in the sale of bonds. The grading cost Grant County $11,694.87, and 1 mile was surfaced at a cost of $3,727.00. It is expected with a better sale of bonds that the project will be completed this winter.

Danby Ranch-Cole Bridge Construction Engineering

Grant County forces started grading the section from Danby Ranch to Cole Bridge on April 9, 1920, under the supervision of Charles D. Jones, Resident Engineer for the State. To date, Grant County has spent approximately $15,000.00 on the work and it will take about $3,000.00 to carry the grading to completion. At the present time work is progressing very slowly on account of the difficulty experienced in financing the work, it having been necessary for the County to sell bonds on a poor market. This section is being macadamized under contract awarded by the State, which will be found described in another article.

John Day-Canyon City Construction Engineering

This section lies between the town of John Day and Canyon City, County Seat of Grant County, and is not on the John Day River Hivhway proper. Work on this section was done and paid for by the County under the supervision of the State Highway Department.

Fisk Creek-Hall Hill Construction Engineering

During the latter part of 1918, Grant County forces started grading and macadamizing of the 3.5 miles of the John Day River Highway between Fisk Creek and Hall Hill. At the time of the last report the grading had been practically completed and gravel macadam was laid on 2.24 miles of the section. This work was carried into the spring of 1919, being supervised until completion by the State Highway Department.

Danby Ranch-Cole Bridge Survey

On petition of the Grant County Court the Highway Commission ordered the survey of that section of the John Day River Highway from a point 2 miles west of the town of John day, known as the Danby Ranch, to the Cole Bridge across the John Day River, a distance of 4.7 miles.

The survey, under R. C. Ingram, began March 5, 1920, and was completed on April 17 of the same year. On completion the County immediately started grading construction.

Dayville-Iron Bridge Survey

On petition of the Grant County Court in the spring of 1920, the Highway Commission ordered the survey of the Dayville-Iron Bridge section of the John Day River Highway, approximately seven miles in

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length. The location crosses the South Fork of the John Day River at Dayville, and the John Day River one-half mile east of this point; thence follows the river's course almost due east to Reeves Creek, where it was found necessary to go over the bluff, introducing about one-half mile of adverse grade.

The construction of this line will be comparatively light except the last half mile, where heavy rock work is encountered.

The present road follows the south side of the river from Dayville to the Iron Bridge, and although there are fewer water spout canyons on this side, the north side was chosen as a more favorable route, because it has better road building material, is better exposed, has less adverse grade and a more direct alignment.

The survey was begun April 19, 1920, and completed July 12 of the same year, under the direction of R. C. Ingram, Locating Engineer.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by George Hagny, County Judge, Sydney Green and W. S. Coverhill, County Commissioners, under date of March 4, 1920, stating that a levy of 2 mills on all the taxable property of the county, was made for Market Road construction, and designating two roads to be improved as Market Road Projects.

A levy of 2 mills on a valuation of $8,337,330.45 produced a County Market Road fund of $16,674.66. Included in the State levy of taxes was a levy of 1 mill on a valuation of $7,948,111.00 which produced $7,948.11 which became a part of the "State Market Road Appropriation."

Funds apportioned by the State Highway Commission March 2	$ 7,948.11
Funds apportioned by the State Highway Commission April 3	3,241.68
Funds produced by County 2-mill levy	16,674.66
Total available for 1920	$ 27,864.45

L. E. Lucas, County Engineer, made the location surveys, prepared plans and estimates and did the necessary construction engineering.

Project No. 1.—"From Ritter to an intersection of the John Day Highway at Mt. Vernon by way of Long Creek and Fox."

"Ritter Hill Section." A road with easy curves and a uniform grade of 6 per cent with a short section of 7 per cent maximum was located, to eliminate a crooked narrow road with very steep pitches. Surveys 2.16 miles in length were made. The road was graded for a distance of 1.67 miles to a 12-foot width of roadbed. No surfacing was placed in 1920. The estimated cost was $13,585.55.

"Beech Creek Section." A survey 2.26 miles in length was made. The road was graded for a distance of 1.64 miles, to a 12-foot width of roadbed. No surfacing was placed in 1920. The estimated cost was $7,805.05.

Project No. 2.—"The road from Monument down the North Fork of the John Day River to an intersection with the John Day Highway at Kimberly." A report from Mr. Lucas, dated October 8, stated that survey work on this project would start about October 15. At that time, the improvement to be made had not been determined, but it was intend- that all funds available would be expended before December 31, 1920.

HARNEY COUNTY

During the biennium just passed, the State Highway Department has put under way two very important projects in Harney County. The Central Oregon Highway has been graded and macadamized from Burns to a point east of Lawen and is at present under contract for grading and macadamizing from this point to Crane. It is anticipated that this latter section will be completed during the 1921 working season. These two projects, with a combined length of 27.18 miles, are being built as Post Road projects and are being paid for by the State, the County and the Federal Government and represent a total estimated cost of $411,000.00. Harney County has shown a very commendable spirit of co-operation with the limited amount of funds which they have available and are putting up $53,000.00 on these two units. The Federal Government participates to the extent of $182,935.60, the State paying the balance of $175,064.40.

Location surveys have been made between Burns and Suntex and present plans call for the placing of a portion of this section under contract during 1921. Work in Harney County was handled under the direction of Division Engineer M. O. Bennett, resigned, until September, 1920, at which time the district was taken over by E. B. Bishop, Division Engineer.

Burns-Lawen Post Road Project

The most important section of the Central Oregon Highway in Harney County is that portion between Burns and the terminus of the Oregon Short Line Railroad at Crane as it is necessary to haul practically all supplies for Harney County over this highway. The location is through a high and dry desert of light, volcanic ash and the old road has been very muddy during the winter and full of dust chuck holes in the summer, rendering transportation of supplies a very difficult and expensive procedure. These conditions were realized by the Highway Commission and on July 8, 1919 contract No. 174 was awarded the Pacific Bridge Company of Portland for grading and macadamizing 16.72 miles between Burns and Lawen. This work was awarded under co-operative agreement No. 15 between the State, Harney County and the Federal Government.

The grading was very light and inexpensive, while the cost of macadamizing has been exceedingly heavy, due to the extreme length of the haul necessary. Nearly all of the gravel was obtained from a pit about two miles from the west end of the project, extensive search failing to locate either gravel pits or quarry sites elsewhere. The gravel used for surfacing was run-of-bank material of very small size and excellent quality. Considerable difficulty was encountered in maintaining the surfacing during construction because of the intense traffic occasioned by the contractors haul. During the dry season of 1920 two motor trucks were installed equipped with large watering tanks. These have given excellent results and reduced the maintenance cost to a minimum.

Construction of this project has progressed rather slowly due to the severely cold winter of 1919-1920 and the necessary long haul of surfac-

[HARNEY]

ing material. The work is practically complete at the present time, however, and will furnish an all year artery of traffic between the limits of the section.

The total estimated cost of the work is $241,000. Of this amount the State co-operates to the extent of $99,118.15, Harney Couny $33,000.00, and the Federal Government $108,881.85. Total expenditures amounting to $206,302.55 have been made under the engineering supervision of C. E. Randels, Resident Engineer, $102,179.85 by the State, $33,000.00 by the County and $71,122.70 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 13,506.36
Sprinkling surfacing by State forces		3,724.05
Equipment rental (to be deducted from amounts due contractor)		5,612.30
Contract Items as Follows:		
Clearing and grubbing, all at $2,100.00	$ 2,100.00	
Common excavation, 69,776 cu. yds. at 50c	34,888.00	
Common excavation stripping gravel pit, 31,886.6 cu. yds. at 30c	9,565.98	
12¼ corrugated iron pipe, 1,328 lin. ft. at $1.80	2,390.40	
18" corrugated iron pipe, 200 lin. ft. at $3.50	700.00	
24" corrugated iron pipe, 246 lin ft. at $6.00	1,476.00	
Class "B" concrete, 6.72 cu. yds. at $40.00	268.80	
Class "C" concrete, 18 cu. yds. at $38.00	684.00	
Run-of-bank gravel. 34,896 cu. yds. at $1.40	48,854.40	
Payhaul per one mile, 217,066 cu. yds. at 55c	119,386.30	
Total	$220,313.88	
Deductions for rental of State equipment	4,478.77	
Total amount earned by contractor	$215,835.11	
Percentage retained until completion of contract	32,375.27	
Total amount paid contractor		$183,459.84
Grand total amount expended to Nov. 30, 1920		$206,302.55
Paid by State	$102,179.85	
Paid by County	33,000.00	
Paid by Government	71,122.70	
Total		$206,302.55

Lawen-Crane Post Road Project

This is the second Post Road project to be put under way in Harney County and when completed will provide an improved surfaced highway between Burns and Crane. The section begins at the end of the Lawen-Crane section and extends 10.46 miles to Crane. The County and Federal Government co-operate on the work under project agreement No. 48.

Contract No. 304 was awarded Porter & Conley on September 28, 1920. Work was started during the month of October, but very little has been accomplished at the time of this report. The soil is very light in this section and, in order that the surfacing may be placed on a moist and firmly compacted roadbed, the contract provides that the grading shall be done during the present winter and the surfacing applied during the spring and early summer of 1921.

The work is estimated to cost approximately $170,000.00, the County share being $20,000.00, the Government share $74,053.75, and the State share $75,946.25.

C. E. Randels, Resident Engineer, is in charge of the work with expenditures to date of $210.23 from State funds.

Burns-Suntex Survey

The survey of this section, which is a part of the Central Oregon Highway between Bend and Burns, was made by J. N. Bishop, Locating Engineer, between March and June, 1920. Survey began at a point 2.9 miles south of the Suntex postoffice, on nearly a straight line between two controlling points. The controlling points consist of a gap in the range of lava buttes west of Suntex, known as the Gap, and the head of Sage Hen Gulch southwest of Burns.

From the above named point of beginning the survey runs on a very direct course to the head of Sage Hen Gulch; thence down the Gulch, past the Sage Hen schoolhouse and through a range of low rolling hills into the Silvies River Valley; thence through the city of Burns and to the east end of the Burns-Lawen section, which section is now under construction, about two miles east of Burns.

Total length of survey is 35.7 miles. That part of this survey from Sage Hen Gulch to Burns follows for the most part a previous preliminary survey made in 1918 by H. B. Wright, Locating Engineer.

The survey was made at the request of the Harney County Court in order that money spent for this section could be placed in permanent construction. It is quite probable that a portion of this section will be placed under contract during the 1921 season, to be paid for by the State and County in co-operation.

Burns-Lawen Survey

The town of Burns, in Harney County, is approximately 27 miles from the nearest railroad point, at Crane, and in the winter season the road between the above points has been impassable. In the summer the light alkali ash soil is a succession of dust holes. Inasmuch as the supplies for both Burns and the surrounding country must be transported over this road, it was of vital importance that these people have a graded and macadamized highway.

Survey of this road was made in August, 1918, by H. B. Wright, Locating Engineer. A portion of this was revised in December, 1918, by P. M. Hall Lewis and completed in March, 1919, by H. B. Gould, Locating Engineer.

The location starts at a point on the present County road about one and one-half miles east of Burns, and runs southeasterly in a very direct line for 16.72 miles to a point about one mile east of Lawen. Grading and macadamizing of this section was completed in 1920 by the Pacific Bridge Company of Portland, Oregon.

Lawen-Crane Survey

The conditions affecting the location of the Lawen-Crane section are virtually similar to the Burns-Lawen section of the same highway, previously described. In September, 1919, a location survey was made between Lawen and Crane, south of the Warm Springs Butte and north of Malheur Lake, which was later revised at request of the citizens of this community, and line located north of Warm Springs Butte. The length of the located line was 10.46 miles and was made by F. N. Drinkhall, Locating Engineer.

[HARNEY]

Market Road Work

The State Highway Commission has on file "Market Road Resolution" signed by R. L. Hass and Jap McKinnon, County Commissioners, under date of March 5, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for Market Road construction, and designating two roads to be improved as Market Road projects.

A levy of 1 mill on a valuation of $12,883,068.00 produced a County Market Road fund of $12,883.07. Included in the State levy of taxes was a levy of 1 mill on a valuation of $11,299,104.80 which produced $11,299.10 which became a part of the "State Market Road Appropriation."

Funds apportioned by the State Highway Commission March 2	$ 11,299.10
Funds apportioned by the State Highway Commission April 3	4,608.40
Funds produced by County 1-mill levy	12,883.07
Total available for 1920	$ 28,790.57

Project No. 1—"Wells Hill-Crane Road."

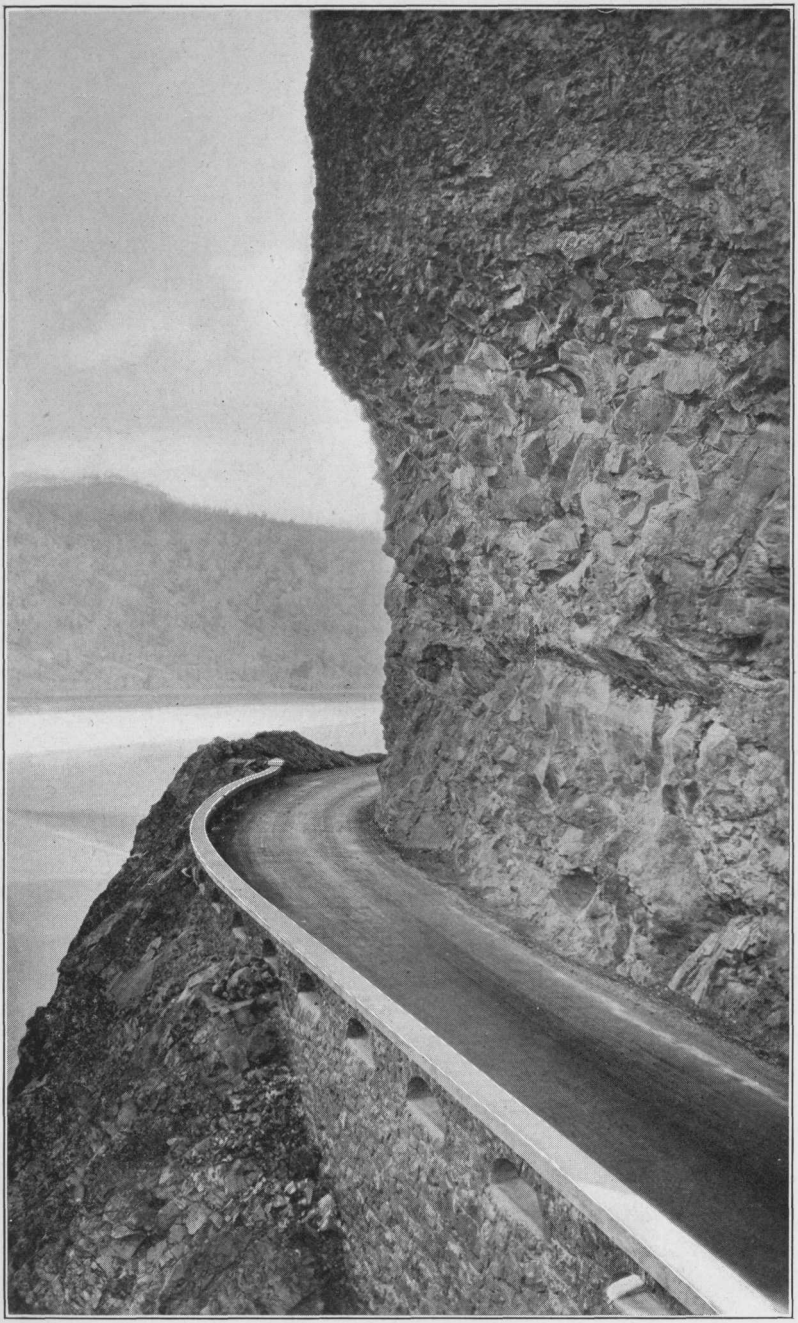
All engineering work on this project was done by C. E. Randels, Resident Engineer in the employ of the State Highway Commission. The location follows approximately the old road, from a point 12 miles south of Crane, running almost due north to Crane. Construction work was very light and was handled as grader work.

A contract was awarded for grading the entire length, 12 miles, to 18 feet width of roadbed. Work was completed in August. Approximate total cost $8,000.00.

Project No. 2.—"Wright's Point Road."

Initial point of the line about twelve miles from Burns. The location passes over a lava butte known as Wright's Point, raising from elevation 4110 to 4370 and dropping back to 4110 on the other side of the butte. The north side of the butte is very rocky.

The line was located for a distance of 2.8 miles, by J. N. Bishop, Engineer in the employ of the State Highway Commission. A maximum 5.5 per cent grade was used. A contract was awarded for grading 2.8 miles of roadbed 18 feet in width (inclusive of ditches), work to be completed in 1920. Estimated cost $14,000.00.



DIFFICULT CONSTRUCTION ON THE COLUMBIA RIVER HIGHWAY. NEAR MITCHELL POINT IN HOOD RIVER COUNTY.



RUTHTON HILL, THREE MILES EAST OF HOOD RIVER ON THE COLUMBIA RIVER HIGHWAY. PAVED IN 1920.

HOOD RIVER COUNTY

During 1919 and 1920, the State Highway Department placed under contract in Hood River County contracts for paving from Cascade Locks to Hood River, grading from Ruthton Hill to Hood River and the grading and macadamizing from Hood River east to the Wasco County line. At the date of this report, paving is complete to Hood River, which provides a paved thoroughfare all the way from Astoria through Portland to the Hood River city limits. The grading and macadamizing has been completed across the balance of the county and an all year highway is now provided through to eastern Oregon. The grading between Ruthton Hill and Hood River eliminated the narrow steep grade and three railroad crossings. The Hood River County section of the Columbia River Highway, and especially the Hood River-Mosier section, has always been considered the barrier. The entire section is in very rough, mountainous country with the railroad contiguous and usually just below. Expense has been greatly increased on account of the precautions that have necessarily been required in order that no delays to railroad traffic might ensue. Completion of the highway to Hood River makes the famous Hood River valley available to Portland. The completion to Mosier eliminates the dreaded and, in winter, impassable Mosier grade. Owing to the character of the country itself and the heavy rainfall, maintenance on all of the highway has been a very serious problem as well as an expensive one, but it is anticipated that this will be fully controlled within another season.

Hood River County has two main highways. The Columbia River Highway extends across the northern portion of the County, paralleling the Columbia River. The Mount Hood Loop connects with the Columbia River Highway at Hood River and furnishes a north and south trunk road which will handle a very large proportion of the County traffic when construction is completed. No work beyond necessary surveys has been undertaken, however, by the State on this highway in Hood River County.

Engineering supervision in this district was handled by C. C. Kelley, Division Engineer, until September, 1920, at which time the work was taken over by J. H. Scott, Division Engineer.

Cascade Locks-Hood River Paving

During 1916 one mile of pavement averaging 10 feet in width was built for Hood River County at the expense of Mr. S. Benson. On May 27, 1919, the State Highway Department awarded contract No. 133, for paving the 22.11 miles between Cascade Locks and Hood River, to G. E. Kibbe of Portland, Oregon. This section included the widening to a standard width of 16 feet of the pavement previously constructed by Mr. Benson. Included with the paving contract were items for guard fence, parapet walls, rubble masonry walls, and, on a force account basis, a considerable amount of removal of earth slides. Rain and damages to the roadbed, delays in shipment of materials and the necessity for keeping the road open to traffic the greater part of the time, delayed the completion of this contract to a considerable extent. The pavement itself was completed and opened to continuous traffic on August 2, 1920. The

[HOOD RIVER]

entire contract was completed on November 1. This project is being paid for entirely from State funds and the total estimated cost is $662,000. Expenditures to date have amounted to $587,353.78.

Construction of this project was carried on under the engineering supervision of W. P. Smith, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 17,404.68
Installing culvert pipe for tunnel drains (work done by O.W.R. & N. forces)		11.49
Rental of State owned equipment (used on force account work)		8,924.35
Contract Items as Follows:		
12" plain concrete pipe, 939 lin. ft. at $1.25	$ 1,173.75	
6" porous drain tile, 17,284 lin. ft. at 12c	2,074.08	
Class "C" concrete, 32 cu. yds. at $20.00	640.00	
Rubble masonry, 1,310 cu. yds. at $15.00	19,650.00	
Parapet wall, 2,517 lin. ft. at $2.50	6,292.50	
Wood guard fence, 27,158 lin. ft. at 70c	19,010.60	
Broken stone, loose measure, 49,969 cu. yds. at $2.875	143,660.88	
Standard Bit. pavement, Type "E", 222,430 sq. yds. at $1.36	302,504.80	
Broken stone shoulders, 212,000 lin. ft. at 5c	10,600.00	
Run-of-bank gravel for shoulders, 2,200 cu. yds. at $1.85	4,070.00	
Force Account Items:		
Clearing channel and building masonry wing walls at Gorton Creek Bridge	527.92	
Placing rock wall at Shell Rock Mountain	3,233.44	
Removing slides, cleaning ditches, excavating for tile drains, rocking slopes, removing overhanging trees, widening grade	59,158.14	
Moving hoist to Cascade Locks for shipment	343.76	
Constructing parapet wall, extending Ruckel Creek Bridge and building wing walls	4,144.08	
Building parapet walls and concrete shoulder 2 ft. wide between wall and pavement	1,547.83	
Removing debris and preparing Hood River Bridge for paving	291.46	
Total	$578,923.24	
Deductions:		
Rental of hoisting crane	390.00	
Cement sacks returned	169.05	
Total amount earned by contractor	$578,364.19	
Percentage retained until completion of contract	17,350.93	
Total amount paid to contractor		$561,013.26
Grand total expended to Nov. 30, 1920 (all State funds)		$587,353.78

Cascade Locks-Hood River Macadam

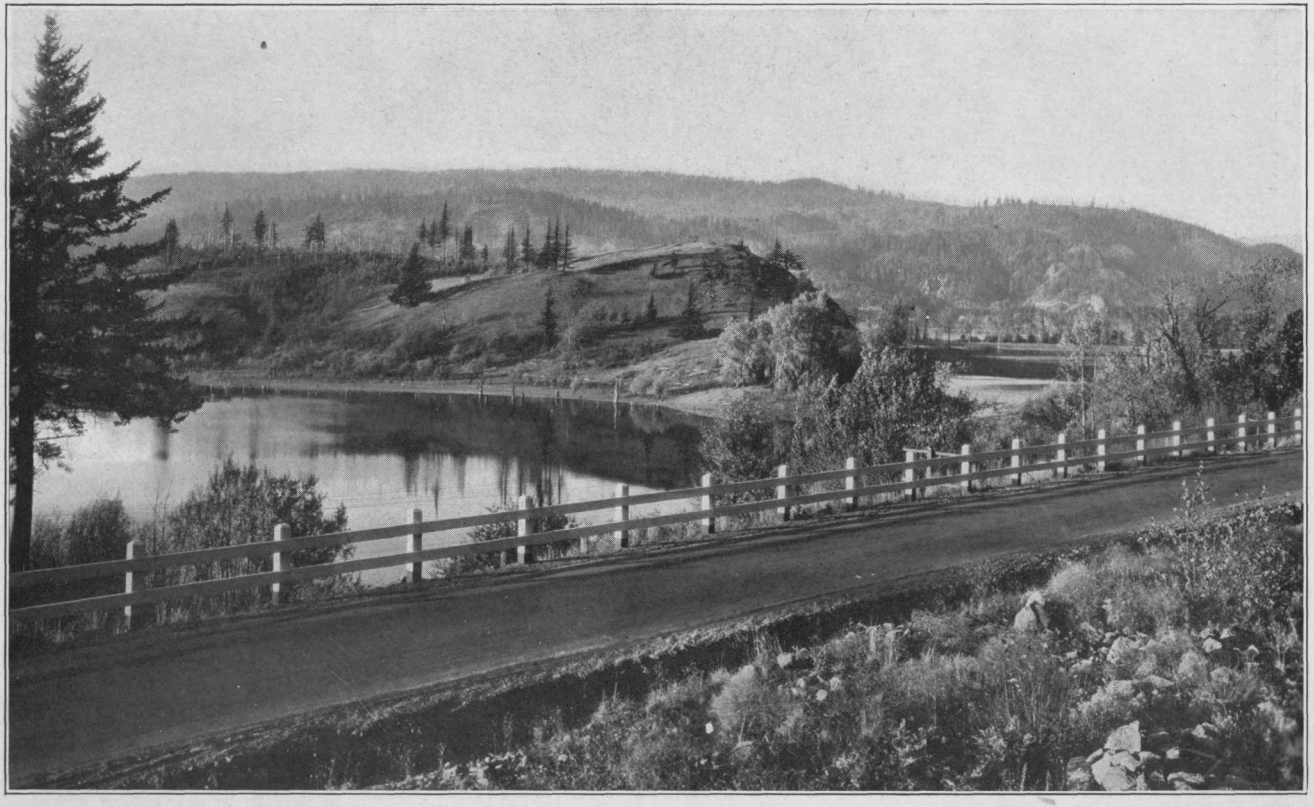
On July 4, 1918, the State Highway Commission awarded a contract to A. D. Kern of Portland, Ore., for gravel surfacing 18 miles of the Columbia River Highway between Hood River and the Multnomah County line on a cost plus basis. Expenditures on this work were incomplete at the date of the last report, a total of $62,895.48 having been paid at that time. During the present biennium, additional expenditures have been made in the amount of $4,849.29, bringing the total cost of the work to $67,744.77, which has all been paid from State funds.

Hood River-Mosier Macadam

On September 9, 1919, the State Highway Commission awarded contract No. 197 for surfacing 6.37 miles between Hood River and Mosier to A. D. Kern of Portland, Oregon. This surfacing covers the grading



BLACK PAVEMENT AT THE FOOT OF SHELL ROCK MOUNTAIN ON THE CASCADE LOCKS—HOOD RIVER SECTION OF THE COLUMBIA RIVER HIGHWAY. LAID IN 1920.



EAST OF CASCADE LOCKS ON THE COLUMBIA RIVER HIGHWAY IN HOOD RIVER COUNTY. SURFACED WITH BITUMINOUS PAVEMENT IN 1920.

[HOOD RIVER]

which was done under units Nos. 1, 2 and 3. Material was obtained from a run-of-bank pit of fine gravel on the loops near Hood River and from the large waste bank of screenings secured from the Pacific Bridge Company's crushing plant at Mosier, and was placed to a width of 20 feet. As the roadbed was composed largely of broken rock containing very little earth, fine gravel was used as this material packed in the voids will make a thorough and substantial base for paving as soon as the roadbed takes its eventual settlement. The macadamizing of this section eliminated the final barrier, and the trip fom Hood River to Mosier, which formerly took from one to two hours, can now be made safely and comfortably in fifteen minutes. Work was completed and the section opened to general traffic in February, 1920. E. O. Archibald, Resident Engineer, had charge of the engineering supervision of the work for the department. Total expenditures of $32,588.07 have been made from State funds for the entire cost of the surfacing.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 617.82
Contract Items as Follows:		
Special surfacing, 13,239.5 cu. yds. at $2.40	$ 31,774.80	
Force Account Items:		
Maintenance work	195.45	
Total amount paid contractor		$ 31,970.25
Grand total cost of project (all State funds)		$ 32,588.07

Cascade Locks Section Grading

This work was placed under contract during 1917 and expenditures of $152,904.85 were made at the time of closing the last biennial report. During the present biennium delayed charges to the amount of $161.42 have been paid, bringing the total cost of the project to $153,066.27.

Viento Section Grading

The contract for this work was awarded during 1917 and completed in September, 1918, at which time total payments of $86,933.00 had been made. During the present biennium delayed charges and the retained percentage on the contractors' estimates have been paid in the amount of $17,108.87, bringing the total cost of the project to $104,041.87 from State funds.

[HOOD RIVER]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,629.09
Material furnished by State for Viento Bridge		507.49
Diverting flume lines		936.37
Guarding and repairing O. W. R. & N tracks and Western Union Telegraph lines		2,440.88
Contract Items as Follows:		
Clearing and grubbing, 2 acres at $200.00	$ 400.00	
Common excavation, 9,505.7 cu. yds. at 39c	3,707.22	
Intermediate excavation, 32,723.7 cu. yds. at 70c	22,906.59	
Solid rock excavation, 54,185.4 cu. yds. at $1.10	59,603.94	
Overhaul, 82,711 sta. yds. at 3c	2,481.33	
12" reinforced concrete pipe, 622 lin. ft. at $1.75	1,088.50	
18" reinforced concrete pipe, 304 lin. ft. at $2.25	684.00	
Class "A" concrete, 124.7 cu. yds. at $20.00	2,494.00	
Class "C" concrete, 20.8 cu. yds. at $14.00	291.20	
Placing reinforcing steel, 7,728 lbs. at ½c	38.64	
Rubble masonry, 12 cu. yds. at $7.00	84.00	
Catch basins, 1 only, at $25.00	25.00	
Force Account Items:		
Excavating for footings, Viento Creek Bridge	128.27	
Private road approach	187.27	
Gravel back fill in rock cut	181.77	
Clearing rock from Mitchell Point Tunnel	93.94	
Repairing Lindsay Creek Bridge	149.92	
Detour crossing under flume	14.97	
Payroll, flagmen on railroad, paid by contractor	967.47	
Total amount paid contractor		$ 95,528.03
Grand total cost of project (all State funds)		$104,041.87

Ruthton Hill Grading

This work was done during the 1917-1918 biennium and expenditures of $90,257.53 had been made at the date of the last Department report. During the biennium just closed expenditures to the amount of $17,112.16 have been made, covering percentage retained on the contractor's estimates and other minor delayed charges.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,115.34
Pipe for reconstruction private pipe line		31.83
Material furnished by State for concrete half viaduct		280.48
Guarding O . W. R. & N. tracks		1,273.47
Contract Items as Follows:		
Clearing outside right of way, 3.5 acres at $200.00	$ 700.00	
Common excavation, 2,669.5 cu. yds. at 39c	1,041.10	
Intermediate excavation, 17,109.4 cu. yds. at 70c	11,976.58	
Solid rock excavation, 79,257.5 cu. yds. at $1.05	83,220.37	
Overhaul, 19,500 sta. yds. at 3c	585.00	
12" reinforced concrete pipe, 536 lin. ft. at $1.75	938.00	
18"reinforced concrete pipe, 140 lin. ft. at $2.25	315.00	
Class "C" concrete, 15.4 cu. yds. at $14.00	215.60	
Rubble masonry, 30 cu. yds. at $7.00	210.00	
Force Account:		
Connecting road with Morton Ranch (right-of-way consideration)	285.50	
Backfilling over rock roadbed	106.48	
Reconstructing pipe line for private water system	112.27	
Reinforced concrete viaduct at Ruthton Hill	1,362.51	
Railroad flagmen paid by contractor	600.16	
Total amount paid contractor		$101,668.57
Grand total cost of project (all State funds)		$107,369.69

[HOOD RIVER]

Ruthton Hill-Hood River Grading

Contract No. 132 for grading the section between Ruthton Hill and Hood River was awarded May 27, 1919 to G. E. Kibbe of Portland, Oregon. Owing to the large percentage of rock which, upon shooting, would break so large that it was hard to find places in the fills deep enough to deposit the rock, grading of this section was attended with many difficulties. The construction was also complicated by the number of residences along the road, occasioning extreme care in the blasting operations. Work was started under the supervision of J. H. Scott, and completed under E. O. Achibald, Resident Engineers. The total cost of the project represents an expenditure of $37,137.89 which has been paid entirely from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,909.54
Contract Items as Follows:		
Clearing and grubbing, all, at $500.00	$ 500.00	
Common excavation, 2,205.1 cu. yds. at 90c	1,984.59	
Intermediate excavation, 1,178.8 cu. yds. at 90c	1,060.92	
Solid rock excavation, 10,433.1 cu. yds. at $2.50	26,082.75	
Overhaul, 22,543 sta. yds. at 5c	1,127.15	
12″ plain concrete pipe, 505 lin. ft. at $1.50	757.50	
18″ reinforced concrete pipe, 73 lin. ft. at $2.75	200.75	
24″ reinforced concrete pipe, 36 lin. ft. at $4.25	153.00	
Class "A" concrete, 55.4 cu. yds. at $35.00	1,939.00	
Class "C" concrete, 8.8 cu. yds. at $30.00	264.00	
Reinforcing steel, 2,827 lbs. at 12c	339.24	
Rip-rap, 98.7 cu. yds. at $6.00	592.20	
Force Account Items:		
Replacing water pipes under grade	225.69	
Total amount earned by contractor	$ 35,228.35	
Total amount paid to contractor		$ 35,228.35
Grand total cost of project (all State funds)		$ 37,137.89

Hood River Bridge

During 1918, the State Highway Commission awarded a contract to Parker & Banfield for the construction of a bridge across the Hood River. A description of the structure will be found on page 111 in the last biennial report. At the date of the last report, expenditures of $40,528.29 had been made, distributed $36,559.80 to the State and $3,968.49 to the County. During the present biennium, the State has expended an additional amount of $4,740.86 and the County $4,041.51, making the total expense of the structure $49,300.66.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,804.79
Ltbor and material furnished by State for building approaches		7,219.80
Contract Items as Follows:		
Class "A" concrete, 1,012.42 cu. yds. at $21.00	$ 21,260.82	
Class "B" concrete, 240.83 cu. yds. at $13.30	3,203.04	
Class "C" concrete, 647.52 cu. yds. at $11.50	7,446.48	
Reinforcing steel, 93,420 lbs. at 6½c	6,072.30	
Concrete handrail, 631.85 lin. ft. at $2.50	1,579.62	
Force Account Items:		
Building west approach	713.80	
Total amount paid to contractor		$ 40,276.06
Grand total cost of structure		$ 49,300.66
Paid by State	$ 41,300.66	
Paid by County	8,000.00	
Total	$ 49,300.66	

[HOOD RIVER]

Unit No. 1 Hood River-Mosier Grading

Contract No. 72, for grading 1.37 miles from Hood River towards Mosier, was awarded to A. D. Kern of Portland, Oregon, on January 7, 1919. Grading operations were carried on with no unusual difficulty and the construction was completed in September, 1919. On this section is a very attractive set of "loops" which were necessary to gain elevation. These are on an open hillside overlooking the town of Hood River and the Columbia River. Work was under the direction of J. H. Scott, Resident Engineer, until succeeded by E. O. Archibald. The total expenditures on the work amount to $38,997.52, which have all been made from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,253.20
Advertisements for bids		9.09
Guarding railroad and telegraph lines		149.79
Contract Items as Follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 35,475.1 cu. yds. at 59c	20,930.31	
Solid rock excavation, 9,819.4 cu. yds. at $1.24	12,176.06	
Overhaul, 45,096 sta. yds. at 3c	1,352.88	
12" plain concrete pipe, 528 lin. ft. at $1.34	707.52	
Class "C" concrete, 15.32 cu. yds. at $20.00	306.40	
Force Account:		
Placing drain tile and back filling	236.50	
Concrete curb and handrail on retaining wall	258.07	
Temporary wearing surface of gravel	117.70	
Total amount paid contractor		$ 36,585.44
Grand total cost of project (all State funds)		$ 38,997.52

Unit No. 2 Hood River-Mosier Grading

On January 7, 1919, the State Highway Commission awarded contract No. 73 to A. D. Kern of Portland, Ore., for grading 2.7 miles from the end of unit No. 1 to the Wasco County line. The greater portion of this work was along talus slides from cliffs above and the natural slopes are too steep to hold a fill. It was consequently necessary to place the roadbed practically all in excavation. The matter of excavation slopes on cut side was entirely a guess until the work was actually done. In general, they held to a 1:1 slope, but on one large slide it was necessary to provide a much flatter slope. At this point there is considerable dirt in the talus material and the high winds cutting this out caused raveling and sliding of much extra material on to the roadbed. Grading work was completed in October, 1919, under the successive engineering supervision of J. H. Scott and E. O. Archibald, Resident Engineers. The project is being paid for from State funds and is estimated to cost a total of $118,500. To date the sum of $112,823.34 has been expended.

A report on the grading of Unit No. 3 will be found under the section devoted to Wasco County.

[HOOD RIVER]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 5,762.09
Advertisement for bids		19.85
Guarding O. W. R. & N. Ry. tracks		415.01
Contract Items as Follows:		
Clearing and grubbing, all, at $2,000.00	$ 2,000.00	
Common excavation, 105,465 cu. yds. at 48c	50,623.20	
Solid rock excavation, 49,454 cu. yds. at $1.00	49,454.00	
12" plain concrete pipe, 444 lin. ft. at $1.34	594.96	
24" reinforced concrete pipe, 52 lin. ft. at $4.00	208.00	
Class "C" concrete, 8.38 cu. yds. at $20.00	167.60	
Rubble masonry, 360 cu. yds. at $12.00	4,320.00	
Force Account Items:		
Moving building from right-of-way	15.40	
Laying drain tile and placing rock wearing surface on new grade	2,283.54	
Building catch basins and flumes for culvert run-off	427.60	
Furnishing labor and material for construction of half-viaduct	1,517.93	
Building dry rock wall at Sta. 1392+50	626.08	
Total amount earned by contractor	$112,238.31	
Percentage retained until completion of contract	5,611.92	
Total amount paid to contractor to Nov. 30, 1920		$106,626.39
Grand total expended to Nov. 30, 1920 (all State funds)		$112,823.34

Maintenance Cascade Locks-Hood River

During the winter of 1918 and 1919, storms caused various slides and washouts on this section. This is to be anticipated on all new work and the Department immediately took steps to keep the section open for winter traffic. Senator J. R. Nickelsen of Hood River was placed in charge of the work under the supervision of the Salem office. The road was kept open for traffic all winter and maintenance work continued until the section was contracted for paving in May, 1919. It is expected that as soon as the paving of this section is completed and final acceptance is made to the contactor, another maintenance order will be put in force and arrangements made to take care of this section during the coming winter. Total expenditures to date for the biennium amount to $12,398.39.

Flood conditions in Gorton Creek early in 1920 undermined the foundations of a small bridge on the Columbia River Highway over that stream near Wyeth. This made it necessary to reconstruct one span of the bridge, which was done by State forces at a cost of $6,979.11.

Ruthton Hill-Hood River Survey

Although surveys of this 1.75 miles were made during 1915 as part of the entire Columbia River Highway location through the County, several changes were necessary and the old line could be used only to the extent of having been a thorough preliminary investigation. Final location was started on March 24 and completed April 10, 1919, being carried on as other work permitted under the direction of J. H. Scott, Locating Engineer.

Mt. Hood Loop Survey

Several reconnaissance trips over this section and into the forest reserve were made by C. H. Whitmore, then Division Engineer, and various government road officials. Based upon the information secured

[HOOD RIVER]

by these investigations, surveys were started October 6, 1919 and completed in the field April 1, 1920 by J. H. Scott, Locating Engineer. The total length of the line from Hood River to the forest boundary was 21.8 miles. At the upper end of the valley, the county is very broken and covered with thick brush. During December and January the work was very greatly interfered with on account of a 4-foot snowfall on December 8. This made location work very slow and tedious and occasioned a large additional location expense that could in no way be avoided. When constructed, this road will serve as a trunk line for about seventy per cent of the population and tonnage of Hood River County, in addition to handling the tourist traffic on the Mt. Hood Loop.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by L. N. Blowers, County Judge, J. O. Hannum and F. H. Blackman, County Commissioners, under date of February 19, 1920, stating that a levy of 1.3635 mills on all the taxable property of the County, was made for Market Road construction and designating two roads to be improved as Market Road projects.

A levy of 1.3635 mills on a valuation of $9,512,641.52 produced a County Market Road fund of $12,972.03.

Included in the State levy of taxes, was a levy of 1 mill on a valuation of $9,777,034.70 which produced $9,777.04, which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 9,777.04
Funds apportioned by the State Highway Commission April 3	3,987.61
Funds produced by County levy of 1.3635 mills	12,972.03
Total available for 1920	$ 26,736.68

Project No. 1.—"Pine Grove near warehouse."

No work was done on this project in 1920.

Project No. 2.—"Odell near warehouse."

The County Court decided to use their Market Road funds for paving, 16 feet wide, with concrete a section of road through the town of Odell.

A survey approximately 1 mile in length was made by E. O. Archibald, Resident Engineer in the employ of the State Highway Commission, and maps, profiles and estimate of cost prepared.

The County Court advertised for bids, for preparing sub-grade and paving 1 mile of road. All bids were rejected and the County Court decided to do the work with County forces, and engaged Mr. Hatch as Superintendent. When construction work was started A. L. Cruikshank, County Surveyor, handled the construction engineering for a short time, followed by J. C. Russell, who acted as engineer and concrete inspector.

Some delay in construction was caused by failure of cement to show the required strength in seven day test made by E. W. Lazell. Other tests made by K. S. Hall, Testing Engineer for the State Highway Commission and by Mr. Beck, Testing Engineer for the City of Portland, showed the cement to be of the required strength.

Approximately 1650 lineal feet of pavement was laid, when it was decided to discontinue the work for the year.

Considerable material is on hand for use in 1921.

Approximately $24,000.00 was expended on this project.

JACKSON COUNTY

During the years 1919-1920 a very extensive road building program has been undertaken in this County. Contracts were let for the Pacific, the Ashland-Klamath Falls and the Medford-Crater Lake Highways.

Jackson County enjoys the distinction of being the only county on the Pacific Highway in which the entire distance has been placed under contract for paving. The contracts awarded during the past two years cover a total paving distance of 41.7 miles, of which a very small portion remains uncompleted at the present time. When these few uncompleted sections are finished, the entire Pacific Highway from the Josephine County line to the California State line, a total distance of 61 miles, will have been paved and will furnish a first class all year road through the County.

The greatest obstacle to through traffic during the winter season has been the condition of the portion over the Siskiyou Mountains. The paving of this stretch is nearing completion at the present time, however, and it is not expected that more than two miles will remain unpaved at the end of the present season. This short section will be rocked in order that the highway may be open to traffic all winter.

In addition to the paving work on the Pacific Highway, two dangerous grade crossings have been eliminated by the construction of concrete overcrossings, one at Tolo and the other south of Ashland. Over the Rogue River at Rock Point the Department has constructed a reinforced concrete arch which has elicited a certain amount of very favorable comment. Neil Creek has been spanned three times with concrete bridges. Two wood trestles have been placed north of Central Point and two concrete bridges constructed north of Gold Hill. South of Ashland on the Ashland-Green Springs Mountain road section, the location has been revised in order to build around the proposed reservoir to be constructed by the Talent Irrigation District.

On the Ashland-Klamath Falls Highway, the State and County are co-operating in the construction of a new road over the Green Springs Mountain summit. The contracts have been awarded for a distance of 19 miles, beginning at the Pacific Highway and extending east. Much of this work is at an altitude of between 4,000 and 5,000 feet and owing to the shortness of the working season will not be completed until next spring. The grading of the four remaining miles in Jackson County, as well as the balance of the highway to Klamath Falls in Klamath County, have been ordered for construction by the State Highway Commission and in all probability will be started early next season. The completion of this highway will afford an easy and convenient route for travel between the eastern and western sections of the southern half of the State. At the present time much of the traffic prefers to take the roundabout route, going south into California and making the trip via Ager and the Topsy Road. As soon as the construction now under way by the State is completed, it will not be neccesary to take this roundabout way as the new location eliminates all the bad features of the old road.

On the Medford-Crater Lake Highway, 22.2 miles of grading have been completed between Prospect and the National Park boundary, and

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6 miles are being surfaced. This work is being done as a Forest Road project and is being carried on under federal supervision. On November 6 the Highway Commission awarded contracts for the grading and bridges on the 14.35 miles between Agate and Trail. This work will be carried to completion during the 1921 season.

In carrying out the extensive program in this County, the State Highway Department has been aided and assisted by the hearty co-operation of the Jackson County Court.

All work in the County has been handled under the supervision of K. E. Hodgeman, Division Engineer for the State.

Gold Hill-Josephine County Line Paving

Contract No. 116, for the paving of this section of the Pacific Highway, was awarded on May 6, 1919 to S. S. Schell & J. L. Calvert, Grants Pass, Oregon. This work is 12.2 miles in length and follows the Rogue River from Gold Hill to the Josephine County line.

The original contract called for a 2-inch bitulithic pavement on a crushed rock, or a crushed gravel base. This was later changed to an inch-and-a-half to three-inch bituminous base, the thickness varying, depending on the conditions of the subgrade.

One of the contractor's paving plants proved to be unsuited for this work after it had been brought on the ground, and could not be used. The quarry first opened produced an excellent rock in the beginning, but as the quarrying progressed the material became so soft that this quarry had to be abandoned. Gravel from Foots Creek was then used, but this had to be washed before it could be used as paving material, and, after a washer had been installed, Foots Creek went dry owing to an unusual drought. Due to these adverse conditions this work has been delayed and will not be completed until next year.

Roy Nunn is Resident Engineer on the work, for which the total estimated final cost is $410,000.00. The entire project is to be paid for from State funds, the expenditures to date being $191,181.07.

Central Point-Gold Hill Paving

On April 15, 1919 contract No. 100 was awarded to the Clark & Henery Construction Company, of Stockton, Cal., for laying 8.9 miles of pavement between Central Point and Gold Hill on the Pacific Highway. This pavement was a 2-inch bitulithic and was laid on a 3-inch bituminous base. The bituminous base was laid upon the ground except in a few places where crushed gravel was rolled in before the base was placed. In addition to the three-legged roller, a tandem roller was used to iron out the top, which gave an exceptionally smooth, even surface. This pavement has been paid over a year and not a single break has occurred as yet.

The building of the fills, or appoaches to the Tolo Overcrossing was included in this contract, and the charges later transferred to the structure construction. These fills were allowed to settle during the winter of 1919-1920, and in the following spring these fills and the overcrossing were paved. Work was started May 15, 1919 and completed December 20, 1919 except for the work at the Tolo overcrossing. The entire section

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was completed July 20, 1920, the final cost of this project being $223,062.72, which was all paid from State funds. Roy Nunn was Resident Engineer in charge of the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,749.77
Furnishing, loading and unloading header boards		2,486.13
Credit by cost of construction of Tolo Overcrossing approaches transferred to the Tolo Overcrossing account		Cr. 11,958.54
Contract Items as Follows:		
Clearing and grubbing, all	$ 500.00	
Excavation, no classification, 33,997.24 cu. yds. at 65c	22,098.21	
Overhaul, 42,145 cu. yds. at 4c	1,685.80	
6" plain concrete pipe, 494 lin. ft. at 70c	345.80	
8" plain concrete pipe, 160 lin. ft. at 85c	136.00	
10" plain concrete pipe, 186 lin. ft. at $1.00	186.00	
12" plain concrete pipe, 186 lin. ft. at $1.25	232.50	
18" reinforced concrete pipe, 100 lin. ft. at $2.75	275.00	
24" reinforced concrete pipe, 68 lin. ft. at $3.74	254.32	
36" reinforced concrete pipe, 80 lin. ft. at $6.33	506.40	
6" porous drain tile, 203 lin. ft. at 30c	60.90	
10" drain tile, 30 lin. ft. at 35c	10.50	
Class "A" concrete, 52.5 cu. yds. at $30.00	1,575.00	
Class "C" concrete, 25 cu. yds. at $20.00	500.00	
Metal reinforcement, 2,940 lbs. at 9c	264.60	
Run-of-bank gravel base, 1,059.3 cu. yds. at $3.50	3,707.55	
Decomposed granite base, 1,639.25 cu. yds. at $2.50	4,098.13	
Decomposed granite in shoulders, 1,783.5 cu. yds. at $2.00	4,110.75	
Earth filler, 20 cu. yds. at $1.00	20.00	
Type "D" Bitulithic pavement, 82,279.5 sq. yds at $2.18	179,369.31	
Gravel shoulders, 91,332.8 lin. ft. at 6c	5,479.96	
Force Account:		
Extending 30" reinforced concrete pipe culvert	42.34	
Lowering manholes on Front Street Central Point	77.90	
Rip-rap at Griffin Creek and Jackson Creek trestles	415.87	
Moving fence from embankment area	40.15	
Rock toe walls at Tolo Overcrossing	94.80	
Total	$226,087.79	
Deductions:		
War tax on freight	302.43	
Total amount paid contractor		$225,785.36
Grand total cost of project (all State funds)		$223,062.72

Ashland Hill Paving

A complete report and a statement of the cost of this work will be found on pages 113 and 115 of the 1917-1918 biennial report. This work was completed at the date of this report, with expenditures of $15,908.03 having been made. During the present biennium, delayed charges have been paid to the extent of $438.22, bringing the total cost of the work to the State to $16,346.25.

Ashland-Green Springs Mountain Road Paving

Paving of this section of the Pacific Highway was awarded to Oskar Huber, Portland, Ore., on May 16, 1919, under contract No. 117. This contract, extending south from the city limits of Ashland, is 5.85 miles in length and covers the gading of the section and the construction of a 2-inch bitulithic wearing surface on a cushed gravel base. Owing to the large number of heavy trucks which are being used on the highways

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throughout the State and in order to take care of the heavy traffic to which the roads are being subjected, the Commission ordered the use of a 3-inch bituminous base shortly after the work was started.

Except for a distance of approximately two-thirds of a mile where a new grade is being constructed to keep the road above the high water line of the proposed Talent reservoir, the paving is completed at the date of this report. Owing to the necessity for allowing a winter's settlement of heavy embankments, it will be impossible for the paving to be laid on this short stretch until next year.

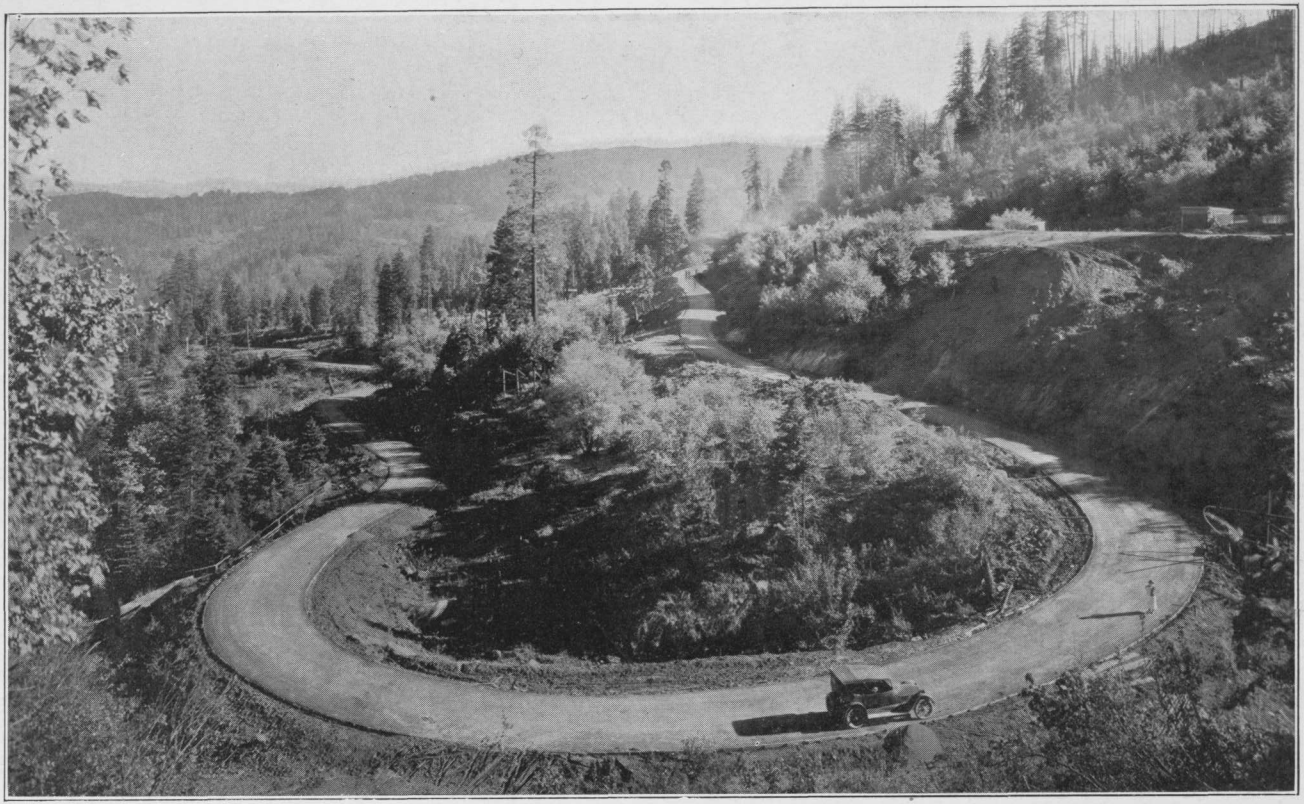
F. H. Walker is Resident Engineer on the construction of the project, which is estimated to cost a total of $230,000. The State is paving the entire construction cost of this project, having made expenditures to date of $159,261.99.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 8,039.71
36'-1" galvanized iron pipe used to drain spring under fill according to terms of right-of-way agreement		6.48
Asphalt furnished by State (to be deducted from amount due contractor)		29,764.32
Contract Items as Follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 14,922 cu. yds. at 60c	8,953.20	
Solid rock excavation, 5,803 cu. yds. at $1.50	8,704.50	
Overhaul, 26,385 sta. yds. at 3c	791.55	
Class "A" concrete, 86.87 cu. yds. at $25.00	2,171.75	
Class "C" concrete, 34.47 cu. yds. at $20.00	689.40	
Metal reinforcement, 3,583 lbs. at 10c	358.30	
12" plain concrete pipe, 540 lin. ft. at $1.25	675.00	
18" Armco pipe, 8 lin ft. at $2.50	20.00	
24" Armco pipe, 32 lin. ft. at $3.25	104.00	
36" Armco Pipe, 2 lin. ft. at $6.00	12.00	
15" Armco Pipe, 30 lin. ft. at $1.75	52.50	
Rip-rap, 66 cu. yds. at $6.00	396.00	
Bitulithic pavement, Type "F" top. 10,710 sq. yds. at $1.79	19,170.90	
Gravel base and shoulders, 10,082 cu. yds. at $4.00	40,328.00	
3" base Standard Bit., Type "D," 22,934.2 sq. yds. at $1.15	26,374.33	
2" base Standard Bit., Type "D," 22,284.9 sq. yds. at $1.79	39,889.97	
Grizzly binder, 424 cu. yds. at $3.50	1,484.00	
Headers for 5" paving, 25,060 lin. ft. at 7½c	1,879.50	
Materials on hand	4,039.20	
Total	$156,594.10	
Deduction for asphalt furnished by State	13,710.00	
Total amount earned by contractor	$142,884.10	
Percentage retained until completion of contract	21,432.62	
Total amount paid to contractor		$121,451.48
Grand total expended to Nov. 30, 1920 (all State funds)		$159,261.99

Green Springs Mountain Road-California Line Paving

Contract No. 118, covering the paving of the Pacific Highway from the Green Springs Mountain Road to the California line was awarded to Oscar Huber, Portland, Ore., on May 6, 1919. This is a continuation of the work let on the same date from Ashland south to the Green Springs Mountain Road. The project extends over the Siskiyou Mountains to the California line, a distance of 14.8 miles. The summit of the pass over these mountains is at an elevation of 4,515 feet and has been impassable



ON THE PACIFIC HIGHWAY IN THE SISKIYOU MOUNTAINS. PAVEMENT LAID IN 1920. SHOULDERS INCOMPLETE WHEN THIS PICTURE WAS TAKEN.

in past years during the winter season on account of the heavy snowfall and the impossibility of keeping anything but a paved surface open to traffic. The contract as awarded called for a 2-inch bitulithic wearing surface on a crushed rock base. The section constructed during 1919 was built of this type, but owing to the desirability of providing for heavier traffic, the wearing surface laid this year has been on either a 2-inch or 3-inch bituminous base according to the varying conditions of subgrade encountered.

Grading of this section was originally done by Jackson County, but in order to provide sufficient and adequate drainage, it was found necessary to widen the cuts and deepen the ditches over much of the distance. The total estimated cost of the work from State funds is $550,000.00 of which amount $388,596.44 has been expended to date. F. H. Walker is Resident Engineer on the construction.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 13,157.84
Rental on crushing equipment furnished by state		2,125.00
Asphalt furnished by State (to be deducted from amounts due contractor)		40.827.82
Contract Items as Follows:		
Common excavation, 21,601 cu. yds. at 75c	$ 16,200.75	
Solid rock excavation, 3,073 cu. yds. at $2.00	6,146.00	
Overhaul, 12,800 sta. yds. at 3c	384.00	
12-inch plain concrete pipe, 66 lin. ft. at $1.25	82.50	
6-inch porous drain tile, 808 lin. ft. at 30c	242.40	
Std. Bit. Pave. Type "F", 49,230.3 sq. yds. at $1.79	88,122.24	
Broken stone shoulders, 40,000 lin. ft. at 7c	2,800.00	
Clay filler, 27 cu. yds. at $1.00	27.00	
Broken stone base and shoulders, 22,140 cu. yds. at $4.00	88,560.00	
3" Bit. Base, 21,500.8 sq. yds. at $1.15	24,725.92	
2" Std. Bit. wearing surface, 68,140.9 sq. yds. at $1.79	121,972.21	
Pavement Bit. Base 3-inch, 7,491 batches at $3.85	28,840.35	
Pavement Bit. Base 3-inch and 2-inch, 8,630 batches at $5.15	44,444.50	
Grizzly binder material, 131 cu. yds. at $3.50	458.50	
Headers for 5-inch pavement, 54,920 lin. ft. at 7.5c	4,119.00	
Headers for 4-inch pavement, 22,682 lin. ft. at 6c	1,360.92	
Materials on hand	6,705.00	
Force Account Items:		
Removing surplus rock from shoulders on account of change in plans	202.20	
Total	$435,393.49	
Deductions for asphalt furnished by state	44,233.75	
Total	$391,159.74	
Percentage retained until completion of contract	58,673.96	
Total amount paid contractor		$332,485.78
Grand total expended to Nov. 30, 1920 (All State Funds)		$388.596.44

Maintenance of Pacific Highway Across Jackson County

The maintenance of those portions of the Pacific Highway which have been completed is assuming greater importance. The amount expended for this purpose by the State during the past two years is $5,893.20, most of which was spent on the pavement between Ashland and Central Point which was laid by the County in 1914. The shoulders being wide and flat, the water was held in pools along the side of the pavement and in some places extended on to the pavement. Last winter, with an outfit consisting of a caterpillar tractor, scarifier, grader and several teams, the shoulders were reshaped by being cut down and given a reasonable slope from the edge of the pavement to the ditch.

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The heavy traffic of the past year is having a marked effect on this pavement, resulting in cracks that are continually increasing. These cracks have recently been filled with hot asphalt and the broken places have been repaired.

Green Springs Mountain Summit-Pacific Highway Surfacing

In order to keep the lower section of the road from the Pacific Highway to the Green Springs Mountain open for local traffic during the winter season, the State Highway Commission on August 10, 1920, awarded a force account contract to A. Giebisch, Portland, Ore., for surfacing with decomposed granite the first 6 miles east from the Pacific Highway.

At the present time the construction work is under way under the supervision of G. E. MacVicar, Resident Engineer. The final estimated cost of the surfacing is $26,000.00, which will be paid entirely from State funds. The sum of $7,987.85 has been expended to date.

Talent Reservoir Grading

Subsequent to the contracting of the Ashland-Green Springs Mountain Road paving, the Talent Irrigation District planned to construct a dam across Emigrant Creek which would back the water up Neil Creek and over the original location of the Pacific Highway at a point about six miles south of Ashland. The district requested the State Highway Commission to change their adopted location in order to accommodate this reservoir and offered to pay the cost of making the change. Although the original location was already under contract, the Commission consented to their proposal and on July 6, 1920 awarded contract No. 274 to Chris H. Natwick, Eagle Point, for the grading of the 0.64 miles affected. Construction work is under way at the present time, the estimated cost being $9,600. Jackson County guaranteed the offer made by the Talent Reservoir Irrigation District and their share of the total cost is estimated at $8,800.00, the State's share of $800.00 being for estimated engineering expenditures. To date $5,338.34 has been expended under the supervision of F. H. Walker, Resident Engineer, $5,334.14 from County funds and $4.20 from State funds.

Green Springs Mountain Summit-Pacific Highway Grading

On June 10, 1919 the State Highway Commission awarded contract No. 152 to A. Giebisch, Portland, Ore., for grading 10.09 miles of the Ashland-Klamath Falls Highway between the Pacific Highway and the Green Springs Mountain Summit. The new location provides for a 16-foot travel way with a maximum gradient of six per cent, eliminating several miles of rough and crooked road with an average gradient of more than ten per cent.

Work has been handled with steam shovels and teams and is about seventy-five per cent completed at the present time. The contractor has provided two steam shovels on the work and has made very fair progress. The heavier work has been handled by various station-men sub-contractors. Construction has been supervised by G. E. MacVicar, Resident

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Engineer, the estimated final cost being $182,000.00. The State assumes all engineering expenditures, the construction expenditures being paid fifty per cent by the State and fifty per cent by the County. It is estimated that the county's share will amount to $84,000.00, and the State share to $98,000. The sum of $115,683.64 has been expended to date by the State.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 11,068.65
Rental on State equipment (to be deducted from amount due contractor)		168.00
T.N.T. furnished by State (to be deducted from amount due contractor)		2,200.00
Contract Items as follows:		
Clearing, 95 per cent at $6,000.00	$ 5,700.00	
Common excavation, 3,433 cu. yds. at 75c	2,574.75	
Intermediate excavation, 11,687 cu. yds. at 90c	10,518.30	
Solid rock excavation, 74,330 cu. yds. at $1.30	96,629.00	
Overhaul, 13,700 sta. yds. at 5c	685.00	
12" plain concrete pipe, 794 lin. ft. at $1.50	1,191.00	
18" reinforced concrete pipe, 156 lin. ft. at $3.75	585.00	
24" reinforced concrete pipe, 84 lin. ft. at $5.25	441.00	
30" reinforced concrete pipe, 48 lin. ft. at $8.00	384.00	
Lumber and timber in place, 34.322 M-FBM at $50.00	1,716.10	
Force Account:		
Changing location of culvert	17.53	
Removing old bridge at Sta. No. 437	21.97	
Total	$120,463.65	
Deductions for truck rental and war tax on freight	173.07	
Total amount earned by contractor	$120,290.58	
Percentage retained until completion of contract	18,043.59	
Total amount paid contractor		$102,246.99
Grand total expended to Nov. 30, 1920 (all State funds)		$115,683.64

Green Springs Mountain Summit-Jenny Creek

This section of the Ashland-Klamath Falls Highway is 8.71 miles in length and extends from the summit of the Green Springs Mountain east to Jenny Creek. The old road was never really graded, being but a rough rocky trail that wound among and over the boulders. A new location has been made, using a maximum six per cent grade with a 16-foot traveled way. After crossing Keene Creek, it follows a high bench on the east side of Jenny Creek, crossing the latter about one-half mile below the present road.

On June 10, 1919, the State Highway Commission entered into a contract with the Jackson County Court for the grading of this section on a cost plus basis, the construction expense to be borne equally by the State and County with the State paying the engineering. The total estimated cost of the work is $110,000.00, which will be divided $60,000.00 to the State and $50,000.00 to the County. Expenditures to date from State funds amount to $75,691.65, having been made under the engineering supervision of G. E. MacVicar, Resident Engineer. At the present time the grading is about seventy-five per cent complete and should be finished during the early summer of next year.

Agate-Trail Post Road Project

This section of the Medford-Crater Lake Highway lies between Agate and Trail and is being built in co-operation with the County and Federal Government under Post Road Project Agreement No. 47. The total esti-

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mated cost of the project, including $193,800.00 for surfacing of the entire distance, which has not yet been awarded, is $530,000.00. This total cost will be divided $198,750.00 to the State, $132,500.00 to the County and $198,750.00 to the Federal Government. The project is 14.35 miles in length and was divided into three units for contracting in order that the individual contracts might be small enough to invite the submission of bids by the smaller contracting organizations. Contracts for grading and construction of bridges on the entire distance were awarded by the State Highway Commission on November 6, 1920. No expenditures have been made to the date of this report.

Unit No. 1 begins at Trail and extends a distance of 2.44 miles towards Agate. Contract No. 312, for the grading of this unit, was awarded to William von der Hellen of Eagle Point, the total estimated cost being $48,650.00. Unit No. 2 constitutes 7.22 miles in the center of the project. Contract No. 313 for the grading of this unit was awarded to Rhodes & Price of Medford, Ore., at a total estimated cost of $121,100.00. Unit No. 3 covers the 4.69 miles adjacent to Trail. Contract No. 314 for grading this portion was awarded to W. B. Tull of Portland, Ore., at a total estimated cost of $62,850.

There are five bridges to be constructed on the project. These bridges consist of two 44-foot concrete spans over Antelope Creek, one 60-foot steel deck span and four 22-foot concrete spans over Little Butte Creek, two 30-foot concrete spans over Reese Creek, one 40-foot concrete span over Indian Creek and two 80-foot steel spans with four 35-foot concrete spans over the Rogue River. Contract No. 307 for the construction of the first four mentioned structures was awarded to Albert Anderson of Grants Pass. Contract No. 308 for construction of bridges over the Rogue River was awarded to the Portland Bridge Company. The total estimated cost of the five bridges is $103,600.00.

Prospect-Crater Lake Forest Road Project

In order to render the wonders of the Crater Lake National Park more accessible to tourist traffic, the government, through its Bureau of Public Roads, and the State and County have co-operated in the grading of a 22.2-mile section between Prospect and the National Park boundary on the Medford-Crater Lake Highway.

This work was done by the Eagle Point Construction Company of Eagle Point, Ore., under contract awarded to them by the Bureau of Public Roads, on July 14, 1919. The grading was completed in October, 1920, under the supervision of C. J. Seymour, United States Highway Engineer, at a cost of approximately $186,000.00, or about $60,000.00 less than the original agreement estimate. This unexpended balance is being used in placing a 9-inch crushed rock macadam over approximately six miles of the section. The grading and surfacing is estimated to cost a total of $246,000.00, which will be paid $121,250.00 by the State, $3,500.00 by Jackson County and $121,250.00 by the Federal Government. Expenditures to date amount to $197,830.50, having been paid $91,626.75 by the State, $2,097.65 by Jackson County and $104,106.10 by the Federal Government.

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Birdseye Creek and Miller's Gulch Bridges

Two small bridges over Birdseye Creek and Miller's Gulch on the Pacific Highway near Rogue River are being built by F. C. Carter of Talent, under contract No. 262, which was awarded to him on April 27, 1920. Each bridge consists of two concrete spans, those over Birdseye Creek being 30 feet in length, while the others are 27-foot spans.

Only a small force has been employed by the contractor and therefore progress has not been rapid, but it is expected that the work will be completed by December 15. A. A. Clausen is Resident Engineer.

The estimated cost of the two structures is $12,210.00, all of which will be paid by the State. Expenditures to date amount to $10,220.07.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,100.39
Contract Items as follows:		
Birdseye Creek Bridge No. 412		
Excavation, 90.87 cu. yds. at $1.25	$ 113.59	
Class "A" concrete, 105.70 cu. yds. at $30.00	3,171.00	
Metal reinforcement, 17,780 lbs. at 10c	1,778.00	
Maintaining traffic, 75 per cent at $300.00	225.00	
Reinforced concrete handrail, 57 lin. ft. at $3.00	171.00	
Force Account:		
Construction of masonry wall to protect west bank of Birdseye Creek	408.50	
Millers Gulch Bridge No. 413		
Excavation, 109.16 cu. yds. at $1.25	136.45	
Class "A" Concrete, 88 cu. yds. at $30.00	2,640.00	
Metal reinforcement, 17,265 lbs. at 10c	1,726.50	
Maintaining traffic, 2-3 at $300.00	200.00	
Materials on hand	159.00	
Total amount earned by contractor	$ 10,729.04	
Percentage retained until completion of contract	1,609.36	
Total amount paid to contractor		$ 9,119.68
Grand total expended to Nov. 30, 1920 (all State funds)		$ 10,220.07

Rock Point Arch

The Pacific Highway crosses Rogue River about two miles north of Gold Hill on a reinforced structure made up of a 115-foot arch span with six 25-foot approach spans on one end and seven on the other.

The topography of the country at this place is such that it provides a wonderful setting for a beautiful structure and therefore an attempt was made to design such a one. Since the construction was completed, much favorable comment has been heard, so it is believed that the attempt was successful.

Contact No. 158 was awarded for this work on June 10, 1919 to Parker & Banfield of Portland, Oregon. Construction was started at once and was completed on February 17, 1920. Owing to the great depth of water, it was impossible to build falsework under the main arch span in the regular way. The contractor solved the problem by building a wood truss span over the river which gave support to the forms and which was an entire success. The Resident Engineer on the work during the entire period of construction was Christ Fauerso.

Of the cost of the work, $23,465.06 will be paid by Jackson County and $24,928.85 by the State, making a total of $48,393.91. Expenditures of the total amount have been made, $25,393.91 by the State and $23,000.00 by the County.

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DETAILED STATEMENT OF EXPENDITURES

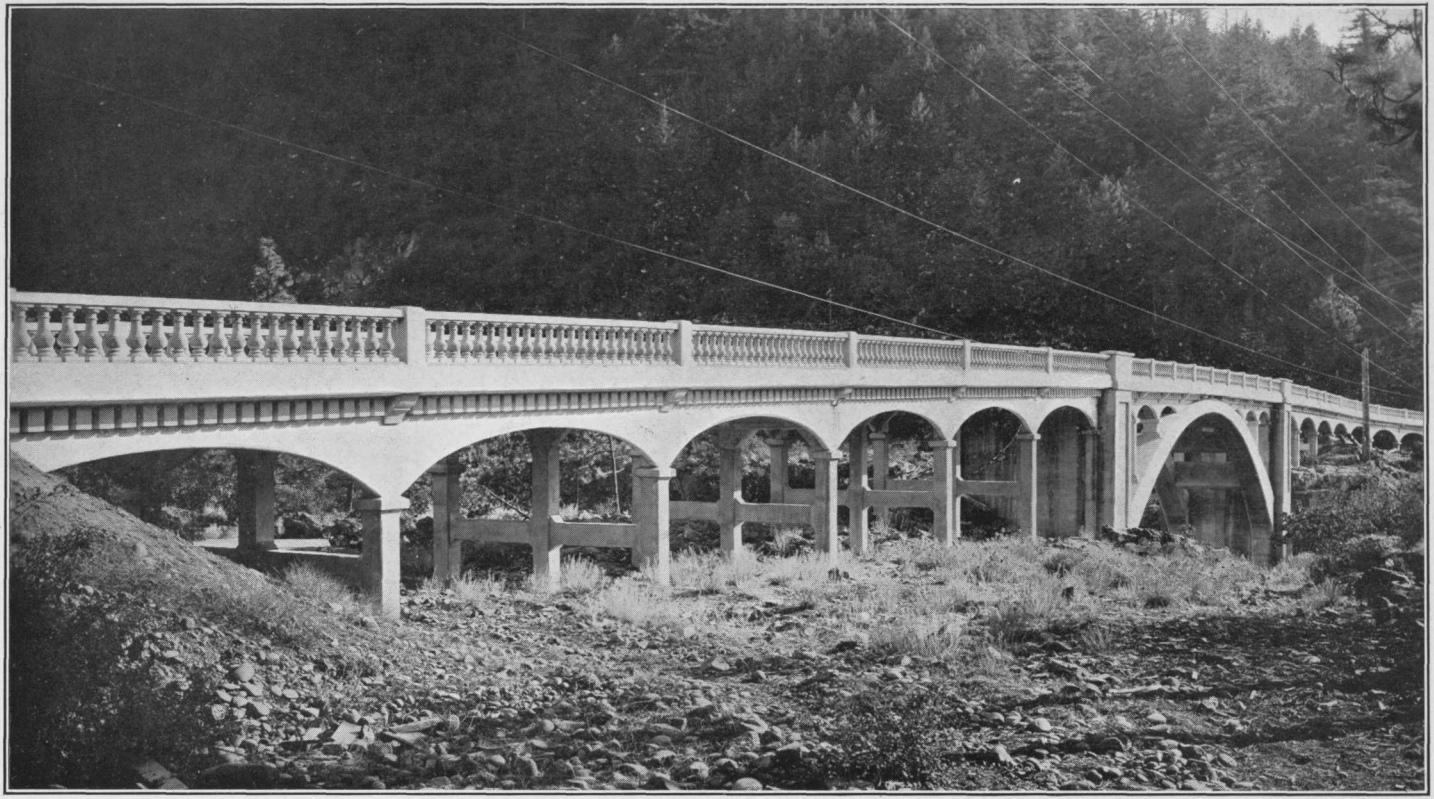
Engineering		$ 1,463.78
Contract Items as follows:		
Class "A" concrete, 969.03 cu. yds. at $32.00	$ 31,008.96	
Reinforcing steel, 151,429 lbs. at 65c	9,842.88	
Concrete handrail, 858 lin. ft. at $3.00	2,574.00	
Force Account:		
Extra labor and material used on Arch Rib Anchorage	1,799.34	
Extra labor and material used in building abutment piers	1,801.79	
Total	47,026.97	
Deduction for war tax	96.84	
Total amount paid to contractor		$ 46,930.13
Grand total cost of structure		$ 48,393.91
Paid by State	$ 25,393.91	
Paid by County	23,000.00	
Total	$ 48,393.91	

Tolo Overcrossing

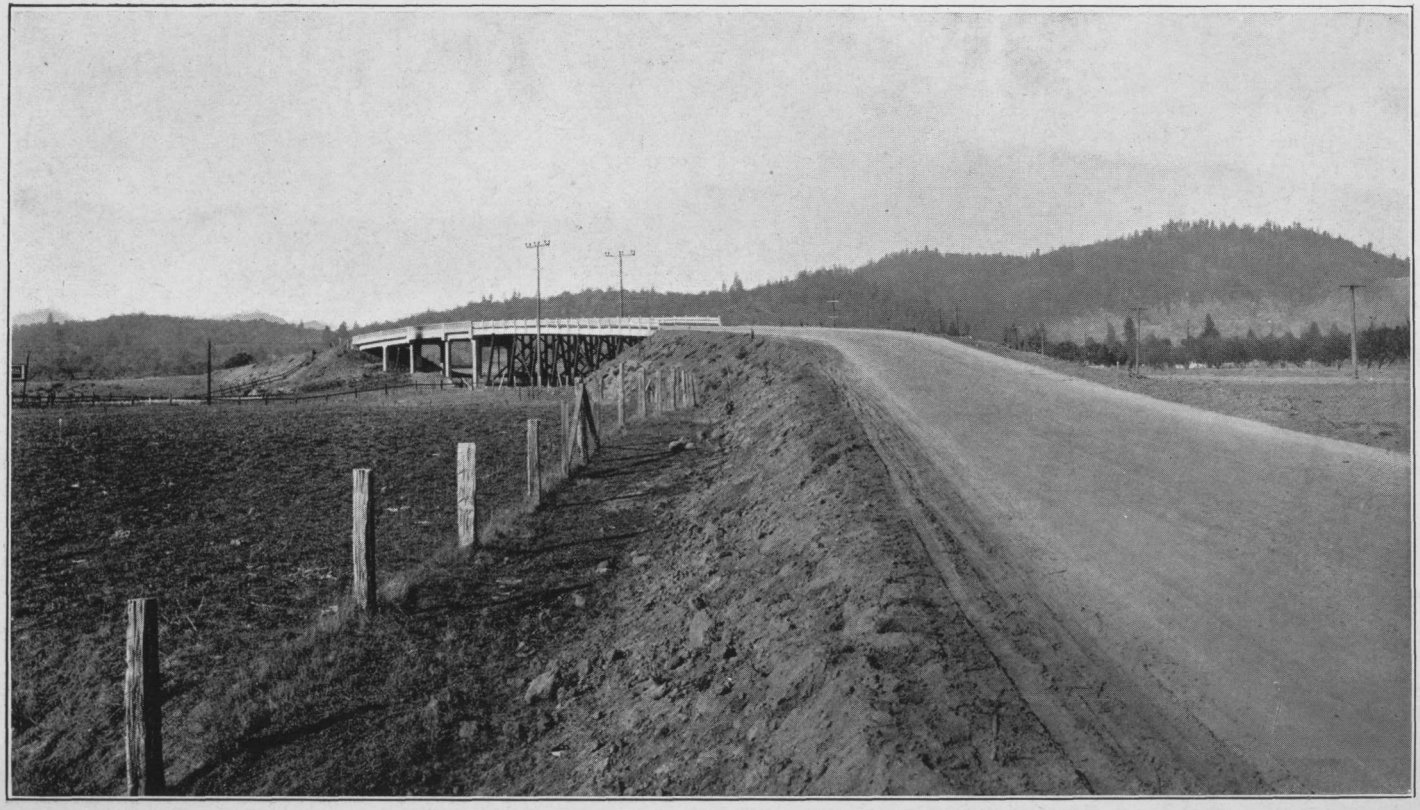
Near the station of Tolo, the Pacific Highway crosses the tracks of the Southern Pacific Railroad Company. A dangerous grade crossing had existed at this place for a long time, and therefore, when plans were prepared for the improvement of the section, they provided for the elimination of the grade crossing by means of an overhead structure. This structure consists of one 36-foot, one 30-foot and two 28-foot concrete spans, with 180 feet of wooden trestle approach. Construction of the bridge was completed on June 1, 1920, by Albert Anderson who was awarded contract No. 222 for the building of the structure on October 7, 1919. Chris Fauerso was Resident Engineer in charge of the work.

Approaches to the structure were built by the Clark & Henery Construction Company of Stockton, Cal., in conjunction with their contract for grading and paving the Central Point-Gold Hill section.

The final estimated cost of the bridge and approaches, including $1,500.00 for guard fence which has not yet been built, is $32,431.87. This amount is to be paid $12,972.75 by the State, $6,486.37 by the County and $12,972.75 by the railroad. To date, there has been spent the sum of $30,931.87, which has all been paid from State funds. This expenditure represents the total cost of the structure and approaches with the exception of the estimated cost of the guard fence which is to be built.



CONCRETE ARCH AND VIADUCT OVER ROGUE RIVER IN JACKSON COUNTY. ON THE PACIFIC HIGHWAY BETWEEN GRANTS PASS AND MEDFORD. BUILT IN 1919. TOTAL LENGTH FOUR HUNDRED AND FORTY FEET.



OVERHEAD CROSSING WITH SOUTHERN PACIFIC RAILWAY. ON THE PACIFIC HIGHWAY, NEAR TOLO IN JACKSON COUNTY. CONSTRUCTED IN 1919 AND 1920.

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DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,484.85
Royalty on material for embankment		250.00
Items Under Contract for Structure:		
Class "A" concrete, 244.55 cu. yds. at $30.00	$ 7,336.50	
Metal reinforcement, 39,908 lbs. at 8.5c	3,392.18	
Structural steel, 24,050 lbs. at 09c	2,164.50	
Approach trestle, 177.3 lin. ft. at $17.90	3,173.67	
Concrete handrail, 250 lin. ft. at $3.25	812.50	
Force Account:		
Painting timbers, digging test holes and removing fill around bracing	359.13	
Total amount paid contractor on structure		$ 17,238.48
Items Under Contract for Approaches:		
Common Excavation, 14,041.21 cu. yds. at 65c	9,126.79	
Overhaul, 42,096 sta. yds. at 40c	1,683.84	
24" reinforced concrete pipe, 40 lin. ft. at $3.74	149.60	
36" reinforced concrete pipe, 80 lin. ft. at $6.33	506.40	
Class "C" concrete, 9.02 cu. yds. at $20.00	180.40	
Force Account:		
Moving fences	40.15	
Building dry rubble walls at end of approach fills	94.80	
Leveling and finishing borrow pit	176.56	
Total cost of approaches		$ 11,958.54
Grand total cost of structure and approaches (all State funds)		$ 30,931.87

Griffin and Jackson Creek Trestles Near Central Point

Between Gold Hill and Central Point, the Pacific Highway crosses Griffin Creek on a pile trestle 83 feet long and Jackson Creek with a similar structure 103 feet in length. These trestles are of heavy standard construction with laminated deck and asphalt paving.

Contract No. 189, for their construction, was awarded on July 8, 1919 to Jasten Hartman of Jacksonville. His work was complete on October 14, 1919 and cost $3,680.70. This cost was borne entirely by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 96.53
Contract Items as follows:		
Wooden trestle, all 100 per cent at $3,350.00	$ 3,350.00	
Force Account:		
Labor and materials for extra work on trestle	234.17	
Total amount paid to contractor		$ 3,584.17
Grand total cost of structures (all State funds)		$ 3,680.70

Ashland Overcrossing

In accordance with its policy of eliminating railway grade crossings wherever possible, the Highway Commission has put under construction an overhead crossing of the Southern Pacific track at a point on the Pacific Highway about one mile south of the city of Ashland. This is the fifth railway grade separation in Jackson County.

The structure built for this purpose consists of three concrete spans of 35 feet each and 340 lineal feet of wood trestle approach. D. M. Stevenson of Portland was awarded contract No. 261 for its construction on April 27, 1920. The work is practically complete at the time of this report and will cost approximately $36,000.00. Of this amount the

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County will pay $7,200.00, the Southern Pacific Company $14,400.00 and the State the balance of $14,400.00. Expenditures to date amount to $27,635.05 from State funds, having been made under the direction of A. A. Clausen, Resident Engineer.

Contract No. 267, for construction of the approaches, was awarded to C. H. Natwick of Ashland, Ore., on June 1, 1920. Material used in the fills consisted of decomposed granite obtained from properties adjoining the approaches on each end. In order to obtain this material, these properties were bought by the County. The fills were made with teams and brought up in layers in order to compact the materials as much as possible preparatory to paving at an early date.

Construction has been carried on under the direction of F. H. Walker, Resident Engineer, and represents a total estimated cost of $12,000.00 for the 0.2 miles involved. This total cost will be divided $4,800.00 to the State, $2,400.00 to the County and $4,800.00 to the railroad company. Expenditures to date amount to $9,417.62, which have all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

STRUCTURE:		
Engineering		$ 1,520.21
Name plate furnished by State (to be deducted from amounts due contractor)		16.00
Contract Items as follows:		
Excavation, 364.54 cu. yds. at $2.00	$ 729.00	
Class "A" concrete, 189.82 cu. yds. at $40.00	7,592.80	
Class "B" concrete, 315.44 cu. yds. at $27.50	8,674.60	
Metal reinforcement, 46,006 lbs. at 9c	4,140.54	
Wood trestle, 268 lin. ft. at $30.00	8,040.00	
Reinforced concrete handrail, 175 lin. ft. at $4.50	787.50	
Materials on hand	740.00	
Total amount earned by contractor	30,704.52	
Percentage retained until completion of contract	4,605.68	
Total amount paid contractor for structure		$ 26,098.84
Total expenditures on structure		$ 27,635.05
APPROACHES:		
Engineering		$ 235.50
Contract Items as follows:		
Clearing and grubbing, 75 per cent at $750.00	$ 562.50	
Common excavation, 16,000 cu. yds. at 64c	10,240.00	
Total amount earned by contractor	$ 10,802.50	
Percentage retained until completion of contract	1,620.38	
Total amount paid contractor for approaches		$ 9,182.12
Total expenditures on approaches		9,417.62
Grand total expended to Nov. 30, 1920 (all State funds)		$ 37,052.67

Neil Creek Bridges

Neil Creek is crossed three times by the Pacific Highway within one and one-half miles just south of Ashland. The bridges used are standard concrete structures, having spans of 20, 21 and 28 feet. Frank Jordan of Ashland was awarded contract No. 190 for their construction on August 5, 1919. His work was complete on June 1, 1920, at a cost of $12,108.99 from State funds, under the direction of F. H. Walker, Resident Engineer.

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DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 512.70
Contract Items as follows:		
Class "A" concrete, 299.68 cu. yds. at $29.25	$ 8,765.64	
Metal reinforcement, 27,733.07 lbs. at 9c	2,495.98	
Reinforced concrete handrail, 176.14 lin. ft. at $1.90	334.67	
Total amount paid contractor		$ 11,596.29
Grand total cost of structures (all State funds)		$ 12,108.99

Central Point to Jackson-Josephine County Line Survey

This survey of the Pacific Highway covers a distance of 21 miles and follows the old County road which traverses a fairly level country. The 12 miles between Gold Hill and the County line follows the grade of the Rogue River, and for much of this distance the location is along the bank overlooking the river. From Gold Hill it follows the right bank of the stream to Rocky Point where a deep narrow gorge makes an ideal crossing, and crossing the river on a concrete arch, the location follows the left bank of the river to the County line.

This location consisted mainly in retracing the old location that had been made over a part of the line some years ago and making minor changes in the old County road which had previously been graded very close to the standard for line and grade. The survey was in charge of F. N. Drinkhall who began the work on March 3, 1919, in order that the contracts for the paving of this section might be let early in the season.

Ashland to California Line Survey

Preliminary to the construction that was to be done on this section of the Pacific Highway early in the spring of 1919, the line was staked out by F. H. Walker. It followed the line of the old road except on the Ashland end, and kept on the grade that had been built over the Siskiyou Mountains by the County. Three different routes were considered out of Ashland, and the middle route between the end of the pavement on the Boulevard and the junction of the Dead Indian Road was finally adopted. This required the construction of some new grade, which was included in the contract for the paving. With the exception of the stretch adjoining the city limits, very little grading was required on this line until the Siskiyou Mountains were reached, where the roadbed was too narrow for proper drainage, and the line as laid out called for considerable excavation in order to obtain sufficient room for ditches.

Medford-Prospect Survey

On September 15, 1919, Paul B. Rynning having finished the location on the Ashland-Keno section, moved camp to Prospect on the Medford-Crater Lake Highway to locate this road from that point to Medford, a distance of 46 miles.

In 1916 the Government in co-operation with the State and County had run a preliminary line over this route, the notes on which were worked up in the office during the winter following, but no location was staked out in the field. This preliminary line was run on railroad standards, with 3 per cent grades and 11 degree and 30 minute curves.

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As the line followed the bluffs along the Rogue River these standards could not be adhered to and 16 degree curves were used in some places. It was the original intention of the Government to make a grade upon which railway track could be laid and trains operated, if desired. Construction on these lines involved many deep cuts and very high fills.

The new line is located on the standards established by the State; it follows the contours of the bluffs more closely, reduces the yardage by several hundred thousand cubic yards, and makes that section of the road above Trail more scenic.

South of Trail the Government's survey followed the right bank of Rogue River to Dodge's Bridge, and crossing the river at this point it continues down the left bank to the camping ground owned by the Elks of Medford, thence in a southerly direction to Medford. Although this route down the river is the most scenic, it is also the more costly and longer, besides it does not serve the local traffic as well as does the route that has been adopted via Eagle Point.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by G. A. Gardner, County Judge, George W. Owen and James Owens, County Commissioners, under date of February 24, 1920, stating that a levy of 2 mills on all the taxable property of the County was made for Market Road construction, and designating six roads to be improved as market road projects.

A levy of 2 mills on a valuation of $27,525,888.71 produced a County Market Road Fund of $55,051.78. Included in the State levy of taxes was a levy of 1 mill on a valuation of $29,203,550.80, which produced $29,203.55 and which became a part of the "State Market Road Appropriation."

Funds apportioned by the State Highway Commission March 2	$ 29,203.55
Funds apportioned by the State Highway Commission April 3	11,910.82
Funds produced by County levy of 2 mills	55,051.78
Total available for 1920	$ 96,166.15

Paul B. Rynning, Engineer in the employ of the State Highway Commission, made the location surveys, prepared plans and estimates, and did the necessary engineering work during construction. All construction work was done by County forces.

Project No. 1.—"Blue Ledge Road—between Jacksonville and Ruch." A preliminary survey, followed by location survey 8 miles in length was made. The located line follows, for 5 miles, practically along the old traveled road through rolling country, for 3 miles on steep hillside through timber. The maximum grade is 5.4 per cent. Three miles of heavy work was rough graded, 2 miles of which was graded to a finished grade with 20-foot roadbed, and surfaced 9 feet wide with gravel. The estimated cost of grading and graveling 8 miles is $105,490.00. The entire project will not be improved in 1920.

Project No. 2—"Butte Falls Road." "That section beginning at Reese Creek Schoolhouse thence toward Butte Falls." A preliminary survey, followed by location survey 3.2 miles in length was made. The

located line follows along the old road 2.2 miles, and through heavy brush on rough side hill for 1 mile. The maximum grade is 5.6 per cent.

Two miles were graded to the proper grade and roadbed width of 16 feet and surfaced, 8 feet wide, with gravel. One and two-tenths miles of additional grade is ninety per cent complete. The estimated cost of this project is $28,512.11.

Project No. 3.—"Dead Indian Road." "Beginning where the proposed road leaves the present traveled road, thence on a grade not to exceed ten per cent maximum, over the Cascade Summit to the Forest Reserve."

A preliminary survey followed by location survey, 4 miles in length, was made. The road is in rough, mountainous country, on steep hill side, through heavy timber, on maximum grade of ten per cent. It was planned to grade this section, four miles in length, to a 12 foot roadbed, in 1920. No surfacing to be placed in 1920. Approximately 3.4 miles of grading was completed. Estimated cost on this project $21,040.15.

Project No. 4.—"Lake Creek Road."
Nothing done on this project in 1920.

Project No. 5.—"Talent R. F. D. No. 1."
Nothing done on this project in 1920.

Project No. 6.—"Foots Creek Road."
Nothing done on this project in 1920.

JEFFERSON COUNTY

The past 2 years have brought forward an active program of highway work in Jefferson County, which hitherto had not asked nor received State aid in these matters. Being sparsely settled, and largely a stock country, no great amount of local traffic exists. With the probable development of the Benham Falls Reservoir and the North Unit Irrigation Project, many thousand acres will have the fertility of the soil transformed into growing fields and the increased products will stimulate the need for more travel facilities.

In the present progam, only one main artery of the State Highway system serves the County, this being The Dalles-California Highway, north and south through the center of the County, and passing through the towns of Gateway, Madras, Metolius and Culver.

Construction work is now in progress from Madras south to the Crooked River Crossing.

Preliminary location has been carried north to Gateway, and reconnaissance lines have been carried over various routes across Trout Creek and Hay Creek with a view to determining the best route to a connection with the Columbia River Highway. No definite decision has yet been reached for adoption of this line, but further reconnaissance during the coming winter will determine the final location.

An initial bond issue of $100,000.00 was passed by Jefferson County voters in June, 1919, $50,000.00 to apply to The Dalles-California Highway from Madras south to the Deschutes County Line, and $50,000.00 to apply on the section north to the Wasco County line.

The Antelope-Mitchell Highway route passes through the northeastern corner of the County, but no active work has yet been done on this project in Jefferson County.

Work in this district was handled by C. C. Kelley, Division Engineer, until September, 1920, being under the supervision of J. H. Scott, Division Engineer, since that time.

Madras-Deschutes County Line Post Road Project

From Madras south to the north line of Deschutes County the route of The Dalles-California Highway was established by survey in August and September of 1919. This location extended south through the towns of Metolius and Culver. By a location through the pass between Haystack Butte and Juniper Butte a saving of 2.5 miles in distance over that of the old road was effected. The flat open ground gives opportunity for excellent alignment by the shortest possible route. About six miles of the existing County road is followed on the location. As no irrigation is being used on the land in this County as yet, very few drainage structures are required.

The crossing of Crooked River was made at the present Trail Crossing. No effort was made to reduce the present 7 per cent grade down to the County Bridge, and it was decided to end the construction work at a point 2 miles north of the Crooked River with the object of allowing further consideration of a crossing of the Crooked River by a high bridge in the vicinity of the famous high steel span of the Oregon Trunk Railway. Such a structure would cost only a few thousand dollars in

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excess of the cost of regrading Trail Crossing to standard gradient, and erecting a new bridge at the bottom of the canyon, and would effect a saving of about one-half mile in distance. Work is being done in co-operation with the County and Federal Government under project agreement No. 39.

Contract No. 250 for grading and surfacing 17.44 miles from Madras south was let on March 23, 1920, to Oskar Huber, Portland, Oregon, at an estimated final cost of $174,000.00, $50,000.00 to be paid by the County, $87,000.00 by the Federal Government and the balance of $37,000.00 by the state. The sum of $51,700.33 has been expended to date from State funds, and it is expected that the construction of the project will be completed about February 1, 1920.

Although extensive prospects were made, little natural surfacing materials were found in this vicinity. A crusher site was established 2 miles southeast of Culver, from which plant crushed rock of suitable quality is being furnished for surfacing.

Location of the project and supervision of the construction has been carried on by R. P. Newland, Resident Engineer.

Madras-Wasco County Line Survey

During the summer of 1920 a preliminary location line was run from Madras north to Gateway, closely approximating the present County road.

Reconnaissance lines were also run down into the Deschutes Canyon, through various other canyons, with the view of making connection with a possible route across the Warm Springs Reservation northward to The Dalles.

Investigations were carried across the Warm Springs Reservation, where serious problems of grade were encountered, and lines run across the mouth of Trout Creek, up the Jersey grade via Criterian and up Ten Mile Creek. Investigation of a route via Hay Creek, and up Cow Canyon via Shaniko were made and one is now being carried up Ward's Canyon. Location via the mouth of Trout Creek would apparently be twenty to thirty miles shorter than via Cow Canyon, and at much less expense.

However, no final conclusion can be drawn until thorough investigation is carried north to the Columbia River Highway, and all the various factors given consideration. Definite selection of a route is expected to be made early in the spring of 1921.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by J. M. King, County Judge, P. Chitwood and Martin Tellefson, County Commissioners, under date of April 8, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for Market Road construction, and designating four roads to be improved as Market Road projects.

A levy of 1 mill on a valuation of $5,171,763.55 produced a County Market Road Fund of $5,171.76. Included in the State levy of taxes was a levy of 1 mill on a valuation of $5,233,729.90, which produced $5,233.73 and which became a part of the "State Market Road Appropriation."

[JEFFERSON]

Funds apportioned by the State Highway Commission March 2	$ 5,233.73
Funds apportioned by the State Highway Commission April 3	2,134.60
Funds produced by County levy of 1 mill	5,171.76
Total available for 1920	$ 12,540.09

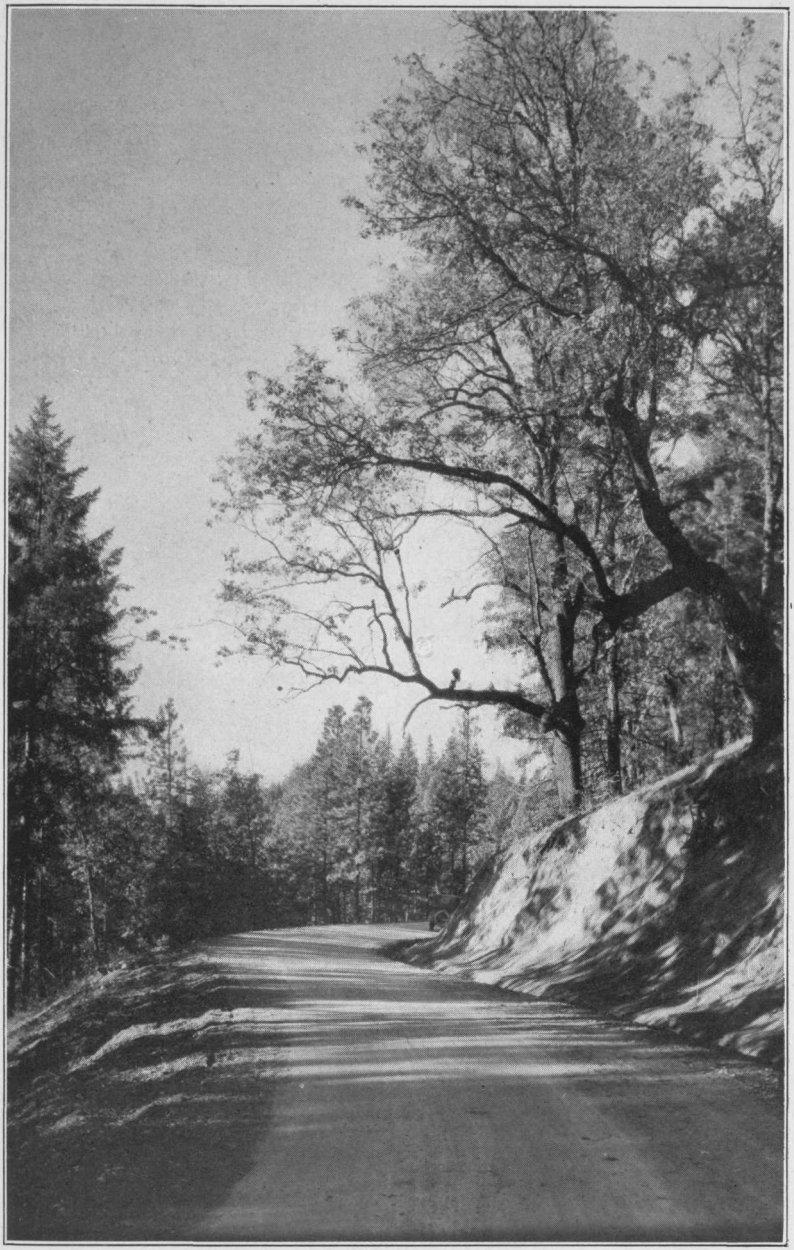
R. P. Newland, Resident Engineer, in the employ of the State Highway Commission, made the surveys and prepared plans and estimates of cost for these projects. Construction work was done by County forces.

Project No. 1.—"Madras-Mecca." This road is through almost level plain country from Madras to the rim of the Deschutes Canyon above Mecca. 0.66 miles was graded to 18 feet roadbed and surfaced 10 feet wide, with gravel in 1920. Estimated cost of project $2,291.65.

Project No. 2.—"Madras-Ashwood." This road is through rolling country with light soil. 1.21 miles were graded to 18 feet roadbed and 0.91 miles surfaced 10 feet wide, with gravel, in 1920. Estimated cost of project $5,578.76.

Project No. 3.—"Culver to Grandview." This road is through flat country except across the Deschutes and Crooked River canyons. 0.95 miles were graded to 18 feet roadbed and 0.3 miles surfaced 10 feet wide with gravel in 1920. Estimated cost of project $2,740.25.

Project No. 4.—"Metolius to Grizzly." This road is through undulating country with light volcanic ash soil. 0.7 miles were graded to 18 feet roadbed and surfaced 10 feet wide with gravel in 1920. Estimated cost of project $1,831.45.



A PAVED SECTION OF THE PACIFIC HIGHWAY IN THE MOUNTAINS SOUTH OF WOLF CREEK. PAVED IN 1919.

JOSEPHINE COUNTY

Two years ago no paving or macadamizing had been done on the Pacific Highway in Josephine County, and but 11 miles had been graded. The grading that had been done was in two separate sections, one from Grants Pass to the Jackson County line, a distance of 6 miles, and the other from Wolf Creek to Grave Creek, a distance of 4.9 miles. Both of these graded sections have since been paved.

During the past 2 years, the Stage Road Pass to Wolf Creek section has been graded and macadamized. Sexton Mountain has been graded and is being macadamized, and the remaining section, which is between Grants Pass and Pleasant Valley, has been placed under contract for grading and macadamizing and this work is now in progress. The County has graded Merlin Hill and has cut down the heaviest grades on the Grants Pass to Pleasant Valley section. This grading is being completed by the State and the macadamizing of this section is also being done by the State. These contracts will be completed in the spring, and will give the Pacific Highway a surfacing of pavement or macadam throughout its entire length across Josephine County, whereas 2 years ago but one-third of this highway was graded.

In addition to the work on the Pacific Highway, the Government, State and County co-operated in the grading of Hayes Hill on the Grants Pass-Crescent City Highway.

A survey was made by the states of Oregon and California over the Oregon Mountain with the view of reducing the grade and eliminating the dangerous hairpin turns.

Work in the County has been handled by K. E. Hodgeman, Division Engineer.

Wolf Creek-Grave Creek Paving

The grading of this section of the Pacific Highway was completed in October, 1919, and the fills were allowed to settle during the following winter. During the rainy season it was almost impassable and surfacing was an absolute necessity. On April 15, 1919, contract No. 98 was awarded to the Warren Construction Company of Portland for the construction of 4.9 miles of 2-inch bitulithic wearing surface on a 6-inch broken stone base. On account of the narrow width of the previously graded roadbed, the pavement was laid to an average width of 14 feet throughout.

Construction was started May 1, 1919, and completed March 10, 1920, being opened in time for the spring traffic. The total cost of the work was paid from State funds and amounted to $141,978.49.

Melville Jones was Resident Engineer throughout most of the construction and on resigning was succeeded by Paul Van Scoy who finished the work.

[JOSEPHINE]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,110.12
Advertising for bids		22.95
Contract Items as follows:		
Excavation, no classification, 7,517.6 cu. yds. at 75c	$ 5,638.20	
6" porous drain tile, 5,879 lin. ft. at 30c	1,763.70	
Standard Bit. pavement, Type "E", 40,489.8 sq. yds. at $1.55	62,759.19	
Broken stone base and shoulders, 14,499.5 cu. yds. at $4.24	61,477.88	
Run-of-bank gravel, 28 cu. yds. at $4.00	112.00	
Broken stone shoulders, 51,538 lin. ft. at 6c	3,092.28	
Force Account Items:		
Laborer to assist Engineer to erect camp, 2½ days at $4.40	11.00	
Moving 12" concrete culvert to new location	89.80	
Lengthen 24" corr. gal. iron pipe culvert	126.94	
Decking bridges with 3" plank	444.55	
Total	$135,515.54	
Deduction for war tax	57.62	
Reduction $125.00 per mile account increased width of pavement	612.50	
Total deductions	$ 670.12	
Total amount paid contractor		$134,845.42
Grand total cost of project (all State funds)		$141,978.49

Grants Pass-Jackson County Line Paving

The grading of this section of the Pacific Highway was done in 1917. On February 4, 1919 the State Highway Commission awarded contract No. 84 to S. S. Schell of Grants Pass for the paving of this 6 mile section. A 2-inch Topeka top was laid on a 3-inch bituminous base, the pavement being constructed 16 feet wide with 2-foot shoulders on each side.

Work was started March 24, 1919 and completed November 30, 1919 under the supervision of J. G. Bromley, Resident Engineer. The total cost of the project was $128,685.50 which has been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,931.44
Asphalt furnished by State		15,963.98
Labor and material furnished by State		1,534.17
Advertisement for bids		9.78
Contract Items as follows:		
Common excavation, 5,755.2 cu. yds. at 75c	$ 4,316.40	
12" plain concrete pipe, 466 lin. ft. at 90c	419.40	
18" reinforced concrete pipe, 30 lin. ft. at $2.50	75.00	
6" porous drain tile, 2,277 lin. ft. at 34c	774.18	
8" porous drain tile, 1,125 lin. ft. at 38c	427.50	
Class "C" concrete, 30.72 cu. yds. at $23.00	706.56	
Metal reinforcement, 20 lbs. at 10c	2.00	
Wood guard fence, 200 lin. ft. at $1.25	250.00	
Broken stone, loose measure, 2,362.5 cu. yd. at $3.00	7,087.50	
Asphaltic concrete pavement, Type "D", 57,943.8 sq. yds. at $1.78	103,139.96	
Broken stone shoulders, 64,479.4 lin. ft. at 6c	3,868.76	
Force Account Items:		
Ditching and tiling with crushed rock back fill	179.15	
Total	$121,246.41	
Deduction for asphalt and war tax	16,000.28	
Total amount paid contractor		$105,246.13
Grand total cost of project (all State funds)		$128,685.50

[JOSEPHINE]

Stage Road Pass-Wolf Creek Macadam

The grading of this section of the Pacific Highway had not quite been completed when the State Highway Commission, on August 5, 1919, awarded contract No. 180 to the Warren Construction Company of Portland, Oregon, for macadamizing the 4.48 miles of the section.

Work was started September 24, 1919 and continued into the winter, but, owing to the deep mud, progress was slow and a large amount of rock was required in order to make a solid base. Three-inch rock was rolled into the sub-grade until settlement ceased, and upon this a wearing surface of finer materials and screenings was placed. The surfacing was waterbound by the rains and practically no sprinkling was required. Construction was completed March 18, 1920 and the macadam has carried a heavy traffic during the past season without apparent injury, being in excellent condition at the present time.

The total cost of the project has been paid from State funds and represents an expenditure of $69,315.49. Paul Van Scoy was Resident Engineer on the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,521.34
Labor and materials furnished by State		10.00
Contract Items as follows:		
Broken stone macadam, waterbound, 15,674.5 cu. yds. at $4.15	$ 65,049.18	
Force Account Items:		
Regrading roadbed	$ 1,734.97	
Total amount paid contractor		$ 66,784.15
Grand total cost of project (all State funds)		$ 69,315.49

Sexton Mountain Macadam

In order to make the Sexton Mountain section passable to traffic this winter, contract No. 275 for macadamizing was awarded on July 6, 1920 to D. M. Stevenson of Portland, Oregon. This section of the Pacific Highway is 7.48 miles in length and extends from the south end of the paving near Grave Creek to the foot of the south slope of Sexton Mountain.

Owing to the fact that the north slope becomes impassable during the winter, while the south slope holds up well enough to allow the passage of traffic, the first effort was made to improve the new grade on the north side. A crusher plant was set up on Grave Creek and a narrow strip of gravel has been laid up the center of the grade in sufficient depth to carry loaded trucks. This strip now extends to the summit and is being used by traffic while the old road is muddy, and, with this improvement, Sexton Mountain will be open for traffic during the entire winter.

The total estimated cost of the surfacing is $96,000.00, which will be paid entirely from State funds. At the date of this report the sum of $15,012.73 has been expended under the engineering supervision of Paul Van Scoy, Resident Engineer.

Grants Pass-Pleasant Valley Macadam

This section of the Pacific Highway extends from the city limits of Grants Pass to the foot of Sexton Mountain, a distance of 9.84 miles. On August 10, 1920, contract No. 287 was awarded to Joplin & Eldon of

[JOSEPHINE]

Portland, Ore., for the work involved. This contract call for completion of the grading which had been started by Josephine County and the placing of a crushed gravel course, from 3 to 6 inches in thickness, in accordance with the subgrade conditions encountered, with a final topping of 2 inches of decomposed granite. Grading was started on September 16 and the crushing plant is now being installed. The estimated cost of the improvement is $125,000.00, which will all be paid from State funds. The total expenditures to date amount to $5,679.40, having been made under the engineering supervision of J. G. Bromley, Resident Engineer.

Stage Road Pass-Wolf Creek Grading

In order to eliminate the twenty per cent grade south of Stage Road Pass on the Pacific Highway, a new grade was constructed on the line of the survey made in 1917. This section is 4.47 miles in length and extends from the south end of the Stage Road Pass section, at the Douglas-Josephine County line, south to a point three-quarters of a mile south of Wolf Creek.

Contract No. 108, covering the grading, was awarded to Joplin & Eldon of Portland, Oregon, on April 15, 1919. Work was started May 18, 1919 and finished September 30, 1919, under the supervision of Paul Van Scoy, Resident Engineer.

The total cost of the project amounted to $51,072.15, which has all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,987.85
Guarding railroad and telegraph line		22.50
Contract Items as follows:		
Clearing and grubbing, all lump sum	$ 3,750.00	
Common excavation, 22,150 cu. yds. at 60c	13,290.00	
Intermediate excavation, 9,609 cu. yds. at 65c	6,245.85	
Solid rock excavation, 15,829 cu. yds. at $1.20	18,994.80	
Overhaul, 6,169 sta. yds. at 5c	308.45	
12" plain concrete pipe, 928 lin. ft. at $1.40	1,299.20	
8" corrugated iron pipe, 42 lin. ft. at $1.30	54.60	
18" corrugated galvanized iron pipe, 336 lin. ft. at $2.40	806.40	
24" corrugated galvanized iron pipe, 124 lin. ft. at $3.25	403.00	
36" corrugated galvanized iron pipe, 64 lin. ft. at $11.00	704.00	
6" porous drain tile, 200 lin. ft. at 20c	40.00	
Class "A" concrete, 41.13 cu. yds. at $28.00	1,151.64	
Class "C" concrete, 24.09 cu. yds. at $26.00	626.34	
Lumber, 1.1 M-FBM at $48.00	52.80	
Metal reinforcement, 2,077 lbs. at 10c	207.70	
Force Account Items:		
Log crib at toe of fill	37.56	
Hauling reinforcing steel and cement to Glendale	35.60	
Hauling gravel for back filling drain tile	53.86	
Total amount paid contractor		$ 48,061.80
Grand total cost of project (all State funds)		$ 51,072.15

Wolf Creek-Grave Creek Grading

On November 6, 1917, the State Highway Commission awarded a contract to the American Exploration and Construction Co., of Grants Pass, for the grading of 4.9 miles between Wolf Creek and Grave Creek on the Pacific Highway. This work was completed during 1918 with total expenditures of $68,301.53. During the present biennium, delayed engineering charges of $74.40 have been paid, bringing the total cost of the work to $68,375.93.

[JOSEPHINE]

Sexton Mountain Grading

Sexton Mountain, or Smith Hill, located about ten miles north of Grants Pass, has been the terror of tourists on account of being impassable for automobiles during the winter season. On May 6, 1919, a contract was awarded to H. J. Hildeburn of Roseburg, Ore., for the grading of this 7.43 miles. In order to assist the contractor in securing bond, this section was divided into three units and given contract numbers 123-4-5. The grading is 20 feet in width and follows up the steep side of Sexton Mountain, having many very deep cuts and high fills. Several small sections were worked with team, but the bulk of the work was done by steam shovel. In order to complete the work before the beginning of the present season, this steam shovel was worked in two shifts for a great deal of the time. The grading was carried to completion during November of the present year.

C. H. Willison was Resident Engineer on this work, which represents a total estimate cost of $153,000.00, Josephine County co-operating to the amount of $10,000.00. The total expenditures to date have been $131,663.07, the County having paid $5,000.00 of this amount.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 8,640.77
T.N.T. furnished by State (to be deducted from amount due contractor)		200.00
Rental of equipment owned by State (to be deducted from amount due contractor		423.42
Contract Items as follows:		
Clearing, 100 per cent at $10,000.00	$ 10,000.00	
Common excavation, 49,132 cu. yds. at 65c	31,935.80	
Intermediate excavation, 68,005 cu. yds. at 65c	44,203.25	
Solid rock excavation, 41,032 cu. yds. at $1.05	43,083.60	
Overhaul, 5,730 sta. yds. at 5c	286.50	
12" plain concrete pipe, 2,379 lin. ft. at $1.50	3,568.50	
18" reinforced concrete pipe, 832 lin. ft. at $3.00	2,496.00	
24" reinforced concrete pipe, 452 lin. ft. at $4.00	1.808.00	
36" reinforced concrete pipe, 140 lin. ft. at $6.50	910.00	
6" porous drain tile, 1,194 lin. ft. at 50c	597.00	
Class "A" concrete, 134.7 cu. yds. at $30.00	4,041.00	
Metal reinforcement, 11,833 lbs. at 11c	1,301.63	
Total	$144,231.28	
Deductions for war tax and rental of equipment	232.60	
Total amount earned by contractor	$143,998.68	
Percentage retained until completion of contract	21,599.80	
Total amount paid contractor		$122,398.88
Grand total expended to Nov. 30, 1920		$131,663.07
Paid by State	$126,663.07	
Paid by County.	5,000.00	
Total	$131,663.07	

Hayes Hill Forest Road Project

This project, 2.4 miles in length, is located about seventeen miles from Grants Pass on the Grants Pass-Crescent City Highway between local points known as Loves Station and Anderson Station. The grading of the unit was completed in May, 1920, and a contract for surfacing was awarded in October. This section of road carries considerable heavy traffic of ore and lumber and does away with the heavy grades formerly encountered on Hayes Hill.

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This work is handled as a forest road project under the Bureau of Public Roads and is estimated to cost a total for the grading and surfacing of $79,500.00, which is to be paid $39,250.00 by the State, $11,000.00 by the County and $29,250.00 by the Federal Government. Expenditures to date amount to $65,166.33, having been paid, $36,250.00 by the State, $3,175.57 by Josephine County and $25,740.76 by the Federal Government.

Grave Creek Bridge

At a point about seven miles north of Grants Pass, the Pacific Highway crosses Grave Creek on a bridge consisting of one 105-foot covered Howe truss on concrete piers and 115 lineal feet of framed trestle. Construction of this bridge is practically complete at the date of this report, J. Elmer Nelson being the contractor, under contract No. 263 dated April 27, 1920. A. A. Clausen is Resident Engineer.

The construction cost will be borne equally by the State and County, and the engineering will be paid for entirely out of State funds. The total estimated cost is $21,500.00, which is to be paid $11,800.00 by the State and $9,700.00 by the County. Expenditures to date amount to $16,557.70 from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,173.19
Bronze name plate furnished by State (to be deducted from amount due contractor)		16.00
Contract Items as follows:		
Excavation, 432.3 cu. yds. at $4.00	$ 1,729.20	
Class "B" concrete, 175 cu. yds. at $25.00	4,375.00	
Metal reinforcement, 2,096 lbs. at 10c	209.60	
Wooden trestle, 100 lin. ft. at $21.50	2,150.00	
Wooden truss span, 84.7 per cent at $10,630.00	9,000.00	
Materials on hand	616.80	
Total amount earned by contractor	$ 18,080.60	
Percentage retained until completion of contract	2,712.09	
Total amount paid contractor		$ 15,368.51
Grand total expended to Nov. 30, 1920 (all State funds)		$ 16,557.70

Maintenance

During the past two years, State expenditures for maintenance in Josephine County have amounted to $4,738.61. These expenditures have covered the placing of a macadam surface on various sections in order to keep the highways open for winter traffic, and on various other sections the cleaning of ditches, removing of slides, etc. Most of the work has been done in co-operation between the County and the State.

Merlin Hill Construction Engineering

On the Merlin Hill section of the Pacific Highway north of Grants Pass, considerable grading was done by Josephine County during 1919 and 1920. Several grades have been eliminated, the longest of which was over Merlin Hill.

On this work the engineering was furnished by the State. This Department has no record of the County expenditures.

[JOSEPHINE]

Sexton Mountain Survey

Prior to the awarding of the contract for grading the 7.4 miles of the Sexton Mountain section, a location survey was made by the department. This location begins at Grave Creek and extends to the south side of Sexton Mountain.

Grants Pass to Crescent City Highway Survey

In order to determine the feasibility of changing the present road over Oregon Mountain to a pass at the head of Smith River, surveys were made by both the Oregon and the California State Highway Commissions. The work on the Oregon side was under the direction of J. G. Bromley, Locating Engineer, and on October 5, 1919, he started a preliminary line from the summit of the Elk Creek and Smith River Divide in California, and continued to Kerby. The work on the California side was in charge of Maj. Jules E. Hanique, Locating Engineer.

From the preliminary work done it was ascertained that a line with excellent grade and alignment could be obtained, which would eliminate the hairpin turns and the steep grades on the California side, and give an exceptionally straight line with easy grades on the Oregon side.

A crossing at the State line has been agreed upon and the location on the Oregon side has been made as far as Kerby. As the new location is over a pass about 600 feet lower than the old road over Oregon Mountain, a road constructed on this survey can readily be kept open during the entire year.

Market Road Work

The State Highway Comimssion has on file "Market Road Resolutions" signed by C. G. Gillette, County Judge, W. F. McCabe and J. S. McFadden, County Commissioners, under date of March 3, 1920, stating that a levy of 4 mills on all the taxable property of the County, was made for Market Road construction, and designating two roads to be improved as Market Road projects.

A levy of four mills on a valuation of $8,317,698.82 produced a County Market Road fund of $35,270.80. Included in the State levy of taxes was a levy of 1 mill on a valuation of $8,046,004.70, which produced $8,046.01 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission, March 2	$ 8,046.01
Funds apportioned by the State Highway Commission, April 3	3,281.60
Funds produced by County levy of 4 mills	35,270.80
Total available for 1920	$ 46,598.41

J. G. Bromley, Resident Engineer in the employ of the State Highway Commission, made the location surveys, prepared plans and estimates and did the necessary engineering work during construction. Construction work was done by County forces.

Project No. 1.—"From Grants Pass to Williams via Murphy." "Gething Hill Section—beginning approximately three miles south of Grants Pass, eliminating an old grade." This section, 0.5 mile in length, was graded to 24-foot roadbed, and will be surfaced 12 feet wide, 6 inches thick. Approximately 2850 cu. yds. of material were moved at a cost of $2,378.00.

[JOSEPHINE]

Section No. 2.—"Murphy to Williams Postoffice—beginning at the steel bridge over Applegate River at Murphy, this road runs in a Southerly direction following the Applegate River to Provalt, then leaving this stream to follow up Williams Creek toward the Oregon Caves."

A location survey 13.5 miles in length was made, using a maximum grade of five per cent. Six miles of road was graded to a 24-foot roadbed in 1920. Five miles of gravel surfacing 12 feet in width, 6 inches in depth was placed in 1920.

Estimated cost of grading and graveling 13.5 miles, $79,000.00. All available funds spent in 1920.

Project No. 2.—"From Grants Pass leading west on the north side of Rogue River, thence crossing ferry, thence east connecting with the Grants Pass-Crescent City Highway at the Applegate Bridge."

Section No. 1.—"Lower Rogue River Road—River Banks Farm to Applegate Bridge section—beginning at the summit of Sloans Hill near the River Banks Farm and running in a westerly direction to the Applegate Bridge at a point intersecting with the main Crescent City-Grants Pass Road."

A location survey 2.5 miles in length was made through rolling country. Approximately 1.5 miles were graded to a 20-foot wide roadbed and surfaced 12 feet wide, 6 inches thick, with gravel in 1920. The estimated cost of improving 2.5 miles is $16,000.00. Total improvement not completed in 1920.

Section No. 2.—"Lower Rogue River Road to Eisman Ranch—beginning at the city limits of Grants Pass and running in a westerly direction, through the orchard district of Josephine County."

A location survey four miles in length was made, through flat and rolling country, using a maximum grade of 5 per cent. A contract was awarded for grading and graveling from station 33 plus 00 to 192 plus 00, the roadbed to be 20 feet wide, surfaced 12 feet wide, 6 inches thick, with gravel. Work was completed in 1920 at a cost of approximately $23,000.00.

KLAMATH COUNTY

During the seasons of 1919 and 1920 there has been approximately 190 miles of location surveys made in Klamath County, and the close of the present season should see all the State highways permanently located and their construction program well under way. At the present time grading and macadam construction has been started on 53.73 miles of State Highway. These projects are the first work in Klamath County which have ever been built to standard State Highway Department grades and alignment.

On June 3, 1919, the County voted a bond issue of $347,704.00 and have offered to co-operate with the State to the extent of 25 per cent on all Post Road projects. With the exception of a short section just north of Klamath Falls all work undertaken by this department in Klamath County has been in co-operation with the State, County and Federal Government. This one unit is being constructed by the State and County.

Work in this district is being carried on under the supervision of E. B. Bishop, Division Engineer.

Anna Creek Forest Road Project

This project is on the Klamath-Crater Lake Highway and extends from the south side boundary of the Crater Lake National Park towards Klamath Falls, a distance of 3 miles. Grading of the unit has been accomplished by contract awarded to G. E. Grieve by the Bureau of Public Roads, the project being constructed under Forest Road Agreement between the State and Federal government. Grading operations were completed in November of the present year.

The total amount involved under the Forest Road project agreement is $15,000.00, which is to be paid $7,500.00 by the Federal Government and the same amount by the State. Expenditures to the date of this report amount to $9,405.18, which have been paid $5,174.36 by the Federal Government and $4,230.82 by the State. The State expenditures include $144.49 which was paid during 1918.

Algoma Section Post Road Project

This portion of The Dalles-California Highway extends from the north limits of the Klamath Falls North-Three Miles section to the south boundary of the Klamath Indian Reservation, being 8.92 miles in length, and when completed will be one of the most picturesque and scenic highways in Southern Oregon.

Work is being handled as Post Road Project No. 26, and on November 4, 1919 contract No. 227 for grading and macadamizing the section, was awarded to Oskar Huber of Portland, Oregon. It is estimated that the total cost will be $145,000.00, the State paying $36,467.04, the County $36,375.00 and the Federal Government $72,157.96. Construction is being handled under the supervision of R. E. Stretchbery and it is expected that the project will be completed about January 1, 1921. Total expenditures to date amount to $47,303.92, which have been paid, State $24,333.35, County $6,037.77, Government $16,932.80.

[KLAMATH]

Klamath Falls-North Grading and Macadam

This section extends from the north city limits of Klamath Falls through Pelican City to a junction with the old road for a total length of 3.3 miles. Besides being a more scenic route and shorter than the old road it eliminates one of the worst stretches of winter road in the County, which is known as "Adobe Hill."

The Southern Pacific Railroad tracks are crossed with an overhead structure at a point about 1 mile north of Pelican City. The road was located at this point on account of its natural advantages as an overhead crossing site, the railroad tracks underneath passing through a solid rock cut. The structure designed for this overhead crossing is a 3-19-foot frame bent and the Public Service Commission ordered that the burden of cost be divided fifty-fifty between the State and County. The work was done by the County Court in connection with their grading and macadam operations and the completed crossing represents a total cost of $3,620.57.

Grading and macadamizing on the section was started November 1, 1918 and finished November 1, 1920, being done by the Klamath County Court under the supervision of the State Highway Department on the basis of cost plus ten per cent.

It is estimated that the entire cost of the project including the overhead crossing, will amount to approximately $74,000.00. Final adjustment has not been made but it is estimated that the total State share will be approximately $39,000.00. Of this amount State funds to the extent of $34,429.48 have been expended. Construction was carried on under the supervision of D. L. Bundy, Resident Engineer.

The quantities involved on the work are as follows:

Construction:		
Clearing and grubbing	100	per cent
Common excavation	11,000	cu. yds.
Intermediate excavation	1,650	cu. yds.
Solid rock excavation	525	cu. yds.
12" corrugated iron pipe	256	lin. ft.
18" corrugated iron pipe	226	lin. ft.
24" corrugated iron pipe	64	lin. ft.
30" corrugated iron pipe	84	lin. ft.
Rubble masonry headwalls	55.09	cu. yds.
Gravel macadam	9,176.5	cu. yds.
Trestle Overhead:		
Trestle timber (in place)	17,720	FBM
Abutments (rubble masonry)	125	cu. yds.
Fottings (hand placed stone)	8	cu. yds.

Klamath Falls-Merrill Post Road Project

This section of The Dalles-California Highway begins at the city limits of Klamath Falls and extends 14.68 miles to the town of Merrill. Contract No. 229 for grading and macadamizing was awarded to Oskar Huber, Portland, Oregon, on November 4, 1919. Construction is being carried on as a Federal Aid project under project agreement No. 31. The total estimated cost is $180,000.00 of which the State's share is $49,732.38, the County's share $45,000.00 and the Federal Government's share $85,267.62. Construction has been handled under the engineering supervision of W. T. Daily. Total expenditures of $99,388.73 have been made to the date of this report, $47,821.17 from State funds, $14,669.79 from County funds and $36,897.77 from Government funds.

[KLAMATH]

Merrill-California Line Post Road Project

This section lies through a portion of the highly developed, irrigated fields between Klamath Falls and the California line. The project extends from Merrill via Malin to the California line and is 12.8 miles in length. Construction has been carried on in co-operation with the County and Federal Government under the terms of the project agreement No. 34. Besides taking care of a very heavy local traffic this road will accomodate through traffic from California. The California Highway Department has an extensive system planned to connect with this system, but to date actual construction has not been started.

Contract No. 288 for the improvement was awarded to Oskar Huber, Portland, Ore., on November 4, 1919. The estimated cost of the completed work is $137,000.00, the State to pay $39,180.51, the County $34,250.00 and the Federal Government $63,569.41. At the date of this report a total expenditure has been made amounting to $12,481.18 under the direction of W. T. Daily, Resident Engineer, 9,177.55 from State funds and $3,303.63 from Government funds.

Klamath Falls-Dairy Post Road Project

On November 4, 1919, contract No. 230 was awarded to Oskar Huber, Portland, Ore., covering the grading and macadamizing of that portion of the Klamath Falls-Lakeview Highway extending from a connection with The Dalles-California Highway, about 4 miles east of Klamath Falls, to the village of Dairy. The section is 13.91 miles in length and is being built as a Post Road project under project agreement No. 30. This road furnishes an outlet to Poe Valley, Langell Valley, Yonna Valley and the Sprague River Valley, as well as being a portion of the through highway from Klamath Falls to Lakeview. It follows very closely the existing road and eliminates a grade crossing with the Oregon-California and Eastern Railway near Dairy, by means of an overhead crossing. On April 14, 1920 the Public Service Commission held a hearing on this crossing and ordered that the railroad company should pay a fixed primary amount of $500.00 of the total cost of the construction, the balance to be paid forty per cent by the State, thirty per cent by Klamath County and thirty per cent by the Oregon California and Eastern Railway Company. This structure is estimated to cost in the neighborhood of $2,800.00 although no work has been undertaken or proposals requested at the date of this report.

The total estimated cost of this project, exclusive of the overhead crossing, is $166,000.00. The burden of this cost is distributed as follows: State $44,195.52, County $41,500.00 and Federal Government $80,304.48. A total expenditure of $26,943.96 has been made under the supervision of R. E. Stretchbery, Resident Engineer, $24,100.80 by the State and $2,843.16 by the County.

Deschutes County Line-Sand Creek Survey

This survey is in two sections. The first section begins at the Deschutes County line and ends at the north boundary of the Deschutes National Forest Reserve. The second section begins at the south boundary of the Deschutes National Forest Reserve and ends at the north boundary of the Crater National Forest Reserve.

[KLAMATH]

The first section is 18.7 miles in length. It follows closely the survey of the Oregon Trunk Railway, paralleling the same where feasible. The town of Crescent is the only settlement encountered on this section.

The second section is approximately nineteen miles in length and has only two curves in its entire distance. The new survey is in a direct course whereas the old road wanders in and out among the jack pine and at certain places is several miles away from its general line of direction. The new survey is in a more scenic country than the old road on account of the large timber and the proximity of the foothills. The soil is chiefly pumice gravel. This unit lies totally within the Klamath Indian Reservation and request has been made of the Indian Service that a strip of timber be left on each side of the right-of-way for scenic purposes. It is believed that this request will be acted upon favorably.

Both of these sections were located during the fall of the present year by F. N. Drinkhall, Locating Engineer for the State Highway Department.

Klamath Falls-Sand Creek Survey

This survey was started May 1, 1919 and completed September 28, 1919. It begins at Klamath Falls and follows along the east side of Klamath and Agency Lakes, through the Klamath Indian Agency and the town of Fort Klamath, and ends at the boundary of the Crater National Forest Reserve. The length of this survey is 46.5 miles. It is a part of The Dalles-California Highway and serves traffic from the south to Crater Lake, Bend and northern points. The location eliminates what is now known as Sand Creek Hill and which has grades as steep as fifteen per cent.

In view of the increased information rendered available by this survey regarding the natural topography of the country, it is probable that the location, from a point 5 miles south of Fort Klamath to the base of Sand Creek Hill, will be revised to follow the east side of Wood River. This revision would place the road in a better drained soil, eliminate two crossings of Wood River and shorten the distance approximately two miles.

Klamath Falls-Merrill-California Line Survey

This survey was made during the season of 1919. The adjoining country is the most thickly populated in Klamath County as well as being the most intensely cultivated. Besides serving the heaviest local traffic of any road in the County, this road accommodates north bound travel from California to Crater Lake and northern points. It is a part of The Dalles-California Highway.

At one point the survey leaves the existing road and parallels the right-of-way of the Modoc Northern Railway for a distance of 5.4 miles, shortening the length of the present traveled road 2.4 miles and eliminating ten right angle corners by so doing.

The length of the survey is 27.48 miles.

Klamath Falls-Lakeview Survey

During the summer months of 1919, the State Highway Department established and located the route between Klamath Falls and Lakeview via Olene Gap, Dairy, Bly, and Drews Valley. The length of this route

as located is 101 miles and follows closely the existing road with the exception of a few places where a supported grade necessitates leaving the old road for short distances. This road is one of very little through travel and as the country through which it traverses is thinly populated, the local travel is likewise light.

Approximately seven miles of this road is through the Fremont National Forest Reserve, which section was located by Mr. St. Claire Thomas of the Bureau of Public Roads during the same season the State Highway Department made the adjoining surveys.

Pacific Highway to Keno Survey

The survey of this section of the Ashland-Klamath Falls Highway was started by George E. MacVicar on April 21, 1919. A preliminary line had been previously run from the Pacific Highway over the Green Spring Mountain to Jenny Creek and from that point two routes were considered, one via Parker Mountain and the other via Pokegama. Both routes cross the Klamath River near Spencers' and just beyond they make a junction with the Ager-Klamath Falls Road, which they follow quite closely to Keno.

The route via Parker Mountain being the most direct, less expensive and having a somewhat better alignment, was chosen and the location was made in the field.

The notes on this section as far as Jenny Creek having been worked up in the Salem office and a line projected, on June 10, 1919, contracts were awarded for the work on the first 19 miles from the Pacific Highway. George E. MacVicar staked out the location of this portion in the field, turning over the location beyond Jenny Creek to Paul B. Rynning, Locating Engineer in July, 1919, who completed the same on September 13, 1919. As the location to Jenny Creek had been made on a 6 per cent grade, the location was continued with the same maximum.

Although the present road is rough and rocky, there are but a few steep grades beyond Jenny Creek. Most of the line was located on a grade of 5 per cent or less, the maximum 6 per cent grades as a rule being in short stretches. The longest stretches of maximum grade were used in descending to the Klamath River near Spencer's and in ascending the high ridge beyond. As the country traversed is sparsely settled the surveying party maintained their own camp. The length of the survey from Jenny Creek to Keno is 26 miles.

Lapine-Lakeview Forest Road Project

This Forest Road project agreement covers the survey of 16.3 miles of the Lapine-Lakeview Highway in Klamath and Lake Counties. The survey is being made in co-operation with the Federal Government, the agreement amount calling for $2,000.00 from each source. Expenditures to date amount to $2,229.08, which have been paid $750.00 by the State and $1,479.08 by the Federal Government.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by R. H. Bunnell, County Judge, Burrell Short and Asa Fordyce, County Commisisoners, under date of June 21, 1920, stating

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that there has been created a fund in the sum of $17,703.16, from all the taxable property of the County, for Market Road construction and designating three roads to be improved as Market Road projects.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $16,635,610.10 which produced $16,635.61, which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission, March 2	$ 16,635.61
Funds apportioned by the State Highway Commission, April 3	6,784.92
Funds apportioned by County levy	17,703.16
Total available for 1920	$ 41,123.79

The County Court requested that Mr. Darley, County Surveyor, be allowed to make the surveys and do the necessary construction engineering for market roads in their County, and the request was granted. No maps, profiles or estimates of cost have been submitted to this office for approval and the arrangement has not been satisfactory. A request for information regarding work accomplished during the year was sent to the County Judge, September 13. No information was sent in and on November 24 a telegram was sent to E. B. Bishop asking him to obtain the information required, and the following data was contained in his report.

Project No. 1—"Klamath Falls-Midland Highway."

There has been approximately 2.5 miles graded, and the total amount expended is $1,170.09, in which both engineering and cost of construction is included.

Project No. 2.—"Olene Bonanza Highway via Poe Valley."

There has been spent the sum of $3,182.20. Engineering is included in the cost of grading and there has been approximately 3 miles graded.

Project No. 3.—"Bonanza-Langell Valley Postoffice Highway."

Amount expended $3,522.70, this amount being spent entirely on surveying, no grading work having been done.

LAKE COUNTY

Transportation by railroad in this County consists only of a narrow-gauge entering from the south and ending at Lakeview. All other traffic in the County is entirely dependent on highways. As evidence that the people recognize the value of good roads, a bond issue of $200,000.00 was voted on and carried June 3, 1919. These funds are being applied entirely on State highways and the County has co-operated to the extent of twenty-five per cent of the cost of all State projects put under way. They have an efficient road-building organization and the two construction projects contracted in their County have been awarded to them, as low bidders.

During the period covered by this report the Highway Department has made approximately 123 miles of location surveys and has placed 12.87 miles of grading and macadamizing under contract.

Work in the County is being handled under the supervision of E. B. Bishop, Division Engineer.

Lakeview-Crooked Creek Post Road Project

This section extends from the city limits of Lakeview, north to, and through the Crooked Creek Canyon, a distance of 11.09 miles. It has been assigned project No. 32 and is being constructed in co-operation with the County and Federal Government. The work consists of grading and macadamizing, being awarded to the County Court of Lake County on October 7, 1919, under contract No. 215.

Work was started January 14, 1920 and is still under way at the date of this report. The total estimated cost is $134,000.00, of which $68,026.53 has been expended to date, $53,145.81 by the State and $14,880.72 by the County. The Federal Government co-operates to the extent of fifty per cent, or $67,000.00, the County to the extent of twenty-five per cent, or $33,500.00, the State paying the balance of $33,500.00.

B. J. Crowley is Resident Engineer on the work.

Unit No. 1, Lakeview-New Pine Creek Post Road Project

Post Road Project No. 23 covers the grading and macadamizing of a section 1.78 miles in length extending south from Lakeview. Contract No. 214 was awarded on October 7, 1919, to the County Court of Lake County for the work to be done. Operations were started October 21 and the grading and base course of the macadam completed by December 10. At this time weather conditions caused the closing down of the work and operations have not been resumed since that date. It was the intention of the County Court to renew efforts on this project as early in the spring as possible, but they later decided to transfer all equipment to the Lakeview-Crooked Creek project. As soon as this last named section is completed, work will be resumed on the project south of Lakeview.

The estimated total cost of the project is $20,000.00, of which $11,347.49 has been expended to date, $8,765.98 by the State and $2,581.51 by the County. The Federal Government co-operates to the extent of $4,667.02, the County to twenty-five per cent of the cost, or $5,000.00, the State paying the balance of $10,332.98.

[LAKE]

Lakeview-Lapine Survey

This survey was made during the season of 1919 under the direction of B. J. Crowley, Locating Engineer.

The line as located follows Crooked Creek to where it empties into the Chewaucan Marsh, thence across the marsh to the town of Paisley and along the west side of Summer Lake and also the west side of the old Silver Lake bed to the town of Silver Lake, and ends at a point approximately 7 miles north, which is the south end of what is known as the Fort Rock line.

The distance is 109 miles and for a considerable part of the way is over a deposit of natural road building gravel. This route is at present the only all winter north and south road east of the Cascades.

Lakeview-New Pine Creek Survey

This survey was made for the State Highway Department under the direction of F. A. Mushen, who at that time was County Surveyor for Lake County.

The line follows closely the base of the foothills to the east of Goose Lake, beginning at Lakeview and ending at New Pine Creek, which is on the boundary line between California and Oregon.

The length of this survey is 13 miles and is through a thickly populated district.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by E. H. Smith, County Judge, and J. P. Duke, County Commissioner, under date of March 6, 1920, stating that a levy of 1 mill on all the taxable property of the County, was made for Market Road construction, and designating one road to be improved as a Market Road project.

A levy of 1 mill on a valuation of $12,323,319.84 produced a County Market Road Fund of $12,323.32. Included in the State levy of taxes was a 1 mill levy on a valuation of $11,104,291.70 which produced $11,104.29 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission, March 2	$ 11,104.29
Funds apportioned by the State Highway Commission, April 3	4,528.95
Funds produced by County 1 mill levy	12,323.32
Total available for 1920	$ 27,956.56

B. J. Crowley, Resident Engineer in the employ of the State Highway Commission made the location survey, prepared plans and estimates and did the necessary construction engineering.

Project No. 1.—"County road from Lakeview to Adel."

This road connects Lakeview with Warner Valley and the town of Adel, a distance of about 35 miles. Between Lakeview, which is in Goose Lake Valley, and Warner Valley to the east is a high range of hills through which the only feasible pass is Warner Canyon, five miles north of Lakeview. The Lakeview-Bend Highway passes the mouth of this canyon, thus affording a modern macadam road to that point. The

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County road as used at present between Lakeview and Adel is only a trail, but with the exception of Warner Canyon, a distance of 4 miles at the west end and about three miles along Deep Creek at the east end, the grades are comparatively easy and with a moderate amount of work can be made a good road. The Warner Canyon section was chosen as the first section to be improved. About twelve miles of preliminary line was run before the location was determined. The located line is 4 miles in length. The maximum grade is six per cent. A contract was awarded for grading 4 miles of road, the width to be 20 feet on favorable ground and 16 feet where slopes exceed 12 degrees. Surfacing 1 mile of road with gravel was included in the contract. The work contemplated for 1920 will probably not be completed. Estimated cost $29,000.00.

LANE COUNTY

The Pacific Highway through Lane County traverses some of the most productive and most settled sections of the Willamette Valley. The construction operations of the State Highway Commission have been, for the most part, concentrated on this highway. All sections graded during the last biennium have been under the supervision of this Department and, excepting co-operative projects involving railroad grade crossing eliminations, were either financed directly by Lane County or by funds advanced by the State and to be repaid to the State by the County at a later date. Macadamizing and paving have been supervised and paid for by the State.

During the past two years, 15 miles have been graded, ten miles macadamized and 17.3 miles paved on the Pacific Highway, and there remains only approximately ten miles of regrading to complete this highway to State standard through the County.

The State has also co-operated fifty-fifty with the County, in addition to paying the engineering costs, on an 11 mile grading project on the Willamette Valley-Florence Highway, and to the extent of $12,500.00 on short sections totaling 1.5 miles between Blue River and Waterville on the McKenzie River Highway.

One grade crossing of the Southern Pacific Railway has been eliminated by an overgrade structure paid for jointly by the State, County and railroad and four grade crossings of the Southern Pacific eliminated by new grading. The railroad company assists the County in this grading to the extent of forty per cent of the cost.

Surveys have been completed on the Pacific Highway and on the Willamette Valley-Florence Highway, from Blachly to the Pacific Highway.

All State surveys and construction work in Lane County have been under the supervision of J. C. McLeod, Division Engineer.

Eugene-Junction City Paving

Prior to paving, this section was one of the best samples of gravel macadam in Oregon. The road was through flat country and was graded to a wide road section which gave very good drainage. The total distance of 12.4 miles was advertised in two equal sections and awarded as contracts No. 159 and No. 160 to the Clark & Henery Construction Company of Stockton, Cal., on July 8, 1919. Work was started August 9, 1919. After reshaping the old macadam of the road to conform to pavement crown, a course of clean stone was added and compacted and a 2-inch bitulithic wearing surface laid. Six miles of pavement were finished in 1919 and all culverts and new bridges constructed during the winter months. Paving operations were resumed April 12, 1920 and the entire job is completed at the present time. The cost of this section was financed by the State, the grading items to be repaid at a later date by Lane County.

The city of Eugene recently completed a section of concrete paving north to the city limits to connect with the State pavement making an unbroken stretch of hard surface from Eugene to Junction City.

H. W. Libby was Resident Engineer in charge of this construction. The total cost of the work is $272,264.81, which has been paid by the



BITUMINOUS PAVEMENT BETWEEN EUGENE AND JUNCTION CITY IN LANE COUNTY. ON THE PACIFIC HIGHWAY. LAID IN 1920.



ALONG THE COAST FORK OF THE WILLAMETTE RIVER, ON THE PACIFIC HIGHWAY IN LANE COUNTY BETWEEN EUGENE AND GOSHEN. BITUMINOUS PAVEMENT LAID IN 1920.

State. Lane County co-operates to the extent of $11,668.94 and Junction City $3,129.62 for work done within the city limits.

The sum of $12,500.00 has been deducted from the County's share. This deduction is occasioned by the fact that the State Highway Commission agreed to co-operate to this amount on the widening of the highway between Eugene and Blue River, which is being done by the county, and instead of paying the County direct on this work, they will be allowed the above reduction on the Eugene-Junction City section.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 9,275.54
Rental of rollers (to be deducted from amount due contractor		1,028.63
Contract Items as follows:		
Unit No. 1:		
Excavation, no classification, 15,670.7 cu. yds. at 75c	$ 11,753.03	
12" plain concrete pipe, 36 lin. ft. at $1.50	54.00	
18" reinforced concrete pipe, 40 lin. ft. at $2.70	108.00	
Class "A" Concrete, 34.4 cu. yds. at $30.00	1,032.00	
Class "C" concrete, 6.5 cu. yds. at $22.00	143.00	
Metal reinforcement, 1,915 lbs. at 10c	191.50	
Broken stone for base, 4,800 cu. yds. at $4.45	21,360.00	
Clay or other earth filler, 100 cu. yds. at $1.00	100.00	
Standad Bit. pave. Type "E", 58,505 sq. yds. at $1.45	84,832.25	
Gravel shoulders, 65,719 lin. ft. at 6c	3,943.14	
Broken stone for shoulders, 2,983 cu. yds. at $4.45	13,274.35	
Force Account Items:		
Widening bridge at Station 208+60	687.08	
Constructing shoulder drains	405.50	
Total	$137,883.85	
Deduction for rental of rollers	1,028.63	
Deduction account contractor being awarded both units	2,500.00	
Total amount paid contractor for Unit No. 1		$134,355.22
Unit No. 2:		
Excavation, no classification, 12,211.8 cu. yds. at 75c	9,158.85	
12" plain concrete pipe, 64 lin. ft. at $1.50	96.00	
24" reinforced concrete pipe, 44 lin. ft. at $3.75	165.00	
Class "A" concete, 106.9 cu. yds. at $30.00	3,207.00	
Class "C" concrete, 4.2 cu. yds. at $22.00	92.40	
Metal reinforcement, 6,107 lbs. at 10c	610.70	
Broken stone for base, 4072 cu. yds. at $4.45	18,120.40	
Clay or other earth filler, 100 cu. yds. at $1.00	100.00	
Standard bitulithic pavement, type "E", 58,591 sq. yds. at $1.50	87,886.50	
Broken stone for shoulders, 1,974 cu. yds. at $4.45	8,784.30	
Broken stone shoulders, 65,665 lin. ft. at 6c	3,939.90	
Force Account Items:		
Constructing shoulder drains	444.37	
Total	$132,605.42	
Deduction account contractor being awarded both units	5,000.00	
Total amount paid contractor for Unit No. 2		$127,605.42
Grand total cost of project (all State funds)		$272,264.81

Eugene-Goshen Paving

This section of 4.9 miles is one of the most traveled roads in the State. Besides the Pacific Highway traffic, there is a heavy local traffic between Eugene and Springfield as well as the travel south to the McKenzie and Willamette Highways. A very good macadam road existed prior to this construction. Some of the macadam was rather narrow and considerable grading was required to build up shoulders and cut high points to conform to a paving grade. Contract No. 119 for the grading

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and paving from the south city limits of Eugene to Goshen was awarded to Guy F. Pyle of Eugene on May 6, 1919. Crushed gravel was added to the regraded base to give in all places a minimum thickness of 8 inches of macadam and over this a 2-inch bituminous wearing surface, 16 feet wide, was placed.

Paving was started July 10, 1919 and finished November 13, 1919. Completion of shoulders, building of guard fence and final drainage details were completed and a final estimate issued July 31, 1920.

The entire project was financed by State funds, grading charges to be refunded by Lane County to the State.

This section was under the supervision of H. W. Libby, Resident Engineer. Total expenditures for the work amount to $101,325.02, of which $9,187.76 is to be refunded by Lane County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,313.41
Contract Items as follows:		
Common excavation, 7,616.2 cu. yds. at 75c	$ 5,712.15	
Overhaul, 5,356.4 sta. yds. at 4c	214.26	
12" plain concrete pipe, 176 lin. ft. at $1.20	211.20	
Class "C" concrete, 11.8 cu. yds. at $22.50	265.50	
Standard bituminous pavement, Type "E", 42,508 sq. yds. at $1.32	56,110.56	
Clay or other earth filler, 450 cu. yds. at 75c	337.50	
Crushed river gravel, 2,639 cu. yds. at $3.65	9,632.35	
Shoulders, 47,438 lin. ft. at 5c	2,371.90	
Broken stone, loose measure, 4,216 cu. yds. at $4.05	17,074.80	
Force Account Items:		
Extension of 36" corrugated iron culvert 20 ft.	127.49	
Dry rock wall to support fill	32.45	
Cleaning, repairing and placing tile drains	749.74	
500 lin. ft. of guard rail	993.80	
Rip rap	470.27	
Reinforced concrete inlets to culverts	56.06	
Shoulder drains	391.48	
Cleaning ditches and retrimming slopes	354.84	
Total	$ 95,106.35	
Deduction for war tax on freight	94.74	
Total amount paid contractor		$ 95,011.61
Grand total cost of project		$101,325.02
Paid by State	$101,325.02	
State to be reimbursed by County	9,187.76	

Junction City-Benton County Line Grading and Macadam

This section of 5.5 miles was awarded to Washburn & Hall of Lebanon for grading and macadamizing on May 16, 1919. Contract No. 120 covered clearing, grading and culverts and a 16-foot waterbound screened gravel macadam 6 inches in depth.

Grading was started May 25, 1919 and macadamizing on July 2, 1919. All rock was placed on the road October 18, 1919, but the final shaping up of macadam and cleaning of ditches was not completed until spring. Supervision of this section was under H. B. Glaisyer, Resident Engineer.

The total cost of the work amounts to $53,056.27. Of this amount, Lane County co-operates to the amount of $15,197.51, which has been advanced by the State.

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DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,139.70
Contract Items as follows:		
Clearing and grubbing, all lump sum	$ 100.00	
Excavation, no classification, 19,829.4 cu. yds. at 60c	11,897.64	
Overhaul, 12,167.7 sta. yds. at 3.5c	425.87	
Class "A" concrete, 38.55 cu. yds. at $24.00	925.20	
Class "C" concrete, 23.36 cu. yds. at $20.00	467.20	
Metal reinforcement, 3,616 lbs. at 10c	361.60	
12" plain concrete pipe, 552 lin. ft. at $1.25	690.00	
24" reinforced concrete pipe, 120 lin. ft. at $2.75	330.00	
Screened gravel, waterbound, 10,883.75 cu. yds. at $2.95	32,107.06	
Clay or other earth filler, 2,612 cu. yds. at $1.00	2,612.00	
Total amount paid contractor		$ 49,916.57
Grand total cost of project		$ 53,056.27
Paid by State	$ 53,056.27	
State to be reimbursed by County	15,197.51	

Walker-Cottage Grove Macadam

On September 9, 1919, contract No. 202 for surfacing this section, 3.07 miles long, with crushed rock and crushed gravel waterbound macadam, 16 feet wide and 6 inches deep, was awarded to Hakanson & Corson of Oakland, Ore. Rocking was started October 25, 1919, and macadam completed June 3, 1920, under the supervision of W. S. Hodge, Resident Engineer. The road was kept open for traffic at all times during surface operations.

Cost of construction was covered entirely by State funds at an expense of $38,059.85.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,425.29
Rental of trucks		254.25
Contract Items as follows:		
6" porous drain tile, 1,224 lin. ft. at 25c	306.00	
Excavation, no classification, 82 cu. yds. at $1.00	82.00	
Broken stone back-fill, 75 cu. yds. at $2.00	150.00	
Broken stone water-bound macadam, 1,872 cu. yds. at $4.55	8,517.60	
Run-of-bank gravel, 228 cu. yds. at $3.45	786.60	
Clay filler, 1,006 cu. yds. at $1.25	1,257.60	
Crushed gravel, 5,572 cu. yds. at $4.45	24,795.40	
Force Account Items:		
Removing slides	663.61	
Cleaning ditches on S. P. right-of-way	28.32	
Towing machines over temporary road account loose gravel	23.45	
Total	$ 36,634.56	
Deductions:		
Truck rental	254.25	
Total amount paid contractor		$ 36,380.31
Grand total cost of project (all State funds)		$ 38,059.85

Divide-Lane-Douglas County Line Macadam

This section of 1.38 miles extends from the Lane-Douglas County line northward to Divide connecting with the Lane County macadam laid by the State in 1917.

At the meeting of the Highway Commission August 5, 1919, no favorable bids being received, this section was ordered macadamized by State forces. A State crusher was installed north of Comstock and rocking

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was started October 5, 1919. Only the portions of new grade connecting the old road were rocked before winter and the job completed in 1920. This work was finished in conjunction with several other small State force jobs between Divide and Leona with small force and small crusher. Work was completed October 1, 1920. W. S. Hodge was Resident Engineer supervising this work and J. L. Shaska was Superintendent in charge of State forces. Total expenditures amount to $26,771.03.

Grading Walker-Cottage Grove

An agreement was entered into between the Lane County Court and the Southern Pacific Company for the grading of a section from Walker to the north end of the bridge over the Willamette Coast Fork, a mile north of Cottage Grove. Because of the elimination of four grade crossings of the railroad by this work, the Southern Pacific Company agreed to pay for forty per cent of the construction cost. At the request of the Lane County Court, the State Highway Commission advertised this 3 mile section for grading and awarded contract No. 126 to Joplin & Eldon of Portland on April 15, 1919. They later sub-contracted the grading to the Western Construction Company of Portland, who finished all the work on January 1, 1920, except some short sections of light grading where the new location coincided with the old road. These sections were graded under supplementary contract No. 126-A in the spring of 1920 by Hakanson & Corson, the contractors doing the macadam work on this project. This arrangement was made in order that the old road sections would not be torn up during wet weather.

Engineering supervision of this work was under W. S. Hodge, Resident Engineer. Total expenditures for the work amount to $49,602.38, the County share being $28,485.91, the Railroad Company's share $19,430.22, and the State share $1,686.25. To date the County has paid $1,963.12 and the Railroad Company $3,634.88.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,788.91
Purchase of right-of-way		1,963.12
Watchman service and repairs to railway and telegraph lines		3,307.26
Removal of grade crossing structures		327.62
Paint furnished by State for guard fences		87.50
Contract Items as follows:		
Clearing and grubbing, all required	$ 1,500.00	
Common excavation, 6,690 cu. yds. at 85c	5,686.50	
Intermediate excavation, 6,895 cu. yds. at 85c	5,860.75	
Solid rock excavation, 13,729 cu. yd. at $1.70	23,339.30	
Overhaul, 22,516 sta. yds. at 5c	1,125.80	
12" concrete pipe, 450 lin. ft. at $1.50	675.00	
18" reinforced concrete pipe, 160 lin. ft. at $2.50	400.00	
24" reinforced concrete pipe, 136 lin. ft. at $3.50	476.00	
Class "A" concrete, 40.7 cu. yds. at $30.00	1,221.00	
Class "C" concrete, 26.3 cu. yds. at $28.00	736.40	
Metal reinforcement, 1,912 lbs. at 10c	191.20	
Force Account Items:		
Helping machines over detours	26.40	
Rock retaining wall	216.15	
Wood culverts at private road crossings	28.85	
Wood guard fence	1,010.56	
Small bridge over borrow pit	14.17	
Concrete toe wall	932.57	
Total	$ 43,440.65	
Deductions:		
Watchman service chargeable to contractor	2,312.68	
Total amount paid contractor		$ 41,127.97
Total cost of project		$ 49,602.38

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Participation in Cost

	State	County	S. P. Ry. Co.	Total
Expended to Nov. 10, 1920	$44,004.38	$ 1,963.12	$ 3,634.88	$49,602.38
Balances	42,318.13	Cr. 26,522.79	15,795.34	
Final participation	$ 1,686.25	$28,485.91	$19,430.22	$49,602.38

Divide-Lane-Douglas County Line Grading

Contract No. 127, covering 1.2 miles of grading from Divide to the Lane Douglas County line, was awarded to J. H. Hawley & Company of Divide on April 15, 1919, and final estimate executed November 26, 1919. This grading was paid for by Lane County and supervised by W. S. Hodge, Resident Engineer, for the Highway Department. Excepted from this section was the Divide overhead and approach fills, covered under a separate contract. Total expenditures amount to $14,607.97, the County paying the construction cost of $12,911.34, and the State paying engineering and maintenance charges amounting to $1,696.63.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,618.63
Maintenance work by State forces		78.00
Contract Items as follows:		
Clearing and grubbing, all lump sum	$ 200.00	
Common excavation, 3,656 cu. yds. at 60c	2,193.60	
Intermediate excavation, 6,525 cu. yds. at 75c	4,893.75	
Solid rock excavation, 4 cu. yds. at 75c	3.00	
Overhaul, 2,750 sta. yds. at 2.5c	68.75	
12" plain concrete pipe, 196 lin. ft. at $1.50	294.00	
24" reinforced concrete pipe, 64 lin. ft. at $3.50	224.00	
24" corrugated galvanized iron pipe, 12 lin. ft. at $4.00	48.00	
Class "A" concrete, 125.6 cu. yds. at $29.00	3,642.40	
Class "C" concrete, 10.8 cu. yds. at $20.00	216.00	
Metal reinforcement, 11,189 lbs. at 9c	1,007.01	
Force Account Items:		
Furnishing and placing 6" drain tile	120.83	
Total amount paid contractor		$ 12,911.34
Grand total cost of project		$ 14,607.97
Paid by State	$ 1,696.63	
Paid by County	12,911.34	
Total	$ 14,607.97	

Maintenance

During the past biennium, maintenance orders have been issued for various small items of maintenance work on the Pacific Highway in Lane County. The work done has consisted principally of minor repairs to macadam surfacing, removing of small slides and cleaning of ditches. This work has been done on the basis of equal payments by the State and County and has occasioned expenditures of $756.69 from State funds at the time of this report.

Goldson Section Grading

On July 20, 1920, the State Highway Commission received bids on the grading of 11.29 miles of the Willamette Valley-Florence Highway in Lane County. Pending a decision of the Attorney General upon the legality of the award, no action was taken until the Commission meeting

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held on November 6. At this time, a favorable decision was received from the Attorney General, and award was made to Washburn & Hall, of Portland, Oregon, under Contract No. 305.

The total estimated cost of the work is $134,000, which will be divided $73,000.00 to the State and $61,000.00 to Lane County. No expenditures have been made on the work at the date of this report.

Eugene-Blue River Widening

On July 7, 1920, the County Court of Lane County requested the State Highway Commission to co-operate on widening the roadbed and eliminating several sharp turns between Eugene and the beginning of the Forest Road project at Blue River on the McKenzie River Highway. The State Highway Commission granted co-operation of State funds to the extent of fifty per cent of the cost of the project, with an agreed State maximum expenditure of $12,500.00. It was understood that the County would advance the total amount of funds for the work and that the State Highway Commission would allow Lane County credit for the State share on the amounts which are due the State by the County on other State projects. For the purposes of this report the sum of $12,500.00 has been deducted from the County share for grading work on the Eugene-Junction City paving project.

Blue River-Sisters Forest Road Project

This project is a portion of the McKenzie River Highway extending from Blue River in Lane County to Sisters in Deschutes County, a total distance of 53.8 miles. It constitutes the longest single Forest Road project put under way in this State and is being constructed by the Federal Government in co-operation with the State and Counties at an agreement estimate cost of $408,000.00, the State paying $184,000.00, Lane County $15,000.00, Deschutes County $5,000.00 and the Federal Government $204,000.00. Contracts have been awarded and construction is being supervised by the Portland office of the Bureau of Public Roads. For construction purposes, the project has been divided by them into four sections, three of which have been placed under contract.

The Blue River section is 14.2 miles in length and extends from Blue River, past the McKenzie bridge, to the forks of the road leading to Belknap Springs. The grading and surfacing of the unit was awarded to Siems & Carlson, contractors, and it is expected that the grading will be completed by about the first of the coming year. Surfacing will be started immediately.

The Dead Horse Grade section consists of 2.4 miles of heavy construction over the summit of the Cascade Mountains and is a continuation of the Blue River section. Contract for grading the unit was awarded to Joplin & Eldon in September of the present year, and when completed the new work will eliminate one of the worst sections of the road.

The Summit section joins the Dead Horse Grade section and extends through the lava beds 22.9 miles across the summit of the Cascade Mountains. No construction has been put under way on this portion.

The Sisters section extends from the east end of the Summit section 14.3 miles to the town of Sisters. Contract for the grading of this

portion was awarded to Siems & Carlson, contractors, during 1919 and the work completed August 31 of the present year.

The total expenditures on the entire project to the date of this report amount to $218,020.82. These expenditures have been paid $91,742.37 by the State, $11,588.31 by the Counties and $114,690.14 by the Federal Government.

Divide Overhead Crossing and Approaches

This structure, with the necessary approaches, eliminates a very dangerous grade crossing at Divide.

Contract No. 80, for the construction of the overhead crossing, was awarded on February 4, 1919 to Albert Anderson of Grants Pass. Work was started immediately and completed in October of the same year. The structure consists of three concrete spans having a combined length of 92 feet and was built at a total cost of $10,803.21.

On March 26, 1919, Albert Anderson was awarded Contract No. 92 for the construction of the approach fills. Final estimate was issued on October 20, 1919, with total expenditures of $11,714.21, having been built under the direction of W. S. Hodge, Resident Engineer.

At about the time of completion of the structure and approaches a general subsidence of the soil commenced and continued throughout the following winter and spring. While the integrity of the structure was never in danger, the settlement caused numerous unsightly cracks which required a certain amount of repair work. A carefully conducted series of measurements indicates that the settlement has now practically stopped and further repairs of a more permanent nature are contemplated, which will bring the whole improvement up to the standard required on State highway work. The total estimated cost of these repairs, together with some minor regrading which is being done on the approaches, is $4,982.58, of which amount $1,248.82 has been expended to date.

The estimated total cost of the structure, approaches and necessary repairs is $27,500.00, toward which the County will co-operate to the extent of $8,250.00, and the Southern Pacific Railroad Company $11,000.00, the State paying the balance of $8,250.00. Total expenditures to date amount to $23,766.24, which have been paid $15,708.02 by the State and $8,058.22 by the railroad company.

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DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,457.68
Regrading approaches by State forces		630.41
Reconstructing structure by State forces		108.89
Advertisement for bids		42.63
Guarding S. P. Ry. and changing signal poles		624.40
Contract Items as follows:		
Clearing and grubbing, all	$ 75.00	
Common excavation, 6,169 cu. yds at 70c	4,318.30	
Intermediate excavation, 5,790 cu. yds. at 70c	4,053.00	
Solid rock excavation, 470 cu. yds. at 70c	329.00	
Overhaul, 8,295 sta. yds. at 2.5c	207.38	
18" reinforced concrete pipe, 96 lin. ft. at $2.00	192.00	
Class "A" concrete, 289.6 cu. yds. at $25.00	7,240.00	
Class "C" concrete, 1.4 cu. yds. at $20.00	28.00	
Metal reinforcement, 29,758 lbs. at 9.5c	2,827.01	
Concrete handrail, 122 lin. ft. at $2.00	244.00	
Force Account Work:		
Wood guard fence (800 lin. ft.)	351.57	
Drainage of spring	19.71	
Moving 18" culvert	12.10	
Gravel backfill in excavation under footings	20.33	
Extra excavation account changes in footings	15.52	
Changes in forms to give additional camber	17.28	
Girder brackets added to strengthen structure, made necessary account of settlement in footings	952.03	
Total amount paid contractor		$ 20,902.23
Grand total expended to Nov. 30, 1920		$ 23,766.24
Paid by State	$ 15,708.02	
Paid by S. P. Ry. Co.	8,058.22	
Total	$ 23,766.24	

Goshen-Walker Construction Engineering

Between Goshen and Walker two sections of grading were done by Lane County forces during August and September, 1919.

The first section of 1 mile was from a point opposite the first grade crossing of the Southern Pacific Company south of Goshen to the second grade crossing south of Goshen. The new grade parallels the railroad alignment and eliminates two railroad grade crossings.

The second section was from the railroad grade crossing south of Creswell to Walker, a distance of 3.5 miles. Both improvements are through flat bottom land and a wide grader section was used throughout. The work was supervised by the State, Resident Engineer H. W. Libby being in charge.

County Bridges Construction Engineering

Designs were prepared in compliance with the request of the County Court for a bridge over Bushnell Slough and over the Coast Fork of the Willamette River near Walker.

The Bushnell Slough bridge is only a 16-foot structure while the Walker bridge requires 170 feet of wood trestle and a 150-foot Howe truss on concrete piers.

Harrisburg-Junction City Survey

Survey was started December 9, 1919, at Harrisburg to establish a location for the Pacific Highway from there to Junction City. The location crossed the Willamette River on an extension of Fountain Street in

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Harrisburg and thence by almost a direct line to Lancaster, eliminating the twisting alignment through overflow land of the present road. Just out of Junction City, the old road was left north of the present Oregon Electric grade crossing and the road located by a new route, entering Junction City on Juniper Street, to a connection with the West Side Highway on Sixth Street. The survey was completed January 17, 1920 under the supervision of H. W. Libby, Locating Engineer.

Junction City-Monroe Survey

In preparation for the 1919 construction program a location of 9 miles from Junction City to Monroe in Lane and Benton Counties, on the West Side Highway, was made by E. B. Bishop, Locating Engineer. Survey was started in January, 1919, and completed in February, 1919.

The general alignment of the road was straightened up and some bad right angle turns were eliminated.

Junction City-Eugene Survey

On June 17, 1919, a location survey in charge of H. W. Libby was started from Eugene to Junction City. With the exception of the elimination of two right angle turns near the center of the job and others near the south city limits of Junction City, the survey followed closely the existing road. The location was completed July 19, 1919, having a total length of 12.4 miles.

Eugene-Goshen Survey

Prior to the advertising of this section for paving, a location survey 5 miles in length was made by E. B. Bishop, Locating Engineer, from the south city limits of Eugene to Goshen. The survey practically followed the existing road, proposed a future overhead crossing of the Southern Pacific at McVeigh Point south of Springfield, and a revised alignment to afford better sight clearance south of the present undergrade crossing of the Southern Pacific. The location was started March 20, 1919, and completed April 4, 1919.

Goshen-Walker Survey

A retracement survey between Goshen and Walker was made in April, 1919, by H. W. Libby, Resident Engineer, and quantity estimates made for Lane County for their summer grading program.

This survey parallels the Southern Pacific south of Goshen, crosses the railroad at grade at the town of Creswell and then parallels the Southern Pacific Railway to Walker.

Walker-Cottage Grove Survey

In March, 1919, a retracement survey of the 1917 location between Walker and Cottage Grove, a distance of 3.3 miles, was made by Resident Engineer E. B. Bishop. Necessary revisions were made and estimates of construction quantities for advertising purposes were prepared.

Pacific Highway-Blachly Survey

Pursuant to the order of the State Highway Commission, a revised location of the 1917 location between the Pacific Highway and Blachly on the Willamette Valley-Florence Highway was started on January 12,

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1920, under the direction of Locating Engineer H. W. Libby. From Blachly the new location supported up the north slope on a 6 per cent grade to the summit of the Coast Range, locally known as the Low Pass. From here the location descended on a 6 per cent grade with a southern exposure, to the Long Tom River. After following the Long Tom drainage for approximately five miles, the location crossed a low divide between the Long Tom River and Bear Creek, crossed Bear Creek and followed the Bear Creek drainage to Cheshire. After crossing the Long Tom River just east of Cheshire, the survey followed an existing County road east to the road locally known as the Prairie Road. A mile and a half of new road will be necessary to connect with the Pacific Highway. The Southern Pacific was crossed at grade at Cheshire and the Southern Pacific and Oregon Electric tracks at grade near the Prairie Road.

The location length from Blachly to the Pacific Highway was 24.3 miles, of which 17.3 miles was new location and seven miles was a retracement of the 1917 survey. The survey was completed March 14, 1920.

Eugene-Florence Forest Road Project

The work covered by this agreement consists of a location survey of thirty miles of the Willamette Valley-Florence Highway in Lane County between the east and west boundaries of the Siuslaw National Forest Reserve. The estimated agreement cost for this location is $8,000.00, to be paid equally by the State and the Federal Government. The survey has been carried on by the Bureau of Public Roads with expenditures to date of $7,329.51, of which the State has paid $3,732.82 and the Federal Government $3,596.69.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by H. L. Brown, County Judge; M. H. Harlow and E. R. Spencer, County Commissioners, under date of March 6, 1920, stating that a levy of 1 mill on all taxable property of the County was made for Market Road construction and designating five roads to be improved as Market Road projects.

A levy of 1 mill on a valuation of $35,021,627.22 produced a County Market Road fund of $35,021.63.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $39,718,636.10, which produced $39,718.64, which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission, March 2	$ 39,718.64
Funds apportioned by the State Highway Commission, April 3	16,199.45
Funds produced by County levy of 1 mill	35,021.63
Total available for 1920	$ 90,939.72

P. M. Morse, County Surveyor, made the necessary surveys, prepared maps and estimates of cost and did the necessary construction engineering. The construction work was done by County forces under the direction of Jack McKy, Roadmaster. Excellent work has been done in this County.

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Project No. 1—"Blachly Road."

From the town of Blachly west for a distance of one-half mile along the Thomas survey, the road was graded 20 feet wide and surfaced 12 feet wide with crushed rock. Approximately $2,500.00 was expended on this project.

Project No. 2—"Eugene-Lorance Road."

A location survey 4 miles in length was made. A section of the road 2¼ miles in length was graded to a 26-foot width of roadbed, and surfaced 16 feet wide with three-course crushed rock macadam. Approximately $29,400.00 was expended on this project.

Project No. 3—"Cottage Grove-Lorane."

This road is through rolling country; preliminary surveys were made to establish a road with a maximum grade of 5 per cent. Location was made on three sections totaling 1½ miles. These sections were graded to a 30-foot roadbed and surfaced 12 feet wide with crushed rock macadam.

Approximately $15,400.00 was expended on this project.

Project No. 4—"Willamette Road."

Approximately $2,500.00 was expended in rebuilding a portion of timber approach to the bridge across the Willamette River and in replacing a part of the approach with an earth fill.

Project No. 5—"Mohawk Road."

This road is a direct route between Eugene and Donna, Macola, Wendling and Maple and carries a larger amount of traffic. The sections improved in 1920 are along the Mohawk River Valley, at the foot of the hills; were narrow and crooked and almost impassable in winter. The sections 1½ miles in length were graded to a 30-foot roadbed and surfaced 12 feet wide with crushed rock macadam. Approximately $8,000.00 was expended on this project.

LINCOLN COUNTY

With the exception of a 1 mile section of grading, known as the Pioneer Mountain section between Toledo and Newport, on which the State co-operated to the extent of $2,054.05 during 1917, and the Alsea River Forest Road project on which it is estimated that the State co-operation will amount to $72,000.00, the State funds expended in Lincoln County to date have been for surveys, bridge plans and field engineering in connection with construction work done by the County or paid for with County funds. There are, however, two sections of the Corvallis-Newport Highway in the County, aggregating about thirteen miles, on which it is anticipated that contracts for surfacing will be awarded in time for completion of the construction during the 1921 season.

Personal reconnaissance of the Coast Highway from Newport north to the Tillamook County line has been made by Mr. Nunn, State Highway Engineer. Between Neskowin in Tillamook County and the Salmon River in Lincoln County, location surveys have been made of the 10.27 miles involved. The Counties offered to put up $12,500.00 each and construction of this section met with favorable consideration by the Highway Commission, providing the Federal Government will co-operate on the cost of its construction as a Forest Road project. Application has been made to the Bureau of Public Roads and the project is under investigation at the present time.

Work in Lincoln County has been under the supervision of W. D. Clarke, Division Engineer for the State.

Toledo-Newport Grading

Contract No. 265, for grading and drainage of the Toledo-Newport section, was awarded April 27, 1920 to Thomas E. Young of Portland. This contract covers that part of the Corvallis-Newport Highway from Toledo to Newport not graded by the County in the Depot Slough-West section, the net length being 5.3 miles.

Work was begun May 20, 1920 and the contract would have been completed in the 1920 season but for the unusually early rain which prevented practically all work after September 10, and caused a complete shutdown soon after October 1. Completion of this grading will be hastened as rapidly as possible with the opening of the 1921 season so that, if possible, macadamizing may be also completed before another winter.

The estimated cost of this work when completed is $64,000.00, of which the County will pay from its bond issue fund $59,000.00, covering all construction work, and the State $5,000.00 covering all engineering.

Expenditures of $30,680.76 have been made to date under the supervision of T. A. Rice, Resident Engineer. County expenditures have amounted to $27,067.55, the State having expended $3,613.21.

Alsea River Forest Road Project

This project extends from Alsea to the bridge over the Alsea River west of Tidewater, a total distance of 19.9 miles. The completed project will provide a link in a highway connection between the Willamette

Valley, in the vicinity of Corvallis, and that section of the Coast Highway in the vicinity of Waldport.

Constructing is being carried on under the supervision of the Bureau of Public Roads under a project agreement which contemplates a four year program. Contract for grading and surfacing 4 miles of the project, known as the Tidewater Hill section and constituting the first year portion, has been awarded to Saar & Lang by the Portland office of the Bureau of Public Roads, and is nearing completion at the present time.

The total estimated cost of the entire four years' work as covered by the project agreement amounts to $192,000.00, the State's share being $72,000.00, the County's share $48,000.00 and the Federal Government's share $72,000.00. Expenditures to date amount to $47,544.68, which have been paid $16,780.78 by the State, $8,452.73 by the County and $22,311.17 by the Federal Government.

Maintenance

The section of the Toledo-Newport road from Toledo to a junction with the Siletz road at Depot Slough is probably the most used section of road in Lincoln County. Upon rejection of the bids for macadamizing the Toledo-Newport section the Commission directed the temporary surfacing, by force account, of the section as far as Depot Slough. This has been done under a maintenance order. Part of the section has been planked with re-laid plank and part has been graveled. Portions where the old gravel or macadam surface was not disturbed by regrading have required none of this temporary work to keep them passable for the winter.

Gravel used for this work was shipped by train from Albany. The total expenditure to date under this maintenance order is $2,449.43, of which $946.16 is to be paid by Lincoln County.

The work has been directed by Resident Engineer T. A. Rice.

Benton County Line-Thornton Creek Construction Engineering

This section of the Corvallis-Newport Highway, from the Benton County line to Thornton Creek, is 18 miles in length. In 1919 Lincoln County began the grading on this section, starting at the County line, and about two miles of light work in unconnected stretches were graded that season. In 1920 these stretches were connected up and a continuous section of approximately 4.6 miles has been finished from the County line west. Work was also begun at the Thornton Creek end and approximately two miles of grade have been completed from Thornton Creek east.

The work has been done by the County with its own force and equipment, with money from its bond issue fund. A small steam shovel was used on two or three of the larger cuts at the Thornton Creek end, but its operation proved to be expensive and unsatisfactory and its use has been discontinued.

It is expected that contracts will be let by the Highway Commission during the winter for rocking these completed sections so that the surfacing may be completed during the 1921 season.

A. A. Amort has been the Resident Engineer on this work.

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Thornton Creek-Toledo Construction Engineering

No construction work was undertaken on the section between Thornton Creek and Toledo until late in the season of 1920. About September 15 a small team outfit was put on by the County at a point about two miles east of Toledo, and a 1,000 foot stretch graded by October 15, when the work was discontinued for the winter. It is expected that this work will be continued in 1921. Expenditures to date by the County total $1,380.97.

T. A. Rice, Resident Engineer, at Toledo, has done the small amount of engineering work necessary on this section.

Depot Slough-West Construction Engineering

The first work undertaken by Lincoln County following the issuance of its bonds voted June 3, 1919, was the grading of a two mile section between Toledo and Newport, immediately west of Depot Slough. Of this distance, 4100 feet was let on contract direct with the County to McMillan & Wright of Toledo, and 5,900 feet was done by the County with its own force and equipment. All engineering work has been done by the State. Work under the contract was begun in June and completed in September, 1919. The County force account work was begun in August, 1919, and completed in June, 1920. T. A. Rice was the Resident Engineer in charge of engineering work on this section.

Total expenditures were $20,468.09, of which $1,401.46 was paid by the State for engineering and $19,066.63 by the County.

Depot Slough Bridge Construction Engineering

A standard wood trestle bridge consisting of seven 19-foot spans has been built on the Corvallis-Newport Highway over Depot Slough, a tidal stream near Toledo.

The work was done by R. W. Pepin under contract No. 218 which was awarded to him on October 7, 1919. It was completed on February 15, 1920, and cost a total of $4,242.63, all of which was paid direct by Lincoln County except $273.42 for engineering, which was paid by the State.

Corvallis-Toledo Survey

A description of the survey between Corvallis in Benton County and Toledo in Lincoln County is given in the portion of this report devoted to Benton County. Of the total 55 miles of this survey, 34 miles are in Lincoln County.

Toledo-Newport Survey

In preparation for construction work under the County bond issue voted June 3, 1919, a survey was begun in that month on the Toledo-Newport section. A contract for grading a small part of the section was let about the same time and County force work on another part began soon afterward. The construction engineering was handled by the survey party, resulting in delay of completion of the final location over the section until early in 1920.

The survey extended from the foot of Eighth Street in Toledo to the city limits of Newport, a distance of 7.25 miles, the major part of the work being under the direction of T. A. Rice, Resident Engineer.

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Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by R. R. Miller, County Judge, and Jay W. Dunn and W. F. Wakefield, County Commissioners, under date of March 5, 1920, stating that a levy of 1 mill (or such amount necessary to match State money) on all the taxable property of the County was made for Market Road construction and designating five roads to be improved as Market Roads.

A levy of 1 mill on a valuation of $9,357,677.08 produced a County Market Road fund of $9,357.68. Included in the State levy of taxes was a levy of 1 mill on a valuation of $7,327,819.60, which produced $7,327.82, and which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission, March 2	$ 7,327.82
Funds apportioned by the State Highway Commission, April 3	2,988.69
Funds produced by County 1 mill levy	9,357.68
Total available for 1920	$ 19,674.19

A. L. Porter, Engineer in the employ of the County Court made the surveys, prepared maps, profiles and estimates of cost and did the necessary engineering work during construction.

Project No. 1.—"Road from Simpson Creek to Toledo via Elk City and river route, including outlet to Railroad at Elk City."

No funds were expended on this project in 1920.

Project No. 2.—"Siletz Road from Highway to Siletz."

A survey of this road 10 miles in length was made. The work contemplated for 1920 consisted of widening the roadbed to 20 feet width, and surfacing 12 feet wide with gravel, a section approximately two miles in length. A report dated October 11, states that it is expected that this improvement will be completed in 1920 at a cost of approximately $14,000.00.

Project No. 3.—"Yaquina route from Eddyville via Nortons and C. A. Clemm road to State Highway near Burnt Woods Postoffice."

This road 4¼ miles in length was surveyed by Mr. Porter. It is planned to grade the road 16 feet wide. Only clearing and grubbing contemplated for 1920. Work will be completed at an estimated cost of $1,200.00.

Project No. 4.—"Spout Creek Road from Harlan Postoffice to State Highway."

A survey 7.8 miles in length was made. It was decided that a section 2100 feet in length (from station 73 plus 00 to 94 plus 00) should be graded 16 feet wide during 1920. The work was done by County forces at a cost of approximately $2,000.00.

Project No. 5.—"Five Rivers Road from Alsea Highway to Denzer." No work was done on this project in 1920.

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During the 1919-1920 biennium a location survey of the Pacific Highway has been completed and established throughout the County. The portion from the north line of the county, at the Santiam River, to Albany has been graded and paved and the section from Albany to 1.6 miles south of Tangent, graded and graveled. Aside from $10,000.00 aid from the State on the Jefferson-Albany section, all grading has been paid for by Linn County. Paving and macadamizing has been paid for by the State.

A new steel bridge over the Santiam River at Mehama has been constructed under State supervision and financed jointly by Linn and Marion Counties.

Surveys and construction in this County are under the supervision of J. C. McLeod, Division Engineer.

Albany-Tangent Graveling

A. D. Kern of Portland, Oregon, was awarded contract No. 285 for graveling 7.4 miles on the Pacific Highway, between the south city limits of Albany and the grade crossing of the Southern Pacific Railway, known as Drivers Crossing, south of Tangent, on July 6, 1920.

The grading, culverts and bridges were handled by Linn County forces ahead of rocking. Placing of gravel started in August and was practically completed by November 30. County grading and State graveling were under the supervision of H. E. Abry, Resident Engineer.

The total estimated cost of surfacing is $46,000.00. Of this amount, the sum of $14,745.93 has been expended to date from State funds.

Albany-Jefferson Grading and Paving

Contract No. 87 for the grading and paving of seven miles, from the north city limits of Albany to the south end of the steel bridge across the Santiam River at Jefferson, was awarded to A. D. Kern, of Portland, on March 16, 1919.

The entire section was graded and new fills were gravelled during 1919 and one-half mile of pavement was laid. Paving was resumed on May 18, 1920, and completed August 3, 1920. The shoulder work and final drainage work on this section is practically completed at the present time. There remains a half mile ungraded and unpaved section at the present grade crossing of the road with the Southern Pacific Railway. It is proposed to go under the railroad at the trestle over Murder Creek.

Supervision of this project was under John R. Penland, Resident Engineer, from March 1, 1919, to September 1, 1919, under L. J. Caufield, Resident Engineer, from September, 1919, to January, 1920, and under H. E. Abry, Resident Engineer, from January, 1920, to date.

Paving laid on this project was a 5-inch bituminous pavement on a 4-inch gravel macadam base. The total estimated cost of the work amounts to $210,000.00, of which $174,721.19 has been expended to date. Linn County co-operates on the work to the extent of $31,000.00, having already paid $14,745.90.

[LINN]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 12,601.27
Macadamizing by State forces		4,470.42
Rental of industrial track owned by State (to be deducted from amount due contractor)		323.91
Advertisements for bids		17.35
Contract Items as follows:		
Clearing and grubbing, 50 per cent at $75.00	$ 37.50	
Excavation, no classification, 32,829.5 cu. yds. at 60c	19,697.70	
Overhaul, 24,740 sta. yds. at 3c	742.20	
Class "A" concrete, 161.37 cu. yds. at $25.00	4,034.25	
Class "C" concrete, 14.27 cu. yds. at $20.00	285.40	
Metal reinforcement, 9,782 lbs. at 10c	978.20	
12" plain concrete pipe, 471 lin. ft. at $1.25	588.75	
18" reinforced concrete pipe, 64 lin. ft. at $2.50	160.00	
Run-of-bank gravel for base, 8,734.5 cu. yds. at $2.00	17,469.00	
Broken stone, 271.5 cu. yds. at $3.50	950.25	
Crushed gravel shoulders, 63,020 lin. ft. at 4c	2,520.80	
Bitulithic pavement, Type "D", 63,299.5 sq. yds. at $1.98	125,333.01	
Force Account Items:		
Excavation for drainage outside of right-of-way	1,829.36	
Clearing extra right-of-way	697.58	
Excavating channel change at Bridge Station 300+00	61.88	
Macadamizing to maintain travel through winter	9,722.58	
Earth filler in gravel sub-base	188.96	
Total	$185,297.42	
Deduction for rental of State owned equipment	228.91	
Total amount earned by contractor	$185,068.51	
Percentage retained until completion of contract	27,760.27	
Total amount paid to contractor		$157,308.24
Grand total expended to Nov. 30, 1920		$174,721.19
Paid by State	$159,975.29	
Paid by County	14,745.90	
Total	$174,721.19	

Santiam River Trestles Constructing Engineering

In order to allow the passage of flood water in the Santiam River it was necessary to provide three openings, having a total length of 798 feet, in the grade across the river bottom just south of Jefferson on the Pacific Highway.

Each opening consists of a series of standard trestle spans on concrete piers, which provides at a moderate cost a very satisfactory type of construction for situations such as this. The construction was done by County forces under contract No. 141, dated May 27, 1919, William D. Hoffman being superintendent for the County. The engineering and inspection were done by the State, L. H. Allen acting as the State's representative on the work. The construction cost was borne direct by the County, the State paying the engineering costs.

Albany-Harrisburg Survey

At various times during 1919 a location survey was carried on from the south city limits of Albany to the north bank of the Willamette River at Harrisburg. Surveys were made by department engineers on adjoining construction. That section from Albany to Shedd was made by John R. Penland, Resident Engineer, and the section from Shedd to Harrisburg by L. J. Caufield, Resident Engineer, and H. E. Abry, Resident Engineer.

[LINN]

The location leaving Albany made a new road change, just north of Tangent, of 1.9 miles, eliminating several right angle turns. South of Tangent there are two miles of new construction traversing the Calapooya Bottom; thence to Shedd over an old County road. This section parallels the Southern Pacific on the west side and eliminates two grade crossings. Between Shedd and Halsey the location follows the old road. South of Halsey the new location parallels the railroad for eight miles, half on an existing County road and half new construction, shortening the existing road by 0.6 mile.

The survey proposed a future overhead crossing on the Oregon Electric Railway north of Harrisburg, running through this town to the proposed bridge crossing of the Willamette River. The total length of the survey was 26.6 miles.

Tangent-Lebanon Survey

A location survey from Lebanon to a connection with the Pacific Highway at Tangent was started May 8, 1920, and completed May 14, 1920, under the direction of W. K. Wright, Locating Engineer. This location runs due west from Lebanon and is 10 miles in length.

Lebanon-Cascadia Survey

On February 9, 1920, a location survey in charge of W. K. Wright, Locating Engineer, was started from the city limits of Lebanon to Cascadia, a section of the Albany-Sisters Highway.

The location followed the present road alignment, with minor revisions, through Sweet Home and Foster to a point a mile east of Foster. From this point the location leaves the old road and follows the south slope of the Santiam River for four miles, around what is locally known as Shea's Hill, to a connection with the old road. From this point the old road is followed very closely to the National Forest Boundary. The total length of the location was 31.4 miles and was completed April 29, 1920.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by W. R. Bilyeu, County Judge; T. P. Butte and D. H. Pierce, County Commissioners, under date of April 15, 1920, stating that a levy of 1.18 mills on all the taxable property of the County was made for Market Road construction, and designating six roads to be improved as Market Road projects.

A levy of 1.18 mills on a valuation of $30,401,035.02 produced a County Market Road fund of $35,873.23. Included in the State levy of taxes was a levy of 1 mill on a valuation of $30,299,149.20, which produced $30,299.15, and which became a part of the "State Market Road appropriation."

Funds apportioned by State Highway Commission March 2	$ 30,299.15
Funds apportioned by State Highway Commission April 3	12,357.67
Funds produced by County levy of 1.18 mills	35,873.23
Total available for 1920	$ 78,530.05

[LINN]

John R. Penland was appointed County Engineer and Roadmaster by the County Court and all engineering and construction work was done under his supervision. All construction work was done by County forces.

Project No. 1—"Beginning at the intersection of a County road with the Corvallis and Peora road, in Section 19, T-12S, R-4W, W.M., and running easterly through Oakville and Verdure and continuing southerly and easterly through Sections 22, 27, 26 and 25 in said township and range to an intersection with the located Pacific Highway near the S.E. corner of said Section 25, a distance of approximately seven miles."

The survey of Project No. 1 shows it to be 6½ miles in length. Five and three-tenths miles were improved in 1920. The road before the 1920 improvement was a narrow dirt road through flat and rolling country. The road was widened to a 24-foot roadbed with a maximum grade of 4.5 per cent, and surfaced with gravel 10 feet in width, approximately 6 inches in depth. A bridge was repaired and drainage cared for.

The estimated cost of the project as follows:

Grading	$ 5,700.00
Bridges and drainage	2,500.00
Graveling	12,000.00
Total	$ 20,200.00

Project No. 2—"Beginning at the southern boundary line of the city of Brownsville and running south one-half mile, thence west and southwesterly through Sections 12, 11 and 15, T-14S, R-3W, to an intersection with the S. P. Railroad on the south boundary line of Section 15 in said T. & R. near Twin Buttes, a distance of approximately four miles."

The survey of Project No. 2 shows it to be 4.7 miles in length. Two and seven-tenths miles were improved in 1920. The road before the 1920 improvement was a narrow road through flat country, two miles of which were gravel, and was not improved during 1920. The 2.7 miles improved in 1920 was dirt road. It was widened to a 24-foot roadbed with a maximum grade of 5 per cent, and surfaced with crushed gravel 10 feet in width, approximately 6 inches in depth. Culverts were added and drainage cared for.

The estimated cost of project as follows:

Grading	$ 2,000.00
Drainage	500.00
Crushed gravel	4,500.00
Total	$ 7,000.00

Project No. 3—"Beginning at the (east or) Linn County end of Greens Bridge over the N. fork of the Santiam River in Section 7, T-10S, R-2W, W.M., and running easterly to Munkers Station on the S. P. Railroad, a distance of approximately four miles."

The survey of Project No. 3 shows it to be 3½ miles in length. Entire length improved in 1920. Before the 1920 improvement the road was a narrow grade surfaced with gravel about six feet in width, through level and rolling country. The road was widened to a 24-foot roadbed with a maximum grade of 3 per cent, and surfaced with crushed gravel 20 feet in width for 3 miles and 16 feet in width for one-half mile, approximately 6 inches in depth. The estimated cost of project as follows:

[LINN]

Grading	$ 4,500.00
Grubbing and drainage	1,500.00
Right-of-way	3,000.00
Crushed gravel	9,750.00
Wetting and rolling	3,250.00
Total	$ 22,000.00

Project No. 4—"Beginning in Bonded Road No. 31 (Linn Co.) at a point about three-eighths of a mile north of the corner of Ts 9 and 10S, Rs 1E & 1W, W.M., and extending first, south to C. Huber's place; thence westerly to W. W. Miller's place in Section 3, T-10S, R-1W, a distance of approximately four miles."

About four miles were improved in 1920. The road before the 1920 improvement was an unimproved road in the red hills. The road was widened to a 20-foot roadbed with a maximum grade of 6 per cent, and surfaced with crushed rock 10 feet in width, approximately 6 inches in depth. Culverts were placed and drainage cared for.

The estimated cost of the project as follows:

Grading	$ 3,750.00
Drainage and grubbing	750.00
Rock	7,500.00
Total	$ 12,000.00

Project No. 5—"Beginning at Swale Road on the eastern line of Thos. G. Dillard's land, said beginning point being also, in the east line of Section 10, T-12S, R-1W, W.M., and extending easterly along said Swale Road two miles."

Approximately 1¼ miles were improved in 1920. The road before the 1920 improvement was an unimproved dirt road through hilly country. The road was widened to an 18-foot roadbed with a maximum grade of 6 per cent and surfaced with crushed rock 10 feet in width, approximately 6 inches in depth. Culverts were placed and drainage cared for.

The estimated cost of the project as follows:

Grading	$ 2,500.00
Grubbing and drainage	750.00
Rock	3,000.00
Total	$ 6,250.00

Project No. 6—"Beginning on the Swale Road at George Smith's house in the S.W. quarter of Section 35, T-12S, R-1W, W.M., and running northerly along said Swale Road one and one-half miles."

No work was done on this project in 1920.

MALHEUR COUNTY

The largest county in Oregon, situated in the southeastern portion of the State, is Malheur County. The area of this county is approximately twelve thousand square miles, which is considerably larger than many states in the Union. The major portion of the population is located in the northern end of the county, and the development of the vast interior region is largely dependent on the construction of serviceable highways and market roads. The circumstance is fully realized by the people of this county and a comprehensive scheme of highways has been developed by the County Court and the State Highway Commission. Three of the main highways of Eastern Oregon, viz., the Old Oregon Trail, John Day River Highway and the Central Oregon Highway, join near the eastern border of the county, connecting with the main arteries of traffic in Idaho. The location of the Old Oregon Trail and the major portion of the John Day River Highway have been completed.

The Cow Valley-Brogan section of the John Day River Highway was graded in the winter of 1919-20, and the Cairo-Nyssa section was graded and graveled during the same period. In the spring of 1920 the county undertook the grading of the Vale-Jamieson section by county forces. They have handled this construction in a very creditable manner, and the Highway Commission ordered the immediate macadamizing of the section. Malheur County also graded that section of the Old Oregon Trail from Ontario to Cairo in the spring of 1920.

Plans for 1921 include grading and graveling of the Vale-Burrelle section of the Central Oregon Highway and the construction of that portion of the Old Oregon Trail from Ontario to the Baker County line.

The county has issued bonds to the amount of $230,000.00 for highway and market roads, and propose to distribute the money received from the sale of these bonds among the different roads as follows: The Old Oregon Trail, $50,000.00; John Day River Highway, $75,000.00; Central Oregon Highway, $45,000.00; Jordan Valley Market Road, $50,000.00; and the remaining $10,000.00 on other market roads.

Work in Malheur County has been handled under the supervision of R. H. Baldock, Division Engineer.

Ontario-Snake River Post Road Project

This section of the Old Oregon Trail lies between the east city limits of Ontario and the west approach of the bridge spanning the Snake River on the Oregon-Idaho boundary. A traffic count taken in May, 1920, gave a total of 1,000 motor and horse-drawn vehicles passing over this section during a period of twenty-four hours. This road had been graveled by Malheur County several times in the past ten years, but it was manifestly impossible for a gravel surface to withstand such intense traffic. Accordingly, on June 1, 1920, Contract No. 268 was awarded to Gilmore & Ritchie, Baker, Oregon, by the State Highway Commission, to pave this section, nine-tenths of a mile in length, with a concrete pavement 6 inches in thickness and 16 feet in width. The work was delayed by inability of the cement company to furnish cement, and the contract was not completed until November 1, 1920.

H. G. Smith was Resident Engineer in charge of the work, which is known as Post Road No. 46. The total cost of the work is estimated at

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$32,000.00, of which amount $24,682.59 has been paid by the State to date. The Federal Government co-operates to the extent of $15,372.33, the balance of the cost being paid from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,941.44
Contract Items as follows:		
Common excavation, 1,977 cu. yds. at 68c	$ 1,344.36	
12" plain concrete pipe, 441 lin. ft. at $1.10	485.10	
18" reinforced concrete pipe, 36 lin. ft. at $2.60	93.60	
Concrete pavement, Type "A," 8,390 sq. yds. at $2.65	22,233.50	
Class "C" concrete, 2.3 cu. yds. at $30.00	69.00	
Crushed gravel, 400 cu. yds. at 70c	1,080.00	
Bit. felt expansion joints, 2,500 lin. ft. at 7c	175.00	
Gravel shoulders, 7,000 lin. ft. at 15c	1,050.00	
Force Account Items:		
Extra clearing and grubbing Sta. 18+00 to 23+00	46.46	
Refinishing subgrade Sta. 0+00 to 1+50	80.39	
Improving turnout at Sta. 39+00	36.40	
Removing concrete pipe Sta. 14+10	60.49	
Total amount earned by contractor	$ 26,754.30	
Percentage retained until completion of contract	4,013.15	
Total amount paid to contractor		$ 22,741.15
Grand total expended to Nov. 30, 1920 (all State funds)		$ 24,682.59

Cow Valley-Brogan Post Road Project

This section of the John Day River Highway, Post Road Project No. 17, is 9.57 miles in length and extends from the head of Cow Valley to Brogan. The old road was built on excessive grades, which have been eliminated by the new construction. The roadbed for the most part is on side hill and through solid rock.

Contract No. 235 for the grading was awarded to Morrison-Knudsen Company, Boise, Idaho, on November 4, 1919. Construction was started on December 8, 1919, and completed May 15, 1920, being started under the direction of G. V. Robinson and completed under F. S. Davis, Resident Engineers. The total cost of the work has been $95,644.80, towards which the County co-operates to the amount of $10,000.00. Final adjustment has not been made with the Federal Government, but it is estimated that their share will amount to approximately $44,700.00, the balance of $40,944.80 being paid by the State.

Contract No. 254 was awarded March 23, 1920, to Curtis Gardner, Portland, Oregon, for the construction of two wooden bridges on this section. Later another small span was added under supplementary agreement, making a total of three structures under one contract. The larger of these bridges is Pole Creek and consists of one 75' Howe truss on concrete piers with two 19' spans of approach trestle. The structure over Canyon Creek consists of 90 feet of standard trestle, and the third is a 14' span over an irrigation ditch. Work was started April 26 and completed August 1, 1920, under the supervision of F. S. Davis, Resident Engineer. Final payment to the contractor has not been made at the time of this report, but it is estimated that the final cost will be approximately $20,250.00. The Government co-operation is estimated at $10,125.00 and the State paying the balance. The total expenditures on these bridges on the date of this report amount to $17,643.73.

The total cost of the entire project is estimated at $115,894.80. The State pays $51,069.80, the County $10,000.00 and the Federal Govern-

ment $54,825.00. Total expenditures amounting to $113,288.53 have been made for the entire project, $67,357.46 from State funds, $10,000.00 from County funds and $35,931.07 from Government funds.

DETAILED STATEMENT OF EXPENDITURES

Grading

Engineering		$ 6,363.71
Contract Items as follows:		
Common excavation, 41,807.3 cu. yds. at 60c	$ 25,084.38	
Intermediate excavation, 18,860.4 cu. yds. at $1.10	20,746.44	
Solid rock excavation, 14,119.5 cu. yds. at $1.80	25,415.10	
Overhaul, 7,112 sta. yds. at 6c	426.72	
12" corrugated iron pipe, 1,394 lin. ft. at $2.80	3,903.20	
18" corrugated iron pipe, 222 lin. ft. at $3.60	799.20	
24" corrugated iron pipe, 596 lin. ft. at $5.00	2,980.00	
Class "A" concrete, 154.2 cu. yds. at $30.00	4,626.00	
Class "C" concrete, 80.75 cu. yds. at $28.00	2,261.00	
Steel reinforcement, 11,688 lbs. at 10c	1,168.80	
Force Account Items:		
Installing additional reinforcement in culvert Sta. 180+00	80.30	
Special adjustment items made necessary on account of line change ordered by Federal Government	1,789.95	
Total amount paid contractor		$ 89,281.09
Grand total cost of project		$ 95,644.80
Paid by State	$ 49,713.73	
Paid by County	10,000.00	
Paid by Government	35,931.07	
Total	$ 95,644.80	

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Bridges

Engineering		$ 613.73
Contract Items as follows:		
Excavation for foundation, 244.6 cu. yds. at $5.00	$ 1,223.00	
Class "B" concrete, 189.72 cu yds. at $40.00	7,588.80	
Timber trestle, 130 lin. ft. at $25.00	3,250.00	
Timber trestle, 13.75 lin. ft. at $35.00	481.25	
Howe truss span, 100 per cent. at $6,800.00	6,800.00	
Excavation for approach fills, 200 cu. yds. at 60c	120.00	
Common excavation for channel change, 123 cu. yds. at 75c	92.25	
Rip-rap, 80 cu. yds. at $6.00	480.00	
Total amount earned by contractor	$ 20,035.30	
Percentage retained until completion of contract	3,005.30	
Total amount paid contractor		$ 17,030.00
Grand total expended to Nov. 30, 1920 (all State funds)		$ 17,643.73

Cairo-Nyssa Post Road Project

This section was graded to State standards by Malheur County in the fall of 1919. Federal aid was applied for by the State, for the surfacing, and the section designated as Post Road Project No. 28. The work was advertised for bids September 20, 1919, and contract No. 204 awarded to Porter & Conley, Portland, Oregon, for surfacing the 8.98 miles involved. Work was started December 15, 1919, and completed May 15, 1920.

The project is situated in the prosperous Snake River Valley and has furnished the traveling public with a smooth, well-drained highway, which carries a very heavy traffic, connecting the towns of Ontario and Nyssa.

Total expenditures for the surfacing amount to $68,777.43. The Federal Government co-operates to the extent of $34,375.78, the balance

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of $34,401.65 being paid by the State. Government co-operation to the extent of $30,099.80 has been received, there being a balance of $4,275.98 still due. This work, as well as the grading done by the County, has been accomplished under the engineering supervision of J. F. Joyce, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,456.83
Contract Items as follows:		
Crushed gravel, 18,885 cu. yds. at $3.56	$ 67,230.60	
Clay or other earth filler, 120 cu. yds. at 75c	90.00	
Total amount paid contractor		$ 67,320.60
Grand total cost of project		$ 68,777.43
Paid by State	$ 38,677.63	
Paid by Government	30,099.80	
Total	$ 68,777.43	

Jamieson-Vale Macadam

On November 6, 1920, the State Highway Commission awarded Oxman & Harrington, Baker, Oregon, contract No. 306 for surfacing the Jamieson-Vale section of the John Day River Highway in Malheur County, a total distance of 17.8 miles. Crushed gravel surfacing 8 feet wide and 8 inches loose thickness will be constructed. Work has not been started at the date of this report.

It is estimated that the surfacing will require a total expenditure of $68,200.00, which is to be paid from State funds.

Vale Bridge

Entering the city of Vale from the east, the present road swings around in a loop, crossing the Malheur River south of town, and returns to the main part of the city by a circuitous route. The new location of the John Day Highway crosses the river on the extension of Main Street and saves a considerable distance and eliminates several sharp curves.

The contract for the new bridge on the revised location was let to the Illinois Steel Bridge Company on the 28th day of September, 1920. The structure is to be a 180-foot steel span on concrete piers, with 114 feet of timber approach on the east and 38 feet on the west end. Construction was started late in November, and the date set for completion is April 30, 1920. At the present time the work is in charge of F. S. Davis, Resident Engineer, with expenditures to date of $1,370.53 from State funds.

The total estimated cost of the work is $45,000.00, which is to be paid $20,750.00 by the County and $24,250.00 by the State.

Vale-Brogan Construction Engineering

In April, 1920, the County Court of Malheur County rejected all bids for grading the Vale-Brogan section of the John Day River Highway, a distance of approximately 24 miles, and undertook the construction of this work by County forces. The County has approximately $60,000.00 available for the construction, and expects to complete the grading from Vale to Jamieson, a distance of about eighteen miles. Work was begun

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on July 6 with a small force and has progressed rapidly since that time. The county forces have averaged twenty-five four-horse teams, two trucks and forty men, in addition to a caterpillar rented from the State. Except for a few short stretches the grading between Vale and Jamieson is very light, that portion between Jamieson and Brogan being considerably heavier. Up to November 1, 1920, the County had expended approximately $33,000.00 on this work, which is about 70 per cent completed.

The work was done under the supervision of the State Highway Department, represented by Engineer F. S. Davis at Vale.

Cairo-Nyssa Construction Engineering

This project, 9 miles in length, extends from Cairo, 4 miles east of Ontario, to Nyssa, by a very direct route. The section was graded by Malheur County between July 22 and November 15, 1919, the work consisting mainly in widening the existing road, and installing culverts and irrigation syphons, preparatory to surfacing with crushed gravel. The total cost of this improvement, exclusive of engineering, was $29,177.45, being paid from County funds. The work was done under the direction of G. V. Robinson, Resident Engineer.

Baker-Malheur County Line-Ontario Survey

Between January and June, 1920, survey was made for that portion of the Old Oregon Trail in Malheur County from the Baker County line to Ontario, a distance of 29.63 miles, by F. N. Drinkhall, Locating Engineer. A few line changes have been made since that time, and the survey, including plans and estimates, is about 90 per cent complete.

For the entire distance the line is located on the west bank of Snake River, which stream is the boundary line between Oregon and Idaho. At the present time there is a trail benched along this side of the river, but is used only by a few local farmers, since it is very narrow and has a number of bad turns and steep grades. The remainder of the traffic crosses the river at Olds Ferry, about one mile from the Baker-Malheur County line, and crosses back into Oregon over the Snake River bridge at Ontario.

The proposed highway will afford an all-Oregon route and shorten the distance about five miles over the present road. About seven miles of heavy construction will be encountered. The remainder will be comparatively light.

Ontario-Snake River Survey

In March, 1920, the Highway Commission ordered paving on that section of the Old Oregon Trail between the north city limits of Ontario and the bridge crossing Snake River, a distance of approximately nine-tenths of a mile. The field work for this location and office plans were made under supervision of J. F. Joyce, Locating Engineer.

Vale-Ontario Survey

From Vale, along the present County road, a survey was run during March, 1920, for a distance of 12 miles. The location by J. F. Joyce, Resident Engineer, was made in order that this section could be improced by County forces, and the work done be in accordance with future permanent improvement. The plans of only four miles of this section were completed.

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Ironside-Cow Valley Survey

On petition of the Malheur County Court, a survey was granted from Ironside to Cow Valley, on the John Day River Highway. The Eastern Oregon Land Company was fencing their property, and the exact location of the highway through this section was desired in order to place their fences accordingly. The location extended from a point in the present County road between Unity and Ironside, about one and one-half miles southwest of Ironside, in a southeasterly direction, in a very direct line, a distance of 15.2 miles to the head of Cow Valley, at which point it makes a connection with the constructed highway between Cow Valley and Brogan, about nine miles west of the town of Brogan.

The survey was started on May 14, 1920, and completed on June 5 of of the same year, under supervision of J. F. Joyce, Resident Engineer. The field work of the location was completed, but the office plans were held up pending definite arrangements for financing the project.

Cow Valley-Brogan Survey

From the head of Cow Valley to Brogan, on the John Day Highway in Malheur County, the former traveled road was a menace to overland navigation for years. The steep grades and blind curves were a snare to the unwary traveler.

The survey of this section started in the fall of 1918, under R. H. Coppock, Locating Engineer, and the original located line was completed in January, 1919. The location was revised on a portion of the line by F. N. Drinkhall, Locating Engineer, in January, 1920. From the east end of Cow Valley, between Ironside and Brogan, just west of the divide separating Cow Creek and Wilson Creek, the location extends in a southeasterly direction to Brogan, a distance of 9.3 miles. For the major portion of the line the survey clings to the steep side wall of the canyon, dropping on five per cent grade to the valley of Willow Creek.

Brogan-Vale Survey

Between the Brogan apple district and Vale, the former County road was filled with dust chucks in summer and mud holes in winter. The people of this section, striving to better this condition, voted $60,000.00 bonds in 1918 for road improvement. A survey was started on July 16, 1919 by P. L. Wise, Locating Engineer, and completed on October 30 of the same year by F. N. Drinkhall, Locating Engineer. The location extends from the east end of the graded Cow Valley-Brogan project at Brogan, along the O. W. R. & N. Railway, through the Willow Creek Valley to Vale, crossing the Malheur River at the south end of A Street in Vale. Malheur County is grading this section by County forces at the present time.

Vale-Riverside Survey

During October, 1920, D. G. Glass, Locating Engineer, made a reconnaissance from Vale to Riverside, along the proposed Central Oregon Highway in Malheur County. On the whole his report confirms that made by M. O. Bennett in 1918, recommending a location along the Malheur River.

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Mr. Glass, in his report, recommends that the portion of this section which has been located between Vale and Burrelle Ranch be changed to the south side of the O. W. R. & N. Railroad, and avoid the grade crossings encountered on the present location. It is expected that a survey of the 6 miles from Vale to Burrelle Ranch, along this reconnaissance will be started early in 1921.

Burrelle-Vale Survey

Survey for this section of the Central Oregon Highway, which begins on the south line of Section 4, T. 19 S., R. 44, E. W. M., near the Burrelle Ranch, and runs easterly to the town of Vale, was made during the fall of 1918, and completed in December of the same year by R. H. Coppock, Locating Engineer. The location was staked above the proposed canal of the Warm Springs Irrigation Company. Later the Irrigation Company changed the location of the canal, necessitating relocation of part of the highway. This revision, 5.9 miles in length, was started in November, 1919, and completed in January, 1920, by F. N. Drinkhall, Locating Engineer.

County Bridges Construction Engineering

At the request of Malheur County, plans have been prepared for a bridge over Bully Creek on the Burrelle-Vale section of the Central Oregon Highway.

These plans call for a 56-foot wood truss and 50 feet of wooden approach trestle, both of standard construction. It is probable that construction will be completed in 1921.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by E. H. Test, County Judge, J. F. Weaver and F. M. Vines, County Commissioners, under date of April 9, 1920, stating that a levy of 1 mill on all taxable property of the County was made for Market Road construction and designating one road to be improved as a Market Road project.

A levy of 1 mill on a valuation of $13,709,794.25 produced a County Market Road fund of $13,709.79. Included in the State levy of taxes was a levy of 1 mill on a valuation of $14,783,834.90 which produced $14,783.83 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 14,783.83
Funds apportioned by the State Highway Commission April 3	6,029.66
Funds produced by County 1-mill levy	13,709.79
Total available for 1920	$ 34,523.28

Project No. 1.—"The road leading from Nyssa, Oregon to Jordan Valley, Oregon.

A survey of this road from Jordan Valley northerly to Cow Creek Valley was commenced by F. N. Drinkhall, Locating Engineer, and finished by R. C. Ingram, Locating Engineer, August 15, 1920, a total length of 11.25 miles. Both engineers are employees of the State Highway Commission. The survey began at the town of Jordan Valley and

[MALHEUR]

terminated at the present bridge over Cow Creek in Cow Creek Valley.

The Jordan Valley is a thriving agricultural community, under an irrigation project, is isolated from railroad and dependant upon highway transport. The old road is almost impassible in winter season. The section surveyed needs improvement more than any other portion, and the County Court of Malheur plans an immediate expenditure of approximately $80,000.00 in grading and graveling this project. Of the above, $50,000.00 is from a County bond issue, the remainder Market Road funds.

The improvement for 1920 consists of grading 11.25 miles of roadbed 18 feet in width, and surfacing 3 miles with gravel, 12 feet in width. The work is being done by County forces under the direction of J. F. Joyce, County Roadmaster. The estimated cost of the improvement of 11.25 miles is approximately $77,000.00.

MARION COUNTY

During the biennium 1919-1920 the Pacific Highway, Marion County's one State highway, has been under construction for its entire length. The section from Aurora, on the north line of the County, to Salem, a distance of 22.16 miles, has been regraded and paved. On the south, the six miles from the north city limits of Jefferson northward has been regraded and paved, and the remaining section of 8.5 miles between the north end of the pavement and Salem has been graded and rocked.

All grading has been performed by Marion County with their own forces, under State supervision.

As described more fully elsewhere, paving north of Salem was paid for jointly, under Federal Aid Projects, by the Government and State, while rocking and paving south of Salem was all paid for by the State.

Construction operations north of Salem are under the supervision of W. D. Clarke, Division Engineer, and work south of Salem under the supervision of J. C. McLeod, Division Engineer.

Salem-Aurora Post Road Project

The project for paving the Pacific Highway between Salem and Aurora was approved by the Highway Commission December 4, 1917, one of the earliest such projects ordered. It was submitted to the Federal Office of Public Roads for co-operation and approved as Federal Aid Project No. 7. After having taken bids for the work in June, 1918, which were rejected because of exceeding the State Highway Engineer's estimate, and after considering construction of the project by State forces but abandoning the plan because of labor, material and transportation conditions during the war, the entire project was postponed until the season of 1919.

On January 7, 1919, Contract No. 75 was awarded to Blake-Compton Company of McMinnville for the construction on Unit No. 1 of a Type "D" pavement, consisting of a 3½-inch gravel bituminous base and 1½-inch asphaltic concrete top, 16 feet in width. This unit extends from a point about 1.2 miles south of Brooks to about one mile north of Gervais, a distance of 7.35 miles, and has been built at a total cost of $177,475.73. Work was begun on the unit April 25, 1919, the first pavement being laid May 1, and completed October 21, and the entire contract completed November 20, 1919.

J. H. Neef was the Resident Engineer on this section.

Contract No. 76 for Unit No. 2 was awarded January 7, 1919 to Oskar Huber of Portland, Oregon. This section was similar to Unit No. 1 in the type of construction.

The section extends from the north end of Unit No. 1, about two miles south of Woodburn, to the south end of the Pudding River bridge approach, a distance of 10.65 miles. Work under the contract was begun June 11, 1919, and completed January 19, 1920. Laying of pavement started June 19 and ended November 26, 1919. Total expenditures on this section amounted to $241,217.48, being made under the supervision of J. G. Garrow, Resident Engineer.

The total cost of the project, exclusive of the grading which was taken care of by Marion County with their own forces and at their own expense, amounted to $418,693.21, being paid $212,963.88 by the State and $205,729.33 by the Federal Government.

[MARION]

DETAILED STATEMENT OF EXPENDITURES
Unit No. 1

Engineering		$ 7,670.17
Advance in cost of asphalt over agreement with contractor		873.70
Asphalt furnished by State (to be deducted from amount due contractor)		21,483.78
Supplies and rental of State equipment (to be deducted from amonnt due contractor)		2,858.69
Advertisements for bids		10.96
Contract Items as follows:		
Common excavation, 87.3 cu. yds. at 90c	$ 78.57	
Intermediate excavation, 349.61 cu. yds. at $1.30	454.49	
Asphaltic concrete pavement, Type "D," 69,095 sq. yds. at $1.94	134,044.30	
Gravel and stone shoulders, 76,789.6 lin. ft. at 7c	5,375.27	
Clay or other earth filler, 478.3 cu. yds. at $1.25	597.88	
Broken stone base and shoulders, 3,378.45 cu. yds. at $4.80	16,216.56	
Broken stone shoulder drains, 785 at $1.00	785.00	
River gravel shoulders and base, 3,563.5 cu. yds. at $3.80	13,541.30	
Freight advanced on asphalt	1,068.05	
Force Account Items:		
Excavation spongy material and backfilling with gravel	249.30	
Laborer to assist engineering crew	24.20	
Cutting samples of pavement and replacing same	126.48	
Total	$172,561.40	
Deductions:		
Asphaltum, 805.658 tons at $21.80	17,563.34	
Asphaltum, 184.058 tons at $21.30	3,920.44	
Freight reduction on sand, 5,247.575 tons at 40c	2,099.02	
Freight reduction on sand, 3,124.97 tons at 20c	625.00	
Freight reduction on gravel, 5,113 024 tons at 10c	511.30	
War tax on freight, 3 per cent, at $13,505.96	405.18	
Rental on trucks	2,858.69	
Total deduction	$ 27,982.97	
Total amount paid contractor		$144,578.43
Grand total cost of Unit No. 1		$177,475.73
Paid by State	$ 89,537.23	
Paid by Government	87,938.50	
Total	$177,475.73	

DETAILED STATEMENT OF EXPENDITURES
Unit No. 2

Engineering		$ 9,251.11
Asphalt furnished by State		38,623.31
Labor and material furnished by State		773.59
Advertisements for bids		12.57
Contract Items as follows:		
Common excavation, 101 cu. yds. at 75c	$ 75.75	
Intermediate excavation, 229.3 cu. yds. at $1.00	229.30	
Asphaltic concrete pavement, Type "D," 100,414.77 sq. yds. at $2.07	207,858.57	
Broken stone shoulders, 112,321.2 lin. ft. at 4c	4,492.85	
Gravel for shoulders, 6,615.25 cu. yds. at $2.75	18,191.94	
Gravel shoulder drains, 1,094 at 40c	437.60	
Force Account Items:		
52 lin. ft. of curved concrete curbing	27.35	
Total	$231,313.36	
Deductions:		
Asphalt, 1,465.624 tons at $21.80	31,950.60	
Asphalt, 313.273 tons at $21.30	6,672.71	
Freight reduction on sand, 250 tons at 50c	125.00	
War tax on freight	8.15	
Total deduction	$ 38,756.46	
Total amount paid contractor		$192,556.90
Grand total cost of Unit No. 2		$241,217.48
Paid by State	$123,426.65	
Paid by Government	117,790.83	
Total	$241,217.48	

[MARION]

Salem-Brooks Post Road Project

After completion of the Salem-Aurora paving project during the season of 1919, there remained unpaved of the project, as originally ordered by the Highway Commission December 4, 1917, only a section of 4.16 miles extending from the south end of Unit No. 1, about 1½ miles south of Brooks, to the north end of the County pavement, 0.9 mile north of the city limits of Salem.

This remaining section, known as the Salem-Brooks section, is in reality a third unit of the original Salem-Aurora project, though not so designated. It was likewise made a Post Road project, being assigned No. 19.

Contract No. 181 was awarded August 5, 1919 to Blake-Compton Company of McMinnville, Ore., for standard 2-inch bitulithic laid on broken stone base and sixteen feet wide with 2-foot gravel shoulders. Before any pavement had been laid under this contract, however, it became apparent from experience elsewhere that the type contemplated was not heavy enough for the traffic which would develop and a supplementary agreement was made with the contractors whereby Type "D", 2-inch gravel bitulithic on a 3-inch bituminous mixed base, with sub-base of run-of-bank gravel, was substituted.

Work on the subgrade and gravel sub-base was begun in November, 1919, but no pavement was laid until May 17, 1920. The pavement was completed August 6, 1920, and the job finally completed and accepted October 14, 1920. The necessary grading on the section was done by Marion County with its own forces and equipment and was handled in a workmanlike and thoroughly satisfactory manner and an excellent job has been accomplished.

Gravel for plant material and for run-of-bank gravel for shoulders and sub-base was obtained from a pit near the Willamette River about five miles west of Brooks. The same plant installation at Brooks was used as for the work on Unit No. 1 constructed by the Blake-Compton Company in 1919.

A feature of special interest in connection with this section is the condition encountered where the highway crosses Lake Labish, a drained beaver-dam lake. The sub-soil is a peaty formation which is very unsuitable and the old macadam was simply a crust, formed by continued application of rock until it would hold up, but was by no means rigid. After careful consideration of several other alternatives, it was decided to use an additional sub-base of 3 inches of bituminous mixed base material. This was laid over 6 inches of crushed rock macadam for a distance of 1,050 feet, making a surfacing 14 inches in thickness, 6 inch macadam, 6 inch bituminous mixed base and 2 inch bitulithic top, which so far shows no sign of failure or weakness under the severe conditions existing there.

J. H. Neef was the Resident Engineer in charge of this section, which has occasioned total expenditures of $115,702.76, to be divided $59,237.23 to the State and $56,465.53 to the Federal Government. To date, Government co-operation to the extent of $32,320.78 has been received, the difference having been advanced by the State.

[MARION]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,420.32
Rental of equipment owned by State (to be deducted from amount due contractor)		4,222.97
Asphalt furnished by State (to be deducted from amount due contractor)		13,377.65
Contract Items as follows:		
Common excavation, 777.09 cu. yds. at 75c	$ 582.82	
Broken stone in base, 266.75 cu. yds. at $4.30	1,147.03	
Gravel in shoulders, 1,987 cu. yds. at $3.00	5,961.00	
Bitulithic pavement, Type "D," 39,131.70 sq. yds. at $2.10	82,176.57	
Gravel in base, 4,121.25 cu. yds. at $3.00	12,363.75	
Shoulders, 43,966.4 lin. ft. at 6c	2,637.98	
Crushed gravel, loose measure, 108 cu. yds. at $3.15	340.20	
Shoulder drains, 471, each 60c	282.60	
Screened gravel for drain tile, 121 cu. yds. at $2.80	338.80	
Sand filler in base, 197 cu. yds. at $2.00	394.00	
3" pavement base, 1,772.4 sq. yds. at 90c	1,595.16	
Screened gravel in sub-base, 123.5 cu. yds. at $2.80	345.80	
Concrete sand for cushion between bases, 6 cu. yds. at $3.60	21.60	
Crushed gravel for shoulders, 95.5 cu. yds. at $3.15	300.83	
Concrete sand for squeegee, 35.5 cu. yds. at $3.60	127.80	
Concrete sand for shoulders, 152 cu. yds. at $3.60	547.20	
Crushed gravel screenings for shoulders, 208 cu. yds. at $2.80	582.40	
Force Account Items:		
Maintenance work	311.01	
Salvaging rock in old roadbed	81.91	
Deepening drains and extra work on headers	332.10	
Total	$110,470.55	
Deductions:		
Rental of equipment owned by State	2,398.00	
Asphalt furnished by State	16,390.73	
Total deduction	$ 18,788.73	
Total amount paid to contractor		$ 91,681.82
Grand total cost of project		$115,702.76
Paid by State	$ 83,381.98	
Paid by Government	32,320.78	
Total	$115,702.76	

Jefferson-North Paving

Contract No. 102, for the paving of 6 miles, north from the north city limits of Jefferson, was awarded to A. D. Kern of Portland, Oregon, on March 15, 1919. The section was graded during 1919 by Marion County by their own forces, and all culverts and concrete bridges constructed. A crushed rock gravel macadam base, preparatory to paving, was laid before the beginning of the winter season. This base was bladed and maintained during the winter months and the road kept open to traffic.

The paving was started on August 4, 1920 and completed in November of the present year. The type of surface laid consisted of a 5-inch bituminous pavement on a 4-inch macadam base, with 2-foot macadam shoulders on each side. Prior to the completion of the work, the contract was extended to include an additional three-quarters of a mile of macadam only. This was done in order to provide a complete paved or macadamized highway between Salem and Jefferson, upon completion of the Salem-South Section.



BETWEEN SALEM AND JEFFERSON ON THE PACIFIC HIGHWAY IN MARION COUNTY. PAVED IN 1920.

[MARION]

H. Kyle was Resident Engineer in charge of the grading by the County on this section during 1919, the construction of the pavement being supervised by J. H. Neef, Resident Engineer.

The total estimated cost of the work is $237,000.00, which will all be paid from State funds. Checking of the final estimate is in progress at the time of this report, with total expenditures of $170,520.28 having been made to date.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 5,373.01
Maintenance work by State forces		9,505.37
Hauling gravel with State trucks (to be deducted from amount due contractor)	625.28	
Contract Items as follows:		
Excavation, no classification, 147.4 cu. yds. at 74c	$ 109.08	
Broken stone for base, 8,082 cu. yds. at $3.72	30,065.04	
Run-of-bank gravel, 2,188 cu. yds. at $3.00	6,564.00	
Sand filler, 402.5 cu. yds. at $3.00	1,207.50	
Type "D" pavement, 2" top, 49,116.5 sq. yds. at $1.45	71,218.64	
Type "D" pavement, 3" base, 51,536.1 sq. yds. at $1.15	59,266.52	
Headers, 54,951.4 lin. ft. at 7½c	4,121.36	
Material on hand	2,457.00	
Force Account Items:		
Building ¾ mile of macadam road at north end of contract	7,988.63	
Total	$182,997.77	
Deduction for hauling gravel with State trucks	625.28	
Total amount earned by contractor	$182,372.49	
Percentage retained until completion of contract	27,355.87	
Total amount paid to contractor		$155,016.62
Grand total expended to Nov. 30, 1920 (all State funds)		$170,520.28

Salem-South Macadam

The Salem-South section extends from the street car track, two-thirds of a mile south of the south city limits of Salem, south, on the newly graded section of the Pacific Highway, to the north end of the Jefferson-north contract.

A contract for 5 miles of crushed rock and 2.2 miles of crushed gravel surfacing was awarded to A. D. Kern of Portland, on July 6, 1920. The contract specified run of crusher material, maximum 2-inch stone, spread 16 feet wide and 8 inches deep. Rocking began August 2, 1920 and is expected to be completed on, or about, December 10, 1920. J. H. Neef, Resident Engineer, has the supervision of this section.

The completion of this rocking will open up the Pacific Highway, on its permanent location, from Salem to Albany, eliminating the Ankeny Hill grade of the present traveled road to Jefferson.

The total estimated cost of the work is $48,000.00, which will be paid from State funds. To date the sum of $20,802.73 has been expended.

[MARION]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,189.79
Maintenance work by State forces		815.25
Rental of equipment owned by State (to be deducted from amounts due contractor)		182.64
Hauling gravel with State trucks (to be deducted from amounts due contractor)		6,400.36
Contract Items as follows:		
Broken stone surfacing, 5,949 cu. yds. at $3.20	$ 19,036.80	
Force Account Items:		
Placing rock salvaged from old macadam	160.29	
Total	$ 19,197.09	
Deductions for equipment rental and hauling gravel	4,826.87	
Total amount earned by contractor	$ 14,370.22	
Percentage retained until completion of contract	2,155.53	
Total amount paid contractor		$ 12,214.69
Grand total expended to Nov. 30, 1920 (all State funds)		$ 20,802.73

Bordner Hill-Wain Hill Macadam

On October 7, 1919, bids were asked for 1.2 miles of gravel surfacing, on the Bordner and Wain hills, in newly graded sections of the Pacific Highway south of Salem, and a bid was received from the Marion County Court to do this work at cost, which was accepted.

It was the intention of this contract to place sufficient gravel on the grade to make the road passable during the winter, and this was accomplished. Only about a third of the estimated yardage was required to do the work. Marion County was released from the balance of their contract on the awarding of a contract for the graveling and rocking of the Salem-South section in 1920. Total expenditures from State funds for the work amount to $1,802.82.

Santiam River Bridge

In 1919 the County Courts of Marion and Linn Counties requested the Highway Department to prepare plans for a bridge over the Santiam River near the towns of Mehama and Lyons. In accordance with this request, plans were prepared calling for a 240 foot steel truss, on concrete piers, to be used in conjunction with one of the two existing wood truss spans.

Parker and Banfield of Portland were awarded contract No. 259 for its construction on March 23, 1920. Work was started as soon as danger from spring freshets was over and continued at a satisfactory rate until September 12, when an unexpected rise in the river took out the contractors' falsework. From this date until October 10 little work was done on account of bad weather conditions, but on the latter date work started again, with the result that by November 20 the steel work was all in place.

After the steel work is painted a laminated wood floor and asphalt paving will be placed by County forces, making the structure one of the best County Highway bridges in the State. It is estimated that the entire work will cost $48,000.00, to be paid by each County in equal portions.

L. H. Allen, of the State Highway Department staff is on the work as Resident Engineer. Expenditures to date amount to $28,153.95, the State having paid $1,718.75 and the Counties $13,217.60 each.

[MARION]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,702.75
Bronze name plate, to be deducted from amounts due contractor		16.00
Contract Items as follows:		
Excavation, 194.6 cu. yds. at $11.60	$ 2,257.35	
Reinforcing steel, placed, 5,872 lbs. at 8c	469.76	
Class "B" concrete, 121 cu. yds. at $36.60	4,428.60	
Class "A" concrete, 13.39 cu. yds. at $45.00	602.55	
Structural steel, placed, 19,900 lbs. at $0.097	1,930.30	
Materials on hand	20,756.10	
Force Account Items:		
Digging test pits for pier foundations	112.04	
Erecting temporary tower bents to carry existing truss span during construction	202.31	
Removing old bridge pier No. 2	341.23	
Total amount earned by contractor	$ 31,100.25	
Percentage retained until completion of contract	4,665.04	
Total amount paid contractor		$ 26,435.20
Grand total expended to Nov. 30, 1920		$ 28,153.95
Paid by State	$ 1,718.75	
Paid by Linn County	13,217.60	
Paid by Marion County	13,217.60	
Total	$ 28,153.95	

Maintenance

Very little maintenance has been required in Marion County during the past biennium. In this period, maintenance orders have been issued for the painting of the guard fence on the highway immediately south of Aurora, which is to be paid for entirely by the State, and the repair of shoulders laid on the Salem-Aurora section. The blading work on the repair of the shoulders is to be paid for or done by the County, any necessary rolling to be paid for by the contractor, the State paying the cost of any required extra material.

Total expenditures, to date, for maintenance work in the entire county amount to $115.29.

Salem-Jefferson Construction Engineering

The grading of 14 miles, between Salem and Jefferson, was accomplished by County forces of Marion County during 1919 and 1920. An excellent piece of grading was done, including installation of culverts and construction of several concrete bridges. As soon as graded these sections were surfaced by the State. Construction engineering on this work was in charge of H. Kyle, Resident Engineer, during 1919 and J. H. Neef, Resident Engineer, during 1920.

County Bridges Construction Engineering

Included in the work on the Pacific Highway, between Salem and Jefferson, are three 20-foot concrete spans and one 16-foot culvert. These were contracted by Marion County on May 20, 1919 to Guy S. Barhan of Lyons, Oregon.

Work was started in June and was carried on continuously, by a small crew, until the end of the season. However, at the request of the County, the contractor spent a great deal of his time on a number of smaller culverts, which he built on a force account basis. For this reason the contract work was not completed, and was laid over until the spring of 1920. Work was resumed at that time and was completed during August.

The total cost to the County for the contract work was $9,954.89.

[MARION]

The State spent $688.96, which includes engineering on both contract and force account work.

Fairground Grade Separation Survey

The only grade crossing of the Pacific Highway, over the main line of the Southern Pacific, which will remain between Salem and Oregon City, when the work now under way is complete, is that near the Fairgrounds at Salem.

Preliminary investigation for an elimination of this crossing has been made, but the study of the situation is, as yet, incomplete, having been deferred until return of the railroads to private control might make co-operation by the Southern Pacific more readily obtainable.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by W. M. Bushey, County Judge, and J. T. Hunt, County Commissioner, under date of February 20, 1920, stating that a levy of 2 mills on all the taxable property of the County was made for Market Road construction, and designating three roads to be improved as Market Road projects.

A levy of 2 mills on a valuation of $42,292,142.84 produced a County Market Road fund of $84,584.28. Included in the State levy of taxes was a levy of 1 mill on a valuation of $41,521,294.70, which produced $41,521.29 and which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 41,521.29
Funds apportioned by the State Highway Commission April 3	16,934.70
Funds produced by County levy of 2 mills	84,584.28
Total available for 1920	$143,040.27

The surveys were made by H. S. Swart in the employ of the County Court.

Construction work was done by County forces under the direction of W. J. Culver, County Roadmaster.

Project No. 1.—"The Salem-Turner road via the Cottage Farm and T. B. Buildings."

A survey was made from the end of the pavement laid in 1919 to the city limits of Turner, a distance of 5.12 miles. The road was graded to a roadbed width of 20 feet and surfaced 16 feet wide with gravel. Bituminous pavement 16 feet in width was laid over a distance of 2.35 miles. Approximately $47,000.00 was expended on this project.

Project No. 2.—"The Salem-Silverton road via Bethany."

A survey was made from the end of the pavement laid in 1919 to the city limits of Silverton, a distance of 8.27 miles. The road was graded to a roadbed width of 20 feet and surfaced 16 feet wide with gravel. Bituminous pavement 16 feet in width was laid over a section 2.3 miles in length. Approximately $47,000.00 was expended on this project.

Project No. 3.—"The Mt. Angel-Woodburn Road via the Norton corner."

A survey was made from Mt. Angel to the Pacific Highway near Woodburn, a distance of 6.45 miles. The road was graded to a roadbed width of 20 feet and surfaced 16 feet wide with gravel. 1.35 miles of bituminous pavement was laid. Approximately $47,000.00 was spent on this project.

MORROW COUNTY

Morrow County is geologically divided into two very different districts. The southern part of the County, situated in the Blue Mountains, has a heavy clay soil interspersed with basalt lava flows and dykes. The natural roads through this section are very good in summer, except those stretches along the rocky hillsides and canyons, while they are almost impassable in winter. The northern section, a rolling bench country cut by deep water courses, is almost uniformly a volcanic ash or sand. The roads in this section are much better in the winter than summer.

Prior to 1919, surveys of the mileage of State highways in Morrow County were made, but only about 7 miles were graded and 3 miles macadamized. On the third day of June, 1919, a special County election was called, providing for an expenditure of $285,000.00 on the construction of permanent highways. This measure passed, and on October 7, 1919, contract for grading 35 miles of the Oregon-Washington Highway, from Heppner to the Morrow-Gilliam County line, was awarded to Oskar Huber of Portland, Oregon. There were a number of encroachments along the Heppner branch of the O. W. R. & N. railroad, necessitated in the elimination of seventeen grade crossings. Agreement for these encroachments was not definitely settled between the County and the railroad company before letting the contract, and their objections to the proximity of a number of the encroachments have resulted in line changes that have materially increased the estimate. This condition, and the addition of several small bridges which were not provided for, will allow the construction of but 25 miles, with available funds. It is expected that the grading of this 25 mile section will be completed this season.

Early in 1919 the construction of the Columbia River Highway began. This project, 30.2 miles in length, was awarded to Porter & Conley, contractors, on March 5, 1919, for grading and macadamizing, and completed in the spring of 1920.

Plans for work in Morrow County during 1921 include the grading and macadamizing of a 12-mile section of the Oregon-Washington Highway, from Heppner to the Lena postoffice on Butter Creek, and for the completion of the grading and macadamizing of the entire Heppner-Morrow County Line section of the Oregon-Washington Highway.

It is also planned to build a Market Road from the junction of Ray Creek and Willow Creek up the former stream about five miles, and grade a portion of the market road from Lexington to the Columbia River.

Work in the County was supervised by M. O. Bennett, Division Engineer, resigned, until September, 1920, at which time the district was taken over by R. H. Baldock, Division Engineer.

Across Morrow County Unit No. 1 Grading and Macadam

This section of the Columbia River Highway extends 20.8 miles from Castle Rock to the Umatilla County line, via Boardman, Messner and Irrigon. The location parallels the O. W. R. & N. Company's tracks

[MORROW]

and the Columbia River, and has excellent grades and alignment throughout. The grading was very light through the Columbia River sands and the roadbed was constructed to a width of 24 feet. Gravel was secured from pits approximately every four miles and the section was surfaced with crushed gravel 16 feet wide and 8 inches loose thickness.

Contract No. 85, covering the grading and surfacing, was awarded to Porter & Conley on February 4, 1919. This work was originally advertised for the entire distance across Morrow County, but the section from Castle Rock to the Gilliam County line was ordered cancelled. Full description of this section will be given under Unit No. 2. Work was started March 5, 1919 and completed March 10, 1920, under the direction of S. H. Boardman, Resident Engineer. The completed work represents an expenditure of $154,201.54, of which amount the County cooperation amounted to $22,611.27, the State paying the balance of $131,590.27.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 12,830.05
Building temporary road around Messner Overcrossing by State forces		364.07
Advertisements for bids		5.17
Contract Items as follows:		
Common excavation, 32,935.7 cu. yds. at 30c	$ 9,880.71	
Solid rock excavation, 392.3 cu. yds. at $2.00	784.60	
Overhaul, 880 sta. yds. at 5c	44.00	
12" plain concrete pipe, 104 lin. ft. at $1.50	156.00	
Class "A" concrete, 52.81 cu. yds. at $25.00	1,320.25	
Reinforcing steel, 4,500 lbs. at 10c	450.00	
Grader work, 14.8109 miles at $500.00	7,405.45	
Gravel surfacing, 47,208.8 cu. yds. at $2.45	115,661.56	
Pay haul per mile, 6,313 cu. yds. at 50c	3,156.50	
Force Account Items:		
Moving right-of-way fences	202.65	
Extending corrugated galvanized iron pipe culvert 24 feet	12.26	
Placing earth filler on gravel	1,620.33	
Temporary box culvert across Government ditch	29.28	
Temporary box culvert across highway account drainage	20.39	
Placing 12" corrugated galvanized iron pipe culvert	13.70	
Digging drainage ditch	44.85	
Maintenance work	147.97	
Regrading and graveling approaches to new bridges	51.75	
Total amount paid contractor		$141,002.25
Grand total cost of project		$154,201.54
Paid by State	$131,590.27	
Paid by County	22,611.27	
Total	$154,201.54	

Across Morrow County Unit No. 2 Grading and Macadam

This section of the Columbia River Highway, 9.4 miles in length, extends from Castle Rock to the Gilliam County line. It was originally included in the advertisement for bids to be received February 4, 1919, for the entire Columbia River Highway in Morrow County, but was withdrawn when award of the contract was made and the Engineer instructed to carry on the work by State forces, giving preference to Oregon soldiers, sailors and marines honorably discharged from the

[MORROW]

service of the Army and Navy of the United States subsequent to November 11, 1918. This action was taken by the Highway Commission in order to carry out the wishes of the State Legislature, as expressed in House Joint Resolution No. 4. Camp was established and work started on February 16, 1919. All possible publicity was given to the fact that this camp was being established for the express purpose of providing employment to ex-service men, and the prevailing scale of wages for this class of work was offered, but very few applications were received and it became increasingly apparent that the idea would have to be abandoned. M. O. Bennett, Division Engineer, reported to the Highway Commission, on March 26, 1919, that only seven ex-service men had applied for employment and that three of these left after a short time. The Commission then ordered the camp discontinued as a State force operation, which was carried out April 1, 1919. Porter & Conley having been low bidders on the work in Morrow County, and having submitted an alternate proposal, at that time, offering to do the work on this special portion on a cost plus basis, the Highway Commission reconsidered its previous action in rejecting this part. Award was accordingly made to Porter & Conley for the grading on the basis of cost plus ten per cent, and for the surfacing at $2.75 per cubic yard, which was 15 cents less per cubic yard than the price originally quoted in their alternate proposal covering the work in Morrow County as a whole. This award was made with the understanding that the contractors take over the State camp and employ all the service men then at work.

The work was handled in a very creditable manner and completed on October 20, 1919. The grading was comparatively expensive, considering the yardage involved, due to the nature of the materials encountered. Throughout nearly the entire length, these materials consisted of scab rock and basalt boulders covered by thin layers of sand.

The grading and surfacing was done under the supervision of S. H. Boardman, Resident Engineer, and represents a total expenditure of $106,376.83. The project was paid for from State funds only.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,195.65
Grading, by State forces		3,477.39
Cost-plus work by Porter & Conley as follows:		
Common excavation	29,975.1 cu. yd.	
Intermediate excavation	316.5 cu. yd.	
Solid rock excavation	5,801.0 cu. yd.	
Overhaul	726.0 sta. yd.	
12" corrugated galvanized iron pipe	116.0 lin. ft.	
Total amount paid Porter & Conley for cost-plus work		$47,775.42
Contract Items as follows:		
Screened gravel, 17,428.5 cu. yds. at $2.75		47,928.37
Total amount paid contractor		$ 95,703.79
Grand total cost of project (all State funds)		$106,376.83

Messner Overcrossing

On the Columbia River Highway, just east of Messner, the State Highway Commission has under contract to Rees and Davis, the construction of a concrete viaduct known as the Messner overcrossing.

[MORROW]

This structure spans the tracks of the Oregon-Washington Railroad and Navigation Company, on the Coyote cutoff, between Messner and Hinkle. It consists of one 34-foot and two 28-foot concrete spans, and 160 lineal feet of wooden approach trestle.

The contract, No. 223, was awarded on October 7, 1919 and should be completed by the close of 1920. The final cost will be about $17,500.00, of which $13,125.00 will be paid out of State funds and $4,375.00 by Morrow County. Christ Fauerso is Resident Engineer in charge of the work, which has occasioned expenditures to date of $11,927.04 from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 756.10
Cement furnished by State (to be deducted from amounts due contractor)		1,557.08
Two bronze name plates (to be deducted from amounts due contractor)		16.00
Contract Items as follows:		
Class "A" concrete, 165 cu. yds. at $31.00	$ 5,115.00	
Class "B" concrete, 22 cu. yds. at $25.50	561.00	
Metal reinforcement, 13,144 lbs. at 7½c	985.80	
Wooden trestle approach, 95 lin. ft. at $30.00	2,850.00	
Materials on hand	1,779.80	
Total amount earned by contractor	$ 11,291.60	
Percentage retained until completion of contract	1,693.74	
Total amount paid contractor		$ 9,597.86
Grand total expended to Nov. 30, 1920 (all State funds)		$ 11,927.04

Heppner-Gilliam County Line Grading

Contract No. 209, for grading the Heppner-Gilliam County Line section of the Oregon-Washington Highway, was awarded to Oskar Huber of Portland, Oregon, on October 7, 1919. The work covered by the contract consisted of grading a distance of 35.3 miles from the Gilliam County line, via Cecil, Morgan, McNab, Ione, Jordan, and Lexington, to an intersection with the present macadam road near Heppner.

There are, in addition to the grading, eight bridges and three cattle passes on the work. Five of the bridges are of standard design and three have required special designs, the cattle passes being all standard timber structures. In the entire length of the line there are twenty-seven railroad encroachments and construction has been greatly impeded owing to certain conditions stipulated by the O. W. R. & N. Co., which have caused line changes materially increasing the yardage. Owing to this yardage increase and on account of shortage of funds available, the work will be discontinued upon completion of a 25 mile section, which is practically done at the present time. The total estimated cost of this 25 mile section is $172,000.00, which is to be paid $39,000.00 by the State, $125,000.00 by the County, and $8,000.00 by one of the road districts. The work has been carried on under the supervision of E. L. Vinton, Resident Engineer, with total expenditures to date of $126,745.81. These expenditures have been paid $23,661.62 by the State, and $103,084.19 by the County.

[MORROW]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 19,771.51
Guarding railroad track		257.57
T.N.T., 1,600 lbs., furnished by State (to be deducted from amounts due contractor)		1,738.29
Rental on State equipment (to be deducted from amounts due contractor)		1,894.25
Contract Items as follows:		
Clearing and grubbing, 72 per cent, at $500.00	$ 360.00	
Common excavation, 129,394.5 cu. yds. at 46c	59,521.47	
Intermediate excavation, 15,815.9 cu. yds. at 77c	12,178.25	
Solid rock excavation, 16,500.3 cu. yds. at $1.90	31,350.57	
Overhaul, 28,735 sta. yds. at 5c	1,436.75	
12" plain concrete pipe, 3,255 lin. ft. at $1.50	4,882.50	
18" reinforced concrete pipe, 664 lin. ft. at $3.00	1,992.00	
24" reinforced concrete pipe, 176 lin. ft. at $3.90	686.40	
36" reinforced concrete pipe, 472 lin. ft. at $6.00	2,832.00	
Rubble masonry, 168.65 cu. yds. at $15.00	2,529.75	
Materials on hand	3,080.05	
Force Account:		
Moving telephone line	16.19	
Raising old culverts to conform to new grade	423.02	
Building rock walls	169.21	
Total	$121,458.16	
Deductions for freight on State equipment	182.64	
Total amount earned by contractor	$121,275.52	
Percentage retained until completion of contract	18,191.33	
Total amount paid to contractor		$103,084.19
Grand total expended to November 30, 1920		$126,745.81
Paid by State	$ 23,661.62	
Paid by County	103,084.19	
Total	$126,745.81	

Columbia River Highway Maintenance

The Columbia River Highway, across north Morrow County, a distance of approximately 30.2 miles, was graded and macadamized during 1919. Immediately after the completion of this work, an agreement was made by, and between, the State Highway Commission and the County Court of Morrow County for maintaining this highway on a fifty-fifty basis. This work is handled by the patrol system, under A. J. Strader, patrolman. An amount of $1,310.64 has been expended to date, including charges of $54.68 which have been made preparatory to oiling work in the County.

Columbia River Highway Survey

This location was completed in 1918, and the charges made during this biennium cover expenditures for office work in the preparation of the plans and estimates.

Heppner-Morrow County Line Survey

The survey of this section of the Oregon-Washington Highway was completed in 1917. It closely followed the O. W. R. & N. branch line, involving a number of encroachments at rock points. The railroad company objected to some of the encroachments and revisions were made early in 1919.

[MORROW]

Oregon-Washington Highway Construction Engineering

During 1918 Morrow County, with their own forces, and by contract, accomplished the grading and surfacing of a section of the Oregon-Washington Highway in the vicinity of Heppner. Engineering supervision of this work was furnished by the State. During the present biennium, delayed charges of $768.31 have been paid.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by Wm. T. Campbell, County Judge, E. L. Padberg and G. A. Bleakman, County Commissioners, stating that a levy of 1 mill on all the taxable property of the County was made for Market Road construction, and designating one road to be improved as a Market Road project.

A levy of 1 mill on a valuation of $14,046,730.54 produced a County Market Road fund of $14,046.73. Included in the State levy of taxes was a levy of 1 mill on a valuation of $11,132,255.40 which produced $11,132.26 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 11,132.26
Funds apportioned by the State Highway Commission April 3	4,540.35
Funds produced by County levy of 1 mill	14,046.73
Total available for 1920	$ 29,719.34

Project No. 1.—"Beginning at a point where the County road running up and down Rhea Creek intersects the State highway (Oregon-Washington Highway) near the mouth of Rhea Creek, running thence up Rhea Creek approximately six and one-half miles to the concrete bridge across Rhea Creek."

A location survey approximately five miles in length was made by C. R. Burns, Locating Engineer in the employ of the State Highway Commission, following closely the old road along the foot of the hills on the east side of Rhea Creek valley, with a maximum grade of 5 per cent.

This road was graded 18 feet in width by County forces. No surfacing has been placed. The estimated cost of the project is approximately $43,000.00. All available funds were expended in 1920.

MULTNOMAH COUNTY

Owing to the fact that Multnomah County has renounced all claim to State funds for the construction and maintenance of their highways, the work done by the Highway Department in the County within the past two years has been very small.

A contract was awarded for paving the section between Bertha and the Washington County line and funds were loaned to the County for its construction. The most important work which the Department has done in the County has consisted of investigations and repairs to various bridges within the city of Portland.

Bertha-Washington County Line Paving

In 1919 Multnomah County, being short of funds and desiring to save the roadway already graded between the Capitol Highway and a connection with the State Highway at the Washington County line, requested the Highway Commission to award a contract covering this 2.76 mile section and advance funds for the construction. This request was granted with the understanding that the funds advanced were to be repaid in 1920. Contract No. 143 was awarded to the Warren Construction Company for paving the section with a 2-inch bitulithic wearing surface, 16 feet wide, on a broken stone base. Work was started June 13 and completed August 18, 1919, being handled under the engineering supervision of Multnomah County. The total charges advanced by the State amount to $61,261.47, of which amount Multnomah County has made reimbursement of $61,252.97. Multnomah County handled the original grading, preparation of plans and supervision of the paving. The Highway Department advertised and awarded the contract, and made payment of claims approved and presented by the County authorities.

DETAILED STATEMENT OF EXPENDITURES

Engineering (cutting samples to check thickness)		$ 8.50
Contract Items as follows:		
Excavation, no classification, 1,007 cu. yds. at 75c	$ 755.25	
Broken stone, loose measure, for shoulders and base 4,992.5 cu. yds. at $4.25	21,218.12	
Standard Bitulithic pavement, Type "E," 25,964 sq. yds. at $1.45	37,647.80	
Broken stone or gravel shoulders, 25,530 lin. ft. at 6c	1,531.80	
Clay or other earth filler, 100 cu. yds. at $1.00	100.00	
Total amount paid contractor		$ 61,252.97
Grand total cost of project		$ 61,261.47
Paid by State	$ 8.50	
Paid by County	61,252.97	
Total	$ 61,261.47	

Bridge Investigations

During the current period, the Bridge Department has conducted special investigations on the trans-Willamette River spans at Burnside and Morrison Streets, in the city of Portland.

[MULTNOMAH]

The investigation of the Morrison Street bridge resulted in a system of repairs and renewals costing in the neighborhood of $200,000.00, and affecting a saving, over and above the interest charge on capital to reconstruct, of $1,181,000.00. The investigation of the Burnside Street structure disclosed a more serious condition of obsolescence than in the case of the Morrison Street structure, for which reason only such repairs as were absolutely necessary from a standpoint of safety were recommended. Both reports were adopted by Multnomah County, and the repair work recommended is now being done under the direction of the State Highway Department.

The total cost of the investigations amounted to $10,138.52. The cost of engineering, plans and supervision on repair work to date has amounted to $2,148.68.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by R. W. Hoyt, Chairman, Rufus C. Holman and A. A. Muck, County Commissioners stating that a levy of 0.3 mills ($100,000.00) on all the taxable property of the County was made for market road construction, and designating nine roads to be improved as Market Road projects.

A levy of approximately 0.3 mills on a valuation of $336,754,862.76 produced a County Market Road fund of $100,000.00. Included in the State levy of taxes was a 1 mill levy on a valuation of $357,279,572.00 which produced $357,279.57 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 99,043.55
Funds apportioned by the State Highway Commission April 3	0.00
Funds produced by County levy of approximately 0.3 mill	100,000.00
Total available for 1920	$199,043.55

All surveys, preparation of plans and estimates were made by Henry Chandler and A. K. Grondahl, Engineers in the employ of the County Court in the department of Wm. Eatchel, Roadmaster.

Project No. 1.—"Sky Line Road." Approximately three miles of crushed rock macadam was laid 12 feet wide, 7 inches in depth. Construction work was done by County forces. Approximately $16,000.00 was expended on this project.

Project No. 2.—"St. Helen's Road." Wood block pavement which was laid in 1915—2,000 feet in length—was torn up and the base repaired and surfaced with 2-inch bitulithic surface. 1,000 feet of concrete pavement laid in 1915 was also surfaced with 2-inch bitulithic surface. Approximately $15,500.00 was expended on this project.

Project No. 3.—"Bertha-Beaverton Road."

This road approximately two and three quarters miles in length was paved in 1919. The County Court at that time did not have funds available for paving this road and the State Highway Commission agreed to advance the necessary funds. The contract was awarded by the State Highway Commission and estimates were paid by them. The engineering, inspection and superintendence of construction was done by employees of the County Roadmaster's department. The State Highway Commission paid out $61,261.47 and was reimbursed from Market Road funds in 1920, to the extent of $61,252.97.

[MULTNOMAH]

Project No. 4.—"St. Johns River Road." In order to take care of traffic from the Derby Street approach to the Interstate Bridge and St. Johns, a road, 70 feet in width, 8,500 feet in length, was graded along the bluffs near the river, which required a large amount of excavation quantities. The road was surfaced with crushed rock macadam 36 feet in width. Approximately $116,500.00 was expended on this road, $58,700.00 to be paid from the Market Road fund.

Project No. 5.—"Columbia Boulevard." Contract was awarded for paving 2 miles on this road in two sections: From Peninsular Avenue to Interstate Avenue, .8 mile. From Union Avenue east, 1 mile. Twenty thousand dollars Market Road funds were expended on this project.

Project No. 6.—"Kaiser Road." Approximately one-half mile of crushed rock macadam, 12 feet wide, was laid. Work was done by County forces. Approximately $2,000.00 was spent on this project.

Project No. 7.—"Maplewood Road." This road 4,300 feet in length was to be surfaced with macadam 12 feet wide. Approximately $250.00 had been expended October 1 when work was stopped because of wet weather.

Project No. 8.—"Lowden Road." Approximately one mile of road was graded 24 feet wide by County forces at a cost of $5,750.00.

Project No. 9.—"Brower Road." This road is in rough mountainous country above Crown Point. The old road which was narrow and crooked was widened and surfaced 12 feet wide with gravel. Approximately three-quarters of a mile were surfaced at a cost of $2,600.00.

POLK COUNTY

The outstanding item in connection with the highway work in Polk County is the litigation instituted by certain cities and citizens of the County, in an endeavor to enjoin the Highway Commission from constructing the West Side Highway on the location adopted by the Commission, and to force its location and construction along the route which it was contended had been intended by the legislature in passing the six million dollar bonding act in 1917.

Although having previously tentatively adopted for the West Side Highway through Polk County, the route from McMinnville via Sheridan, Ballston, Dallas, Monmouth, and Independence to Corvallis, the Commission later reconsidered this selection, and, after careful investigation, chose the route via Amity, Holmes Gap, Rickreall and Monmouth as the proper location. Being desirous of complying with the spirit as well as the letter of the law relating to this highway, and being assured by the Attorney General that it was making such compliance by their choice, the Commission, at a public meeting of citizens and representatives of various interested localities held at Rickreall in March, 1919, agreed to improve the West Side Highway as designated via Holmes Gap and Monmouth and to extend the Salem-West Post Road project, then being considered, to Dallas, and, also, to construct a spur road from Monmouth to Independence. In consideration thereof it was agreed, by the citizens and representatives present, for the people of Polk County and the interested localities, that the County would prepare the grade for the sections mentioned and that all claim for any other routing of the West Side Highway was waived. The substance of this agreement was brought before the electorate of the County, in concrete form, by the vote on a bond isue of $265,000.00. In the measure providing for the bonds it was clearly set forth that part of the amount was to be expended on the roads according to the Rickreall agreement, and, by the passage of that measure, the agreement was approved by the people of Polk County.

In fulfillment of its part of the agreement, the Highway Commission awarded contracts almost immediately for the sections from Amity to Holmes Gap, from Rickreall to Monmouth, including the spur from Monmouth to Independence, from Suver to the Benton County line, and for the section from Salem to Dallas. All of these contracts included hard surface pavement, and, in the desire to facilitate the work, the Commission agreed to advance money, as a loan, to pay for such part of the County's obligation in preparing the grade as might be lacking in the County funds.

Work on all these contracts was well under way, and a considerable part had been completed, when the County authorities refused to proceed with the preparation of the grade on the section south from Monmouth. This refusal was considered by the Commission a breach of the agreement, and work on the Salem-Dallas Section was suspended pending an adjustment of the matter, whereupon the cities of Dallas and Independ-

ence, and certain citizens of Polk County, entered suits to enjoin further construction on the Rickreall-Monmouth section and on the Amity-Holmes Gap section south of McCoy, and to force the Commission to locate and construct the West Side Highway by way of Dallas and south from Independence.

These suits were finally determined in favor of the Commission, but the temporary injunction, which halted the work for several weeks on the sections in question, caused considerably more than an equivalent delay in the completion of the work, by continuing it into the bad weather this fall. The financial loss to both contractors and the State by reason of such delay has been considerable, and one short stretch in the Amity-Holmes Gap section will be practically impassable this winter because the delay into rainy weather has made it impossible to carry the work to completion.

Almost immediately after the decision on the suits mentioned above, another suit, involving practically the same matters, was filed by other citizens of Polk County, which suit is yet pending.

In the meantime, however, the contract on the Salem-Dallas section remains suspended pending final settlement of the controversy and this road, one of the most important in the County, will be in a deplorable state during the coming winter. For this condition, and similar conditions at Holmes Gap and on the Suver-Benton County Line Section, the people of Polk County have only the institutors of these suits to blame.

All work for the State in the County is under the supervision of W. D. Clarke, Division Engineer, at the present time, the Amity-Holmes Gap Crossing section having been under the direction of C. W. Wanzer, Division Engineer, until September, 1920, at which time it was taken over by Mr. Clarke.

Amity-Holmes Gap Grading and Paving

The Amity-Holmes Gap section of the West Side Highway extends from the north city limits of Amity in Yamhill County to Holmes Gap in Polk County, a distance of 8.3 miles, being 3.3 miles in Yamhill County and 5 miles in Polk County. Construction of this section was undertaken by the Highway Commission in fulfillment of its part of the Rickreall agreement with Polk County.

Contract No. 103 was awarded to the Oregon Independent Paving Company of Portland, April 15, 1919 and work began July 10, 1919. Grading was completed during the 1919 season, and, during the winter, a large amount of gravel for sub-base and plant material was stored and a paving plant erected at Calvert, near the County line. The original specifications called for Type "E," 2-inch bitulithic top on an open broken stone base, but were changed, before any pavement had been laid or base rock placed, to Type "D," a 2-inch bitulithic top on a 3-inch mixed gravel bituminous base over a 3-inch gravel sub-base.

Together with the Rickreall-Monmouth-Independence section, that part of this work south of McCoy was suspended under injunction of the Court during 1920. At that time 1.44 miles, out of the 2.86 miles lying south of McCoy, were paved, an additional 0.34 mile had bituminous base in place and a further 0.35 mile was graded and graveled ready

[POLK]

for the paving. The remaining 0.73 mile, though graded in 1919 to the grade then established, was to be regraded, and raised to make better drainage conditions, as soon as the paving south thereof was completed. Because of the delay occasioned by the injunction, this regrading could not be started until after the rainy weather, which began early in September, had set in. The result has been a very considerable increase in the cost of that work and has made its completion in the 1920 season very doubtful.

The estimated cost of the completed project is $289,000.00, of which the State's share will be $275,500.00 and the Yamhill and Polk County share $13,500.00.

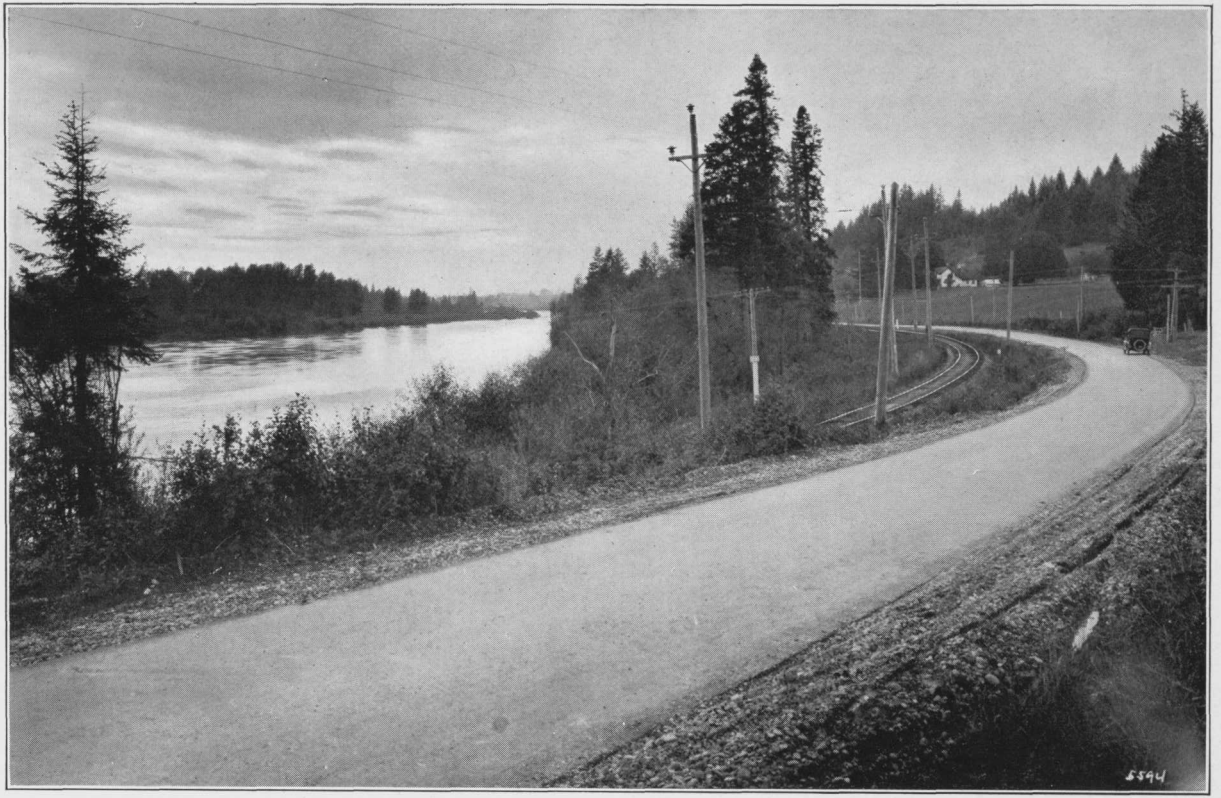
Engineering work on this section was in charge of O. H. Schrader until November 1, 1920, since which time H. B. Fletcher has been Resident Engineer in charge. Total expenditures to date amount to $209,399.45, having been paid $203,595.73 by the State and $5,803.72 by Yamhill County.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 11,655.48
Raising grade Stations 341+00 to 379+50 by State forces		200.56
Maintenance work to maintain winter travel		1,369.95
Contract Items as follows:		
Standard Bitulithic pavement, Type "D" base, 42,126.2 sq. yds. at $2.30	$ 96,890.26	
Excavation, no classification, 11,615.8 cu. yds. at 75c	8,711.85	
Overhaul, 5,800.5 sta. yds. at 3c	174.02	
Class "C" concrete, 18.86 cu. yds. at $20.00	377.20	
12" plain concrete pipe, 303 lin. ft. at $1.25	378.75	
18" reinforced concrete pipe, 160 lin. ft. at $2.58	412.80	
24" reinforced concrete pipe, 68 lin. ft. at $3.35	227.80	
Gravel shoulders, 7,310 lin. ft. at 6c	438.60	
Clay or other earth filler, 3,895.5 cu. yds. at $1.00	3,895.50	
Broken stone, 10,548 cu. yds. at $4.77	50,313.96	
Materials on hand	73,840.00	
Force Account Items:		
Extra clearing	323.72	
Total	$235,984.46	
Deduction for freight reduction and war tax	5,192.16	
Total amount earned by contractor	$230,792.30	
Percentage retained until completion of contract	34,618.84	
Total amount paid contractor		$196,173.46
Grand total expended to November 30, 1920		$209,399.45
Paid by State	$203,595.73	
Paid by County	5,803.72	
Total	$209,399.45	

Salem-Dallas Post Road Project

Construction of the Salem-Dallas section, from the west end of the Salem bridge to the city limits of Dallas, 13.07 miles, was approved by the Bureau of Public Roads as Federal Aid Post Road Project No. 18, at an estimated cost for grading and paving of $355,000.00, of which the Federal Government has agreed to pay $176,408.37, the County $29,250.00 and the State $149,341.63.



BITUMINOUS PAVEMENT ALONG THE WILLAMETTE RIVER ON THE SALEM-DALLAS HIGHWAY NEAR SALEM. PAVED IN 1920.

[POLK]

The work covered in the contract includes grading and paving with Type "D" gravel bitulithic pavement, 16 feet wide, with 2-foot run-of-bank gravel shoulders. This type of pavement consists of 2 inches of gravel-bitulithic top on 3 inches of gravel bituminous base.

Contract No. 169 was awarded July 8, 1919 to Oskar Huber of Portland and operations were begun July 30, 1919. During the 1919 season 1.63 miles of pavement, and all heavy grading, were completed. During 1920, up to August 12, the pavement was completed from the Salem end to Brunk's Corner, a distance of 5.5 miles. On that date the contract was suspended by the Highway Commission, pending settlement of litigation relating to the construction of the State highways in Polk County as established by the Highway Commission. The order of suspension is still in effect and no work has been done on the contract since August.

C. F. Smith has been in charge as Resident Engineer on this section. Total expenditures to date amount to $168,490.58, which have been paid $92,362.05 by the State, $10,000.00 by the County, and $66,128.53 by the Federal Government.

Rickreall-Monmouth-Independence Paving

Pursuant to the agreement of the Highway Commission made with the people of Polk County at the Rickreall meeting in March, 1919, contract No. 106 was awarded, April 15, 1919, to the Warren Construction Co. of Portland for grading and paving 7.8 miles of the West Side Highway from Rickreall, through Monmouth, to Independence.

The specifications called for Type "E" pavement, consisting of 2 inches of bitulithic top on 4 inches of new macadam base, and 3.9 miles of that type of pavement, extending from Independence through Monmouth to a point about one and one-half miles north of the Monmouth city limits, were completed during the 1919 season. With the reopening of work in 1920 the type was changed to include a mixed bituminous base. This was made 3 inches in thickness, where the rock sub-base already in place was less than four inches in depth, and, where the macadam was four inches or more, the mixed base was made 2 inches thick.

Work on this contract, in 1920, progressed steadily from its beginning, about the first of June, until stopped by the injunction of the Court. Following dissolution of the injunction, and after much delay on account of rainy weather, the pavement was finally completed October 22, and the entire contract work finished November 9, 1920 with H. B. Fletcher Resident Engineer in charge of the work.

Funds for the County's share of the cost, covering the grading and drainage, have been advanced by the Highway Commission as a loan to Polk County, to be repaid as County funds are available. The total estimated cost of the work is $267,000.00, which is to be paid $243,000.00 by the State and $24,000.00 by the County. Expenditures to date amount to $214,547.82, which have all been paid from State funds.

[POLK]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 12,447.83
Royalty on material for embankment		124.80
Contract Items as follows:		
Excavation, no classification, 24,554 cu. yds. at 75c	$ 18,415.50	
Bituminous base, 3", 17,630 sq. yds. at 96c	16,924.80	
Bituminous base, 2", 17,590 sq. yds. at 64c	11,257.60	
Broken stone, 14,430 cu. yds. at $4.70	67,821.00	
Bituminous base, 3", 5,675 sq. yds. at 85c	4,823.75	
Standard bituminous top, 71,720 sq. yds. at $1.34	96,104.80	
Gravel shoulders, 71,780 lin. ft. at 6c	4,306.80	
Gravel for shoulders, 2,780 cu. yds. at $3.74	10,397.20	
Clay or earth filler, 200 cu. yds. at $1.00	200.00	
Gravel screenings for filler, 2,110 cu. yds at $3.74	7,891.40	
12" plain concrete pipe, 405 lin. ft at $1.25	506.25	
18" reinforced concrete pipe, 64 lin. ft. at $2.58	165.12	
24" reinforced concrete pipe, 236 lin. ft. at $3.35	790.60	
30" reinforced concrete pipe, 144 lin. ft. at $4.25	612.00	
Class "A" concrete, 46.13 cu. yds. at $25.00	1,153.25	
Class "C" concrete, 33 cu. yds. at $20.00	660.00	
Reinforcing steel, 2,805 lbs. at 10c	280.50	
6" drain tile, 66 lin. ft. at 29c	19.14	
Force Account:		
Removing concrete crosswalks in Monmouth	149.63	
Improving detour	12.95	
Clearing and grubbing Station 730 to 1095	347.87	
Placing wood headers	2,391.48	
Building bleeders	687.16	
Total	$245,918.80	
Deductions for war tax and freight reduction	8,300.93	
Total amount earned by contractor	$237,617.87	
Percentage retained until completion of contract	35,642.68	
Total amount paid contractor		$201,975.19
Grand total expended to Nov. 30, 1920 (all State funds)		$214,547.82

Benton County Line-North Grading and Paving

Contract for the grading and paving of 1.2 miles of the West Side Highway in Polk County, north from the Benton County line, was awarded May 27, 1919 to Oskar Huber of Portland, who already had the contract for paving the same highway from the Benton County line south to Corvallis.

Due to the fact that the contractor anticipated laying this pavement from the plant at Lewisburg after completion of his adjoining contract, and has been unable to complete that work, no paving has been done on this section. Grading was finished and some rock for sub-base was placed in 1919, but, aside from a little force account work, nothing has been done on the section in 1920.

The Benton County Line-North section extends from the Benton County line to the Suver-Airlie road, a distance of 1.64 miles, omitting a stretch of about 0.44 mile, covering the high fill and two bridges at Soap Creek, making the contract 1.2 miles in length.

The estimated completed cost of this section is $53,500.00, of which the State will pay $38,500.00 and the balance of $15,00.000, covering the grading and drainage, is to be paid by the County. Funds for the cost of the grading are being advanced by the Highway Commission as a loan to the County, to be repaid as County funds are available.

J. G. Garrow has been in charge on this section as Resident Engineer in 1920 succeeding M. E. DeWitt, who had charge during 1919. Total expenditures to date amount to $15,946.87, which have all been paid by the State.

[POLK]

Yamhill County Line-Butler's Store Grading and Macadam

This section comprises 7.6 miles of the McMinnville-Tillamook Highway from the Yamhill County line, near Willamina, through Polk County to the Yamhill County line, near Butler's Store, about two miles east of Grand Ronde.

Contract for grading and rocking the section was awarded July 20, 1920 to Elliott and Scoggin of Portland, at an estimated cost when completed of $108,000.00. Work under this contract was not begun until October 5, and, largely due to continued unfavorable weather, little has been accomplished to date aside from the installation of the crushing plant, and construction of a bridge across the Yamhill River necessary to reach the quarry. Rock for surfacing is being obtained from a quarry known as the Tharp Quarry, about 3.75 miles west of Willamina.

The construction of this section has been somewhat complicated by the construction of the Willamina & Grand Ronde Railway, which has necessitated changes in location of the highway in two places. Grading of the new road at such points is being done by the railroad company.

W. W. Harcombe is Resident Engineer on this section. Total expenditures to date amount to $368.56, which have been paid from State funds.

Bentley-Grande Ronde Rocking

In October and November, 1919, a short section of road in Polk County, from Bentley to the Yamhill County line south of Grand Ronde, was rocked with a temporary, or emergency, surfacing in order to make a passable detour around the Grand Ronde-Butler's Store section of the McMinnville-Tillamook Highway, which was under construction and impassable for winter traffic. The work was done on a force account basis by W. N. Trent, the contractor on the Grand Ronde-Butler's Store section. Approximately five hundred cubic yards of rock were placed, in an intermittent 8 foot surfacing, as needed over a section of about 1.3 miles. Rock was obtained from the Wirth Quarry near Butler's Store.

The total expense of this work was $2,385.60, which has all been paid by the State.

Amity-Holmes Gap Bridges

In addition to the work covered by the grading and paving contract for the Amity-Holmes Gap section, five concrete structures were required consisting of two 8-foot culverts, two 18-foot spans and one bridge of three spans with a total length of 92 feet.

These were advertised for bids on August 15, 1919, but the bids were rejected as being too high. On September 9 bids were again asked for but only one was received, which was considered high. It was accordingly decided to build the bridges with State forces. By this time the season was well advanced, but, nevertheless, a start was made, Wm. D. Hoffman being employed as Superintendent. In spite of the severe weather during the winter of 1919-1920 the work was not suspended, but was brought to a successful completion in April of 1920 at a net cost of $21,132.73, which is to be paid $721.48 by the State and $20,411.25 by the Counties. Gross expenditures, including credits due, amount to $23,032.76 and have all been paid by the State.

[POLK]

The cost of the work done was practically the same as it would have been had the bid been accepted, which is considered a very creditable showing in view of the severe weather conditions encountered, and in view of the fact that an organization had to be perfected for this one job. Subsequent work should show a material lowering of costs.

County Bridges Construction Engineering

During the period covered by this report, two bridges have been built on County highways from plans prepared by this Department.

One, a 114 foot covered Howe truss span over the North Yamhill River, is near Willamina and is known locally as the Wallace bridge. This was built by E. C. Bushnell during the summer of 1919 at a cost of $3,733.50. The other bridge is a 72-foot steel pony truss on timber foundations, over the Little Luckiamute River near Luckiamute Station, and is known as the John Smith Bridge. This bridge, costing $2,950.00, was built by the Portland Bridge Company, and was completed at about the same time as the Wallace Bridge.

The State spent the sum of $348.54 for engineering on these two structures.

Maintenance

Maintenance work accomplished, and under way, in Polk County has consisted of the construction of ditches and laying of drain tile on the Salem-Dallas section, rendered necessary by injunctions granted which prevented completion of the work before the setting in of the winter rains. Total expenditures for maintenance to the date of this report amount to $76.50.

Amity-Rickreall Survey

Survey of the West Side Highway from Amity, via Holmes Gap, to Rickreall was made in 1919. This survey follows the east side of the railroad from Amity to Holmes Gap, eliminating two grade crossings from the former route between Amity and Baxter station. At Holmes Gap an overhead crossing is contemplated. From that point to Rickreall, several alternate lines have been surveyed, the last being in April, 1920, along a route following the existing road from Holmes Gap for approximately one and one-half miles, thence skirting around the hill to the west, eliminating two long grades in excess of the State standard, and rejoining the existing road 1.75 miles north of Rickreall.

Rickreall-Monmouth-Independence Survey

In April, 1919, a location survey was made of the highway from Rickreall to Independence, via Monmouth, 8.3 miles, by H. B. Fletcher, Locating Engineer.

Salem-West Survey

This project, as originally planned, extended from the west end of the Salem bridge along the Salem-Dallas road to Greenwood Corner, a distance of 7 miles. Survey for the project was made by Earl Withycombe and the project was approved as a Federal Aid project by the Bureau of Public Roads.

[POLK]

Prior to the letting of any contract on this work, the matter of the location of the West Side Highway through Polk County came up, and, in the settlement of that question, the Highway Commission agreed with the people of Polk County to extend this post road project from Salem to Dallas. The survey through to Dallas was completed by H. B. Fletcher, Locating Engineer.

Monmouth-Suver Survey

Surveys for the location of the section of the West Side Highway in Polk County from Monmouth to Suver have been made during 1919 and 1920. The first survey ran due south from Monmouth, following practically along the existing road for 3.75 miles, then bearing to the southeast to the Luckiamute River, which was crossed about three-quarters of a mile above Parker. From this point the line ran in nearly a direct line to the junction of the Suver-Airlie road with the road to Corvallis, about a mile west of Suver. This route necessitated 3.5 miles of new right-of-way, most of which is through highly cultivated land, and an expensive bridge over the Luckiamute.

In April, 1920, another location was made directly south from Monmouth, crossing the Luckiamute on the present bridge at Helmick and continuing along the existing road to a point 0.75 miles south of the Luckiamute. This survey then bore to the southeast and joined the first survey at a point 1.3 miles north of the Suver-Airlie road. This route is 0.3 miles shorter than the first survey, requires 1.9 miles less of new right of way, and does not require the construction of a bridge over the Luckiamute, at this time, as the existing bridge is a comparatively new structure. Its most serious disadvantage is the overflow land crossed just south of the Luckiamute. This will require quite a long fill which, however, is entirely practicable, and the second route has been adopted by the Highway Commission.

These surveys have all been made by H. B. Fletcher, Locating Engineer.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by A. B. Robinson, County Judge, and T. J. Graves, County Commissioner, under date of February 26, 1920, stating that a levy of "1 mill upon all the taxable property, as equalized by the State Tax Commission, namely $17,867,000.00 or $17,867.00 and $6,000.00 to match apportionment due from Multnomah County surplus, total $23,867.00." The resolution does not show any roads designated as Market Road projects.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $17,389,672.00, which produced $17,389.67, which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 17,389.67
Funds apportioned by the State Highway Commission April 3	7,092.47
Funds produced by County levy	23,867.00
Total available for 1920	$ 48,349.14

[POLK]

On June 16, 1920, C. H. Whitmore, Engineer in charge of Market Road work, in the employ of the State Highway Commission, at the request of Judge Robinson, with Judge Robinson and County Commissioner Graves, made an inspection trip over two roads which the County Court wished to improve with Market Road funds. Judge Robinson requested that the County Surveyor be allowed to make the surveys and estimates of cost for Market Road work done in Polk County, and submit the plans to the State Highway Commission for approval. The two roads visited were the "Oakdale Road" and "Dallas-Polk Station Road." Judge Robinson said that they wished to expend about $6,500.00 on each of these roads.

On September 11, 1920, C. H. Whitmore, with Judge Robinson and Commissioner Graves, made an inspection trip over the "Zena to Bethel Road" on which the County Court wished to expend Market Road funds.

No maps, plans, profiles or estimates of cost have been furnished the State Highway Commission for Market Road work by the County Surveyor or County Court.

Judge Robinson furnished the following report, received November 17, 1920:

Project No. 1.—"Oakdale Road."

About two miles were surveyed. Two miles were graded about 14 feet wide and a small amount of crushed rock was hauled and spread 8 to 9 feet wide. Construction work was done by County forces. Estimated cost $6,500.00.

Project No. 2.—"Dallas-Polk Station Road."

One and one-half miles were surveyed. No grading done in 1920, only right-of-way secured. Road is to be graded 16 feet wide and surfaced 9 feet wide. Work will be done by County forces. Estimated cost $6,500.00. This road will be partly graded and graveled during winter.

Project No. 3.—"Zena to Bethel Road, about three miles."

Three miles were surveyed. Not graded. Three miles to be graveled in 1921. Grade to be 16 feet wide, surfaced 9 feet wide with gravel. Grading to be done by County forces. Gravel by contract. Estimated cost $7,000.00 to $8,000.00.

SHERMAN COUNTY

Sherman County is crossed by two State highways, viz., the Columbia River Highway, along the north boundary of the County, and the John Day River Highway, from Biggs southeasterly to the Cottonwood Crossing of the John Day River, near the center of the east boundary of the County. The County is traversed by many miles of good natural earth roads and is fairly well equipped for carrying on road work with their own forces. At the present time, the County has plans for quite an extensive program and a considerable mileage has already been graded.

In May, 1919, the people of the County voted a bond issue of $350,000.00. Of this issue $50,000 was designated to apply, in co-operation with the State and Federal Government, on that portion of the John Day River Highway within the County, and the sum of $250,000.00 was designated to be applied on the north and south road, from a point on the Columbia River Highway, to be designated by the State Highway Commission, south through Wasco, Moro, Grass Valley and Kent. Some preliminary investigations have been made on each of two alternate routes for this north and south road, but, at the present time, no definite decision has been reached. This north and south road is of prime importance for travel from central Oregon to Columbia River Highway points, as well as being a main outlet for the vast grain raising section of Sherman County. It is expected that a definite construction program will be undertaken on this project during the spring of 1921.

State work in Sherman County was handled under the supervision of C. C. Kelley, Division Engineer, until September, 1920, when the district was taken over by J. H. Scott, Division Engineer.

Sherman County Post Road Project

Active construction work in Sherman County has been confined to that portion of the Columbia River Highway extending across the north end of the County. This section begins at the Deschutes River Bridge and runs along the Columbia River to the John Day River Bridge, a total length of 14.78 miles. At Sherman the Bend branch of the O. W. & N. Co's tracks are crossed on grade. The Shaniko branch is crossed by a 360 foot timber trestle which carries the highway over Spanish Gulch. At this point is provided an outlet for the Wasco road up Spanish Gulch, known as the "Sam Hill.." road and connecting with the ferry crossing the Columbia River at Mary Hill.

East of Spanish Gulch, heavy side hill cutting was required for over a mile between the road and bluffs. Another similar cut was required near Day, the balance of the work being comparatively light. Construction of this unit has been carried on by the State in co-operation with the Federal Government under the terms of Post Road Project Agreement No. 25. Three contracts have been awarded on the work covering the grading, macadamizing, and the Spanish Gulch Bridge, respectively.

On September 9, 1919 contract No. 198 was awarded to Porter and Conley of Portland, Oregon for the grading. Included in this contract were five concrete bridges, ranging in length from 18 feet to 30 feet. Some delays were experienced in the construction work, due to the necessity for securing easments through property of the O. W. R. & N.

[SHERMAN]

Co., but the work is complete at the present time, although final payment has not yet been made to the contractor. The total estimated cost of this work is $239,000.00, of which amount $173,007.20 has been expended to date.

About a mile east of Biggs, the Columbia River Highway crosses Spanish Gulch, and the Shaniko Branch of the Oregon-Washington Railroad and Navigation Company, by means of a structure consisting of one 56-foot deck truss and 320 lineal feet of trestle approach, all of wooden construction. The Hord-Brooks Company of Portland were awarded contract No. 271 for its construction on June 1, 1920, and proceeded at once with the work. Very good progress was made with the result that in September the bridge was opened to traffic. Some little work was required after that date in order to finish the job, which was complete on November 15. The completed cost will be about $22,500.00, of which $18,266.78 has been expended to date. Christ Fauerso was Resident Engineer in charge of the construction of the bridge in addition to supervising the construction of the structures awarded with the grading contract.

On July 20, 1920 contract No. 282 for surfacing the entire section with crushed gravel was awarded to Porter and Conley of Portland. The total estimated cost of this surfacing is $118,800.00. The expenditures to date amount to only $107.02. It is anticipated that this surfacing will be completed during the early part of the 1921 working season. Supervision of this work, in addition to the grading which was done, is being handled by C. E. Carter, Resident Engineer.

The total estimated cost of the entire project, including the grading, surfacing, and bridges, is $380,300.00, towards which the Federal Government co-operates to the extent of $177,944.11, the State paying the balance of $202,355.89. Total expenditures to date amount to $191,381.00, of which $122,130.19 has been paid by the State and $69,250.81 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Grading

Engineering		$ 13,179.29
Guarding O. W. R. & N. Railway tracks		536.08
Rental of State-owned equipment (to be deducted from amounts due contractor)		922.57
Cement furnished by State (to be deducted from amounts due contractor)		370.46
Contract Items as follows:		
Clearing and grubbing, 100 per cent	$ 100.00	
Common excavation, 165,670 cu. yds. at 38c	62,954.60	
Intermediate excavation, 33,952 cu. yds. at 60c	20,371.20	
Solid rock excavation, 40,236 cu. yds. at $1.45	58,342.20	
Overhaul, 215,935 sta. yds. at 3c	6,478.05	
12" plain concrete pipe, 756 lin. ft. at $2.00	1,512.00	
12" corrugated galv. iron pipe, 1,002 lin. ft. at $1.75	1,753.50	
18" corrugated galv. iron pipe, 292 lin. ft. at $2.50	730.00	
24" corrugated galv. iron pipe, 668 lin. ft. at $3.00	2,004.00	
36" corrugated galv. iron pipe, 180 lin. ft. at $6.00	1,080.00	
Class "A" concrete, 428.1 cu. yds. at $35.00	14,983.50	
Class "C" concrete, 124.78 cu. yds. at $30.00	3,743.40	
Concrete handrail, 212 lin. ft. at $3.50	742.00	
Metal reinforcement, 39,539 lbs. at 9c	3,558.51	
Structural steel, 17,325 lbs. at 10c	1,732.50	
Rubble masonry, 466.5 cu. yds. at $8.00	3,732.00	
Rip-rap, 211 cu. yds. at $2.00	422.00	
Force Account Items:		
Extending water main through embankment	117.30	
Moving right-of-way fence	254.96	
Digging up and relaying culvert pipe in new location	400.31	

[SHERMAN]

Protecting embankment slopes from wind action	1,325.51	
Lowering Rufus city water pipe line	10.14	
Removing abandoned telegraph poles	16.90	
Placing 48" reinforced concrete pipe culvert	230.55	
Total		$186,595.13
Deduction for rental of State equipment	714.19	
Total amount earned by contractor		$185,880.94
Percentage retained until completion of contract	27,882.14	
Total amount paid to contractor		$157,998.80
Grand total expended to November 30, 1920		$173,007.20
Paid by State		$103,756.39
Paid by Government	69,250.81	
Total		$173,007.20

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Spanish Gulch Bridge

Engineering		$ 876.38
Contract Items as follows:		
Excavation, 939.7 cu. yds. at $3.00	$ 2,819.10	
Class "B" concrete, 120.15 cu. yds. at $23.00	2,763.45	
Wooden approach 302.3 lin. ft. at $32.15	9,718.95	
56-ft. wooden truss span, 1, at $4,905.00	4,905.00	
Rip-rap, 63.2 cu. yds. at $4.00	252.80	
Total amount earned by contractor	$ 20,459.30	
Percentage retained until completion of contract	3,068.90	
Total amount paid contractor		$ 17,390.40
Grand total expended to Nov. 30, 1920 (all State funds)		$ 18,266.78

Columbia River Highway Oiling

Considerable trouble has been encountered at several points in Sherman County with what is known as "blow sand," the action of the high winds causing serious erosion during the progress of the work and a considerable loss of new fills. This trouble has been relieved to a large extent by oiling the worst areas. By spraying a thin coat of crude oil under steam pressure on these blow sands adjacent to the highway, and on the sand cuts and fills, this menace has been largely overcome. A repetition of the oiling may be necessary, however, after two or three years, unless a successful growth of vegetation is secured.

Oiling operations were started May, 1920, under R. R. Lyons, with a State force of five men equipped with a steam tractor, oil pump, and tanks. About sixty acres were oiled, at a cost of $9,373.14 to the date of this report. Some additional oiling will be necessary, after completion of the surfacing of the highway, during the spring of 1921.

John Day River Bridge

This structure on the Columbia River Highway, spanning the John Day River, connects Gilliam and Sherman Counties. A full report of the bridge will be found in the portion of this report devoted to Gilliam County.

[SHERMAN]

Deschutes River Bridge

During the period covered by the last report, a design was prepared for this crossing consisting of a series of concrete arch spans. At a later date new plans were drawn which called for two 95-foot and three 78-foot plate girder spans, with concrete approach spans at each end having a combined length of 85 feet.

The structure is located on the Columbia River Highway near the mouth of the Deschutes River, just up stream from the railroad bridge, and about one-half mile below the old wooden toll bridge that is so well known to travelers in that locality.

Contract No. 111 for its construction was awarded on April 15, 1919, to Lindstrom and Feigenson of Portland. Steel fabrication started at an early date, but no work was done at the bridge site until August. From then the work progressed very well until the severe cold weather in December, when it was again delayed. Work was resumed about January 15 and the bridge was completed June 19, 1920. H. F. Miller was Resident Engineer until March 10, 1920. At that time he was detailed on other work and was replaced by Christ Fauerso.

At the time of completion the grading of the section just west of the bridge was unfinished, which made it impossible to use the bridge except by bulding a connecting line from the County Road leadng to the toll bridge. Considerable difficulty was experienced in securing the right of way for this connection but it was finally obtained and the bridge was opened to traffic in September.

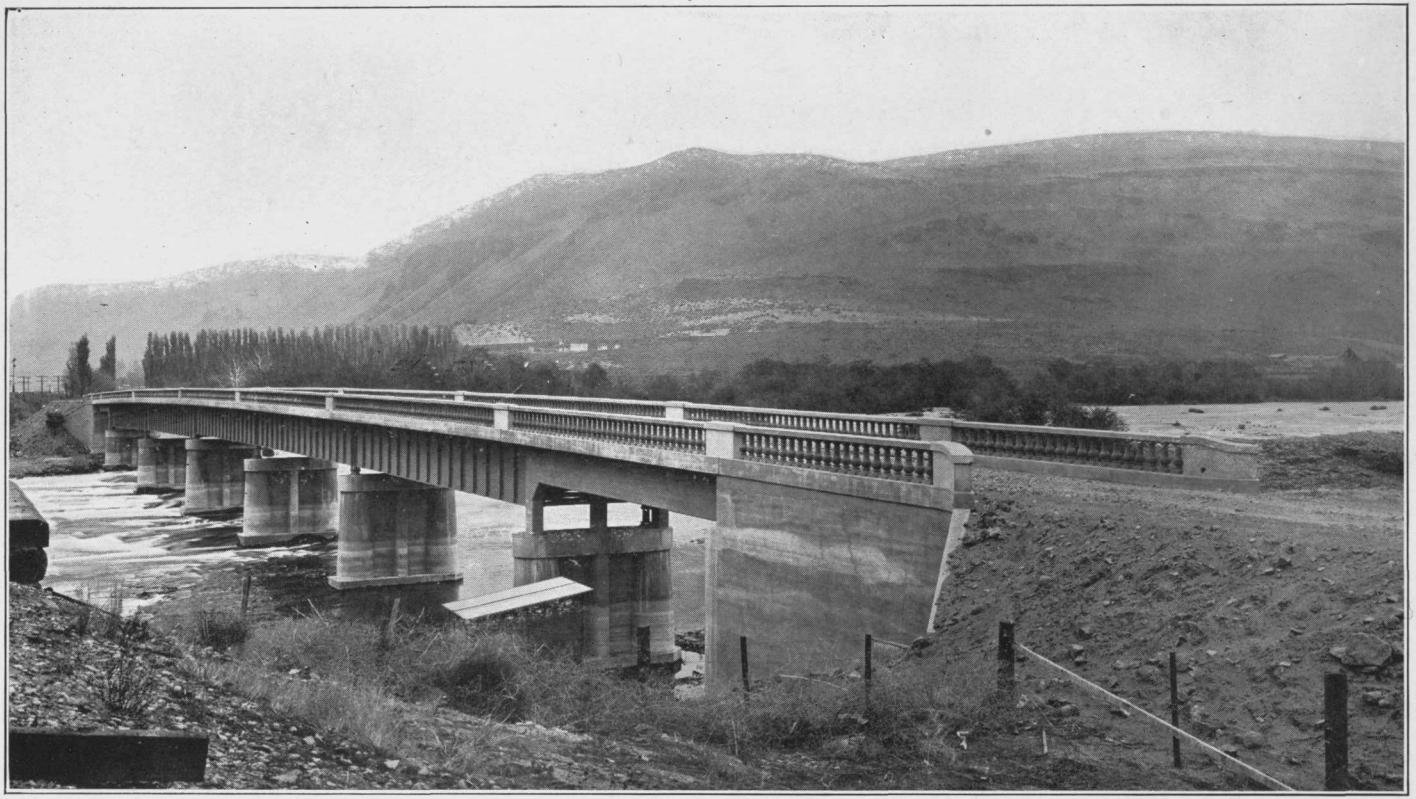
Being an inter-County bridge, between Wasco and Sherman Counties, both Counties contributed toward its construction, each one paying the sum of $25,000.00. The total cost was $81,191.26, leaving $31,191.26 which was paid by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,751.11
Cement furnished by State		4,847.03
Contract Items as follows:		
Class "B" concrete, 374.41 cu. yds. at $31.20	$ 11,681.59	
Class "A" concrete, 798.98 cu. yds. at $27.40	21,892.05	
Metal reinforcing, 87,907 lbs. at 8c	7,032.56	
Structural steel, lump sum	26,943.84	
R. C. handrail, 1,128 lin. ft. at $3.00	3,384.00	
Force Account Items:		
Furnishing and installing expansion angles and weep holes, cutting and bending reinforcing steel, account change in plans	884.32	
Total	$ 71,818.36	
Deduction for freight reduction and war tax	225.24	
Total amount paid to contractor		$ 71,593.12
Grand total cost of structure		$ 81,191.26
Paid by State	$ 31,191.26	
Paid by Sherman County	25,000.00	
Paid by Wasco County	25,000.00	
Total	$ 81,191.26	

Sherman County Survey

Survey for the Columbia River Highway across Sherman County was made during 1918 by Locating Engineer C. S. Noble, and revised during 1919 to meet the requirements of the O. W. R. & N. Company where encroachments on their right-of-way occurred.



FIVE HUNDRED AND NINE FOOT STEEL PLATE GIRDER BRIDGE WITH CONCRETE FLOOR AND APPROACHES BUILT IN 1919. OVER THE DESCHUTES RIVER BETWEEN WASCO AND SHERMAN COUNTIES. ON THE COLUMBIA RIVER HIGHWAY.

[SHERMAN]

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by E. D. McKee, County Judge and R. J. Ginn, County Commissioner, under date of March 3, 1920, stating that a levy of 1.3635 mills on all the taxable property of the County was made for Market Road construction and designating four roads to be improved as market road projects.

A levy of 1.3635 mills on a valuation of $15,313,474.01 produced a County Market Road fund of $20,882.39. Included in the State levy of taxes was a levy of 1 mill on a valuation of $10,948,935.60 which produced $10,948.94 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 10,948.94
Funds apportioned by the State Highway Commission April 3	4,465.58
Funds produced by County levy of 1.3635 mills	20,882.39
Total available for 1920	$ 36,296.91

Homer S. Wall, County Surveyor and Roadmaster, made the surveys, prepared maps and estimates and did the necessary construction engineering.

Project No. 1.—"Beginning at a point in the main County road, one-half mile west of Kent; thence easterly through Kent and continuing in a southeasterly direction by the way of Wilcox to the southerly line of Sherman County."

A report dated October 21, 1920 shows that a survey 7,800 feet in length, has been made and maps and estimate of cost prepared for grading a roadbed 24 and 26 feet wide and surfacing 18 feet wide with crushed rock, at an estimated cost of $16,521.17. The work to be completed in 1920.

Project No. 2.—"Beginning at the intersection of the O. W. R. & N. Railroad tract with the main County road near the Grass Valley depot, thence in a southwesterly direction via Sherars Bridge Road, to the southwest corner of section 36, T-3S, range 15 east.

A survey was made and maps and profiles prepared. It was decided to improve three sections of this road in 1920, by grading the roadbed 18 and 22 feet wide and surfacing 14, 16 and 18 feet wide with crushed rock. The sections improved were station 0 plus 00 to 32 plus 00, station 54 plus 00 to 66 plus 00, and an extension through Grass Valley 921 feet in length. The work was completed at a cost of approximately $19,800.00.

Project No. 3.—"Beginning at the intersection of First Street with the O. W. R. & N. Railroad right-of-way in the city of Moro, thence in a southeasterly direction via Lone Rock Road to Lone Rock Bridge."

A survey was made but owing to right-of-way difficulties, no construction work was done in 1920.

Project No. 4.—"Beginning at the intersection of First Street with the O. W. R. & N. railroad right-of-way in the City of Wasco, thence in a westerly direction to the southwest corner of Section 1, T-1N, R-16E."

No work was done on this project in 1920.

TILLAMOOK COUNTY

Tillamook County's best, and practically its only, outlet to the Willamette Valley is the McMinnville-Tillamook Highway. In the days before State highway construction was undertaken in Oregon the Grand Ronde road to Tillamook was a famously poor one; a summer road only and a very rough, disagreeable one even then. Construction of the Sourgrass section in 1916, eliminating the old Dolph toll road with its fifteen and twenty per cent grades was the first step in the improvement of this road. In the winter of 1919-1920, for the first time, all winter travel by automobile was rendered possible by improvement of the Grand Ronde, Bee Ranch, and Three Rivers sections, and upon completion of the contracts now under way which, barring unforeseen contingencies, will be accomplished in the season of 1921, the entire distance from Tillamook to McMinnville will be graded and either paved, macadamized or graveled. Within Tillamook County, this will mean a total of 13 miles of pavement, 11 miles of broken stone macadam and 8 miles of graveled road.

For future development there are two projects on the Coast Highway; one, north from Tillamook to the Clatsop County line, on which one contract for 4.69 miles of graveling has already been let, and, the other, the section from Hebo south to the Lincoln County line, preliminary surveys of which have already been made.

Tillamook County has already done some construction work between Hebo and Neskowin, and plans to do additional work there in 1921. The Neskowin-Salmon River Section is being developed as a Federal Aid Forest Road project, to be constructed by the Federal Government in co-operation with the State and Tillamook and Lincoln Counties.

Work in Tillamook County was handled by C. L. Grutze, Division Engineer, until September, 1920, when the district was taken over by W. D. Clarke, Division Engineer.

Tillamook-South Paving

On August 7, 1917 a contract was awarded to Oskar Huber of Portland for the paving of a 5 mile section of the Coast Highway, extending south from the end of the pavement approximately three miles south of Tillamook. A complete description of this work will be found on pages 133 and 134 of the last biennial report.

At the close of the last biennium total expenditures of $89,213.74 had been made, $63,203.90 by the State and $26,009.84 by the County. During 1919 additional expenditures, totaling $20,081.16, have been made, $13,731.72 by the State, and $6,349.44 by the County. This makes the completed cost of the work $109,294.90, the County co-operating to the extent of $32,359.28, covering the cost of grading of the section, and the State paying the balance of $76,935.62.

[TILLAMOOK]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,196.85
Contract Items as follows:		
Common excavation, 13,022.5 cu. yds. at 60c	$ 7,813.50	
Intermediate excavation, 2,039.5 cu. yds. at 90c	1,835.55	
Overhaul, 6,314.8 sta. yds. at 2c	126.30	
12" reinforced concrete pipe, 112 lin. ft. at 48c	53.76	
18" reinforced concrete pipe, 665 lin. ft. at 78c	518.70	
24" reinforced concrete pipe, 386 lin. ft. at $1.16	447.76	
36" reinforced concrete pipe, 72 lin. ft. at $1.80	129.60	
Standard Bit. pavement, 47,555.5 sq. yds. at $1.42	67,528.81	
Broken stone, loose measure, 9,100.4 cu. yds. at $2.20	20,020.88	
Crushed stone shoulders, 51,257.6 lin. ft. at 6c	3,075.45	
Force Account:		
Clearing and grubbing	543.75	
Moving fences	4.00	
Total amount paid contractor		$102,098.05
Grand total cost of project		$109,294.90
Paid by State	$ 76,935.62	
Paid by County	32,359.28	
Total	$109,294.90	

Hemlock-Beaver Paving

The Hemlock-Beaver section is the second section of the Coast Highway in Tillamook County to be taken up by the Highway Commission for paying. The contract, as originally awarded April 15, 1919, to the Warren Construction Company of Portland, provided for Type "E," 2-inch standard bitulithic on a broken stone base. Work was begun June 14, 1919 and 1.5 miles completed that season. At the beginning of the 1920 season, the type was changed by adding a 3-inch bituminous base, and 2.2 miles of this type were laid. Progress on this contract has been slow and the working season, ordinarily short in this locality, was shortened even more by the unusually early rains during September.

The Hemlock-Beaver section is 5 miles in length, extending from Beaver north to the south end of the Moore Cut-off, about three-quarters of a mile north of Hemlock. The pavement is 16 feet in width and has 2-foot rock shoulders. There remains 1.3 miles to be completed in 1921.

The estimated cost of the completed section is $166,000.00, which is to be paid entirely by the State. Expenditures to date amount to $105,-911.14. Engineering work in connection with this section was in charge of Resident Engineers W. S. Coates in 1919 and L. Wendleboe, during the 1920 season.

Riverdale-Hobsonville Macadam

Contract for graveling the Riverdale-Hobsonville section of the Coast Highway was let, July 6, 1920, to the Tillamook County Court. This section extends from Riverdale, approximately 4 miles north of Tillamook, to Hobsonville, a distance of 4.69 miles. The work consists of constructing a run-of-bank gravel surfacing, 16 feet wide and 8 inches thick, loose measure.

Work was begun August 12, 1920, and was approximately thirty per cent finished during the 1920 season. The estimated cost when complete is $33,000.00 of which $5,907.86 has been expended to date. Grading of this section was done by Tillamook County with its own force and equipment.

W. S. Coates, Resident Engineer, is in charge of the work, which is being paid for from State funds.

[TILLAMOOK]

Moore Cut-Off Macadam

This section of the Coast Highway in Tillamook County extends from the north end of the Beaver-Hemlock paving section to the south end of the section paved in 1918 at Pleasant Valley, a distance of 3 miles, practically all of which is new road.

Grading of the section was undertaken in 1919, by Tillamook County, with its own force and equipment, and, although the grading was incomplete, contract for graveling was awarded to the Tillamook County Court July 6, 1920. This surfacing is of run-of-bank gravel, 16 feet wide and 8 inches thick, loose measure. The estimated cost when completed is $31,000.00, which is to be paid entirely from State funds. Expenditures to date amount to $3,821.80.

L. Wendleboe has been in charge as Resident Engineer during 1920, W. S. Coates having had charge during the grading work in 1919.

Beaver-Hebo Macadam

On July 6, 1920 contract for graveling the section of the Coast Highway from Beaver to Hebo, 4.72 miles in Tillamook County, was awarded to the Tillamook County Court. This section is the most southerly of three sections being graded by Tillamook County, and for which graveling contracts were awarded to the County Court at one time.

As in the case of the others, the Moore Cut-off and Riverdale-Hobsonville sections, the surfacing is to be run-of-bank gravel, 16 feet wide and 8 inches in depth, loose measure. The estimated cost of the section is $34,000.00, to be paid for by the State. To date only a small part of the work has been finished, with expenditures of $1,173.95, operations having not been begun until September 4th and having been suspended a short time later because of rain. On this section, also, the County is doing the grading and drainage construction with its own forces, and this work is not yet complete.

L. Wendleboe has been in charge of the work as Resident Engineer.

Three Rivers Forest Road Project

The construction of the Federal Aid Forest Road project, comprising 10.3 miles of grading and macadamizing between Hebo and Dolph, which was begun in 1918, has been completed and was accepted by the engineers of the Bureau of Public Roads September 24, 1920.

This work was originally awarded to the Tillamook County Court, but, upon ruling of the Attorney General that they had no authority to contract for such work, the contract was assumed by the Highway Commission and has been carried out by it as a contractor.

The project, as laid out by the Federal engineers, contemplated grading, bridges and culverts on the entire 10.3 miles and a 9-foot macadam surface on approximately 7.5 miles, the remaining 2.8 miles already having a rock surface considered adequate. The project was a co-operative one with State, County and Federal Government participating. Work was begun late in the season of 1918 under J. M. Baker, Superintendent of Construction, who continued in charge until August, 1919, when the work was taken over by C. L. Grutze. Mr. Grutze remained in charge until his transfer to the Salem office early in September, 1920, the section being carried to completion by Guy Mattoon.

During progress of the work the construction originally planned was found inadequate, particularly in the amount of rock necessary to make a satisfactory surface. In addition, also, the surfacing was widened from 9 to 12 feet and certain bridges were changed from wood to concrete. Labor conditions seriously handicapped the work and added greatly to its cost by delaying its progress, as well as by the large increase in wages which took place soon after the work was started.

The total cost of the project has been $224,116.45, which is to be paid $163,746.52 by the State, $20,808.87 by the County and $39,561.06 by the Federal Government. To date, the County has paid $16,411.14, the Federal Government $30,040.64 and the State $177,664.67, including $2,076.78 expended in 1918.

Kilchis River Bridge

The Coast Highway crosses Kilchis River, near the station of Juno, about three miles north of Tillamook. The structure designed for this place consists of a 90-foot low steel truss span and two 30-foot concrete approach spans, all on concrete piers.

Work was started on the foundations for the bridge about August 1, 1919, by County forces. Only a small crew was employed, but this crew was able to complete all the concrete work by June 1, 1920, except that portion to be placed after the steel span was erected. This is considered very satisfactory progress in view of the difficulties encountered in the foundation excavation, and, also, in view of the time lost during the winter.

In the meantime, at the request of the County, the State Highway Commission advertised for bids on the steel span, to be received on February 5, 1920, and contract number 245 was awarded on that day to the Pacific Foundation Company of Portland. This company had considerable difficulty in securing their fabricated steel, being unable to deliver any of it to the site until September 1. Falsework was in place by that time but was lost on about September 10, due to a sudden rise in the river. The falsework was replaced and erection of steel again started and was complete by November 1.

The County now plans on placing the remainder of the concrete at once, and opening the bridge to traffic at an early date. The old span now in use will be taken down and rebuilt on some secondary road where traffic conditions are less severe. The estimated cost of the new structure complete is $28,500.00. Of this sum, $27,000.00 will be paid by Tillamook County and $1,500.00 by the State.

W. S. Coates was in charge until March 15, at which time H. F. Miller became Resident Engineer. Expenditures of $3,485.52 have been made to date, being paid from State funds.

Nestucca River Bridge

The extensive revision of the alignment of the Coast Highway required the construction of a new bridge over the Nestucca River at a point about a mile north of Hebo. This structure consists of a 140-foot steel span on concrete piers, with one 16-foot and four 30-foot concrete spans of approach. The concrete work is being done by County forces

and is well along at the time of this report. The steel work was awarded to the Pacific Foundation Company under contract No. 260 on March 23, 1920.

It is expected that the bridge will be completed early in the spring of 1921 at a cost of approximately $46,500.00. Of this sum $43,000.00 will be for construction and will be paid by Tillamook County. The balance will be for engineering and will be paid out of State funds. H. F. Miller was Resident Engineer until November 1, at which time the work was turned over to W. S. Coates.

Expenditures to date amount to $9,520.57 from State funds.

Construction Engineering on County Grading

In connection with the construction of the sections on which paving and graveling contracts have been let, Tillamook County has done the grading and drainage work, with its own force and equipment, and the State has furnished the necessary engineering. Such sections include the following:

Beaver-Hebo section, 4.7 miles; L. Wendleboe, Resident Engineer.

Hemlock-Beaver section, 5 miles; L. Wendleboe, Resident Engineer.

Moore Cut-off Section, 3.0 miles; W. S. Coates, Resident Engineer.

Riverdale-Hobsonville section, 4.69 miles; W. S. Coates, Resident Engineer.

Total expenditures by the State, for engineering on County grading construction during the biennium ending November 30, 1920, amount to $2,711.25.

Maintenance

Under the original plans for construction of the Three Rivers Forest Road project from Dolph to Hebo several short sections, aggregating approximately 2.8 miles, were omitted from the proposed surfacing on account of their already having a rock surface considered sufficient by the Office of Public Roads. Before completion of the project, however, it was decided necessary that these sections be resurfaced and this work, together with the grading and other work required to bring these sections up to the same standard as the other parts of the contract, was undertaken as maintenance. The County and State are co-operating on a fifty-fifty basis, and there is included in the maintenance order general maintenance work and stocking the road with crushed rock for future maintenance. The work is being handled by State forces under direction of Mr. Guy Mattoon, Superintendent of Construction, with expenditures to date from State funds of $1,115.20.

For the general maintenance work, dragging, clearing ditches, etc., patrol sections, averaging about three miles in length, have been established, each in charge of a patrolman who is a local resident living on or near his section, and who spends such time at the maintenance work as is required to keep his section in proper shape.

In connection with the maintenance work under way on the Sourgrass section, the west 0.8 mile of the road constructed in 1916, lying in Tillamook County between the County line and Dolph, is being rehabilitated in a similar manner.

Maintenance orders provide for sufficient rock for a new wearing surface 2.5 inches in depth and for stocking the road with four cubic yards every hundred feet for future maintenance. The work is being handled by State force under direction of Guy Mattoon and is to be paid for by the State and County co-operating on a fifty-fifty basis.

Work was begun September 7, 1920, but has been greatly delayed by bad weather. The rain has made it impracticable to do the resurfacing as originally planned, and less rock will be used for that purpose at this time, but more will be stocked along the road for winter purposes.

The total expenditures to date from State funds are $1,958.37.

Tillamook-Clatsop County Line Survey

Location survey of the Coast Highway was started, during the latter part of 1919, from a point one and one-half miles north of Tillamook City, north to the Clatsop County line. For the first 15 miles the survey follows the old County road, and from thence on intermittent stretches of this County road are used. The portions not following the old road are across sections of the country which have not been previously located. The last few miles lie in the valley of the north fork of the Nehalem River, and parallel to that stream. The topographical character of the country will demand a heavy type of highway construction. The sections not in a hilly country are across tide flats, and, owing to paralleling the ocean shore for the greater part of the distance, there is a continual cross drainage to be taken care of.

Since the location has been made, a discussion has arisen relative to changing the alignment between a point 10 miles north of Tillamook City and a point 5 miles south of the Clatsop County line. The located line between these points follows along the ocean and establishes easy access to the various beaches. Another route may be taken which lies about five miles inland and which follows distinct lines of drainage, in addition to shortening the length approximately four and one-half miles. Reconnaissance has been made of this proposed change, and reports made showing that the inner line could be constructed at a considerable saving of cost, even after taking into consideration the construction of spur roads to the beaches. A final decision on the adopted location between these points has not been made.

The complete location survey has not yet been finished. The primary line has been run out in the field and a large portion of the office work done, but considerable minor changes will necessarily have to be made before construction.

The section from the City of Nehalem to the Clatsop County line has been adopted as a Market Road. In addition to this, considerable construction has been accomplished on the first 10 miles by County forces, and State contract for the graveling of 4.69 miles between Riverdale and Hobsonville was awarded by the Commission on July 6.

Tillamook-Hebo Survey

During the spring and early summer of 1919 the survey of the Tillamook-Hebo section of the Coast Highway, started during the 1918 season by Locating Engineer C. A. Dunn, was carried to completion by W. S.

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Coates. This survey work was handled by Mr. Coates along with the engineering on the grading of several portions of this section of highway, which grading work was performed by County forces of Tillamook County.

Neskowin-Salmon River Survey

Survey of the section of the Coast Highway between Neskowin and Hebo was made, during the late winter and early spring of 1919, by C. W. Wanzer. The survey was sixteen miles in length, and, in a general way, followed the route of the existing County road, deviating from it only where improvements in grade and alignment were necessary in order to meet the standards of State Highway work, or could be made without materially increased expense.

Since this survey was made, the County has done grading work as several points along the route, this work being done in conformity with the location established by the State survey.

Neskowin-Salmon River Survey

With a view to determining the most feasible route for the Coast Highway from Neskowin to Salmon River, a survey was made of the territory between these points, from which a location was projected and estimates of quantities and costs prepared. At the present time it is barely possible to travel with team over the existing trail, and there is a strong demand for the construction of a satisfactory road. Arrangements are under way from which it is expected that the Coast Highway will be undertaken as a co-operative Forest Road project, the cost to be shared by the State, Federal Government and the Counties of Tillamook and Lincoln.

The distance between Neskowin and Salmon River on the route surveyed is approximately 10.27 miles. The survey was made during the early spring of 1919 by Locating Engineer J. M. Myers.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by A. M. Hare, County Judge, H. M. Farmer and H. V. Alley, County Commissioners, under date of March 13, 1920, stating that a levy of 1.3635 mills on all the taxable property of the County was made for Market Road construction, and designating three roads to be improved as Market Road projects.

A levy of 1.3635 mills on a valuation of $22,057,649.90 produced a County Market Road fund of $30,079.16. Included in the State levy of taxes was a 1 mill levy on a valuation of $16,121,399.10 which produced $16,121.40 which became a part of the "State Market Road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 16,121.40
Funds apportioned by the State Highway Commission April 3	6,575.20
Funds produced by County 1.3635 mills levy	30,079.16
Total available for 1920	$ 52,775.76

W. S. Coates, County Engineer, made all surveys, prepared plans and estimates and did the necessary construction engineering.

[TILLAMOOK]

Project No. 1.—From the west end of the North Fork of the Nehalem River bridge at a point S51 degrees 34 minutes W. 687.14 feet from the Meander corner between Lots 2 and 3, Section 23, T-3N, R-10W, W.M. on the north bank of the Nehalem River, running thence in a Northeasterly direction to the Clatsop County line at a point N-5347.4 feet and E-5879.9 feet from the SW. corner of Section 6, T-3N, R-10W, W.M.

A survey 5.07 miles in length was made. An estimate of cost was prepared for clearing, grading and surfacing the "Seavell Cut-off," 2800 feet in length, and building a 105-foot wood span bridge, estimated at $25,000.00, included,—total estimated cost $36,120.81. The only work accomplished in 1920 was the clearing on the "Scovell-Cutoff" at a cost of approximately $1,300.00. The County Court expended $5,000.00 as part payment of cost of a Marion steam shovel, from funds available for this project. They expect to start grading this project early in the spring of 1921.

Estimated amount of funds available for 1920	$ 15,000.00
Approximate amount of funds expended in 1920	6,550.00
Approximate amount carried over for use in 1921	$ 8,450.00

Project No. 2.—From the intersection of Third Street, Tillamook City with the city limits on the West Side, to Happy Camp on Netart's Bay in Section 31, T-1S, R-10W, W.M.

A survey was made of 7.4 miles. The road was graded for a distance of 1.6 miles to a width of 24 feet. Most of the grading was light and was done by County forces with tractor and grader.

A contract was awarded to the Oregon Contract Company to grade and pave with 6-inch concrete pavement 18 feet in width, from Tillamook City limits to Trask River bridge a distance of 1,080 feet. Work was completed.

A contract was awarded to the Tillamook Transfer Company for surfacing with 6 inches of gravel, 12 feet wide. One and six-tenths miles were surfaced.

Summary of Expenditures

Paving	$ 7,710.80
Gravel surfacing	4,187.50
Rebuilding Tillamook River Bridge approaches	2,176.10
Engineering	925.60
Total	$ 15,000.00

Project No. 3.—"From the intersection of the present Sand Lake Road with the Coast Highway at Hemlock, to the corner of Sections 16, 17, 20 and 21, T-3S, R-10W, W.M."

A survey 6.5 miles in length has been made, and an estimate of cost to clear, grade and gravel, from Station 135 plus 23 to 292 plus 82.3, 3 miles in length, has been prepared. The 3 miles for which the estimate was made is through heavy timber and rough country, and will be the first section improved. Estimated cost, $58,814.25.

No grading was done in 1920.

A contract has been awarded for clearing and grubbing 3 miles of 60-foot right-of-way, for $15,840.00. This work will not be completed in 1920. All available funds will be expended on this contract.

UMATILLA COUNTY

Umatilla County has a large mileage of State highways within its boundaries. Prior to 1919 a number of surveys had been made, but few miles of highway were constructed. The northern portion of the County, which consists of a rich alfalfa and wheat belt, had few improved highways, while the unimproved roads were very poor. The soil through this section is volcanic ash, which becomes impassable both in summer and winter when required to carry any large amount of traffic.

Surveys for the entire mileage of highways in the County have now been completed, with the exception of the Pendleton-John Day Highway from Pendleton south to the Grant County line. A party is, however, locating this line at the present time.

On March 4, 1919, the County voted a bond issue of $1,050,000.00 for expenditures on State highways. The amounts assigned to the various highways are as follows: Oregon-Washington Highway, $330,000.00; Columbia River Highway, $250,000.00; Old Oregon Trail, $100,000.00; Pendleton-Cold Springs Highway, $185,000.00; Pendleton-John Day Highway, $65,000; Havana-Helix Road, $90,000.00; Hudson Bay Market Road, $30,000.00. Plans for immediate co-operation with the State and Federal Government for financing the construction of a number of projects were made, and in a short time work was under way. The individual projects, some of which have been placed under contract by the Highway Department and some of which have been carried on under State direction by Umatilla County with their own forces, are taken up in the descriptions which follow:

State work in Umatilla County was supervised by Division Engineer M. O. Bennett, resigned, until September, 1920, when the district was taken over by R. H. Baldock, Division Engineer.

Adams-Athena Paving

During the years of 1914-15-16, Umatilla County constructed a macadamized road from Pendleton to the Washington State line, approximately 37 miles in length, passing through the towns of Adams, Athena, Weston, Milton and Freewater; traversing for 30 miles one of the best wheat producing sections in the northwest, and for the latter 7 miles one of the heaviest fruit producing sections in the State of Oregon. This highway is the only direct connection between Eastern Washington and Eastern Oregon and carries an immense local and tourist traffic.

In 1917 it was found uneconomical to maintain the macadam because of the volume and intensity of the traffic, and the first 10 miles from Pendleton, known as the Wild Horse section, was paved. Construction of the remainder of this highway was held up pending the cessation of the war, and in the spring of 1919 survey of the second unit, known as the Adams-Athena section, from the railroad station of Blakely, the end of the Wild Horse pavement, to a point about one mile east of Athena, was made and plans prepared for advertising for bids. On March 26, 1919, contract No. 90, for laying 9 miles of 2-inch bitulithic pavement on crushed rock base, was awarded the Warren Construction Company of Portland. Light grading was done, consisting mainly in widening the

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present road to 24 feet. Additional crushed rock was added to the old macadam, and pavement laid to a width of 16 feet. Considerable difficulty was experienced by the contractors in prosecuting the work, because of inability to secure cars for shipping material, lack of experienced men, and the loss of paving plant by fire during the height of the season. As a result of these conditions, only 7 miles were completed in 1919. The early winter stopped work on December 1, 1919, and the weather conditions in the first part of the spring of 1920 were very unfavorable, rendering it impossible to start paving until late in April. The section is practically completed at the present time, and the final estimate will be made before the close of 1920.

The total estimated cost of this work is $230,000.00, of which $188,893.92 has been expended to date, $138,893.92 by the State and $50,000.00 by the County. The County's total share in financing this project will be $65,000.00, the State paying the remaining $165,000.00.

Oscar Cutler is Resident Engineer in charge of the construction.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 14,800.02
Advertisement for bids		6.00
Contract Items as follows:		
Common excavation, 6,816 cu. yds. at 50c	$ 3,408.00	
Intermediate excavation, 710.8 cu. yds. at 90c	639.72	
Solid rock excavation, 2,431.3 cu. yds. at $1.60	3,890.08	
Overhaul, 565 sta. yds. at 4c	22.60	
12" plain concrete pipe, 2,174 lin. ft. at $1.25	2,717.50	
Standard Bit. pavement, Type "F," 84,945.3 sq. yds. at $1.53	129,966.31	
Crushed rock for base, 14,647.5 cu. yds. at $3.00	43,942.50	
Broken stone shoulders, 65,984.6 lin. ft. at 6c	3,959.08	
Ditching, 5,253.2 cu. yds. at 60c	3,151.92	
Bitulithic headers, 3,140 lin. ft. at 40c	1,256.00	
Clay or other earth filler, 45 cu. yds. at $1.00	45.00	
Crushed rock for shoulders, 2,575.5 cu. yds. at $3.00	7,726.50	
Materials on hand	195.36	
Force Account Items:		
Building masonry retaining wall	10.80	
Building dry rock wall to protect private property and embankment	282.15	
Moving fences and grubbing out trees	52.36	
Widening shoulders	973.98	
Salvaging rock in abandoned roadway	260.41	
Repairing damage caused by washout	1,673.55	
Excavating for shoulder drains	186.22	
Furnishing lumber for headers at railroad crossing	10.00	
Regrading slopes to improve drainage	1,683.73	
Total	$206,053.77	
Deductions for freight reduction and war tax	1,244.47	
Total amount earned by contractor	$204,809.30	
Percentage retained until completion of contract	30,721.40	
Total amount paid to contractor		$174,087.90
Grand total expended to November 30, 1920		$188,893.92
Paid by State	$138,893.92	
Paid by County	50,000.00	
Total	$188,893.92	

Athena-Milton Paving

Contract No. 179 was awarded the Warren Construction Company of Portland, Ore., August 5, 1919, for a 2-inch bitulithic pavement on a 6-inch macadam base, between Athena and Milton, on the Oregon-Wash-

ington Highway. The contractors started work on this section on September 19, 1919, paving approximately one mile before closing work for the winter. Paving was resumed in the spring of 1920, and 6.5 miles will be constructed at the close of the season's work.

The grading of this work was handled by County forces of Umatilla County. This grading had not progressed as rapidly as had been anticipated, and in the spring of 1920 it was decided to hold over paving of approximately the last five miles of this project until the season of 1921, which would allow this new work to settle through the winter. This section held over will be macadamized during the winter of 1920-1921, by the contractors. Approximately 1.25 miles have been completed to date. On those sections of the work paved during 1920 over fills or low ground, a 3-inch bitulithic base was constructed. About one-half a mile has been so treated.

The estimated total cost of this work, exclusive of the grading done by the County, is $379,000.00, of which Umatilla County's share is $110,000.00, the State supplying the remainder. A total of $136,795.56 has been expended to date from State funds.

V. Waggoner was Resident Engineer on construction during 1919, and was succeeded by Oscar Cutler, who is at present in charge of this work. The pavement which has been laid on this section is in excellent condition and is a very creditable piece of work.

The completion of the Athena-Milton section will connect the last link from Pendleton to the Washington State line, making a total of 37 miles of paved road. The entire length of this highway is through a very productive farming community, and carries a heavy tonnage. In addition, it forms a direct connection with the Washington highways, and supports heavy interstate traffic.

Milton-Washington State Line Paving

On March 26, 1919, contract No. 89 for 6.2 miles of 2-inch bitulithic pavement, 16 feet wide, on a broken stone base, was awarded to the Warren Construction Company of Portland, Ore. The project extends from the south city limits of Milton, through Freewater, to the Washington State line. This portion of the Oregon-Washington Highway is located through a thickly settled, irrigation section and is the main artery of highway transportation between Pendleton and Walla Walla. As may be expected, the traffic is very heavy. The County had macadamized this road several years previous, but it was found necessary to do considerable light grading and place additional material to strengthen the base before placing the wearing surface. Ample shoulders and ditches were constructed, and the pavement is well drained and in excellent condition at the present time.

Work was started May 20, 1919 and completed April 27, 1920, under V. Waggoner, Resident Engineer. Total expenditures amount to $139,329.59, towards which the County co-operates to the extent of $50,000.00.

In addition to the paving and grading work, financed by the State and Umatilla County as outlined above, considerable paving was laid in the cities of Milton and Freewater during the same period. The State High-

way Commission paved through these cities to a width of 16 feet, but, on petition of the County Commissioners, this width was increased and the excess width paid for by the two towns. The engineering charges on the increased width were paid for by the State, however. On these increases in width, the city of Milton spent $48,822.14 and the city of Freewater $11,371.62.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,618.64
Advertising for bids		6.00
Contract Items as follows:		
Ditch excavation, 2,222 cu. yds. at 60c	$ 1,333.20	
Overhaul on ditch excavation, 16,121 sta. yds. at 5c	806.05	
8" plain concrete pipe, 908 lin. ft. at $1.10	998.80	
12" plain concrete pipe, 1,486 lin. ft. at $1.25	1,857.50	
Class "A" concrete, 18.22 cu. yds. at $20.00	364.40	
Type "F" Bitulithic pavement, 58,200 sq. yds. at $1.53	89,046.00	
Bitulithic headers, 1,699 lin. ft. at 40c	679.60	
Broken stone for base, 6,104.5 cu. yds. at $3.00	18,313.50	
Clay or other earth filler, 491.3 cu. yds. at $1.00	491.30	
Broken stone for shoulders, 537 cu. yds. at $3.00	1,611.00	
Broken stone shoulders, 9,134 lin. ft. at 6c	548.04	
Force Account:		
Clearing, grubbing, grading and fencing on cost-plus basis	12,586.34	
Adjustment account increase in freight rates, as per contract	69.22	
Total amount paid contractor		$128,704.95
Grand total cost of project		$139,329.59
Paid by State	$ 89,329.59	
Paid by County	50,000.00	
Total	$139,329.59	

Echo-Morrow County Line Grading and Macadam

On March 26, 1919, contract No. 94 was awarded to Porter & Conley of Portland, Oregon, for grading and macadamizing 20.8 miles of the Columbia River Highway from the Morrow County line, via Umatilla, Hermiston and Stanfield, to Echo. From the County line to Umatilla, the highway parallels the O. W. R. R. & N. Co.'s tracks and the Columbia River to the confluence of the Columbia and Umatilla Rivers at Umatilla. From Umatilla the highway lies parallel and adjacent to the railroad tracks and the Umatilla River, crossing the former at grade within the city limits of Hermiston. There is a site for an undercrossing available at this place which can be built at some later date.

Construction was completed during 1920 under W. G. Phelps, Resident Engineer, at a total cost of $193,578.14. This cost is to be divided $73,578.14 to the State and $120,000.00 to the County. County co-operation of $90,000.00 has been received to date, the balance being advanced by the State.

The section has been graded to the standard 24-foot width and excellent grades and alignment were secured. The macadam consists of crushed gravel and has been constructed 16 feet wide, to a depth of 8 inches, loose measure.

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DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,866.32
Guarding R. R. from damage		40.00
Advertisements for bids		6.00
Contract Items as follows:		
Common excavation, 59,131.5 cu. yds. at 45c	$ 26,609.18	
Intermediate excavation, 3,636.8 cu. yds. at $1.25	4,546.00	
Solid rock excavation, 1,477.8 cu. yds. at $3.50	5,172.30	
Overhaul, 38,670 sta. yds. at 3½c	1,353.45	
12" plain concrete pipe, 1,892 lin. ft. at $1.20	2,270.40	
18" reinforced concrete pipe, 395 lin. ft. at $2.60	1,027.00	
24" reinforced concrete pipe, 137 lin ft. at $3.15	431.55	
30" reinforced concrete pipe, 102 lin. ft. at $4.25	433.50	
30" Corr. Galv. iron pipe, 32 lin. ft. at $4.50	144.00	
Class "C" concrete, 83.38 cu. yds. at $20.00	1,667.60	
Grader work, 6.792 miles at $1,000.00	6,792.00	
Screened gravel, 43,195.74 cu. yds. at $2.70	116,628.50	
Filler, 132.75 cu. yds. at $1.00	132.75	
Payhaul, 23,503.5 yd. miles at 45c	10,576.58	
Force Account Items:		
Constructing drainage ditches	576.51	
Placing soil on gravel	165.00	
Building irrigation lateral for farm	71.29	
Salvaging gravel from original grade	710.10	
Maintenance work on completed section	55.86	
Moving concrete irrigation turn-out from bridge site	256.62	
Lining irrigation ditch with concrete account highway crossing at an angle	45.63	
Total amount paid to contractor		$179,665.82
Grand total cost of project		$193,578.14
Paid by State	$103,578.14	
Paid by County	90,000.00	
Total	$193,578.14	

Echo-Pendleton Post Road Project

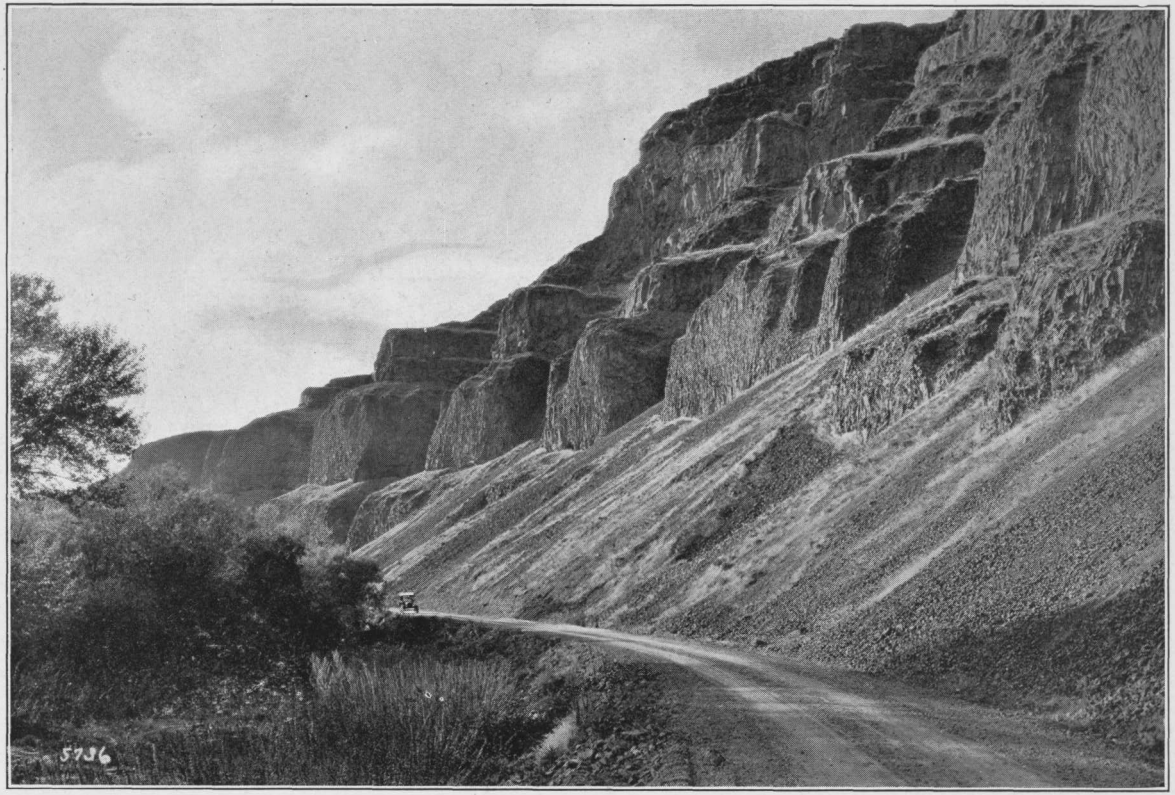
Application was made by the State Highway Commission to the Bureau of Public Roads for co-operation in surfacing the Echo-Pendleton section of the Columbia River Highway, previously placed under contract for grading. The Bureau of Public Roads recommended this work for co-operation and it was assigned project No. 42. Contract No. 252, for surfacing the 22 miles involved, was awarded to Porter & Conley on March 23, 1920.

The total estimated cost of the project is $139,200.00, of which $64,900.00 is to be paid by the Federal Government and the balance of $74,300.00 by the State. A total amount of $64,353.36 has been expended from State funds to date.

The engineering on the work has been handled in two sections, one section under the supervision of J. F. Waller, Resident Engineer, and the other one under the supervision of G. V. Robinson, Resident Engineer.

Pendleton-Cabbage Hill Post Road Project

Under co-operative agreement No. 38 between the State, the Federal Government and Umatilla County, a 7.54 mile section, between Pendleton and the foot of Cabbage Hill, on the Old Oregon Trail, is now being graded and macadamized. This project will eliminate two dangerous grade crossings just east of Pendleton, at which points the heaviest grading on this section was encountered.



ON THE ECHO-PENDLETON SECTION IN UMATILLA COUNTY. GRADED AND GRAVELED DURING 1919 AND 1920.



PAVEMENT ON THE OREGON-WASHINGTON HIGHWAY NORTH OF PENDLETON.

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Contract No. 236 for the project was awarded to Clifton, Applegate & Toole, on November 4, 1919. The estimated cost of the section is $116,000.00, of which the Federal Government will pay $53,963.49, the County $58,000.00, and the State $4,036.51. The total amount expended to date is $77,745.14, which has been paid $27,519.66 by the State, $17,000.00 by the County and $33,225.48 by the Government.

The work is under the supervision of Resident Engineer Paul Jones.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 8,204.64
Contract Items as follows:		
Clearing and grubbing, all	$ 350.00	
Common excavation, 35,036.9 cu. yds. at 65c	22,773.98	
Intermediate excavation, 7,006.9 cu. yds. at $1.10	7,707.59	
Solid rock excavation, 12,954 cu. yds. at $2.00	25,908.00	
Overhaul, 10,345 sta. yds. at 5c	517.25	
12" plain concrete pipe, 966 lin. ft. at $1.50	1,449.00	
18" reinforced concrete pipe, 384 lin. ft. at $2.75	1,056.00	
24" reinforced concrete pipe, 72 lin. ft. at $4.00	288.00	
36" reinforced concrete pipe, 48 lin. ft. at $6.75	324.00	
Class "A" concrete, 48.14 cu. yds. at $28.00	1,347.92	
Class "C" concrete, 51.84 cu. yds. at $30.00	1,555.20	
Reinforcing steel, 2,549 lbs. at 10c	254.90	
Crushed gravel, 8,268.25 cu. yds. at $1.98	16,371.13	
Payhaul, 3,353.7 yd. mile at 50c	1,676.85	
Force Account Items:		
Reducing crown in subgrade Sta. 58 to Sta. 62	24.75	
Securing and spreading dirt filler	80.44	
Redistributing culvert pipe account change in size	43.34	
Total amount earned by contractor	$ 81,812.35	
Percentage retained until completion of contract	12,271.85	
Total amount paid to contractor		$ 69,540.50
Grand total expended to November 30, 1920		$ 77,745.14
Paid by State	$ 27,519.66	
Paid by County	17,000.00	
Paid by Government	33,225.48	
Total	$ 77,745.14	

Cabbage Hill-Deadman's Pass Macadamizing

On August 10, 1920, the Security Construction Company of La Grande was awarded contract No. 288 for macadamizing 12.82 miles, from the foot of Cabbage Hill to Dead Man's Pass, on the Old Oregon Trail, in Umatilla County, which section had been previously graded by the County. The estimated cost to the State of this macadam is $106,000.00. The contractors are busy installing crusher plants and developing quarry sites, but, to date, have not placed any surfacing. Expenditures for the work amount to $23.03.

Paul Jones, Resident Engineer, is in charge of this section.

Echo-Pendleton Grading

Contract No. 158, for grading the Echo-Pendleton section of the Columbia River Highway, was awarded to Clifton, Applegate & Toole, of Spokane, on August 18, 1919. The construction of this section was materially delayed by the severe winter of 1919-1920, but the total

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distance of 21.88 miles is now practically completed, and the final estimate will be rendered during December.

The total expense, when final payment is made, will be approximately $277,500.00, of which amount Umatilla County will pay $120,000.00. To date a total of $233,947.12 has been expended, $153,576.62 by the State and $80,370.50 by the County.

This work is under the supervision of Resident Engineers J. F. Waller and A. A. Kirkwood. The highway was constructed along the north bank of the Umatilla River, between Reith and Echo, and, on the major portion, very heavy work was encountered. It was found possible to use approximately four miles of abandoned railroad grade, which materially reduced the cost of the section over what would have been necessary if this grade had not been built. The highway affords the local and through traffic a water grade route from Pendleton to the Columbia River. Macadamizing of this section is now under way as a Post Road project.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 23,635.14
Culvert pipe furnished by State		329.42
Premium for additional bond required to indemnify railroad from damage		150.00
Watchman's services for guarding O. W. R. & N. tracks		9.24
Rental and repair parts for truck (to be deducted from amounts due contractor)		1,146.68
Contract Items as follows:		
Clearing and grubbing, all	$ 600.00	
Common excavation, 108,672.3 cu. yds. at 44c	47,815.81	
Intermediate excavation, 59,374.6 cu. yds. at 83c	49,280.92	
Solid rock excavation, 75,856.8 cu. yds. at $1.56	118,336.61	
Overhaul, 141,565 sta. yds. at 3c	4,246.95	
12" Corr. Galv. iron pipe, 16-gauge, 1,258 lin. ft. at $1.80	2,264.40	
18" Corr. Galv. iron pipe, 16-gauge, 930 lin. ft. at $2.70	2,511.00	
18" Corr. Galv. iron pipe, 14-gauge. 100 lin. ft. at $3.15	315.00	
24" Corr. Galv. iron pipe, 16-gauge, 1,416 lin. ft. at $3.55	5,026.80	
36" Corr. Galv. iron pipe, 14-gauge, 774 lin. ft. at $6.25	4,837.50	
36" Corr. Galv. iron pipe, 12-gauge, 50 lin. ft. at $8.33	416.50	
6" porous drain tile, 126 lin. ft. at 50c	63.00	
Class "A" concrete, 81.91 cu. yds. at $26.00	2,129.66	
Class "C" concrete, 131.56 cu. yds. at $25.00	3,289.00	
Rubble masonry, 43.76 cu. yds. at $15.00	656.40	
Rip-rap, 98.7 cu. yds. at $3.50	345.45	
Metal reinforcement, 4,228 lbs. at 10c	422.80	
Grader work, 1.556 miles at $1,000.00	1,556.00	
Placing 12" Corr. Galv. iron pipe, 146 lin. ft. at 71c	103.66	
Placing 24" Corr. Galv. iron pipe, 32 lin. ft at $1.46	46.72	
Lumber and timber in place, 8M FBM at $60.00	480.00	
Force Account Items:		
Moving equipment as per engineer's orders	304.18	
Moving right-of-way fences	57.51	
Extending 36" Corr. Galv. iron pipe culverts	48.45	
Hand placing rock on steep slopes	43.20	
Removing culverts from O. W. R. & N. right-of-way	134.66	
Redistributing culvert pipe account change in plans	28.31	
Rocking embankment slope to protect reservoir	141.45	
Total amount earned by contractor	$245,501.94	
Percentage retained until completion of contract	36,825.30	
Total amount paid to contractor		$208,676.64
Grand total expended to November 30, 1920		$233,947.12
Paid by State	$153,576.62	
Paid by County	80,370.50	
Total	$233,947.12	

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Cabbage Hill-Kamela Grading

On July 18, 1919, the County of Umatilla began work, by force account, grading 27.11 miles from the foot of Cabbage Hill to Kamela, the entire construction costs to be paid from County funds. Only a small amount of work was completed on the east end of this section, and all forces were placed on the 12.82 miles over Cabbage Hill, which is now nearing completion. The estimated cost of this 12.82 miles is $119,431.13, of which $82,651.07 has been expended to date. The engineering costs are assumed by the State. Paul A. Jones is Resident Engineer in charge of this work.

The construction of this grade replaces the most dangerous hill in eastern Oregon. The grade of the old road ascending Cabbage Hill in many places exceeded 22 per cent. The new grade climbs the mountain with a series of graceful hairpin curves. There are five hairpin turns in one canyon, all of which are visible from the same point. From the top of the mountain an immense scope of country can be viewed and the Umatilla Valley resembles a gigantic checker board, with alternate sections of summer fallow and grain fields.

Athena-Milton Grading

This section, which extends from a point 1 mile east of Athena, northeasterly 11.54 miles, through the town of Weston, to the south city limits of Milton, was graded by Umatilla County in the months of July, August and September, 1920. About one-half of this section is coincident with the old road, which was graded and macadamized by Umatilla County in 1918. The work on this portion consisted mainly in widening the roadbed to 24 feet. It was not found possible to use the remaining portion of the old road on account of heavy grades and sharp turns. The resulting new construction gave a very good line and grade and shortened the distance approximately 1 mile. Umatilla County has appropriated $110,000.00 for this construction. Of this amount, $103,822.92 was spent for grading and engineering supervision, and the remainder for right-of-way. The engineering costs on this job were exceptionally high due to a dispute in the town of Weston relative to road location, resulting in extra engineering work in preparing comparative estimates over different routes. These charges were paid by the State. The Resident Engineer in charge of this work was Oscar Cutler.

The quantities of the various items of work done are as follows:

61,000 cubic yards common excavation.
5,000 cubic yards intermediate excavation.
10,000 cubic yards solid rock excavation.
100,000 station yards overhaul.
3,500 lin. feet culvert pipe.
1 6 x 8′ concrete box culvert.

Pilot Rock-Pendleton Grading

At the request of the County, on June 1, 1920, bids were opened by the State Highway Commission for grading and macadamizing a 10.48 mile section between Pilot Rock and Pendleton. The contract was awarded to Umatilla County as low bidders, at an estimated cost of $112,224.00.

On the fourth day of March, 1919, a special election had been held in Umatilla County and the sum of $70,000.00 was voted to be expended on

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this project. It was estimated that this amount would grade and surface a section approximately 8.5 miles in length, beginning at McKay Creek and extending south toward Pilot Rock. At present no arrangements have been made to finance the balance of the project. To October 1, 1920, $30,719.56 had been expended, including the engineering charges which are being paid by the State.

G. V. Robinson is Resident Engineer on this section.

Athena-Milton Bridges

Near the station of Blue Mountain, on the Athena-Milton section, the Oregon-Washington Highway crosses Dry Creek on a 60-foot steel pony truss span having concrete abutments.

Contract No. 247 covering its construction was awarded on February 5, 1920, to the Pacific Foundation Company. Progress of the work has been slow, but it is expected that it will be complete by January 1, 1921. V. Waggoner was Resident Engineer up to August 1, at which time he was succeeded by Oscar Cutler. The estimated cost of the work is $11,600.00, which is to be paid $1,100.00 by the State and $10,500.00 by the County. Expenditures to date amount to $2,232.88, the State having paid $281.66 and the County $1,951.22.

Adams-Athena Bridges

Wild Horse Creek is crossed twice by the Oregon Washington Highway within the limits of the Adams-Athena section, once at Athena, near the head of the stream, and once ten miles further south, at Adams. For the upper crossing a 12-foot box culvert is provided and for the lower one a concrete viaduct of three 18-foot spans.

Contract No. 246, providing for the construction of these two bridges, was awarded to Rhyner-Dicke Company of Portland on February 5, 1920. Construction was started early in March on the culvert, but was stopped by floods in March and April and was not completed until July 20. Work started on the other structure on June 1 and was completed by September 15. Oscar Cutler was the Resident Engineer.

The estimated cost of this work is $15,250.00, to be paid $1,391.20 by the State and $13,858.80 by the County. Expenditures to date amount to $12,316.48, the State having paid $1,190.49 and the County $11,125.99.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 1,190.49
Contract Items as follows:		
Excavation, 525 cu. yds. at $1.00	$ 525.00	
Class "A" concrete, 282 cu. yds. at $35.00	9,870.00	
Metal reinforcement, 29,537 lbs. at 8½c	2,510.65	
Handrail, 48 lin. ft at $3.50	168.00	
Materials on hand	15.75	
Total amount earned by contractor	$ 13,089.40	
Percentage retained until completion of contract	1,963.41	
Total amount paid to contractor		$ 11,125.99
Grand total expended to November 30, 1920		$ 12,316.48
Paid by State	$ 1,190.49	
Paid by County	11,125.99	
Total	$ 12,316.48	

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Umatilla-Nolin Bridges

In the summer of 1919, Umatilla County awarded a contract to Gefeke & Bain, for the construction of sixteen small reinforced concrete bridges spanning the irrigation canals between Umatilla and Nolin. These bridges were designed and constructed under the direct supervision of the Bridge Department of the State of Oregon, and were completed in October, 1920, at a cost of $68,000.00, which is assumed by Umatilla County.

This construction was under the supervision of J. F. Waller, Resident Engineer, the engineering charges being paid from State funds.

Pendleton-County Poor Farm Construction Engineering

During the latter part of 1918 the County, with their own forces, graded and macadamized the section of the highway between Pendleton and the County Poor Farm. A complete description of this work will be found on page 137 of the previous Department biennial report. The State furnished the engineering supervision on this construction, and, during the present biennium, delayed engineering charges of $25.87 have been paid.

Oregon-Washington Highway Maintenance

The section, known as the Wild Horse paving, on the Oregon-Washington Highway in Umatilla County, was graded and paved in 1917, over a length of 10 miles. After the work was completed no provision for maintenance was made until the fall of 1919, at which time an agreement was entered into between the Highway Commission and Umatilla County for necessary maintenance work on a 50-50 basis. The winter of 1919-1920 was exceptionally severe, the ground being frozen to a depth of 18 inches in advance of a heavy fall of snow. In December, 1919, a Chinook wind swept through this section, and, because of the frozen ground, the melting snow was unable to penetrate the earth and heavy floods resulted. The Oregon-Washington railroad tracks adjacent to the Highway were in some places washed out, and an immense volume of water swept over the pavement, washing out a portion and covering the remainder with a thick deposit of mud. An estimate of the work necessary to properly repair the damage to the pavement was made, and a maintenance contract authorized by the Highway Commission and Umatilla County requiring an expenditure of $34,079. To date $2,871.99 has been expended by the State. The work has been done by County forces of Umatilla County, under the supervision of Oscar Cutler, Resident Engineer.

Echo-Reith Survey

Between March 27, 1919, and May 19, 1919, a location survey, 21.36 miles in length, was made between Echo and Reith, on the Columbia River Highway in Umatilla County, by J. F. Waller, Locating Engineer.

From Echo the location follows the north side of the O. W. R. & N. railway and the Umatilla River to Reith, passing through, or near, Nolin and Barnhart. For about four miles the highway occupies an old railroad grade, abandoned by the O. W. R. & N. Company in line changes

made some years ago, and gives an excellent grade and alignment in these sections at nominal cost. For the major portion, however, the line is through very heavy work, benching out rock cliffs above the Umatilla River and O. W. R. & N. Railway tracks.

Plans were immediately prepared, and a contract let to Clifton, Applegate & Toole on August 18, 1919, for grading the section.

Pendleton-Cabbage Hill Survey

In September, 1919, a survey was made from the east city limits of Pendleton to the foot of the Cabbage Hill grade, a distance of 7.54 miles. From Pendleton the location was placed on the south of the O. W. R. & N. railroad, avoiding two very dangerous grade crossings in the present road; thence southeasterly past the Indian Agency, to a junction with the Cabbage Hill-Kamela survey, which project is under construction. With the exception of the rock cuts near Pendleton, made to avoid railroad grade crossings, the grading was very light. The survey passes through the rich wheat belt of the Umatilla Valley, and is subject to heavy local traffic and a seasonal tourist traffic.

The survey was made by David Glass, Locating Engineer.

Dead Man's Pass-Kamela Survey

In the summer of 1920 the survey from Dead Man's Pass to Kamela was restaked, some revisions made, and the office plans completed. Paul Jones and David Glass were the Locating Engineers on this work.

Saxe Overhead Crossing Survey

In order to determine the relative cost between two proposed grade crossings at Saxe Station, about four miles east of Pendleton on the Oregon-Washington Highway, a detailed survey was ordered. This survey was made under the supervision of D. G. Glass, Locating Engineer, in August, 1920. The map and estimates are now complete.

Athena-Milton Survey

The survey of the Oregon-Washington Highway from Athena to Milton completed the last gap of this highway between Pendleton and the Washington State line. The location extends from a point about two miles east of Athena through Weston, down Day Creek and over a pass into the Walla Walla River Valley at Milton.

Umatilla County had macadamized the main traveled road between Athena and Milton some years previous, but, while in general the survey followed this route, it was not possible to take advantage of this excellent base because of the heavy grades and sharp turns encountered. The new location has a very good alignment with maximum five per cent grades.

This section of the highway is located in a very productive wheat belt, is subject to very heavy local traffic in the fall of the year occasioned by hauling wheat to the warehouses, and to a continuous tourist traffic in the summer months.

This survey was started in May, 1919, and completed in September of the same year by J. M. Clark, Locating Engineer.

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Umatilla-Washington State Line Survey

There is a possible connection between the trade and tourist routes of Oregon and Washington, which may be made by continuing down the Columbia River from Wallula, Washington, to Umatilla, Oregon, connecting at the latter point with the Columbia River Highway, and in September, 1920, a reconnaissance survey was made by David Glass, Locating Engineer, between Umatilla and the Oregon-Washington State line. All possible routes were considered and reported in detail to the State Highway Engineer and the Highway Commission. No further action was taken on this project pending personal inspection by the State Highway Commission.

Pendleton-Cold Springs Survey

During the winter of 1919 a survey was made under the supervision of David Glass, Locating Engineer, between Pendleton and the Columbia River, terminating at Cold Springs landing. For the first 22 miles this location traverses a rich wheat country. The Cold Springs Canyon is the natural outlet for an extensive area, and reconnaissance data indicates that this road will carry an annual traffic of 45,000 tons.

The line is located for a 22-foot roadbed, with a maximum grade in the direction of haul of 2.8 per cent. The section of line ascending from the Columbia River has a gradient of 5 per cent, but this is in the direction of light haul. The same condition is also found in leaving the Umatilla River at Pendleton.

This location is 31 miles in length and final location is at present about 70 per cent complete.

Pendleton-Pilot Rock Survey

In October, 1919, a revision was made on the Pendleton-Pilot Rock section of the Oregon-Washington Highway, by David Glass, Locating Engineer. Plans were immediately prepared and Umatilla County started construction.

Ukiah-Grant County Line Survey

The present road between Ukiah and the Grant County line has the local reputation of being the worst road in Oregon. To overcome this feature, provide the people in this section with a means of highway transport, and develop the county, Umatilla County, on the fourth day of March, 1919, voted a bond issue for $165,000.00, to be spent between Nye and the Grant County line. At the request of Umatilla County, survey of this section was begun in September, 1920, by C. R. Burns, Locating Engineer. The location will extend from the Umatilla-Grant County line near Dale, north up Camas Creek to Ukiah, a distance of approximately 16 miles. It is expected the survey will be completed about January 1, 1921, and the contract for construction let in the spring of the same year.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by Chas. H. Marsh, County Judge; B. E. Anderson and G. L. Dunning, County Commissioners, stating that a levy of 1 mill on

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all the taxable property of the County was made for market road construction, and designating eleven roads to be improved as market road projects.

A levy of 1 mill on a valuation of $49,240,060.97 produced a County market road fund of $49,240.06. Included in the State levy of taxes was a levy of 1 mill on a valuation of $44,369,212.60, which produced $44,369.21, which became a part of the "State market road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 44,369.21
Funds apportioned by the State Highway Commission April 3	18,096.22
Funds produced by County 1-mill levy	49,240.06
Total available for 1920	$111,705.49

R. E. Phelps, Roadmaster, made all surveys, prepared all plans and estimates and did the necessary engineering work during construction.

Project No. 1—"Sunnyside to Umapine." Beginning at Sunnyside on the Oregon-Washington Highway north of Freewater, thence in a westerly direction through Umapine to a point about two miles west of Umapine.

This road, 7.71 miles in length, was graded to a roadbed width of 20 feet and 24 feet and surfaced with gravel 10 and 14 feet in width, 7 inches in depth. The road is through flat country of gravel formation, under irrigation. The construction work was done by contract at a cost of $59,346.71.

Project No. 2—"Havana to Helix." No work done.

Project No. 3.—"Milton to South Fork of Walla Walla River." This road, 4.7 miles in length, is in river bottom in a deep canyon. Four and seven-tenths miles were graded 20 and 24 feet wide by County forces, and 4.2 miles of gravel surface 16 feet wide, 8 inches deep was placed. Gravel was hauled by contract. The expenditure for this improvement was $38,156.37.

Project No. 4—"Helix to Ruther's Corner." No work done.

Project No. 5—"Butter Creek Road." No work done.

Project No. 6—"Despain Gulch to Stanfield." No work done.

Project No. 7—"Pendleton to Pilot Rock." No work done.

Project No. 8—"Pendleton to Cold Springs." No work done.

Project No. 9—"Hermiston to Columbia." No work done.

Project No. 10—"Umatilla to Columbia." No work done.

Project No. 11.—"Echo to Stage Gulch." No work done.

UNION COUNTY

Union County, situated on the east flank of the Blue Mountains, is very rough, and broken by spurs from the main range. The chief industries in the County are lumbering, stockraising and farming. Many of the roads are through a rough mountainous section, the improvement of which will be very expensive. The heavy alluvial soil in the valleys presents a serious drainage problem in securing good foundation for highways.

The County is served by two State highways. The Old Oregon Trail, the trunk highway, traverses northeast and southwest, serving the populous Grande Ronde Valley and the North Powder Valley, both very fertile sections. Connecting at La Grande, the La Grande-Joseph Highway runs northeast a distance of 38.28 miles within the County. The latter highway is a feeder to the Old Oregon Trail, serving the lower Grande Ronde Valley, and affording an outlet from Wallowa County.

The Old Oregon Trail has been surveyed for its entire length within the County, a distance of 48.8 miles. The La Grande-Hot Lake section and the Union-Telocaset section were graded by County forces in 1918-19, and the Telocaset-North Powder section is now under construction. The Kamela-Hilgard section very probably will be awarded in 1921. This latter unit extends from the summit of the Blue Mountains to the Grande Ronde Valley. The Hilgard-La Grande section was advertised for that portion between Perry and La Grande in July, 1920, but, because of a legal technicality existing in the County bond issue, award has been held up pending the decision of the Supreme Court on the legality of the bond issue, based on the six per cent tax limitation measure, voted on and carried at the last election. The Hot Lake-Union section has not been definitely located, and construction of this unit depends upon the location and the decision on the bond issue. During 1919-20 approximately 4.3 miles were paved between La Grande and Hot Lake. Unstable subsoil conditions through this section caused a failure of approximately one mile of this pavement, which was relaid in 1920. A full outline of this circumstance is incorporated in the report on the job. If weather conditions will permit, this pavement will be completed during the present season. On the east end of this pavement, and from there to Hot Lake, four miles of crushed rock macadam is under construction, which will be completed in the season of 1920.

On the La Grande-Joseph Highway, the Elgin-Minam section was graded in 1917-18. Macadamizing of this unit has been ordered, but construction is held up pending decision on the County bond issue. A bitulithic pavement was laid on the section from La Grande to Island City, a distance of approximately two miles, in 1919. The entire section of the La Grande-Joseph Highway in Union County has been surveyed.

On the 11th day of October, 1919, Union County voted a bond issue for $1,498,000.00 under the six per cent tax limitation law, to be distributed as follows:

Old Oregon Trail	$ 388,500.00
La Grande-Joseph Highway	697,500.00
County roads	412,000.00
	$1,498,000.00

Work in Union County was handled by Division Engineer M. O. Bennett, resigned, until September, 1920, at which time the district was taken over by R. H. Baldock, Division Engineer.

[UNION]

Island City-La Grande-Hot Lake Paving

Contract No. 121, for paving this section with two inches of bitulithic wearing course, on a six-inch crushed rock base, was awarded the Warren Construction Company on May 6, 1919. The project comprises two sections, one from the La Grande city limits to Island City, a distance of two miles, the other from the La Grande city limits to Lone Tree station, a distance of four miles. Construction was started on July 1, 1919, and continued until late in November of the same year, during which time 4.3 miles of this type of pavement were laid. In the early portion of 1920, sections of the pavement began to show signs of disintegration. This process, aggravated by heavy trucking, continued until twenty per cent of that portion between La Grande and Lone Tree had entirely broken down. Since it appeared that unstable subsoil was responsible for the failure, a heavier pavement was directed for the remainder of the project. During 1920 a heavier rock sub-base was placed, and a three-inch bituminous base with a two-inch bitulithic wearing course placed thereon. This type of pavement will be laid on 1.7 miles.

As a treatment for that section laid in 1919 which had broken down, the contractor agreed to lay a new surface at his own expense, the State paying for a three-inch black base on this portion. This reconstruction will cover 2.2 miles, of which 1.7 miles has been laid and is now in excellent condition. Seven-tenths of a mile of new work has been covered with a five-inch pavement.

The total estimated cost of this work is $226,000.00, of which $159,765.22 has been expended to date, $158,886.45 by the State and $878.77 by the County. Union County co-operates to the extent of $10,000.00, the balance of the cost being borne by the State.

R. A. Pratt, Resident Engineer, is in charge of the work.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 9,140.14
Contract Items as follows:		
Excavation, no classification, 3,499 cu. yds. at 50c	$ 1,749.50	
Broken stone, 13,845 cu. yds. at $3.92	54,272.40	
Gravel, 1,938 cu. yds. at $3.65	7,073.70	
Earth filler, 490 cu. yds. at $1.00	490.00	
Pavement, Type "E." 40,471 sq. yds. at $1.47	59,492.37	
3" bituminous base, 25,397 sq. yds. at $1.10	27,936.70	
2" bituminous top, 6,320 sq. yds. at $1.47	9,290.40	
Shoulders, 50,938 lin. ft. at 6c	3,056.28	
Materials on hand	3,475.00	
Force Account Items:		
Widening shoulders, trimming slope, etc.	5,396.76	
Excavating for shoulder drains	1,709.38	
Furnishing timber for permanent header boards	3,452.90	
Total	$177,395.39	
Deduction for war tax on freight	189.41	
Total amount earned by contractor		$177,205.98
Percentage retained until completion of contract		26,580.90
Total amount paid to contractor		$150,625.08
Grand total expended to November 30, 1920		$159,765.22
Paid by State	$158,886.45	
Paid by County	878.77	
Total	$159,765.22	

[UNION]

Lone Pine-Hot Lake Macadam

Contract No. 176, for macadamizing the Lone Pine-Hot Lake section, was awarded the Warren Construction Company on August 5, 1919. Difficulty in locating a suitable quarry site prevented operations until May 26, 1920. This project extends from Lone Pine station on the Oregon-Washington Railroad to Hot Lake, a distance of 3.9 miles, and is a continuation of the route now being paved and known as the Island City-La Grande-Hot Lake section. It is located in the valley of the Grande Ronde River and crosses an old tule lake bed. This section was graded in 1917-1918, and three concrete bridges were also constructed during this period. The portion of the line crossing the old lake bed presented very difficult sub-drainage problems, and in addition was subject to overflow from the spring floods. Lacking a comprehensive drainage system, and the ability to finance a project of this magnitude, the County was forced to lay rip-rap for bank protection along one-half mile of roadbed fill.

In macadamizing this section it was found that the quarry site selected failed to furnish sufficient fine material to properly bind the macadam, and sand was added for top dressing and binder on 2.6 miles.

In the early part of October, 1920, the continued rains rendered it nearly impossible to procure sufficient rock from the quarry to complete the work this season and arrangement was made with the contractor to furnish screened gravel from a pit near La Grande. The gravel used is an excellent surfacing material and will allow the section to be completed and opened to the public before the winter season begins.

The total estimated cost of this project is $69,000.00, of which 3.6 miles have been completed to date with expenditures of $35,262.25 from State funds. The County co-operates on this work to an estimated amount of $4,000.00 for the grading required.

R. A. Pratt is Resident Engineer in charge of construction.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 2,200.80
Contract Items as follows:		
Broken stone, 6,722 cu. yds. at $3.65	$ 24,535.30	
Payhaul, 16,682 yd. mi. at 50c	8,341.00	
Clay filler, 297 cu. yds. at $1.00	297.00	
Force Account Items:		
Completing grading work left by County forces	2,993.42	
Rolling base course macadam	598.87	
Hauling and spreading sand filler	1,821.40	
Laying "Telford" base	292.12	
Watering subgrade and macadam	16.71	
Total amount earned by contractor	$ 38,895.82	
Percentage retained until completion of contract	5,834.37	
Total amount paid to contractor		$ 33,061.45
Grand total expended to Nov. 30, 1920 (all State funds)		$ 35,262.25

[UNION]

Kamela-Hilgard Grading

The State location involves the construction of an entirely new road from the Umatilla-Union County line to Hilgard, a distance of 12.06 miles. This section was advertised for grading early in September, 1920, and bids were received during the same month. Opposition to the encroachments on railroad property was registered by the O. W. R. & N. Co., and it was decided to reject the single bid received and readvertise after an adjustment has been reached with the railroad company. This project will probably be readvertised early in 1921.

Under special agreement with the County, it is understood that the State will pay for the grading of this section. In return, Union County has agreed to surface the Union-Telocaset section to the extent of an equal expenditure.

Hilgard-La Grande Construction Engineering

Union County contemplated the grading of the section between Hilgard and La Grande, either by contract awarded by the State, or with their own forces, the work to be paid for by the County, with the State furnishing the necessary engineering supervision of construction. Owing to the unsatisfactory status of the County bonds, this work was necessarily abandoned. At this time engineering work to the amount of $113.08 had been done by the State, preparatory to the construction of the project.

La Grande-Hot Lake Grading

Between La Grande and Hot Lake, Union County agreed to construct, ready for surfacing, a new grade following a direct line across the valley, to replace the old road, which followed the line of the foothills. The new route saves 1.6 miles in 8.25. Work on this project was started in 1917, under David Glass as Resident Engineer. From then until September, 1920, grading was carried on as funds and equipment became available. Most of the work was done by team and proved slow, heavy and expensive, though the latter portion, handled with heavy mechanical equipment of the most modern type, shows better results. Three concrete bridges and one concrete culvert were built during 1919 by County forces. To date 7.75 miles have been completed, leaving unopened a short stretch bordering the lake at Hot Lake and one-quarter mile at Lone Tree, which is still under question regarding encroachment on railroad property occasioned by a conflict with their arrangements for hauling the output of a planing mill at this point. To avoid interference at this place it is planned to move the industrial track back nearer to the main track and install an overhead conveyor for the lumber, the highway passing between the mill and its loading track.

Except for the last one-quarter mile at Hot Lake, this section is being surfaced by the State under the job headings of "Island City-La Grande-Hot Lake" and "Lone Pine-Hot Lake." Considerable difficulty has been encountered with the grade because of the low, wet soil of the vicinity.

Since 1918 the work has been in charge of R. A. Pratt. No yardage figures or costs are available for the work done by Union County.

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Union-Telocaset Post Road Project

This improvement extends from the town of Union, along Pyles Canyon for six miles, closely following the route of the old wagon road, to a point about two miles north of Telocaset. Evidence of the old emigrant trail of Indian days can still be seen on the rocky hillsides in Pyles Canyon.

The contract for this work was let to Union County on August 6, 1918, and equipment was secured and work started. However, this procedure was declared illegal and the project was taken over by the State of Oregon and the work handled by State forces under C. A. Dunn, Superintendent of Construction. In the fall of 1918 R. A. Pratt replaced Mr. Dunn, acting as engineer in charge and superintendent of construction until the work was carried to completion in November, 1919.

The project was graded to a width of 24 feet and a very creditable piece of work was secured. Work was carried on in co-operation with the Federal Government under Project Agreement No. 8, the Government paying $15,000.00 of the total cost of $76,690.77. During 1918, the State expended $16,642.29, the balance having been expended during the present biennium.

STATEMENT SHOWING QUANTITIES OF WORK DONE AND EXPENDITURES MADE

Expenditures

For engineering	$ 4,286.33
For construction	72,404.44
Total	$ 76,690.77
Paid by State	$ 61,690.77
Paid by Federal Government	15,000.00
Total	$ 76,690.77

Quantities of Work Done

Common excavation	10,986	cu. yds.
Intermediate excavation	13,379	cu. yds.
Solid rock excavation	7,978	cu. yds.
Overhaul	21,855	sta. yds.
12" culvert pipe	744	lin. ft.
18" culvert pipe	104	lin. ft.
24" culvert pipe	144	lin. ft.
Class "A" concrete	85.3	cu. yds.
Class "B" concrete	42.7	cu. yds.
Rubble masonry	8.3	cu. yds.
Rip-rap	1,343	cu. yds.
Metal reinforcement	5,171	lbs.

North Powder-Telocaset Grading

The grading of a 9.06-mile section of the old Oregon Trail, between Telocaset and the Union-Baker County line near North Powder, was awarded Oxman & Harrington, Baker, Oregon, on August 10, 1920, under Contract No. 290, and by September 10 work was under way. The total estimated cost is $46,000.00, of which $4,500.00 will be borne by the State and $41,500.00 by Union County. The State is financing the entire work owing to the legal status of the County bond issue. This is being done with the understanding that Union County will make reimbursement for the construction expenditures, plus the average discount on State road bonds during the construction period.

[UNION]

Total expenditures made to the date of this report amount to $6,644.45, with construction being handled under the engineering supervision of V. Waggoner, Resident Engineer.

Elgin-Minam Post Road Project

This section of the La Grande-Joseph Highway is 9.37 miles in length and lies between the towns of Elgin and Minam. On July 9, 1918, a contract was awarded to Union County for grading the section, but it later developed that Union County could not legally hold the position of contractor in doing State work, and it was necessary for this Department to carry on the improvement with State forces. Operations were started October 2, 1918, but, on account of unfavorable location and shortage of labor during the period, the work was not completed until November 25, 1919.

In addition to the work done by State forces, nine culverts were built by the Rhyner-Dicke Company, under Contract No. 168. This contract was awarded on July 8, 1919, and provided for labor only, the material being furnished by the State. Construction started immediately and was completed by October 1, 1919, at a total cost of $10,494.60.

This improvement was made in co-operation with the Federal Government under Project Agreement No. 5. The total expenditures, including the bridges awarded under separate contract, amount to $82,-711.26. Expenditures of $3,838.44 were made during 1918, the balance of $78,872.82 being expended during the period covered by this report. The Federal Government co-operates to the extent of $20,575.50, the balance being paid from State funds.

Construction work was carried on until May 13, 1919, under the direction of R. A. Pratt, at which time he was succeeded by D. C. Marriott, Resident Engineer.

STATEMENT SHOWING QUANTITIES WORK DONE AND EXPENDITURES MADE

Expenditures

For engineering	$ 5,924.46
For construction	76,786.80
Total	$ 82,711.26
Paid by State	$ 62,135.76
Paid by Federal Government	20,575.50
Total	$ 82,711.26

Quantities of Work Done

Common excavation	31,864	cu. yds.
Intermediate excavation	11,439.9	cu. yds.
Solid rock excavation	6,851.3	cu. yds.
Overhaul	50,802	sta. yds.
12" plain concrete pipe	837	lin. ft.
18" reinforced concrete pipe	184	lin ft.
36" reinforced concrete pipe	68	lin. ft.
Class "A" concrete	238.09	cu. yds.
Class "B" concrete	719.51	cu. yds.
Metal reinforcement	12,798	lbs.
Rubble masonry	0.9	cu. yds.
Guard fence	56	lin. ft.
Catch basins	112.1	cu. yds.

[UNION]

Maintenance

Maintenance work in Union County has been applied only on the Union-Telocaset Post Road Project, which was turned over to the State for annual maintenance upon the completion of the grading by the Bureau of Public Roads. The work done has consisted of dragging and blading the roadbed, cleaning ditches and culverts and other minor miscellaneous work. This has been accomplished by County forces, on a co-operative basis of equal payments by the State and County. Expenditures to date amount to $469.11 from County funds, no payments having been made by the State.

Kamela-La Grande Survey

In the summer of 1920 David Glass and Max Kuney, Locating Engineers, restaked and revised the Kamela-La Grande section of the Old Oregon Trail in Union County, a distance of 19.27 miles. The location costs were very heavy, due to a number of railroad encroachments, the plans of which were necessary for submission to the railroad company. The survey extends from the Umatilla-Union County line near Kamela, at the summit of the Blue Mountains, and drops down Spring Canyon along the north side of the O. W. R. & N. Railroad to Glover Siding, at which point an overhead crossing of the railroad is made. From this point the location leaves Spring Canyon, crosses a low pass and enters the Grande Ronde Canyon at Haus Bridge and follows down this stream to Hilgard. From Hilgard the location follows the Grande Ronde River to La Grande. The Grande Ronde River Canyon is very narrow and the most feasible place for location is occupied by the O. W. R. & N. Railroad. This circumstance renders highway location difficult and construction expensive, involving heavy grading, three grade separation structures and two stream crossings of the Grande Ronde River.

The construction of this location will afford the traveling public a well-drained open route from La Grande to the summit of the Blue Mountains, on a maximum five per cent grade.

Wallowa Hill Survey

The survey of the Wallowa Hill section was made in 1917. Plans and estimates for this location were worked up in 1919.

Hot Lake-Union Survey

This location, 6.3 miles in length, running from Hot Lake to Union, and connecting the La Grande-Hot Lake section on one end and the Union-Telocaset section on the other, was made in June, 1919, by W. P. Hughes. While a gravel bank is encountered on the last three miles, the first three from Hot Lake are over the same low bog land as that between La Grande and Hot Lake. For this reason it will probably be necessary to depart from the direct route at first laid out, in order to take advantage of any firmer soil conditions that may be found.

This section will include an overhead crossing of the O. W. R. & N. at Hot Lake, two 60-foot spans over Catherine Creek and a number of structures over irrigation ditches.

[UNION]

Telocaset-North Powder Survey

During March, April and May of 1920, a survey of 9.06 miles of the Old Oregon Trail, between Telocaset and North Powder, was made by G. V. Robinson, Locating Engineer.

From a point about two miles northwest of Telocaset, at the end of the Union-Telocaset construction, the survey extends south and east, approximately on the line of the present road, to North Powder. The O. W. R. & N. Railroad is crossed with one overhead crossing at Telocaset and one at North Powder. It was not practicable to parallel the railroad and avoid the grade separation crossings, because of the longer distance and very heavy construction which would be encountered by a line on the north side of the railroad.

The location is through a productive grain and hay country, and will accommodate a large local traffic, in addition to being a part of the main trunk east and west road carrying seasonal tourist traffic.

Willow Creek-Elgin Survey

This location extends from Willow Creek, at a point about three miles north of Imbler, for six miles to Elgin, connecting with the graded Elgin-Minam section. As now located, entirely on the west side of the Grande Ronde River, the line will include one 60-foot span and a number of minor structures. An alternate route, still under consideration because of better grades and apparent greater freedom from snow blockade, involves crossing the river twice, as well as the bridge used on the west side line.

Under the same section is included a piece, 3.46 miles long, extending from Island City, along the Joseph Branch tracks, to Conley station. Location of this has been completed. All work on the above two units has been done, at odd times, under R. A. Pratt, Resident Engineer, in connection with paving and macadam work.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by J. F. Phy, County Judge; W. J. Townley and C. A. Galloway, County Commissioners, under date of April 8, 1920, stating that a levy of 1 mill on all taxable property of the county was made for market road construction and designating seven roads to be improved as market road projects.

A levy of 1 mill on a valuation of $25,938,932.23 produced a County market road fund of $25,938.93. Included in the State levy of taxes was a levy of 1 mill on a valuation of $21,064,593.20, which produced $21,064.59, which became a part of the "State market road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 21,064.59
Funds apportioned by the State Highway Commission April 3	8,591.31
Funds produced by County 1-mill levy	25,938.93
Total available for 1920	$ 55,594.83

Project No. 1—"Ladd Canyon Road."

A survey 5.5 miles in length was made by Mr. Birney, Roadmaster. The road is through a rugged canyon and a section 1.27 miles in length

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was graded 14 feet in width, in light work, and 12 feet in width in heavy work, in 1920. Construction work was done by County forces. Estimated cost, $20,000.00.

Project No. 2.—"Union-High Valley."

A survey four miles in length was made by Mr. Birney, Roadmaster. The road is through a rugged canyon. County forces constructed one mile of grade, 14 feet in width. No surfacing was done. Estimated cost, $5,000.00.

Project No. 3—"Union-Cove Road." No work was done.

Project No. 4—"Hilgard-Starkey Road." A survey two miles in length was made by Mr. Birney, Roadmaster. The road is through rough country, over ledge rock. About one-half mile of grade, 16 feet wide, was constructed by County forces. Estimated cost, $5,000.00. Approximately $1,000.00 was expended in 1920.

Project No. 5—"North Powder River Road, Southwest."

A survey 5.1 miles in length was made by G. V. Robinson, Locating Engineer, in the employ of the State Highway Commission. The road is through open, level county. The road, 5.1 miles in length, was graded 20 feet wide by County forces and surfaced 9 feet wide with crushed gravel by contract. Approximately $15,000.00 was expended on this project.

Project No. 6—"Union-Medical Springs"—Catherine Creek Section.

A survey five miles in length was made by Mr. Birney, Roadmaster. The road is through open, level country. Four miles were graded 20 feet in width and surfaced 8 feet in width with crushed gravel, by County forces. Approximately $16,000.00 was expended on this project.

Project No. 7—"Elgin-Cabin Creek." No work done.

WALLOWA COUNTY

Wallowa County is so situated with respect to the State highway system that its road problem is entirely local in character. It is not touched by a trunk highway. The La Grande-Joseph Highway is the County's most important traffic artery and connects the fertile Wallowa valley with outside points. In addition to its commercial value, the construction of this highway will furnish easy access to the attractive summer camping grounds near the lakes and mountains of eastern Wallowa County.

The people of Wallowa County, realizing these conditions and the value of good roads, voted in June, 1919, the sum of $300,000.00 for permanent road construction. Of this amount, $200,000.00 will be spent on the La Grande-Joseph Highway and the balance, $100,000.00, on the different County and Market Roads.

In 1919 the State Highway Department surveyed the entire length of the La Grande-Joseph Highway, a distance of 39.8 miles. The grading of 8.38 miles of this project is now under contract to A. D. Kern of Portland. The County has agreed to co-operate, on a fifty-fifty basis with the State, in grading and graveling the balance of this highway from Rock Creek to Joseph, 31.42 miles. The approximate cost of this improvement is $500,000.00, and it is expected that construction will be started in the spring of 1921.

Work in Wallowa County was handled by Division Engineer M. O. Bennett, resigned, until September, 1920, when the district was taken over by R. H. Baldock, Division Engineer.

Wallowa Canyon Post Road Project

The Wallowa Canyon section of the La Grande-Joseph Highway extends from Minam southeasterly to the mouth of Rock Creek, a distance of 8.38 miles. Under co-operative agreement No. 40, the project is financed by the State, the Federal Government and Wallowa County. The total estimated cost of the project is $140,000.00, of which $8,215.15 is assumed by the State, $70,000.00 by Wallowa County and $61,784.85 by the Federal Government.

On March 23, 1920, the State Highway Commission awarded contract No. 249 to A. D. Kern of Portland, Ore., for the grading of the project. Work was started on April 15 and is approximately 40 per cent complete at the present time, expenditures of $51,971.83 having been made, $33,586.14 by the State and $18,385.69 by the County. R. L. Shreve is Resident Engineer on the work.

Flora-Enterprise Forest Road Project

During 1919 the Bureau of Public Roads inaugurated State highway construction in Wallowa County by locating, and starting construction on the grading of a 13 mile section extending through the Wallowa National Forest, known as the Flora-Enterprise Forest Road Project. This work was handled, under the supervision of the Bureau of Public Roads, by day labor forces and paid for from funds advanced by the State, County, and Federal Government.

The roadbed was built to a width of 16 feet, with maximum grades of five per cent, and was completed in November, 1919 at a cost of $88,691.35. The project agreement calls for total expenditures of $123,000.00, to be paid $51,637.00 by the State, $19,733.00 by Wallowa County, and $51,630 by the Federal Government. The difference saved in the grading of the project is being applied to placing a crushed rock surfacing on 6 miles of the road, to cover portions which were impassable during bad weather.

Total expenditures to date amount to $103,799.58, which have been paid $15,671.05 by the County, $46,420.41 by the Federal Government and $41,708.12 by the State, including $765.07 expended during 1918.

Minam-Joseph Survey

The Minam-Joseph Section of the La Grande-Joseph Highway is an important link, being the only outlet from Wallowa Valley to outside points.

This section begins at the County line between Union and Wallowa Counties, crossing the Wallowa River at Minam and extending easterly through the Wallowa River Canyon and the town of Wallowa; thence southeasterly, passing between the towns of Lostine and Evans and through the upper valley, into the town of Enterprise. Leaving Enterprise, the road turns south into the town of Joseph, making the length of this section 39.8 miles, all situated in Wallowa County.

This road will be of great benefit to Wallowa County, giving the people a direct winter and summer route to outside points, winter travel at the present time being almost impossible. The improvement of this section will also greatly increase the tourist and pleasure traffic, bringing within easy reach of outside points the numerous camping and pleasure resorts.

About fifteen miles of this section will be in canyon, with the balance through highly cultivated farm and hay lands. Several bridges, of from fifty to one hundred foot span, will also be required.

The survey was started in May, 1919, and completed in September of the same year. The first 8.38 miles, known as the Wallowa Canyon section, is now under construction by contract awarded to A. D. Kern of Portland.

Location was made under the direction of J. M. Clark, Locating Engineer for the State Highway Department.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions" signed by Edgar Marvin, County Judge, Ernest F. Johnson and Sam Litch, County Commissioners, under date of March 5, 1920, stating that a levy of 1 mill ($17,528.42) on all the taxable property of the County, was made for Market Road construction and designating four roads to be improved as Market Road projects.

A levy of one mill on a valuation of $17,472,147.35 produced a County Market Road fund of $17,492.15. Included in the State levy of taxes was

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a levy of 1 mill on a valuation of $14,188,852.20, which produced $14,188.85, and which became a part of the "State Market Road Appropriation."

Funds apportioned by the State Highway Commission March 2	$ 14,188.85
Funds apportioned by the State Highway Commission April 3	5,787.00
Funds produced by County levy of 1 mill	17,472.15
Total available for 1920	$ 37,448.00

All surveys, preparation of plans and estimates has been done by R. N. Kellogg, County Engineer.

Project No. 1.—"The Wallowa-Powatka Road."

A reconnaissance survey was made of approximately twelve miles. Location line has been established for a distance of six miles. The country through which the road passes is rolling and mountainous. It is proposed to grade a roadbed 16 feet in width with a maximum grade of five and one-half per cent. No construction work was done in 1920.

Project No. 2.—"The Lostine-Evans Leap Road.

A reconnaissance survey was made of approximately twenty miles. Location line has been established for a distance of 16 miles. The country through which the road passes is rolling. It is proposed to grade a roadbed 16 feet in width with a maximum grade of five and one-half per cent. One mile is being graded 24 feet in width and surfaced 16 feet in width, with gravel, at an estimated cost of $4,800.00. This 1 mile section will be completed in 1920. Work done by County forces.

Project No. 3.—"The Enterprise-Imnaha Road."

A reconnaissance survey was made of approximately 16 miles. Location line has been established for a distance of 7.5 miles. The maximum grade is five and one-half per cent. The improvement for 1920 consisted of grading a roadbed 16 feet wide approximately six miles in length. The estimated cost of 6.95 miles is $42,828.90. Available for 1920, $27,398.00.

Project No. 4.—"The Joseph-Armon Road."

No location line has been established and no construction work done.

WASCO COUNTY

In Wasco County is located the junction point of The Dalles-California Highway with the Columbia River Highway. During the years 1919 and 1920 this County has been the center of activity for a large amount of highway work.

The Columbia River Highway, being the main artery of travel between Eastern and Western Oregon, is of prime importance, and construction work upon the last link is being rushed to completion.

Next in importance is The Dalles-California Highway, which extends southerly through the County into large grain and fruit districts. Three miles out of The Dalles have been paved, and a survey has been made to Dufur. Extended reconnaissance of possible routes of location between The Dalles and Madras have been made, but, owing to the varied problems of topography and distance involved, the final location has been delayed.

An urgent request for the early construction of that section of The Dalles-California Highway between Three Mile Creek and Dufur has been made by the people of Wasco County, and a bond issue of $100,000.00 for the grading of this section by the County was carried at the election in November, contingent upon the Highway Commission agreeing to pave the 14 miles when graded.

Wasco County voted bonds in 1916 to the extent of $260,000.00 for highways, and there yet remains about $38,000.00 authorized for use in present construction.

Work in the County has been handled by Division Engineer C. C. Kelley until September, 1920, and by Division Engineer J. H. Scott since that time.

The Dalles-Chenowith Paving

On May 27, 1919, contract No. 135 was awarded to the United Contracting Company of Portland, Ore., for paving the 2.1 miles section of the Columbia River Highway between the city limits of The Dalles and Chenowith. This pavement was to consist of a 2-inch bitulithic wearing surface on a broken stone base. After the completion of one-half mile of pavement, the State Highway Commission cancelled the contract and abandoned the section in favor of a revised location which makes a saving of nearly one mile in distance between the terminal points. Wasco County took over a portion of the contract, and continued the pavement for approximately one-half mile at their own expense. The half-mile constructed by the State represents a total expenditure of $12,900.93, being all paid from State funds. Work was handled under the supervision of J. E. Peck, Resident Engineer.

[WASCO]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 709.07
Contract Items as follows:		
Clearing, all, at $50.00	$ 50.00	
Common excavation, 848.3 cu. yds. at 40c	339.32	
Intermediate excavation, 66.4 cu. yds. at 80c	53.12	
Solid rock excavation, 709.7 cu. yds. at $2.00	1,419.40	
Overhaul, 1,000 sta. yds. at 4c	40.00	
Type "E" Bit. pavement, 4,315.7 sq. yds. at $1.50	6,473.55	
Broken stone, loose measure, 1,059.25 cu. yds. at $2.97	3,145.97	
12" plain concrete pipe, 36 lin. ft. at $1.30	46.80	
Broken stone shoulders, 4,855 lin. ft. at 6c	291.30	
Class "C" concrete, .8 cu. yds. at $28.00	22.40	
Clay filler, 24 cu. yds. at $1.00	24.00	
Force Account Work:		
Extra work account changing limits of contract	286.00	
Total amount paid contractor		$ 12,191.86
Grand total cost of project (all State funds)		$ 12,900.93

The Dalles-Seufert Paving

This work extends from The Dalles city limits to Seuferts, a distance of 2 miles. It was graded in 1917 by the County, using money from the bond issue of the previous year. During the winter months of 1917-1918 it was almost impassable and location survey was made for the State in January, 1919. March 26, 1919, contract No. 95, for paving with standard bitulithic on crushed rock base, was let to the United Contracting Company of Portland. Paving was completed August 20, 1919. This pavement is 16 feet wide with 2-foot macadam shoulders.

J. E. Peck was Resident Engineer in charge of the work, which represents a total cost of $44,670.10 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,889.49
Advertisements for bids		6.90
Contract Items as follows:		
Excavation, no classification, 2,972.3 cu. yds. at 60c	$ 1,783.38	
Overhaul, 800 sta. yds. at 4c	32.00	
Pavement, Bitulithic, Type "E," 17,525.2 sq. yds. at $1.59	27,865.07	
Broken stone, 4,801.75 cu. yds. at $2.80	13,444.90	
Broken stone shoulders, 19,705 lin. ft. at 6c	1,182.30	
Clay fillers, 100 cu. yds. at $1.00	100.00	
Force Account Items:		
Placing drain tile and culvert	322.65	
Total	$ 44,730.30	
Deductions:		
War tax reduction on freight	28.82	
Royalty retained pending validity of W. C. Co.'s patent on Bitulithic pavement	1,927.77	
Total deductions	$ 1,956.59	
Total amount paid contractor		$ 42,773.71
Total amount expended on project to Nov. 30, 1920 (all State funds)		$ 44,670.10

The Dalles-Threemile Creek Post Road Project

This project lies at the north end of The Dalles-California Highway and extends from the city limits of The Dalles south 2 miles to Threemile Creek.

On August 5, 1919, the State Highway Commission awarded contract No. 175 to the United Contracting Company of Portland, Ore., for the

[WASCO]

paving of the section with a 2-inch bitulithic wearing surface on broken stone base. Work was started immediately and completed in October of the same year. The project was financed in co-operation with the Federal Government and Wasco County under the terms of Post Road Project agreement No. 16 and the completed work represents a total expenditure of $47,229.78. Of this amount, $4,000.00 was paid by Wasco County, $23,368.77 by the Federal Government and $19,861.01 by the State. Engineering supervision on the project was handled by J. E. Peck, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,076.74
Contract Items as follows:		
Common excavation, 3,938.8 cu. yds. at 70c	$ 2,757.16	
Solid rock excavation, 498.1 cu. yds. at $2.00	996.20	
Broken stone, 3,915.5 cu. yds. at $2.91	11,394.11	
Standard Bitulithic pavement, Type "E," 18,786 sq. yds. at $1.48	27,803.28	
12" plain concrete pipe, 220.6 lin. ft. at $1.50	330.90	
18" reinforced concrete pipe, 64 lin. ft. at $2.45	156.80	
Class "C" concrete, 9.2 cu. yds. at $28.00	257.60	
Clay or earth filler, 150 cu. yds. at $1.00	150.00	
Run-of-bank gravel, 405.75 cu. yds. at $1.98	803.39	
Shoulders, 21,120 lin. ft. at 6c	1,267.20	
Force Account:		
Placing drain tile	236.40	
Total amount paid contractor		$ 46,153.04
Grand total cost of project		$ 47,229.78
Paid by State	$ 19,861.01	
Paid by Government	23,368.77	
Paid by County	4,000.00	
Total	$ 47,229.78	

Hood River-Mosier Macadam

Full description of the macadamizing of the Hood River-Mosier section, which is partly within Hood River County and partly within Wasco County, will be found in the section of this report devoted to Hood River County.

Toll Bridge Cutoff Grading and Macadam

The Deschutes River Bridge was completed in June, 1920, and upon completion of the fill for the approaches to the bridge on September 5, the need for a connecting highway from the present County road, on the west side of the Deschutes River, to the new bridge was apparent. After the successful conclusion of a legal controversy with M. A. Moody, owner of the land between the old toll bridge and the new highway bridge, the right-of-way was secured. State forces were immediately put to work on grading this connecting link and travelers bound for the 1920 roundup at Pendleton were routed over the new Deschutes bridge, thus eliminating the use of a toll bridge which had been used since 1867.

Upon completion of the grading, an emergency agreement was made with Robert M. Niemeyer for gravel surfacing the section at an additional cost of $1,050. This work was completed about October 1, 1920, Wasco County bearing fifty per cent of the cost of graveling and fencing the right-of-way. The grading was paid for by the State.

Work was accomplished under the direction of J. E. Peck, Resident Engineer. The total cost to the State amounted to $2,226.55.

[WASCO]

Unit No. 3 Hood River-Mosier Grading

This is the easterly unit of the Hood River-Mosier section of the Columbia River Highway and involves some of the heaviest grading work encountered in the operations of this Department. It includes what is known as the Twin Tunnels, these tunnels having a combined length of 350 feet. In places the roadbed is carried directly above the tracks of the O. W. R. & N. Co., at a difference of elevation of approximately 300 feet. No serious interference with the operation of trains occurred, however, as extreme care was exercised in the handling of the materials.

Contract No. 74, covering the grading of 2.3 miles and the construction of the Twin Tunnels, was awarded to A. D. Kern of Portland, Ore., on January 7, 1919. The total estimated cost of the work is $197,599.14, of which amount the sum of $184,600.07 has been expended to date.

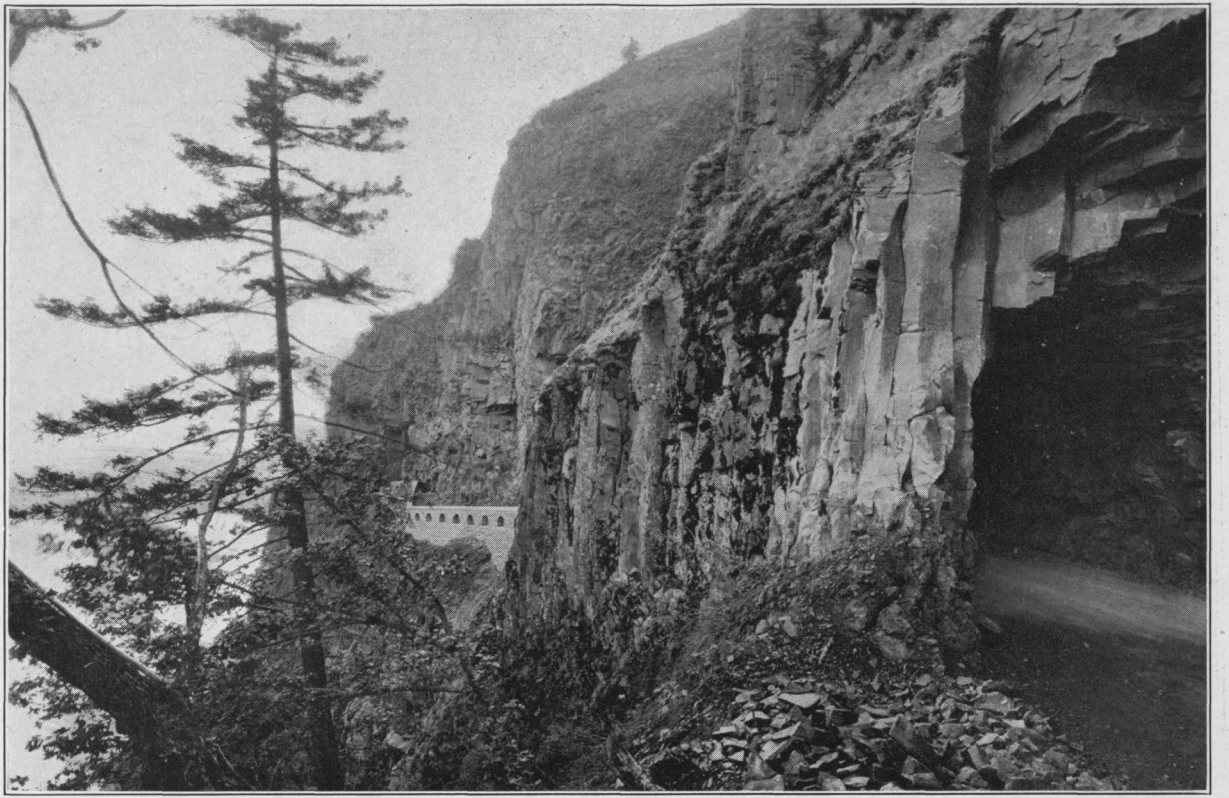
Description of units Nos. 1 and 2 will be found in the section of this report devoted to Hood River County.

DETAILED STATEMENT OF EXPENDITURES

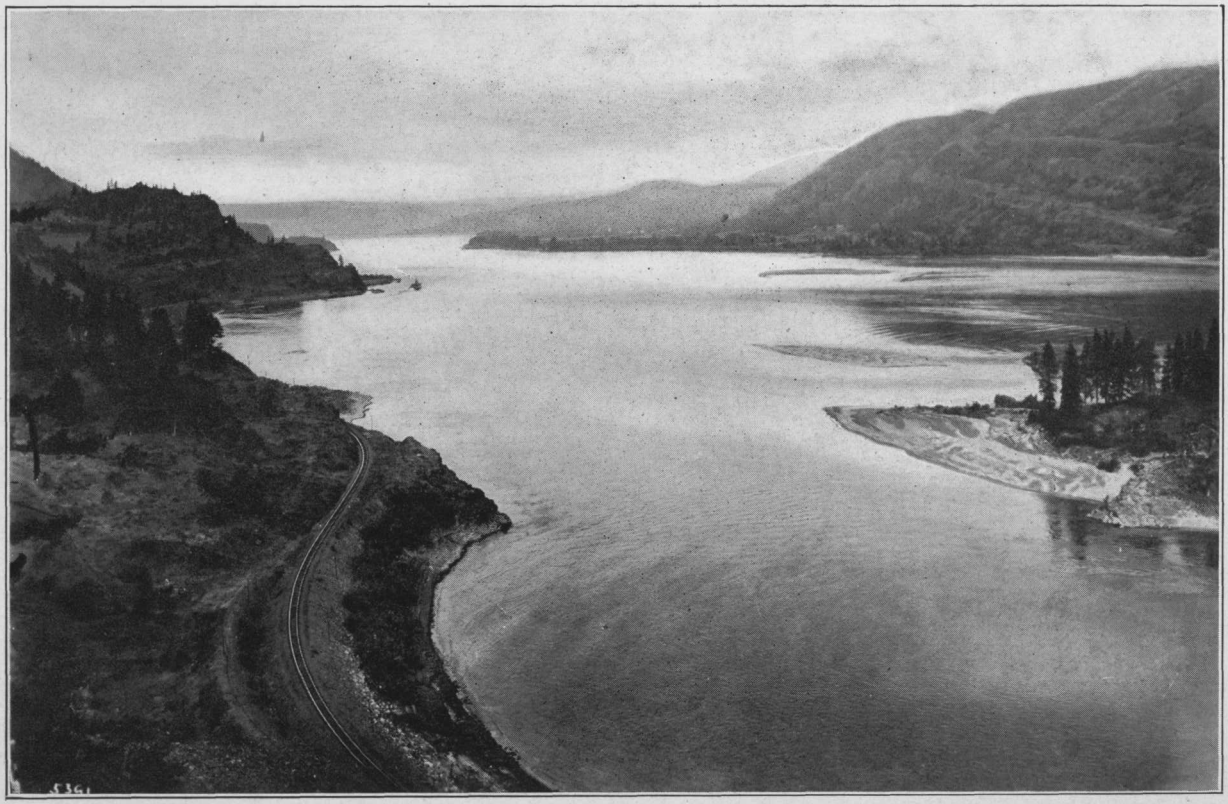
Engineering		$ 7,563.69
Advertisement for bids		15.29
Guarding railroad and power line		1,180.31
Contract Items as follows:		
Clearing and grubbing, all	$ 500.00	
Extra clearing and grubbing, 3.557 acres at $100.00	355.70	
Common excavation, 120,117.9 cu. yds. at 48c	57,656.59	
Solid rock excavation, 85,988.2 cu. yds. at $1.04	89,427.73	
Overhaul, 155,776 sta. yds. at 3c	4,673.28	
12" concrete pipe, 402 lin. ft. at $1.34	538.68	
Class "A" concrete, 80.14 cu. yds. at $30.00	2,404.20	
Class "C" concrete, 5.20 cu. yds. at $20.00	104.00	
Reinforcing steel, 7,622 lbs. at 9c	685.98	
Dry rock walls, 120.42 cu. yds. at $4.00	481.68	
Tunnel, 349.8 lin. ft. at $57.00	19,938.60	
Tunnel overbreak, 263.5 cu. yds. at $3.00	790.50	
Bridge railing, 95.5 lin. ft. at $3.00	286.50	
Rubble masonry, 90.01 cu. yds. at $12.00	1,080.12	
Force Account:		
Moving Pacific Bridge Co's oil house off right-of-way	47.30	
Constructing rubble wall and timber barricade alongside O. W. R. & N. Company's tracks	3,788.00	
Hauling screenings for new fill	13.20	
Constructing rubble wall and railing at tunnels	3,395.04	
Constructing retaining wall, backfilling and making hand placed slope	2,672.75	
Total amount earned by contractor		$188,839.85
Grand total cost of project		$197,599.14
Final payment to contractor in transit		12,999.07
Total amount expended to Nov. 30, 1920 (all State funds)		$184,600.07

Tunnel No. 1—Lining

In the west tunnel, of the two tunnels on unit No. 3 of the Hood River-Mosier section, bad rock conditions were encountered and apparent movement of the hillsides in this vicinity has caused frequent falls of rock which have been a dangerous menace to traffic. In order to care for this situation a concrete lining and monumental portal on the tunnel were advertised, but later withdrawn when continued movement of the



TUNNEL ON THE HOOD RIVER-MOSIER SECTION OF THE COLUMBIA RIVER HIGHWAY IN WASCO COUNTY. SHOWING OBSERVATION GALLERY REACHED THROUGH ONE OF THE TUNNELS TO LIGHT THE MAIN TUNNEL. CONSTRUCTED IN 1919 AND 1920.



VIEW DOWN THE COLUMBIA RIVER FROM THE OBSERVATION GALLERY SHOWN ON THE PRECEDING PAGE.

[WASCO]

rock made a rigid lining inadvisable. The work has been taken over by State forces that are now engaged in placing a timber lining in the tunnel, which, it is believed, will solve the problem. This work is estimated to cost $12,000.00, of which $2,835.25 has been expended to date. The cost of the work is to be paid for entirely by the State.

Mosier-Rowena Post Road Project

Grading

On October 7, 1919, contract No. 205 for grading 8.96 miles on the Columbia River Highway between Mosier and Rowena was awarded to the Johnson Contract Company of Portland, Oregon. Much heavy rock work was encountered along the bluff above Rowena. The grading is now practically complete and represents one of the best finished sections of the highway in the State. On the finished roadbed a layer or talus rock has been placed on all earth and sandy places. The total estimated cost of this grading and talus is $280,000. Expenditures to date amount to $234,477.80.

Surfacing

On August 10, 1920, contract No. 289 was awarded to A. D. Kern of Portland, Oregon, for surfacing this section. It was later decided that the project would be paved during 1921 and the surfacing has been reduced to a depth of 4 inches, this being sufficient to carry traffic during the present winter, and furnish a suitable base for pavement when a contract for the same is awarded. Inasmuch as the contractor had based his organization upon placing the entire amount of gravel appearing in the original contract, the work has been extended to cover the section from Rowena to Chenowith Creek near The Dalles. It is estimated that the total cost of the surfacing of the Mosier-Rowena section proper, will be approximately $37,500.00, with expenditures to date of $9,952.75.

The grading and surfacing mentioned above has been carried on under the engineering supervision of U. R. Grey, Resident Engineer, for this Department.

Mosier Arch

The highway crosses Mosier Creek just at the edge of the town of Mosier. A concrete structure was designed for this crossing and is now in progress of construction. This design calls for a center arch span 110 feet with 36 feet of approach on each end, making a total length of 182 feet. Contract No. 208 was awarded for its construction on February 5, 1920, Lindstrom & Feigenson being the successful bidders. It is probable that the work will be complete by January 1, 1921, and will cost approximately $47,400.00, of which $25,904.00 has been expended to date.

Dry Canyon Arch

About six miles east of Mosier the highway crosses a deep ravine at an elevation of approximately 600 feet above the Columbia River. This crossing is made by means of a 75-foot arch span with two 15-foot approach spans all of reinforced concrete construction. Bids were received for the construction of this structure on February 5, 1920. All proposals

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received were considered excessive and it was decided to do the work with State forces, utilizing the organization which had been built up on work in Yamhill County. Carrying out this plan, materials were assembled and the work started in July. Progress is being made satisfactorily, and it is expected that construction will be finished by January 1, 1921, at a total estimated cost of $22,300.00. This work is subjected to the same inspection as would be given if it were under contract, Christ Fauerso being Resident Bridge Engineer on this as well as the Mosier Creek structure. Expenditures to date amount to $19,856.33.

This entire project is being constructed in co-operation with the Federal Government under project agreement No. 35. The total estimated cost is $387,200.00, of which $221,338.02 will be paid by the State and $165,861.98 by the Federal Government. At the closing of the present biennium expenditures of $290,190.88 have been made from State funds.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

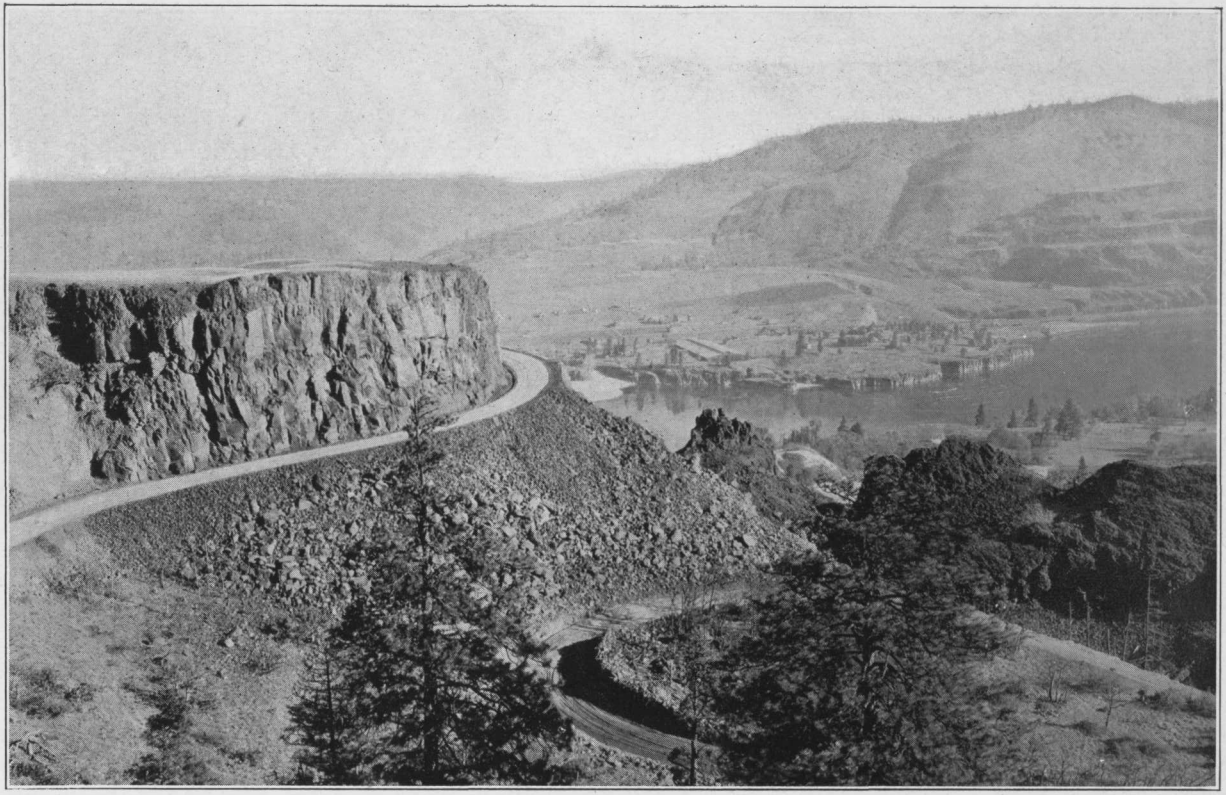
Grading

Engineering		$ 10,230.45
Payment to reimburse contractor for powder exceeding 10c per lb.		570.63
Graveling to maintain traffic at Dry Canyon Arch		57.00
Cost of explosives furnished as per contract (deduction from contractor's payments to be made at 10c per pound)		8,108.37
Contract Items as follows:		
Clearing and grubbing, all, at $6,300.00	$ 6,300.00	
Common excavation, 83,209 cu. yds. at 60c	49,925.40	
Solid rock excavation, 125,804 cu. yds. at $1.40	176,125.60	
Overhaul, 30,204 sta. yds. at 5c	1,510.20	
12" plain concrete pipe, 1,428 lin. ft. at $1.50	2,142.00	
18" reinforced concrete pipe, 120 lin. ft. at $3.75	450.00	
24" reinforced concrete pipe, 96 lin. ft. at $5.00	480.00	
36" reinforced concrete pipe, 128 lin. ft. at $8.25	1,056.00	
6" porous drain tile, 168 lin. ft. at 50c	84.00	
Class "C" concrete, 45.14 cu. yds. at $30.00	1,354.20	
Rubble masonry, 112.8 cu. yds. at $15.00	1,692.00	
Dry rock wall, 153.5 cu. yds. at $8.00	1,228.00	
Hauling talus sub-surfacing, 1st mile, 2,425.5 cu. yds. at 60c	1,455.30	
Hauling talus sub-surfacing, 2nd mile, 520.5 cu. yds. at $1.05	546.53	
Hauling talus sub surfacing, 3rd mile, 974 cu. yds. at $1.45	1,412.30	
Hauling talus sub-surfacing, 4th mile, 3,336.5 cu. yds. at $1.85	6,172.53	
Materials on hand	922.50	
Force Account Items:		
Reconstructing private water system under highway grade	301.50	
Draining spring in roadbed	361.68	
Changing forms on Hog Canyon Bridge to fit super-elevation	23.02	
Total amount earned by contractor	$253,542.76	
Percentage retained until completion of contract	38,031.41	
Total amount paid to contractor		$215,511.35
Grand total expended to Nov. 30, 1920 (all State funds)		$234,477.80

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Surfacing

Engineering		$ 677.82
Contract Items as follows:		
Gravel surfacing, 5,246 cu. yds. at $2.08	$ 10,911.68	
Total amount earned by contractor	$ 10,911.68	
Percentage retained until completion of contract	1,636.75	
Total amount paid to contractor		$ 9,274.93
Grand total expended to Nov. 30, 1920 (all State funds)		$ 9,952.75



BETWEEN MOSIER AND THE DALLES ON THE COLUMBIA RIVER HIGHWAY IN WASCO COUNTY. GRADED IN 1920.



CONCRETE VIADUCT OVER THREE MILE CREEK ABOUT THREE MILES EAST OF THE DALLES ON THE COLUMBIA RIVER HIGHWAY IN WASCO COUNTY. TOTAL LENGTH TWO HUNDRED FEET. WILL BE COMPLETED ABOUT DECEMBER 20, 1920.

[WASCO]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Mosier Arch

Engineering		$ 2,098.46
Truck drivers' wages		15.00
Contract Items as follows:		
Excavation, 385 cu. yds. at $4.25	$ 1,636.25	
Excavation below elevation shown on plans, 74 cu. yds. at $4.25	314.50	
Class "A" concrete, 295.3 cu. yds. at $35.75	10,556.98	
Class "B" concrete, 181.8 cu. yds. at $30.00	5,454.00	
Metal reinforcement, 43,156 lbs. at 7½c	3,236.70	
Materials on hand	6,790.44	
Total amount earned by contractor	$ 27,988.87	
Percentage retained until completion of contract	4,198.33	
Total amount paid to contractor		$ 23,790.54
Grand total expended to Nov. 30, 1920 (all State funds)		$ 25,904.00

Rowena-The Dalles Post Road Project

On October 7, 1919, contract No. 206, for grading the 7.76 miles between Rowena and the west city limits of The Dalles, was awarded to A. D. Kern of Portland, Oregon. Included in this contract was a reinforced concrete bridge, 60 feet in length, over Chenowith Creek. The grading was completed in October, 1920, and immediately thereafter work was started by State forces spreading talus rock on all sand and earth portions between Rowena and Chenowith Creek bridge, in preparation for the placing of a 4-inch course of pit run gravel. This gravel surfacing will be done by A. D. Kern, as extension to his contract for surfacing the section between Mosier and Rowena. The remaining 1.76 miles between the Chenowith Creek and The Dalles will be surfaced with 8-inches of crushed rock by State forces and will be completed about January 1, 1921. The completion of the surfacing under way will provide suitable traffic conditions for winter travel and after compacting during the present winter season will afford an excellent base for paving. Considerable extra work has been accomplished by the State forces in erecting walls, making a channel change and placing rip rap on the bottom and sides of the channel in order to fully protect the footings on the Chenowith Creek bridge. Expenditures for this work amount to $3,570.34 to date.

The total estimated cost of the project is $150,000.00. Of this amount the Federal Government co-operates to the extent of $49,200.69, the County $1,350.00, for construction of a cattle pass at station 731 plus 40, with the State paying the balance of $99,449.31. This work is being handled as a co-operative project under the terms of project agreement No. 36, the sum of $84,748.62 having been expended to the date of this report, $60,642.19 by the State and $24,106.43 by the Government.

[WASCO]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Contract Grading

Engineering		$ 4,328.60
Extra excavation paid direct by State		53.25
Wet masonry wall, paid direct by State		605.00
Guarding O. W. R. & N. track during construction		12.50
Contract Items as follows:		
Clearing and grubbing, 100 per cent, at $500.00	$ 500.00	
Common excavation, 41,851 cu. yds. at 74c	30,969.74	
Solid rock excavation, 21,795 cu. yds. at $1.80	39,231.00	
Overhaul, 14,514 sta. yds. at 5c	725.70	
12" plain concrete pipe, 1,215 lin. ft. at $1.70	2,065.50	
Class "A" concrete, 230.87 cu. yds. at $35.00	8,080.45	
Class "C" concrete, 20.64 cu. yds. at $30.00	619.20	
Metal reinforcement, 27,776 lbs. at 10c	2,777.60	
Concrete handrail, 133 lin. ft. at $3.50	465.50	
Rubble masonry, 69.4 cu. yds. at $12.00	832.80	
Payhaul on talus, 1,948 yd. miles at 50c	974.00	
Force Account Items:		
Driving 70 lin. ft. water tunnel	121.83	
Removing stone, rip-rapping slopes, protecting grade	58.68	
Hauling and spreading talus on sandy section of grade	772.58	
Total amount earned by contractor	$ 88,194.58	
Percentage retained until completion of contract	13,229.19	
Total amount paid to contractor		$ 74,965.39
Grand total expended to November 30, 1920		$ 79,964.74
Paid by State	$ 55,858.31	
Paid by County	24,106.43	
Total	$ 79,964.74	

Seufert-Deschutes Post Road Project

This section of the Columbia River Highway begins at the end of the pavement about three miles east of The Dalles, and extends to the County boundary line at the Deschutes River. Five Mile Creek is crossed by what is known as the Seufert Viaduct, a 210-foot concrete bridge of ornamental design. At Big Eddy and Dillon the O. W. R. & N. Railroad has been crossed by overhead structures. These three bridges have been awarded under separate contracts and are in addition to several small concrete bridges which have been constructed under the grading contract. In the final adopted alignment, use is made of the old Portage Railroad roadbed, as well as the rock bank of the Celilo Canal. From Dillon the location follows closely the south side of the O. W. R. & N. Company's tracks to the Deschutes bridge. Two miles of abandoned roadbed has been utilized over this section. A 220-foot tunnel is being constructed through a high rock bluff two miles east of Celilo, and 120-foot tunnel is being constructed about one mile west of the Deschutes River.

There are several features of interest on this section. For 8 miles it parallels the Celilo Canal, giving an excellent view of the rugged Big Eddy and the magnificent Celilo Falls. Here the Indians, at certain seasons, make immense catches of salmon with spear and net. Fish wheels may be seen in operation at various points, and just east of Celilo the highway passes under Fall bridge, which spans the Columbia River at this point. Either macadam or a pavement surfacing is contemplated on this section, and, when this is completed, a wonderful highway will be open from Pendleton to the sea.

[WASCO]

Grading

Contract No. 253 covering the grading of the 12.5 miles of the section was awarded March 23, 1920 to the James F. Clarkson Company of Portland, Ore. Some delay will be experienced in finishing the two tunnels, as bad rock conditions encountered have made necessary some minor revisions in their location. This work is being handled under the direction of J. E. Peck, Resident Engineer, with a total cost of $241,000.00. Of this amount, $121,221.02 has been expended to date.

Seufert Viaduct

Just south of the cannery at Seufert, about three miles east of The Dalles, the Highway crosses Threemile Creek at an elevation of some fifty feet above the bottom of the stream bed.

A concrete viaduct consisting of one 22-foot and five 40-foot spans is practically complete for this crossing and will soon be opened to traffic. In order to get a suitable foundation, it was necessary to excavate to a depth of 20 feet below the stream bed, making some of the columns as long as 70 feet.

The contract for this work was awarded on March 23, 1920, to the Colonial Building Company under contract No. 257. It is probable that it will be completed by December 1 and will cost approximately $42,200.00. The expenditures to date amount to $34,284.05.

Big Eddy Overcrossing

About one mile east of Seufert station, the highway crosses the O. W. R. & N. Company's track on a concrete viaduct having one 47-foot span, two 33-foot spans and 133 lineal feet of wooden approach trestle. Contract No. 255 was awarded for this structure on March 23, 1920, to the Colonial Building Company of Spokane, Washington. It is expected that work will be complete by January 1, 1921, and that it will cost a total of approximately $19,500.00. This structure is to be paid for twenty per cent by the railroad company, twenty per cent by the County and sixty per cent by the State. Expenditures to date, $7,842.42.

Dillon Overcrossing

About five miles east of the Big Eddy Overcrossing the highway re-crosses to the south side of the railroad track. The overcrossing constructed at this point has been given the name of the nearby railroad station. This structure differs from the Big Eddy overcrossing in that the wooden trestle used there, is here replaced by long earth fills. The concrete portion of the work consists of three spans of 37 feet each, one of 36 feet and one of 25 feet, making a total length of 172 feet. It is estimated that the total cost of this strucure will be $33,000.00, twenty per cent to be borne by the County and 80 per cent by the State. This work was awarded to the Colonial Building Company on the same date as the Big Eddy overcrossing, and probably will be completed at the same time.

Christ Fauerso is Resident Bridge Engineer for the State on all the above bridges. Expenditures of $6,098.61 have been made on the Dillon Overcrossing.

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Oiling Sand

At several points drifts of blow sand have accumulated, and which, during periods of high winds, are blown upon the roadbed. At other places, particularly the sand fills which form the approaches to the Dillon overhead crossing of the O. W. R. & N. Company's tracks, the winds carry away portions of the roadbed and fills.

This menace is being taken care of by an extensive oiling program by the State Highway Commission. The same method in use by the O. W. R. & N. Company has been adopted, namely, vaporizing the oil with steam and spraying it upon the sand drifts adjacent to the highway. About 700 to 800 gallons of road oil are used to the acre, and it is found that this will hold the sand until vegetation takes hold. A repetition may be necessary in two years. At this date, the only oiling done in Wasco County has been the approaches to the Dillon overhead, which was done on a cost plus basis by the contractor doing the grading. Early in 1921 it is contemplated oiling the sand drifts and cut and fill slopes with State equipment which is now in use in Gilliam County. Expenditures to date amount to $492.38, in a total estimated cost of $3,000.00.

The total estimated cost of the entire project including the grading, bridges and oiling is $338,700.00. Of this amount the State will pay $174,697.80, the O. W. R. & N. Company $3,900.00, Wasco County $10,500.00 and the Federal Government $149,602.20. Total expenditures of $170,152.25 have been made by the State to date.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Grading

Engineering		$ 5,660.19
Expense paid by State for guarding track during construction		324.51
Material furnished by State (to be deducted from amounts due contractor)		55.51
Contract Items as follows:		
Clearing and grubbing, 80 per cent, at $1,500.00	$ 1,200.00	
Common excavation, 70,409 cu. yds. at 60c	42,245.40	
Intermediate excavation, 13,054 cu. yds. at 90c	11,748.60	
Solid rock excavation, 23,302 cu. yds. at $2.50	58,255.00	
Overhaul, 76,530 sta. yds. at 5c	3,826.50	
12" corrugated iron pipe, 897 lin. ft. at $2.00	1,794.00	
18" corrugated iron pipe, 210 lin. ft. at $3.50	735.00	
24" corrugated iron pipe, 230 lin. ft. at $4.50	1,035.00	
Class "A" concrete, 29 cu. yds. at $50.00	1,450.00	
Class "C" concrete, 150 cu. yds. at $45.00	6,750.00	
Metal reinforcement, 2,269 lbs. at 10c	226.90	
Rubble masonry, 230.7 cu. yds. at $15.00	3,460.50	
Hand-placed rock slope, 490 sq. yds. at $2.50	1,225.00	
Under-cut excavation, 18 cu. yds. at $3.00	54.00	
Force Account Items:		
Hauling and placing material to protect sand slopes	1,432.59	
Hauling material for private crossing	68.35	
Total amount earned by contractor	$135,506.84	
Percentage retained until completion of contract	20,326.03	
Total amount paid to contractor		$115,180.81
Grand total expended to Nov. 30, 1920 (all State funds)		$121,221.02

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DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Seufert Viaduct

Engineering		$ 1,930.51
Bronze name plate furnished by State (to be deducted from amount due contractor)		16.00
Contract Items as follows:		
Excavation, 932 cu. yds. at $3.00	$ 2,796.00	
Class "A" concrete, 668 cu. yds. at $36.00	24,048.00	
Metal reinforcement, 110,000 lbs. at 8c	8,800.00	
Materials on hand	600.00	
Force Account Items:		
Excavation below elevation shown on plans	1,800.16	
Total amount earned by contractor	$ 38,044.16	
Percentage retained until completion of contract	5,706.62	
Total amount paid to contractor		$ 32,337.54
Grand total expended to Nov. 30, 1920 (all State funds)		$ 34,284.05

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Big Eddy Overcrossing

Engineering		$ 683.87
Name plate furnished by State (to be deducted from amounts due contractor)		16.00
Contract Items as follows:		
Excavation, 337 cu. yds. at $2.50	$ 842.50	
Class "A" concrete, 17 cu. yds. at $33.50	569.50	
Class "B" concrete, 28 cu. yds. at $33.00	924.00	
Metal reinforcement, 1,900 lbs. at 8c	152.00	
Timber trestle, 5 lin. ft. at $23.00	115.00	
Materials on hand	5,800.00	
Total amount earned by contractor	$ 8,403.00	
Percentage retained until completion of contract	1,260.45	
Total amount paid to contractor		$ 7,142.55
Grand total expended to Nov. 30, 1920 (all State funds)		$ 7,842.42

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Dillon Overcrossing

Engineering		$ 800.81
Name plate furnished (to be deducted from amount due contractor)		16.00
Contract Items as follows:		
Excavation, 150 cu. yds. at $2.50	$ 375.00	
Force Account Items:		
Materials on hand	5,800.00	
Soundings for foundation	38.88	
Total amount earned by contractor	$ 6,213.88	
Percentage retained until completion of contract	932.08	
Total amount paid to contractor		$ 5,281.80
Grand total expended to Nov. 30, 1920 (all State funds)		$ 6,098.61

Deschutes River Bridge

During the present biennium a structure has been built across the Deschutes River between Sherman and Wasco Counties. Complete description of this bridge will be found in the portion of this report devoted to Sherman County.

Maintenance

Wasco County has signed maintenance agreements to bear fifty per cent of the cost of maintaining the pavement laid on The Dalles-Three Mile Creek and The Dalles-Seufert sections. Guard fences have been built, shoulders re-shaped, ditches cleaned and screenings spread on the

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pavement to prevent bleeding. A total expenditure of approximately $1,500.00 for this work is contemplated.

Continuous maintenance for re-shaping the surface and taking care of slides caused by wind erosions of the high cut slopes between Mosier and the Hood River County line, has been carried on.

Mosier-The Dalles Survey

In May, 1919, survey was started eastward from Mosier under the direction of J. H. Scott, Locating Engineer, to determine a final location of the Columbia River Highway between Mosier and The Dalles. Leaving Mosier, this line crosses Mosier Creek over a 200-foot reinforced concrete arch and thence follows along the bench land by easy grades through the rich orchards at Mayerdale. After crossing Hog Canyon, the location reaches the high bluff above Rowena, from where one of the views for which the Columbia River Highway is famous may be obtained. The highway then winds and circles down through a figure eight and a series of curves in Rowena Canyon to Rowena. This location was found to be much more desirable in scenic values and point of economy than the present County road over "Seven Mile Hill," which was built during 1917. This County road has a maximum gradient of seven per cent and attains an elevation of 1,700 feet near Ortley. Winter conditions at this altitude make the old road almost impassable. The State Highway Department location adopted has a maximum gradient of five per cent and a maximum elevation of 700 feet.

From Rowena to The Dalles, the location was continued by U. R. Grey, Locating Engineer, during the summer of 1919. It follows the abandoned railroad grade of the O. W. R. & N. Company from Rowena eastward to within 1.5 miles of the west city limits of The Dalles. From this point, the location extends across Chenowith flats to The Dalles city limits. The use of the abandoned railroad grade greatly reduced the cost of construction and offered a very suitable roadbed, with superior grade and alignment.

Chenowith-Seufert Survey

Preparatory to awarding contracts on the Chenowith-The Dalles and The Dalles-Seufert sections, location surveys were made early during 1919 by Locating Engineer J. E. Peck. The length of these two surveys aggregated three miles.

Seufert-Deschutes River Survey

During 1918 preliminary surveys were made between Seufert and the Deschutes River. After the consideration of two alternate routes a location was adopted and final location survey made during the present biennium.

The Dalles-Three Mile Creek Survey

Preparatory to awarding a contract for the paving of The Dalles-California Highway between The Dalles and Three Mile Creek, a location survey two miles in length was completed during 1919 by J. E. Peck, Locating Engineer.

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Three Mile Creek-Dufur Survey

Locating Engineer W. T. Nelson started work on this survey about July 1, 1919. It begins at Three Mile Creek, the end of the present pavement on The Dalles-California Highway, about three miles south of The Dalles, and extends southerly 13.25 miles to the town of Dufur. Field work was completed in October, 1919, and after considerable delay the maps, profile and estimates were finished July 15, 1920. The survey has not yet been definitely adopted by the Highway Commission.

In 1916 the County located and constructed a road over this section, with a maximum grade of eight per cent, from County bond issue. Using the State Highway maximum grade of five per cent, it was found impossible to utilize but little more than one-half of this road. Two estimates have been prepared, both of which may need some revision as to grade and alignment, one using a maximum of five per cent, the other a maximum of six per cent. The latter makes possible the use of three-fourths mile south of Eight Mile Creek, of very good alignment and now macadamized.

This highway is very much desired by the residents of Wasco County, as it will open up a large orchard district, with a means of rapid transportation to the large canneries located at The Dalles. It will be a link in The Dalles-California Highway, and carry a large tourist travel from southern and central Oregon to the Columbia River Highway.

This survey crosses the drainage system of the County, but is desired in preference to a location up Fifteen Mile Creek, which is longer by 2.5 miles and has a junction with the Columbia River Highway about three miles east of The Dalles.

Antelope Grade Section Survey

This section of The Dalles-California Highway has been held in abeyance pending a definite location between Madras and The Dalles. It is three miles in length, and is immediately north of Antelope. Wasco County is holding in reserve about $47,000.00 remaining from County bond issue funds, to be expended on the east side of the Deschutes River when a location is decided upon. Some reconnaissance work has been done.

Market Road Work

The State Highway Commission has on file Market Road Resolutions" signed by J. T. Adkisson, County Judge, F. C. Clausen and J. W. Hix, County Commissioners, under date of February 19, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for Market Road construction and designating two roads to be improved as Market Road projects.

A levy of 1 mill on a valuation of $18,297,391.85 produced a County Market Road fund of $18,297.39.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $16,487,405.90 which produced $16,487.41 which became a part of the State Market Road appropriation.

Funds apportioned by the State Highway Commission March 2	$ 16,487.41
Funds apportioned by the State Highway Commission April 3	6,724.48
Funds produced by County levy of 1 mill	18,297.39
Total available for 1920	$ 41,509.28

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P. W. Marx, Roadmaster, made the surveys, prepared maps and estimates and did the necessary construction engineering.

Project No. 1.—"Leading from the southwesterly city limits of Dufur up Fifteen Mile Creek to Ramsey Grange Hall."

A location survey approximately five and one-fourth miles in length was made, using a maximum grade of five per cent. The improvement consisted of grading a roadbed 24 feet in width, placing the necessary drainage culverts and structures, and surfacing 12 feet wide, with crushed rock macadam.

A contract for grading and macadam was awarded by the County Court to the United Contracting Co., and work was started October 8, the work to be completed January 1, 1921.

The estimated cost of the project exclusive of bridges is $44,408.18.

Project No. 2.—"Beginning at the S. E. corner of section 36, T. 4 S. R. 13 E. W. M., running thence west on Township line between Townships 4 and 5 S., to where the present County road running southwesterly toward Wapinitia crosses the Township line in section 33, T. 4 S. R. 13 E., W. M., thence along County road southwesterly toward Wapinitia."

No work was done on this project in 1920.

WASHINGTON COUNTY

During the past two years the Tualatin Valley Highway, from the Multnomah County line to Forest Grove, has been paved, and from this point south is under macadam construction at the present time. The paving of the entire West Side Highway through the County was begun in 1917 and practically finished at the close of the last biennium. This work was carried to final completion during the early part of 1919.

The West Side and Tualatin Valley Highways are the only two highways within the County, and upon completion of the work now under way, will be either paved or macadamized throughout their entire length.

Washington County has either paid for, or accomplished, all the grading required on these highways, the paving and macadamizing having been financed by the State.

All work in the County is being handled by C. W. Wanzer, Division Engineer.

Multnomah County Line-Newberg Paving

During 1917 and 1918 the State Highway Department had under construction 15.7 miles of the West Side Highway between the Multnomah County line and Newberg. A complete description of this work will be found on pages 143 and 145 of the previous Department report.

Expenditures to the close of the last biennium amounted to $278,-976.93, which had been paid, $269,581.93 by the State, and $9,395.00 by Washington County. During the present biennium work has been carried to completion at a cost of $55,872.24, this expenditure being borne $55,-372.24 by the State and $500.00 by the Counties. This brings the total expenditures to $334,849.17, which have been paid, $324,954.17 by the State, $9,478.85 by Washington County and $416.15 by Yamhill County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,391.20
Purchase of right-of-way		549.98
Hauling and placing rock on embankment at end of Tualatin Bridge		30.00
Fence material and labor		7.50
Payment to S. P. R. R. Co. for labor furnished		103.30
Refund from S. P. Ry. on Votaw Undercrossing		Cr. 511.22
Contract Items as follows:		
Clearing and grubbing, 100 per cent	$ 1,250.00	
Common excavation, 47,008 cu. yds. at 34c	15,982.72	
Intermediate excavation, 12,100.2 cu. yds. at 62c	7,502.12	
Solid rock excavation, 385 cu. yds. at $1.15	442.75	
Overhaul, 144,184 sta. yds. at 1c	1,441.84	
12" reinforced concrete pipe, 1,630 lin. ft. at $1.25	2,037.50	
24" reinforced concrete pipe, 52 lin. ft. at $2.45	127.40	
36" reinforced concrete pipe, 96 lin. ft. at $4.25	408.00	
6" porous drain tile, 8,553 lin. ft. at 15c	1,282.95	
Rip-rap, 32 cu. yds. at $2.75	88.00	
Crushed stone shoulders, 163,663.4 lin. ft. at 6c	9,819.80	
Standard Bitulithic pavement, 149,764.4 sq. yds. at $1.28	191,698.43	
Broken stone, loose measure, 34,885.75 cu. yds. at $2.40	83,725.80	
Force Account Items:		
Extra haul on paving materials account of change of plans at Tigard railway crossing	1,152.00	
Repairs to pavement Tualatin Bridge	188.05	
Repairs to pavement at Votaw Undercrossing	462.37	

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Drainage work at Votaw Undercrossing	343.87	
Lowering and lengthening existing culverts	1,081.67	
Replacing bridge approach at Tualatin River	50.27	
Special wide ditches alongside road near Four Corners	814.50	
Backfill and planking at Onion Flat Trestle	405.94	
Tearing down old trestles over Onion Flat	55.33	
Replacing private water supply crossing	13.31	
Rebuilding right-of-way fences	70.85	
Grading at Middleton railroad crossing	1,970.47	
Blind stone drains	189.68	
New 30-foot culvert	223.60	
New 42-foot culvert and special fill over same	468.26	
Drain tiling, backfilled with rock	980.93	
Total amount paid contractor		$324,278.41
Grand total cost of project		$334,849.17
Paid by State	$324,954.17	
Paid by Washington County	9,478.85	
Paid by Yamhill County	416.15	
Total	$334,849.17	

Beaverton-Multnomah County Line Paving

On July 8, 1919, Contract No. 171 was awarded to the Warren Construction Company of Portland, Oregon, for paving 3.89 miles from the Multnomah County line, over what is known as the Canyon Road, to Beaverton, where a connection is made with the Tualatin Valley Highway.

Grading was started on July 28 and practically completed by December of the same year. Paving operations began on September 20 and continued until October 25, when weather conditions were such as to require the abandoning of paving work for the winter.

During April of the present year fine grading and rocking operations were started, and paving operations begun on the first of July. During the year all fills and soft spots in the sub-grade were reinforced with a 3-inch bituminous base placed on the crushed rock sub-base, although the original contract called for the department standard Type "E" pavement. The wisdom of the use of this bituminous reinforcing was very apparent when the section was thrown open to traffic, as the travel which has developed is very much heavier than would ordinarily have been anticipated. The pavement proper was completed by November 1 and all shoulder work and ditching is practically done at the present time, and the entire job ready for final acceptance.

The paving of this section shortens the distance from Portland to Beaverton, Hillsboro, and all points on the Tualatin Valley Highway, by approximately two and one-half miles, and will carry all the heavy valley hauling, as trucking is not allowed over the Terwilliger Boulevard, which connects with the Tualatin Valley Highway at Bertha Station. In addition to being a commercial route of primary importance, this section possesses scenic beauties which are unusually attractive. A splendid view of the Tualatin Valley is obtained from the highway.

The total estimated cost of the project is $126,000.00, which is to be paid $109,000.00 from State funds and $17,000.00 from County funds, covering the cost of grading. Construction has been carried on under the supervision of C. G. Reiter, Resident Engineer, with expenditures to date of $104,670.45. These have been paid, $92,670.45 by the state and $12,000.00 by the County.

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DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 6,077.95
Contract Items as follows:		
Clearing and grubbing, 100 per cent, at $300.00	$ 300.00	
Common excavation, 12,667 cu. yds. at 75c	9,500.25	
Intermediate excavation, 849 cu. yds. at $1.25	1,061.25	
Solid rock excavation, 52 cu. yds. at $1.75	91.00	
Overhaul, 4,095 sta. yds. at 4c	163.80	
48" reinforced concrete pipe, 52 lin. ft. at $8.80	457.60	
18" reinforced concrete pipe, 176 lin. ft. at $2.20	387.20	
12" plain concrete pipe, 105 lin. ft. at $1.25	131.25	
12" corrugated Galv. iron pipe, 72 lin. ft. at $1.51	108.72	
24" corrugated Galv. iron pipe, 30 lin. ft. at $2.99	89.70	
6" porous drain tile, 40 lin. ft. at 30c	12.00	
Broken stone base, 7,119 cu. yds. at $3.74	26,625.06	
Standard Bit. pave. Type "E," 36,586 sq. yds. at $1.50	54,879.00	
Broken stone for shoulders, 1,936 cu. yds. at $3.74	7,240.64	
12" 45° Corr. Galv. iron bends, 1, each $3.89	3.89	
Class "A" concrete, 109.06 cu. yds. at $28.00	3,053.68	
Metal reinforcement, 8,419 lbs. at 10c	841.90	
Type "D" base, batch haul for 5 miles, 819 batches, at $3.85	3,153.15	
Type "D" base, batch haul for 6 miles, 803 batches, at $4.05	3,252.15	
Type "D" base, batch haul for 7 miles, 341 batches, at $4.25	1,449.25	
Type "D" base, batch haul for 8 miles, 399 batches, at $4.45	1,775.55	
Type "D" base, batch haul for 9 miles, 162 batches, at $4.65	753.30	
Broken stone shoulders, 8,000 lin. ft. at 6c	480.00	
Force Account Items:		
Building wooden flumes for drainage	134.59	
Moving garages to facilitate grading	46.25	
Total amount earned by contractor	$115,991.18	
Percentage retained until completion of contract	17,398.68	
Total amount paid to contractor		$ 98,592.50
Grand total expended to November 30, 1920		$104,670.45
Paid by State	$ 92,670.45	
Paid by County	12,000.00	
Total	$104,670.45	

Hillsboro-Multnomah County Line Paving

This section of the Tualatin Valley between Hillsboro and Multnomah County line was graded by the Washington County Court during 1917 and 1918. On February 4, 1919, Contract No. 82 was awarded to A. Guthrie & Co. of Portland, Oregon, for the paving of 11.2 miles with a 6-inch 16-foot concrete pavement, with 2-foot gravel shoulders on each side and concealed bituminous felt expansion joints placed every thirty feet. Work was started May 28, 1919, and the pavement practically completed in November, 1919. Final acceptance was not given to the job until April, 1920, owing to the incompletion of some portions of the work which had to wait on the finishing of the grading and ditching done by Washington County. The workmanship on this job was excellent, and the finished pavement presented as smooth and even an appearance as could be desired. Owing to the manner in which the concealed expansion joints were constructed, these joints later showed more or less of an uneven crack. These expansion joints consisted of a 4-inch height of bituminous felt placed at the bottom of the slab, allow-

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ing a space of one and one-half inches at the sides to two and one-half inches in the center, over which the concrete was placed and finished. This type of joint insures that the connecting slabs are both on the same horizontal plane, and gives a riding surface that is much smoother than is secured when the expansion joints are allowed to extend through to the surface of the pavement. These joints were tried on this work more or less as an experiment, and while no serious objections have been found with this type, the cracks which follow present an undesirable appearance.

The paving of this section eliminated four railroad grade crossings between Beaverton and Hillsboro, and its completion provided a continuous paved highway from Hillsboro in to Portland. The completed project represents a total cost of $234,969.98, being all paid from State funds. Expenditures to date amount to $228,110.37. Engineering supervision was handled under the direction of C. G. Reiter, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 5,206.94
Extra paving and patchwork not included in contract		920.90
Rental of State equipment (to be deducted from amounts due contractor)		150.00
Advertisements for bids		38.63
Contract Items as follows:		
Concrete pavement No. 2, 105,624 sq. yds. $2.05	$216,529.20	
Gravel for shoulders, 3,719 cu. yds. at $3.25	12,086.75	
Broken stone shoulders, 115,804 lin. ft. at 10c	11,580.40	
Total	$240,196.35	
Deduction for rental of State concrete mixer	150.00	
Deduction for freight reduction and war tax	11,392.84	
Total deduction	$ 11,542.84	
Total amount earned by contractor	$228,653.51	
Percentage retained until completion of contract	6,859.61	
Total amount paid to contractor		$221,793.90
Grand total expended to Nov. 30, 1920 (all State funds)		$228,110.37

Hillsboro-Forest Grove Paving

Contract No. 122 for paving this section of the Tualatin Valley Highway, 4.3 miles in length, was awarded to the Warren Construction Company of Portland, Oregon, on May 6, 1919. The contract called for a 2-inch bitulithic wearing surface, 16 feet wide with 2-foot shoulders on each side. The existing base to be re-surfaced consisted of a 6-inch penetration macadam, which was in fairly good condition, although it had an excessive crown for a finished bituminous pavement. As any attempt to scarify and reshape this existing macadam would destroy its excellent solidity and value as a foundation for the new paving, it was considered advisable to leave it intact and secure the proper crown by placing a bituminous base mixture wherever necessary.

Owing to the sub-grade conditions it was possible to carry on the work on this section during the winter months and work was not started until October 15, 1919, being completed April 22, 1920. The completion of this work provides a continuous paved highway from Forest Grove to Portland.

C. G. Reiter, Resident Engineer, handled the work during construction. Total expenditures amount to $83,690.01, which have all been paid by the State.

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DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,331.36
Contract Items as follows:		
Common excavation, 1,174.3 cu. yds. at 60c	$ 704.58	
Overhaul, 100 lin. ft., 575 sta. yds. at 4c	23.00	
12" plain concrete pipe, 72 lin. ft. at $1.25	90.00	
6" porous drain tile, 360 lin. ft. at 29c	104.40	
Type "D" base, 2,492 batches at $4.00	9,968.00	
Type "E" Bit. pavement, 40,485 sq. yds. at $1.58	63,966.30	
R.-O.-B. gravel for shoulders, 1,197 cu. yds. at $4.51	5,398.47	
Gravel shoulders, 45,545 lin. ft. at 6c	2,732.70	
Broken stone base, 142.5 cu. yds. at $5.17	736.73	
Total	$ 83,724.18	
Deductions:		
Freight reduction on materials, 4,151.95 tons at 40c	1,660.74	
Freight reduction on materials, 3,672.42 tons at 30c	1,101.73	
Freight reduction on materials, 1,268.08 tons at 20c	253.62	
War tax on freight	349.44	
Total deduction	$ 3,365.53	
Paid to contractor		$ 80,358.65
Grand total cost of project (all State funds)		$ 83,690.01

Forest Grove-Gaston Macadam

On August 14, 1919, Contract No. 195 was awarded to the Washington County Court for macadamizing 6.7 miles of the Tualatin Valley Highway, extending from the south city limits of Forest Grove to the Yamhill County line at Gaston. Some alignment changes have been made on this route which eliminate two railroad crossings and slightly shorten the distance between the above limits. The County began macadamizing operations in October, 1919, but only approximately 3,000 lin. ft. were laid prior to the winter season. Operations were resumed in May of the present year and will be completed by about the first of December.

One reinforced concrete deck girder span, one wood span, one 8 ft. by 12 ft. reinforced concrete culvert and three wood trestles were included in this work. The structures were built from designs prepared by the Highway Department and paid for directly by the County.

With the paving of this section, the Tualatin Valley Highway, the main artery of traffic through Washington County, will have been paved throughout its entire length. The total estimated cost of the macadam is $47,500.00, which is to be paid for entirely by the State. To date expenditures of $44,462.31 have been made under the supervision of C. G. Reiter, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 2,830.02
Equipment furnished by State (to be deducted from amount due Washington County)		225.00
Rental of State trucks (loaned to Washington County)		16,048.49
Contract Items as follows:		
Broken stone, 10,930.5 cu. yds. at $2.75	$ 30,058.88	
Total	$ 30,058.88	
Deduction for rental of State equipment	225.00	
Total amount earned by contractor	$ 29,833.88	
Percentage retained until completion of contract	4,475.08	
Total amount paid to contractor		$ 25,358.80
Grand total expended to Nov. 30, 1920 (all State funds)		$ 44,462.31

[WASHINGTON]

Maintenance Work

Washington County officials have given full co-operation to the Highway Commission in the matter of maintaining the State highways in their County. Considerable was done on the West Side Highway through the County during the early part of the present year, and at the present time the rock shoulders are being repaired and reconstructed and ditching is being done. On the Hillsboro-Multnomah County line section, the expansion joints are being repaired and all other work necessary is being accomplished. The County co-operates to fifty per cent of the cost of all this work.

Beaverton-Multnomah County Line Survey

Between May 5 and 12, 1919, a preliminary line was run on the Canyon Road between the Multnomah County line and Beaverton, by R. E. Jackson, Resident Engineer. This line was about four miles in length, but had a maximum gradient of seven per cent, being abandoned when the Highway Commission decided on the lower route, which has no grade exceeding five per cent. Location on the lower line, 3.89 miles in length, was made by C. G. Reiter, Resident Engineer, between July 18 and September 11, 1919, in conjunction with the supervision of construction of other State work which was being carried on in this locality.

Hillsboro-Forest Grove Survey

Between March 19 and April 2, 1919, a survey was made between the city limits of Hillsboro and Forest Grove. The survey is 5 miles in length and was made by C. G. Reiter, Resident Engineer, in conjunction with supervision of the construction on the Hillsboro-Multnomah County line section.

Forest Grove-Gaston Survey

Between March 4 and April 2, 1919, preliminary and location surveys were made between the south city limits of Forest Grove and the Yamhill County line, a distance of 6.7 miles. The location follows the old traveled road and eliminates two railroad crossings and approximately 900 lin. ft. of trestle. This location was made by C. G. Reiter, Resident Engineer.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by J. W. Goodin, County Judge; H. T. Hesse and John McClaron, County Commissioners, under date of March 24, 1920, stating that a levy of 1.54 mills on all the taxable property of the County was made for market road construction, and designating eight roads to be improved as market road projects.

A levy of 1.54 mills on a valuation of $22,718,967.58 produced a County market road fund of $34,987.21. Included in the State levy of taxes was a levy of 1 mill on a valuation of $29,302,482.50, which produced $29,302.48, and which became a part of the "State Market Road appropriation."

[WASHINGTON]

Funds apportioned by the State Highway Commission March 2	$ 29,302.48
Funds apportioned by the State Highway Commission April 3	11,951.18
Funds produced by County levy of 1.54 mills	34,987.21
Total available for 1920	$ 76,240.87

C. G. Reiter, County Surveyor, also Resident Engineer for the State Highway Commission, made all surveys, prepared plans and estimates and handled the construction engineering. All construction work done by County forces.

Project No. 1—"Hammelman's place south of Cornelius, north through Cornelius, via Shefflin station, Dershams, Mt. Dale to Lucks Quarry." This road is through level and slightly rolling country, the roadbed from 18 to 24 feet in width. Three sections were designated for improvement. Two sections, "Cemetery north of Cornelius toward Centerville," 1,200 feet in length, and "From Mountaindale to Lucks Quarry, 0.9 miles in length, were surfaced, 12 feet wide, with rock in 1920. Five thousand one hundred and sixty dollars was expended on this work. No work was done on the section "From Hammelman's south of Cornelius north to Cornelius."

Project No. 2—"Beginning one mile north of Beaverton at intersection of Shackelford road with Walker road and extending north and west via Cedar Mill, Bethany, North Plains, Mountaindale, Banks to Buxton." This road is through rolling and hilly country. Improvements are being made on the worst sections.

Five sections were made of approximately 6.5 miles. Approximately 850 cu. yds. of earth was moved. Culverts were installed and 2.55 miles were surfaced 12 feet wide with crushed rock. The Shackelford section, 2,250 feet in length, was surfaced. The Banks-Buxton section, 9,200 feet in length, was graded and surfaced. The "Bethany-Holcomb" section, 9,200 feet in length, according to report of October 15, was partly graded, but no rock spread. Will not be completed in 1920. "Bailey-Connell" section, 10,500 feet in length, 9,200 feet surfaced, 740 cu. yds. of earth to move in 1921. "North Plains westerly," eighty stations being surfaced, 12 feet wide, not completed in 1920. Approximately $14,000.00 was expended on Project No. 2.

Project No. 3—"Beginning at intersection of Scholls road with the Bertha-Beaverton Highway, thence southwesterly to Scholls-Laurel to Arthur Hill's place." This road is through rolling country. Sections improved were graded to 24 feet roadbed, surfaced 9 feet wide. Three sections were designated for improvement in 1920.

Surveys were made of approximately four miles. Approximately 350 cu. yds. of earth was moved. Approximately one mile of crushed rock surface, 9 feet wide, was laid. Nothing was done on "Caldwell Hill Section." "Scholls-Laurel" section, length 6,600 feet, was surfaced. "Laurel to Arthur Hills" section, 0.33 miles in length—nothing done. Approximately $4,000.00 was expended on Project No. 3.

Project No. 4—"Hillsboro via Scholls toward Sherwood." No work was done on this project in 1920.

Project No. 5—"From Greenville west and southwest to Hillside Quarry." The section from Greenville west (Kansas City), 0.35 miles in length, was surfaced 9 feet in width with crushed rock. The section

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Thatcher west to Hillside quarry covers a distance of 1.5 miles. Crushed rock was added in place for repairing bad places and short stretches of new macadam were put down. One thousand two hundred and eighty-seven dollars and sixty cents was expended on Project No. 5 in 1920.

Project No. 6—"Garden Home-Metzger Road." A report dated October 1 gives the following information. The work has not been started, but will be completed in 1920. The roadway is in fair condition and the County Court proposed to place 867 cu. yds. of gravel on the section, approximately one mile in length, to be spread 8 feet wide. County trucks will do the hauling, all other labor to be donated by residents. Estimated cost, $1,734.00.

Project No. 7—"North Plains-Pumpkin Ridge." A report dated October 1 gives the following information. It is proposed to surface this section, 0.36 miles in length, 10 feet in width, with crushed rock. No work has been done to date. County expects to complete before January 1, 1921. Estimated cost, $1,947.50.

Project No. 8—"Forest Grove north to Gales Creek." This project is 2.44 miles in length, the roadbed is being widened to 24 feet and surfaced 12 feet in width with gravel. Improvement will not be completed in 1920. The estimated cost of improvement is $9,709.25. Amount expended to October 1, 1920, $5,316.71.

WHEELER COUNTY

Wheeler County is entirely dependent upon its roads for communication with outside points, as well as points within the County, as it is without either rail or water transportation. The agricultural products of the County must be transported for long distances over roads and highways, and good roads are of the utmost importance.

Remarkable progress has been made in carrying out the highway program in the County in the past two years. The entire John Day River Highway, which is the main traffic road through the County, is now either under construction or completed, with the exception of a 2-mile section just north of Fossil and the section from the end of the Butte Creek summit to Sarvice Creek. The sections which have been under grading construction will be thrown open to travel as soon as a suitable wearing surface can be placed on portions where the large size rock used in the construction of the roadbed prevents travel. It is expected that this will be accomplished about the first of the coming year.

Cummins Hill Section Macadamizing.

The macadamizing of 4.2 miles between Fossil and the Gilliam County line was undertaken by the Department in 1917. This was approximately completed at the time of making the last Department report, and a detailed desription of the work will be found therein. During the present biennium the sum of $1,939.20 has been paid for delayed charges. This brings the total cost of the project to $34,404.64, which have all been paid from State funds.

Cummins Hill Section Resurfacing

The Cummins Hill section of the John Day River Highway is 5.05 miles in length of which 4.1 miles are in Wheeler County and 0.95 miles in Gilliam County.

During the latter part of 1917 and the early part of 1918, this section was macadamized, but, owing to the method of construction and the large volume of traffic, satisfactory results were not obtained. The summer traffic during 1918 caused the large rock from the bottom course to come to the top, and the general aspect of the road was such that the Highway Commission decide to put on a topping course of materials such as had been used on the city streets of Fossil with very good results. This material consisted of a volcanic flow breccia secured from hills in the vicinity of the work.

Prior to placing the topping course, the macadam was smoothed up and new material placed to a depth of approximately two inches and spread with rakes. No rolling was done, as the material was hauled with trucks, and satisfactory compacting was secured by hauling the new materials over the surfacing course as it was placed.

Work was started on November 11, 1918, and completed January 18, 1919, under the supervision of C. L. Grutze, Construction Superintendent. The completed work represents a total expenditure of $6,065.94. Of this amount, Wheeler County co-operated to the extent of $1,516.49, the balance of $4,549.45 being paid by the State, $444.88 during 1918 and $4,104.57 during 1919.

[WHEELER]

Sarvice Creek Summit Macadam

On March 26, 1919, the State Highway Commission awarded Contract No. 93 to Copenhagen Bros. Co. of Portland for the macadamizing of 1.7 miles south from the summit between Butte Creek and Sarvice Creek.

Operations were started on May 1 and completed on August 23 of the same year. The completed work represents a total cost of $12,302.28, which has been paid, $10,130.92 by the State and $2,171.36 by Wheeler County. This work was carried on under the engineering supervision of R. E. Austin, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 667.21
Advertisements for bids		6.00
Contract Items as follows:		
Broken stone macadam, 2,980 cu. yds. at $3.45	$ 10,281.00	
Force Account Items:		
Removing slide Station 919 to 1003	88.55	
Placing 9" culvert at Station 972+70	3.30	
Removing tree from across grade	2.20	
Placing dirt binder and widening shoulders	973.26	
Moving rock crusher to new location at order of engineer	280.76	
Total amount paid to contractor		$ 11,629.07
Grand total cost of project		$ 12,302.28
Paid by State	$ 10,130.92	
Paid by County	2,171.36	
Total	$ 12,302.28	

Butte Creek Summit Construction Engineering

During 1918 the County graded, under State supervision, the section 1.7 miles in length from the Butte Creek-Sarvice Creek Summit south. A full report of this work will be found on page 149 of the last Department report. The work continued into the present biennium and additional engineering supervision charges of $538.72 have been made. The additional quantities completed by the County during the present biennium are not available in the records of this office.

Butte Creek Section Post Road Project

This project extends for about 6.5 miles through the farm lands in the valley along Butte Creek and then follows Butte Creek for approximately three miles further, where it connects with the Butte Creek Summit section. Most of the grading work was very light and was handled by teams, only about one mile of the total project being rock. The grading and surfacing of the section has been accomplished in co-operation with the Bureau of Public Roads, under Federal Aid Project No. 4.

The work has been handled under two contracts, one being for grading and the other for surfacing. Contract No. 183 for the grading of 9.35 miles was awarded August 5, 1919, to James F. Clarkson of Portland, Oregon. Actual construction was started on September 1, 1919, but, on account of the heavy snowfall and extremely cold weather, it was found necessary to shut down the work from December 10, 1919, until May 1, 1920. At the present time the grading is entirely completed, except for a few minor details. The total estimated cost of the grading is $73,300.00, with expenditures made of $71,992.40.

Contract No. 291 for surfacing the section was awarded to the Blake-Compton Company at McMinnville on August 24,1920. The contract calls for construction of a surface 12 feet in width and of a variable thickness, to be determined in accordance with the sub-grade conditions. Actual work was started on September 20, but progress has been rather slow to date, and it is improbable that this surfacing will be completed before next season. The estimated cost is $81,576.00, of which $4,018.01 has been expended.

K. D. Lytle has been Resident Engineer on both the grading and surfacing. The total estimated cost for both contracts is $154,900.00, of which $76,010.41 has been expended to date. The Federal Government co-operates to the extent of $66,828.85, and the balance of $88,071.15 is being paid from State funds. Government payments to date amount to $20,562.28.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Grading

Engineering		$ 7,714.75
Contract Items as follows:		
Clearing and grubbing, 100 per cent	$ 3,000.00	
Common excavation, 41,413.6 cu. yds. at 74c	30,646.06	
Solid rock excavation, 13,618.7 cu. yds. at $1.80	24,513.66	
Overhaul, 6,751 sta. yds. at 5c	337.55	
12" corrugated iron pipe, 1,842 lin. ft. at $2.00	3,684.00	
18" corrugated iron pipe, 104 lin. ft. at $2.50	260.00	
24" corrugated iron pipe, 24 lin. ft. at $3.50	84.00	
36" corrugated iron pipe, 36 lin. ft. at $5.50	198.00	
Rubble masonry, 182.71 cu. yds. at $9.00	1,644.39	
Lumber and timber, 14.352 M FBM at $50.00	717.60	
Force Account:		
Extra clearing due to line change	76.47	
Hand placing rock embankment	39.65	
Removing culvert on account of change of plans	37.32	
Alteration of catch basins	38.95	
Total amount earned by contractor	$ 65,277.65	
Percentage retained until completion of contract	1,000.00	
Total amount paid to contractor		$ 64,277.65
Grand total expended to November 30, 1920		$ 71,992.40
Paid by State	$ 51,430.12	
Paid by Government	20,562.28	
Total	$ 71,992.40	

Bridge Creek Grading

On November 27, 1917, contract for grading the Bridge Creek section was awarded by the State Highway Commission. A complete description of this work will be found on page 148 of the 1917-1918 report. During the present biennium a delayed charge of $20.94 has been paid for engineering supervision.

Sarvice Creek-Valades Ranch Post Road Project

This project begins at Sarvice Creek in Wheeler County and extends to Valades Ranch in Grant County. A full description of the project will be found under the section devoted to Grant County.

Ochoco Canyon Forest Road Project

This section of the Ochoco Canyon Forest Road, in Wheeler County, extends from the end of the Crook County section at the County line, a

distance of 10.1 miles, toward Mitchell. The location crosses the summit of the mountains and extends down the north side to the foot. The grading is through mountainous country, and, like the Crook County section, is partly through adobe soil.

The work is being done under the supervision of the Bureau of Public Roads, and they awarded a contract for the grading to Elliott & Scoggin, in October, 1919. It is anticipated that the work will be completed about the end of the present year. Approximately four miles of the section, covering the worst portions, will be surfaced with crushed rock by day labor forces working under the supervision of the Bureau of Public Roads. This work will be done by savings from the project agreement amount, which have been effected on the grading.

The project is financed in co-operation between the State, County and Federal Government. The total estimated cost of the entire project is $233,600.00, which is to be paid $114,350.00 by the State, $4,900.00 by the County, and $114,350.00 by the Federal Government. Expenditures to date amount to $116,265.71, having been paid, $56,043.43 by the State and $60,222.28 by the Government.

Surveys

At the close of the last biennium surveys had been made of the entire McKenzie River Highway in Wheeler County, and the John Day River Highway had been located except for a two-mile section immediately west of Fossil. During the present biennium location of these two miles has been made, and all necessary detailed plans for work contracted in the County have been prepared.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by Henry D. Keyes, County Judge; R. E. Wright and Mike Dukek, County Commissioners, under date of April 7, 1920, stating that a levy of 1 mill on all the taxable property of the County was made for market road construction, and designating three roads to be improved as market road projects.

A levy of 1 mill on a valuation of $6,390,249.85 produced a County market road fund of $6,390.25.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $5,189,420.00, which produced $5,189.42, which became a part of the "State market road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 5,189.42
Funds apportioned by the State Highway Commission April 3	2,116.53
Funds produced by County levy of 1 mill	6,390.25
Total available for 1920	$ 13,690.20

Project No. 1—"From junction of John Day Highway at mouth of Sarvis Creek via Richmond to Mitchell."

C. R. Burns, Locating Engineer in the employ of the State Highway Commission, made a preliminary survey of this road, approximately twenty-one miles in length.

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Location surveys were made of two sections of this road, the Mitchell Hill section, approximately one and one-fourth miles in length, and the Donnelly Hill section, approximately three miles in length. Maps, profiles and estimate of quantities were prepared for these sections.

No construction work was done on this project in 1920.

Project No. 2—"From the town of Fossil up Cottonwood Creek to Rowe Creek Road at or near Prindle Sawmill."

No work was done on this project in 1920.

Project No. 3.—"From the junction of the Clarno Road at four-mile post from Fossil to junction of Pine Creek Road at Henry Chapman Ranch on Pine Creek."

A location survey, approximately 1.3 miles in length, was made by C. R. Burns. Maps, profiles and estimate of quantities were prepared.

No construction work was done on this project.

Engineering costs were paid direct by Wheeler County Court.

YAMHILL COUNTY

Yamhill County has accomplished with its own forces, or has agreed to pay for, practically all the grading on State highways which has been placed under way during the past biennium. Owing to the adverse decision which was rendered on their bonds, the State has been advancing funds for the grading on certain sections, but a reversal of this opinion which has just been handed down by the Supreme Court will place the road finances of the County in a much better condition.

During the biennium just past, the Tualatin Valley Highway has been placed under contract for grading between Gaston and Yamhill and has been graded and paved from Yamhill to a connection with the West Side Highway near McMinnville, and thence to McMinnville on the West Side Highway. On the McMinnville-Tillamook Highway, the gap between McMinnville and Sheridan has been paved and the section from Sheridan to the Polk County line is now being macadamized. On the West Side Highway, the section between the Washington County line and Newberg was under paving operations during 1918. From Newberg to West Dayton the highway has been graded and macadamized and is now under contract for concrete pavement. The section between West Dayton and a junction with the pavement near McMinnville has been graded and is now being macadamized. No surfacing has been undertaken between McMinnville and Amity, but the section from Amity south is now being graded and paved.

Work in Yamhill County, with the exception of the West Side Highway south of Amity and the McMinnville-Tillamook Highway west from Sheridan, is being handled by C. W. Wanzer, Division Engineer. The two excepted sections are under the supervision of W. D. Clarke, Division Engineer.

Yamhill-McMinnville Grading and Paving

On May 27, 1919, the State Highway Commission awarded contract No. 137 to the Northwestern Construction Company, of Portland, for the paving of 8.84 miles of the Tualatin Valley Highway between the towns of Yamhill and McMinnville. This contract called for the construction of a 16-foot concrete pavement, six inches in average thickness, with concealed felt expansion joints placed every 30 feet, and 2-foot gravel shoulders on each side of the pavement. Work on the clearing and grading was started on June 15, and laying of the concrete begun as soon as the material and equipment could be assembled. The paving operations were continued until the fall rains stopped the work for the winter. Operations were again resumed in the spring of 1920, and the pavement carried to completion during September. The last section was kept closed to traffic until November 1, when the pavement was thrown open to traffic and the contractor allowed to use the same for the completion of the shoulder work. This shoulder work is practically all done at the present time.

The total estimated cost of the entire work is $245,000.00, toward which the County co-operates to the extent of $45,000.00, for the grading, the State paying the balance. Expenditures to date, made under the supervision of P. O. Harding, Resident Engineer, amount to $217,035.31, the State paying $181,501.80 and the County $35,533.51.

[YAMHILL]

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 9,612.24
Maintenance work to maintain travel through winter		139.75
Cement furnished by State (to be deducted from amounts due contractor)		81,156.33
Contract Items as follows:		
Common excavation, 42,837.6 cu. yds. at 70c	$ 29,986.32	
Overhaul, 24,871 sta. yds. at 4c	994 84	
12" plain concrete pipe, 626 lin. ft. at 60c	375.60	
18" reinforced concrete pipe, 52 lin. ft. at $1.60	83.20	
24" reinforced concrete pipe, 176 lin. ft. at $2.20	387.20	
6" porous drain tile, 5,689 lin. ft. at 35c	1,991.15	
Class "C" concrete, 46.8 cu. yds. at $12.00	561.60	
Concrete pavement, No. 2, 82,136.2 sq. yds. at $2.05	168,379.21	
Felt expansion joints, 24,810 lin. ft. at 5c	1,240.50	
Gravel for shoulders, 1,895.2 cu. yds. at $2.50	4,738.00	
Placing gravel shoulders, 23,910 lin. ft. at 4c	956.40	
Materials on hand	2,701.24	
Force Account Items:		
Clearing, grubbing and moving fence account change in alignment	4,834.12	
Furnishing and laying 36" corrugated galvanized iron pipe	1,260.86	
Fencing new right-of-way as per agreement	623.38	
Removing obstructions from new right-of-way	705.86	
Total	$219,819.48	
Deduction for cement furnished by State	71,434.79	
Total amount earned by contractor	$148,384.69	
Percentage retained until completion of contract	22,257.70	
Total amount paid to contractor		$126,126.99
Grand total expended to November 30, 1920		$217,035.31
Paid by State	$181,501.80	
Paid by County	35,533.51	
Total	$217,035.31	

McMinnville-Sheridan Grading and Paving

On April 15, 1919, contract No. 105 was awarded to V. R. Dennis Construction Company of McMinnville, for paving 8.48 miles of the McMinnville-Tillamook Highway between the city limits of McMinnville and a connection with the concrete pavement near Sheridan. This contract called for the construction of a standard bitulithic pavement 16 feet wide and 2 inches thick, on a new macadam base. The necessary grading of the section was to be either accomplished or paid for by the Yamhill County Court.

Work was started on May 1, and proceeded in a very unsatisfactory manner, due to continual break-downs and shortage of labor, until the fall rains rendered necessary the closing down of the work for the winter season. At this time, a total of only approximately two and one-half miles of pavement had been laid. Work was continued in the spring of 1920, and the pavement proper completed during November. At the present time, there remains only the necessary shoulder work and ditching to complete the contract.

During the latter part of the work, it was decided to reinforce the sub-base with 2 inches of bituminous mixture over such portions as had not been previously paved, and which required strengthening of weak spots in the sub-base.

The total cost of the work is estimated at $240,000.00, of which $217,000.00 will be paid by the State and $23,000.00 by the County, covering the grading. Construction has been carried on under the supervision

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of P. P. Whitmore, Resident Engineer, with expenditures to date of $169,308.65. These expenditures have been made $165,643.63 by the State and $3,665.02 by Yamhill County.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 9,491.24
Asphaltum furnished by State (to be deducted from amount due contractor)		16,248.32
Contract Items as follows:		
Excavation, no classification, 4,857.1 cu. yds. at 65c	$ 3,157.12	
12" plain concrete pipe, 132 lin. ft. at $1.00	132.00	
18" reinforced concrete pipe, 36 lin. ft. at $2.50	90.00	
24" reinforced concrete pipe, 132 lin. ft. at $3.50	462.00	
6" porous drain tile, 1,114 lin. ft. at 25c	278.50	
Broken stone for base (L. M.), 20,018 cu. yds. at $3.25	65,058.50	
Broken stone shoulders, 8,000 lin. ft. at 6c	480.00	
2" bituminous pavement, Type "F," 73,072 sq. yds. at $1.45	105,954.40	
3" bituminous base, 148.8 sq. yds. at $1.45	215.76	
2" bituminous base, 6,727.6 sq. yds. at $1.05	7,063.98	
Force Account Items:		
Building concrete curb and catch basin	192.17	
Total	$183,084.43	
Deduction for asphalt furnished by State	13,838.00	
Deduction for freight reduction and war tax	341.62	
Total deductions	$ 14,179.62	
Total amount earned by contractor	$168,904.81	
Percentage retained until completion of contract	25,335.72	
Total amount paid to contractor		$143,569.09
Grand total expended to November 30, 1920		$169,308.65
Paid by State	$165,643.63	
Paid by County	3,665.02	
Total	$169,308.65	

Sheridan Section Paving

During 1918 a continuation of the concrete laid from Sheridan towards McMinnville, during 1917, was undertaken. A complete description of this paving will be found on pages 151, 152 and 154 of the 1917-1918 Department Report. At the close of the last biennium expenditures of $40,065.61 had been made, distributed $37,945.17 to the State and $2,120.44 to the County. During 1919 delayed charges of $839.48 were paid by the State. This brings the total cost to $40,905.09, which has been borne $38,784.65 by the State and $2,120.44 by Yamhill County.

Newberg-West Dayton Paving

On November 6, 1920, the State Highway Commision awarded contract No. 315 to the Oregon Contract Company, of Portland, Ore., for paving 5.9 miles of the West Side Highway between Newberg and West Dayton. The contract as awarded calls for a 16-foot concrete pavement with an average thickness of 6 inches, and is estimated to cost a total of $185,000.00, which will be paid entirely by the State. No expenditures have been made to the date of this report.

Amity-Holmes Gap Grading and Paving

Data regarding the Amity-Holmes Gap section of the West Side Highway will be found in the portion of this report devoted to Polk County.

[YAMHILL]

Grand Ronde-Butler's Store Macadam

After awarding contract for the Grand Ronde section of the McMinnville-Tillamook Highway as a post road project in March, 1919, there remained a stretch of 1.85 miles, in Yamhill County, extending east from Grand Ronde to the Polk County line near Butler's Store.

Contract No. 156 for macadamizing this section was awarded June 10, 1919, to W. N. Trent of McMinnville, Ore.

Although the contract time for completion was set at August 31, 1919, the contractor accomplished practically nothing during that season and the road was impassable for automobiles during the winter. This condition necessitated the temporary, or emergency, work done on the Bentley-Grand Ronde road to provide a passable detour in order that traffic between Willamina and Tillamook might be maintained.

Starting work again May 25, 1920, the contractor has frittered away the season until the job was caught unfinished by the early rains of September, and is still uncompleted. The work will thus run over into the third season, though the section will be in good passable condition during this winter.

The expenditure to date on this section is $8,864.00 and the estimated total cost completed is $16,000.00, to be paid by the State. Resident Engineer W. E. Anderson is in charge.

Sheridan-Polk County Line Macadam

Contract No 286, for surfacing the McMinnville-Tillamook Highway from Sheridan to the Polk County Line just west of Willamina, was awarded July 6, 1920 to W. N. Trent of McMinnville, Ore. This improvement, which is 4.5 miles in length, consists of a crushed rock run-of-crusher surfacing 16 feet wide and 8 inches in thickness, loose measure, laid in two courses. The original specifications called for rock of one and one-half inch maximum size, and the bid of Mr. Trent was made contingent on use of rock from what is known as the Rowell Quarry, located near the middle of the job and only a few rods off the highway. This rock is rather soft for the purpose, but is the only material readily available in that locality. To offset this defect, and avoid the presence of an excess of the finer material, the manner of handling has been changed and better results have been obtained thereby. The size of material in the base course has been increased to 2 inches, with the finest screened out and used for binder only in such quantity as required. Oversize rock from the 2-inch screen is recrushed to one and one-half inches and this used as crusher-run for the top course.

Work was begun on this contract August 19, 1920 and to date the contract is thirty-three per cent complete.

Expenditures to date amount to $5,554.34, in an estimated total cost of $35,500.00 from State funds. W. W. Harcombe is in charge of the work as Resident Engineer.

Grand Ronde Post Road Project

The worst stretch of road which remained in the road between Willamina and Tillamook, after the elimination of the old Dolph toll road by the construction of the Sourgrass section in 1916, was the 6.8

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miles from Grand Ronde to the Bee Ranch, at the east end of the Sourgrass. Improvement of this stretch of the McMinnville-Tillamook Highway was undertaken early in 1919 and two sections were made of it. The easterly 3.47 miles were submitted and approved as Federal Aid Post Road Project No. 12, and contract No. 96, for the grading and macadamizing of the section, was awarded on March 26, 1919, to W. N. Trent of McMinnville, Ore. The roadbed was graded to the standard 24 feet width, and the surfacing consists of 8 inches, loose measure, of broken stone macadam, 16 feet wide.

Work was begun on the contract April 10, 1919, but, due in part to a considerable increase in the amount of rock found necessary to make a satisfactory surface, and partly to the contractor's dilatory tactics, lack of energy and organization, the bulk of the work was not finished until September, 1920, and final acceptance of the job has not yet been made.

The estimated cost of the section when complete is $57,250.00, of which the Federal Government will pay $19,993.47, the State $27,265.53 and the County $10,000.00. Expenditures to date amount to $48,307.52, being made $42,720.28 by the State and $5,587.24 by the Federal Government.

The Resident Engineer in charge of the work during 1919 was W. G. Warnicke, and during 1920, W. E. Anderson.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 4,299.77
Labor and materials for repairing bridges by State forces		181.85
Advertising for bids		23.36
Cement furnished by State (to be deducted from amounts due contractor)		147.49
Contract Items as follows:		
Clearing and grubbing, 100 per cent, $3,000.00	$ 3,000.00	
Common excavation, 16,919 cu. yds. at 52c	8,797.88	
Solid rock excavation, 3,739 cu. yds. at $1.25	4,673.75	
Overhaul, 6,435 sta. yds. at 5c	321.75	
Broken stone macadam, waterbound, 5,510.5 cu. yds. at $3.85	21,215.43	
Class "A" concrete, 22.13 cu. yds. at $25.00	553.25	
Class "C" concrete, 35.56 cu. yds. at $20.00	711.20	
Metal reinforcement, 707.2 lbs. at 9c	63.65	
12" plain concrete pipe, 188 lin. ft. at $1.65	310.20	
18" reinforced concrete pipe, 88 lin. ft. at $2.65	233.20	
30" reinforced concrete pipe, 200 lin. ft. at $5.00	1,000.00	
12" corrugated iron pipe, 18 lin. ft. at $1.65	29.70	
Lumber and timber, 23.576 M FBM at $40.00	943.04	
Extra clearing and grubbing, 2.62 acres at $200.00	524.00	
Clay or earth filler, 629 cu. yds. at 80c	503.20	
Extra macadamizing for maintenance Grand Ronde Store to Salmon Creek Bridge, 1,059 cu. yds. at $4.35	4,606.65	
Broken stone placed by Elliott & Scoggin, 833 cu. yds. at $4.35	3,623.55	
Force Account:		
Graveling to maintain winter travel	310.75	
Laying corduroy at bridge detour	49.50	
Total amount earned by contractor	$ 51,470.70	
Percentage retained until completion of contract	7,815.65	
Total amount paid to contractor		$ 43,655.05
Grand total expended to November 30, 1920		$ 48,307.52
Paid by State	$ 42,720.28	
Paid by Government	5,587.24	
Total	$ 48,307.52	

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Bee Ranch Grading and Macadam

Contract No. 78, for grading what is known as the Bee Ranch section of the McMinnville-Tillamook Highway, was awarded to Elliott and Scoggin of Portland, February 4, 1919. This section is 3.97 miles in length, extending from the east end of the Sourgrass section, at the Bee Ranch, to Midway. The improvement includes grading and drainage, and a broken stone macadam surfacing 12 feet in width and 8 inches thick, loose measure. The time for completion of this contract was originally set at August 31, 1919, was later extended to June 30, 1920, and the work actually completed in November at a total estimated cost of $81,000.00. This cost is to be borne $76,000.00 by the State and $5,000.00 by the County. Expenditures to date amount to $69,800.54 from State funds.

Construction of the project was carried to completion under the supervision of W. E. Anderson, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 5,659.41
Extra work done by W. N. Trent		384.79
Laying and repairing corduroy road by State forces		40.75
Cement furnished by State (to be deducted from amounts due contractor)		90.48
Rental on State equipment (to be deducted from amounts due contractor)		261.13
Advertisements for bids		8.02
Contract Items as follows:		
Clearing and grubbing, 95 per cent at $1,500.00	$ 1,425.00	
Common excavation, 14,602 cu. yds. at 50c	7,301.00	
Intermediate excavation, 18,781 cu. yds. at 80c	15,024.80	
Solid rock excavation, 3,333 cu. yds. at $1.50	4,999.50	
Overhaul, 9,960 sta. yds. at 3c	298.80	
12" corrugated iron pipe, 196 lin. ft. at $1.45	284.20	
18" corrugated iron pipe, 595 lin. ft. at $2.80	1,666.00	
24" corrugated iron pipe, 40 lin. ft. at $3.95	158.00	
30" corrugated iron pipe, 44 lin. ft. at $5.40	237.60	
36" corrugated iron pipe, 246 lin. ft. at $6.00	1,476.00	
Class "B" concrete, 23.54 cu. yds. at $30.00	706.20	
Clay filler, 804 cu. yds. at 80c	643.20	
Lumber and timber, 30.480 M FBM at $40.00	1,219.20	
Broken stone macadam, 7,948.5 cu. yds. at $3.25	25,832.63	
Wood span, 100 per cent at $550.00	550.00	
Class "C" concrete, 54.19 cu. yds. at $25.00	1,354.75	
Broken stone macadam for maintenance, 2,714.5 cu. yds. at $4.00	10,858.00	
Force Account Items:		
Laying and removing corduroy road	354.20	
Maintenance work on detour	37.77	
Ditching to protect fill, Station 190	33.99	
Repairing bridge, Station 171+00	100.58	
Removing slide, Station 102+00	47.55	
Maintenance work on main highway	17.93	
Total	$ 74,626.90	
Deduction for cement furnished by State	90.48	
Total amount earned by contractor	$ 74,536.42	
Percentage retained until completion of contract	11,180.46	
Total amount paid to contractor		$ 63,355.96
Grand total expended to Nov. 30, 1920 (all State funds)		$ 69,800.54

Newberg-West Dayton Grading and Macadam

Under contract No. 136, the grading of 7.2 miles and the macadamizing of 2 miles, between Newberg and West Dayton on the West Side Highway, was awarded to E. E. Cummins of McMinnville, Ore., on May

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27, 1919. Work was started on June 11, 1919, and carried to final completion on July 12, 1920. The contractor experienced many difficulties in procuring teams and labor, and trouble with sub-contractors explains the desultory manner in which the work proceeded.

The work comprised the grading of some very heavy cuts and deep fills containing large culverts, and the new graveling of such portions of the old highway where the existing macadam was disturbed. Construction was handled under the engineering supervision of J. R. Mitchell, Resident Engineer, at a final cost of $38,148.45. Yamhill County pays for the grading, amounting to $23,274.05, the balance of $14,874.40, for engineering supervision and macadamizing, being paid from State funds. County expenditures to date amount to $13,880.78, the State having advanced the balance.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,275.15
Trucks furnished by State (to be deducted from amount due contractor)		450.00
Labor furnished by State		15.00
Contract Items as follows:		
Clearing and grubbing, all	$ 614.30	
Common excavation, 32,382.2 cu. yds. at 50c	16,191.10	
Solid rock excavation, 13.3 cu. yds. at $2.00	26.60	
Overhaul, 38,891 sta. yds. at 4c	1,555.64	
12" plain concrete pipe, 155 lin. ft. at $1.25	193.75	
18" reinforced concrete pipe, 292 lin. ft. at $2.75	803.00	
24" reinforced concrete pipe, 40 lin. ft. at $3.50	140.00	
36" reinforced concrete pipe, 148 lin. ft. at $5.40	799.20	
42" reinforced concrete pipe, 236 lin. ft. at $8.85	2,088.60	
18" corrugated galvanized iron pipe, 12 lin. ft. at $2.90	34.80	
42" corrugated galvanized iron pipe, 24 lin. ft. at $8.85	212.40	
6" porous drain tile, 3,098 lin. ft. at 17c	526.66	
Waterbound macadam, 167 cu. yds. at $3.50	584.50	
Run-of-bank gravel, rolled, 943 cu. yds. at $2.60	2,451.80	
Run-of-bank gravel, loose, 2,910.2 cu. yds. at $2.25	6,547.95	
Force Account Items:		
Furnishing and placing 32 ft. of 15" corrugated galvanized iron pipe	88.00	
Total	$ 32,858.30	
Deductions:		
Truck rental	450.00	
Total amount paid contractor		$ 32,408.30
Grand total cost of project		$ 38,148.45
Paid by State	$ 24,267.67	
Paid by County	13,880.78	
Total	$ 38,148.45	

Newberg-Dundee Macadam

E. A. Palmer, of Lafayette was awarded contract No. 279, on July 6, 1920, for the surfacing of 1.58 miles of new roadbed, from the city limits of Newberg southerly toward the town of Dundee. Run-of-bank gravel was specified as the material to be used, and was secured from the river at Newberg.

Work was started on July 19, and was completed November 2. Delays in the work were occasioned by the heavy and continuous rains during the month of September. The total estimated cost of the work is $9,500.00. Expenditures to date amount to $8,898.94, having been made under the supervision of J. R. Mitchell, Resident Engineer.

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DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 382.38
Contract Items as follows:		
Run-of-bank gravel, 3,448 cu. yds. at $2.47	$ 8,516.56	
Total amount paid to contractor		$ 8,516.56
Grand total cost of project (all State funds)		$ 8,898.94

McMinnville-West Dayton Macadam

On August 24, 1920, E. A. Palmer, of Lafayette, was awarded Contract No. 301, for graveling 4.95 miles on the newly graded roadbed between the towns of McMinnville and West Dayton. Run-of-bank gravel is being used in the construction of this surfacing, and work was started on August 31, being practically complete at the present time. Considerable trouble has been encountered by sluffing of the fills, and crib work has been necessary.

The total estimated cost of the work is $26,000.00, which is all to be paid by the State. Expenditures amounting to $8,575.64 have been made under the engineering supervision of J. R. Mitchell, Resident Engineer.

Yamhill-North Macadam

In order to render passable the portion of the newly graded highway between Yamhill and Gaston, a macadam surface is being placed on the first one-half mile north of Yamhill. This work is being done by State forces under the supervision of P. O. Harding, Resident Engineer, and is estimated to cost a total of $3,500.00, to be paid entirely by the State. Expenditures to date amount to $328.29.

Yamhill-Gaston Grading

On August 5, 1919, contract No. 193, for grading 7.96 miles of the Tualatin Valley Highway between Yamhill and Gaston, was awarded to the Yamhill County Court. Work was not started until April 26, 1920, but continued until the setting in of the winter season rendered it necessary to close down the work. At this time, approximately five and six-tenths miles have been graded. The section covers an entire new location and eliminates two railroad crossings and two stream crossings.

The total estimated cost of the work is $40,000.00, the State paying an estimated amount of $4,000.00, and Yamhill County, $36,000.00. The work has been carried on under the supervision of P. O. Harding, Resident Engineer, with expenditures to date amounting to $20,704.18. These expenditures have been made $3,712.19 by the State and $16,991.99 by the County.

Rex-Newberg Grading

During the biennium prior to the one covered by this report, the West Side Highway between the Multnomah County line and Newberg was placed under contract for grading and paving, 3.2 miles of this section being in Yamhill County. At the time of the last report a total amount of $6,153.05 had been expended for the grading of this portion within Yamhill County. These expenditures had been made entirely from County funds. During the present biennium delayed charges in the

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amount of $218.98 have been paid, $23.39 by the State and $195.59 by the County. This makes the total cost of the grading $6,372.03, which is divided $23.39 to the State and $6,348.64 to the County.

McMinnville-West Dayton Grading

On September 9, 1919, Contract No. 203 was awarded to Palmer & Young of Portland, covering the grading of five miles of the West Side Highway between McMinnville and West Dayton. The contract involves some very heavy cuts and fills and eliminated two bridges, three railroad crossings and three large reinforced concrete culverts, in addition to a number of smaller drainage openings.

The work was started September 15, and continued until fall rains forced the closing down of the work for the winter. High water caused considerable damage to the work at Hahn Creek, the reinforced concrete culvert at this point not having been stripped of its forms and braces in time to take care of the flood water.

As soon as the weather permitted, work was resumed in the spring of 1920, and carried to completion, with a total estimated cost of $91,500.00. This total cost is to be paid, $84,500.00 by Yamhill County and $7,000.00 by the State. Expenditures to date amount to $76,097.46, which have been paid, $45,331.09 by the County and $30,766.37 by the State, the State advancing the necessary sums to complete the project on account of legal difficulties involving Yamhill County bond funds.

Construction of the project has been carried on under the engineering supervision of P. P. Whitmore, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES TO NOVEMBER 30, 1920

Engineering		$ 6,380.22
Contract Items as follows:		
Clearing and grubbing, 90 per cent at $1,800.00	$ 1,620.00	
Excavation, no classification, 60,789.6 cu. yds. at 72c	43,768.51	
Overhaul, 32,450 sta. yds. at 6c	1,947.00	
12" plain concrete pipe, 15 lin. ft. at $1.60	24.00	
18" reinforced concrete pipe, 156 lin. ft. at $2.70	421.20	
30" reinforced concrete pipe, 32 lin. ft. at $6.50	208.00	
48" reinforced concrete pipe, 144 lin. ft. at $12.00	1,728.00	
12" corrugated iron pipe, 240 lin. ft. at $1.55	372.00	
18" corrugated iron pipe, 50 lin. ft. at $2.60	130.00	
24" corrugated iron pipe, 84 lin. ft. at $4.00	336.00	
6" porous drain tile, 255 lin. ft. at 50c	127.50	
Class "A" concrete, 734.1 cu. yds. at $30.00	22,023.00	
Class "C" concrete, 28 cu. yds. at $30.00	840.00	
Metal reinforcement, 64,097 lbs. at 10c	6,409.70	
Force Account Items:		
Tearing out old concrete for extending culvert	243.60	
Deepening channel Hahn Creek	1,821.77	
Total amount earned by contractor	$ 82,020.28	
Percentage retained until completion of contract	12,303.04	
Total amount paid to contractor		$ 69,717.24
Grand total expended to November 30, 1920		$ 76,097.46
Paid by State	$ 30,766.37	
Paid by County	45,331.09	
Total	$ 76,097.46	

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Newberg Viaduct Construction Engineering

At the east edge of the town of Newberg the West Side Highway formerly crossed a deep ravine by means of a long wooden trestle. For a long time Yamhill County and the people of Newberg have desired a more suitable crossing at this place than was provided by the old wooden structure. Accordingly, plans were prepared calling for a concrete structure, having eighteen 32-foot spans and two shorter approach spans, of a total over-all length of 602 feet. This plan provided for a roadway 24 feet in width and one 5-foot sidewalk, together with ornamented handrail, lighting fixtures and all that goes to make a first-class bridge.

Bids were received by the Yamhill County Court on July 21, 1919, and the contract was awarded to the Sadler-Clarkson Company of Portland. Work was started at once and brought to a successful completion by about March 1, 1920. L. P. Campbell was Resident Engineer until January 1, 1920, after which the work was handled by A. A. Clausen.

The total cost was $66,670.69, of which $63,870.65 was for construction and was paid by Yamhill County. The remaining $2,800.04 represents the cost of engineering supervision, and was borne by the State.

Chehalem Creek Trestle

Just at the south edge of the city of Newberg, the West Side Highway crosses Chehalem Creek on a pile trestle 323 feet in length, which parallels the Southern Pacific trestle over the same stream.

Contract No. 241, covering the building of this bridge, was awarded to Mr. E. D. Olds of Oak Grove, Oregon, on December 20, 1919. Work was not started until March of 1920, which put completion off until July of the same year. A. A. Clausen was Resident Engineer until May 1, 1920, when the work was turned over to Stewart Mitchell for completion.

The completed cost of the structure was $10,902.60, of which $10,078.26 was paid by the County. The remaining $824.34, which was for engineering, was paid by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 824.34
Contract Items as follows:		
Fir piling, 3,299.9 lin. ft. at 89c	$ 2,936.91	
Frame superstructure, 343 lin. ft. at $18.50	6,345.50	
Extra bulkhead lumber, 1.112 M FBM at $50	55.60	
Force Account:		
Construction of bulkhead to protect pump house	740.25	
Total amount paid to contractor		$ 10,078.26
Grand total cost of structure		$ 10,902.60
Paid by State	$ 824.34	
Paid by County	10,078.26	
Total	$ 10,902.60	

McMinnville-Sheridan Bridges

Eight concrete bridges on the McMinnville-Sheridan section of the McMinnville-Tillamook Highway, ranging in span twelve to forty feet, were advertised for letting under one contract on June 10, 1919. The

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contract, No. 157, was awarded to the County Court of Yamhill County, and was completed, at their own expense, early in the spring of 1920, with the exception of a small amount of finishing, which was done later by State forces.

The total amount spent by the State on this work was $1,684.27, of which $348.10 was for the finishing noted above, and will be returned by the County. The remaining $1,336.17 is for engineering, and is borne by the State. The State was represented on this work by L. P. Campbell, Resident Engineer.

Construction Engineering County Bridges

A number of designs have been prepared for small structures in this County, most of which were built during the season of 1920. Among them is a standard wooden trestle structure at the edge of the town of Yamhill, which has just been completed.

Maintenance

The Sourgrass section of the McMinnville-Tillamook Highway, extending from the Bee Ranch 4.5 miles west to the Tillamook County line, was macadamized in 1916. In spite of the fact that very little maintenance work has been done on it since then, the road has held up in very fair condition, due to the fact that during the winters of 1916, 1917 and 1918 other portions of the Tillamook road were impassable and this section received very little traffic. In 1919, however, the road to Tillamook, through improvement of other sections, was passable during the entire winter, and traffic broke through the macadam on the Sourgrass section in many places. In 1920 the State and County entered into a co-operative agreement for the repair of this road, and a maintenance order contemplating expenditures of $17,290.65 was approved, the work to be handled by State forces. Owing to delay in completing other work on which equipment was engaged, this work was not begun till September 7, 1920, and unexpectedly early and continued rains delayed it seriously.

The original work planned consisted of scarifying the existing macadam, laying two and one-half inches of new rock and rolling, stocking the road with four cubic yards of maintenance rock per hundred feet and general drainage maintenance. The rain has made scarifying and resurfacing impracticable, and the work is being confined to stocking with a much larger quantity than originally contemplated, for use in winter maintenance. For this maintenance work a small crew will be kept to cover this section and the Yamhill County line-Dolph section in Tillamook County. The work is under the direction of Guy Mattoon, Superintendent of Construction.

The County Court of Yamhill County has shown a very liberal spirit in desiring to co-operate with the State Highway Commission for the maintenance of the State highways in the County. Most of the work has been done on a fifty-fifty basis and has included repairs to the Rex-Newberg paving and scarifying and redressing the Newberg-West Dayton macadam, in addition to various other minor work throughout the County.

To date the State has advanced all expenditures, but it is understood that the County will make reimbursement when in funds, the adverse decision on the six per cent County bond limitation having placed Yamhill County in an unsatisfactory financial condition.

McMinnville-Gaston Survey

A location survey between McMinnville and Gaston was made by Locating Engineers Meyers and Jackson during March and April, 1919. The total length of the lines surveyed was approximately twenty-two miles.

During November and December, 1919, and January, 1920, relocation was made by P. P. Whitmore of a portion of this line between Yamhill and Gaston. This location eliminated two railroad crossings and two stream crossings, and was made in conjunction with the supervision of other State construction work which was under way in the vicinity.

McMinnville-Sheridan Survey

The location survey between McMinnville and Bellevue was made by P. P. Whitmore, Resident Engineer, from February 24 to April 1, 1919. A total length of 10.7 miles was run out and staked, including a proposed cut-off of 2.2 miles which was afterwards abandoned. The net distance between termini of the section is 8.5 miles. At the time of the location, detailed vicinity surveys were made for eight reinforced concrete bridges.

Newberg-West Dayton Survey

The preliminary location surveys between Newberg and West Dayton were made prior to 1919, by Locating Engineer Smith. Between April 9 and April 22, 1919, approximately three miles of this line was re-located by P. P. Whitmore, Resident Engineer. This re-location eliminated one railroad crossing and slightly reduced the distance between the two towns.

West Dayton-McMinnville Survey

During July and August, 1919, a survey was made by Resident Engineer P. P. Whitmore of 5.1 miles between West Dayton and McMinnville. This survey was made by Mr. Whitmore at odd times in conjunction with other State work in the vicinity. The located line eliminates three railroad crossings between the two towns. Approximately one mile of the length is entirely new location, the balance of the distance following the old road. Detailed surveys for an overhead railway crossing at St. Joseph were included in the location.

McMinnville-Amity Survey

This survey of the section of the West Side Highway, as located between McMinnville and Amity, follows the old road from McMinnville to Whiteson. From this point, a revised alignment has been adopted along the S. P. Railroad from Whiteson to Amity, eliminating three railroad crossings. The survey was made by P. P. Whitmore, Resident Engineer, at irregular intervals from November 1, 1919, to February, 1920, in con-

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junction with other State work in this vicinity. Included in the work were detailed surveys for a bridge crossing the Yamhill River and an undergrade crossing of the S. P. Railroad between McMinnville and Whiteson.

Sheridan-Butler's Store Survey

During the past year, location survey has been made from Sheridan, through Polk County, to a junction with the Polk-Yamhill County line near Butler's Store. The location, which was made by Resident Engineer W. W. Harcombe, is 12.1 miles in length, of which 4.25 miles are in Yamhill County and the remainder in Polk County. Except for minor revisions the entire location is along the present County road.

Grand Ronde-Butler's Store Survey

This location is 1.85 miles in length, all of which is in Yamhill County. Location was made by Resident Engineer W. G. Warnicke during 1919. Except for minor revisions, the entire distance was along the old County road, across open farming country.

Market Road Work

The State Highway Commission has on file "Market Road Resolutions," signed by C. F. Daniels, County Judge; S. E. Cummins and Wm. Gunning, County Commissioners, under date of April 9, 1920, stating that a levy of 1.5 mills on all the taxable property of the County was made for market road construction, and designating six roads to be improved as market road projects.

A levy of 1.5 mills on a valuation of $20,845,798.08 produced a County market road fund of $31,267.70.

Included in the State levy of taxes was a levy of 1 mill on a valuation of $22,853,529.20, which produced $22,853.53, which became a part of the "State market road appropriation."

Funds apportioned by the State Highway Commission March 2	$ 22,853.53
Funds apportioned by the State Highway Commission April 3	9,320.93
Funds produced by County levy of 1.5 mills	31,267.70
Total available for 1920	$ 63,442.16

Project No. 1—"From Newberg to Yamhill."

This road is along the foot of the hills and through the Chehalem Valley, a rich fruit and agricultural section. A location survey 10 miles in length was made by J. C. Russel, Engineer in the employ of the State Highway Commission. Maps, profiles and estimates of cost to grade a 24-foot roadway were prepared. Approximately three miles of grading was done in 1920 by County forces. Mr. Russel also did the necessary construction engineering work. Approximately $7,600.00 was expended for grading on this project.

Project No. 2—"From Panther Creek to Moores Valley."

A new road was surveyed by W. G. Warnick in the employ of the County Court. The road was located on the side hills of a narrow valley, on a maximum five per cent grade, and makes accessible a fertile valley

which could only be reached by roads with excessive grades. Approximately two miles of grade 22 feet in width were graded in 1920. Much work was donated by farmers in the district. Approximately $4,500.00 was expended on this project.

Project No. 3—"Gopher Valley Road."

The present traveled County road from the McMinnville-Sheridan Road, up to Gopher Valley passes over two hills with grades of approximately nine per cent, which can be eliminated by new location. Surveys were made of four routes, three of which eliminate the hills. Maps, profiles and estimates of cost for each route were prepared, but the County Court has not been able to agree on the definite location, and no construction work has been done.

Project No. 4—"Wapato Lake Road."

This road from Chehalem Valley to Wapato Lake is along the foot of the hills and furnishes an outlet for a fertile valley. A survey 4.6 miles in length was made, maps, profiles and estimates of cost to grade a 24-foot roadbed, and surface 8 feet wide with crushed rock, prepared. Approximately two miles were graded and surfaced by County forces in 1920. All engineering work was done by J. C. Russell. Approximately $13,000.00 was spent on this project.

Project No. 5.—"Known as the Butteville Road, about four miles in length, located between Newberg and Butteville."

This section of road before improvement was narrow and crooked and along the side hill above a swampy creek bottom impassable in winter. A survey 4 miles in length was made, maps, profiles and estimates of cost to grade a 12-foot roadbed and surface 8 feet wide with crushed rock, were prepared. Approximately two miles of road was graded and surfaced in 1920 by County forces.

All engineering work was done by J. C. Russell. Approximately $7,000.00 was expended on this project.

Project No. 6.—"Known as the Amity and Hopewell Road about six miles in length between Amity and the intersection of the road from Dayton to Salem."

A survey aproximately two miles in length was made of a section of this road which crosses the summit of the hills which separate the valley country near Amity and Hopewell.

It is expected that approximately $7,000.00 will be expended during the winter of 1920 and 1921 in grading this project.

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